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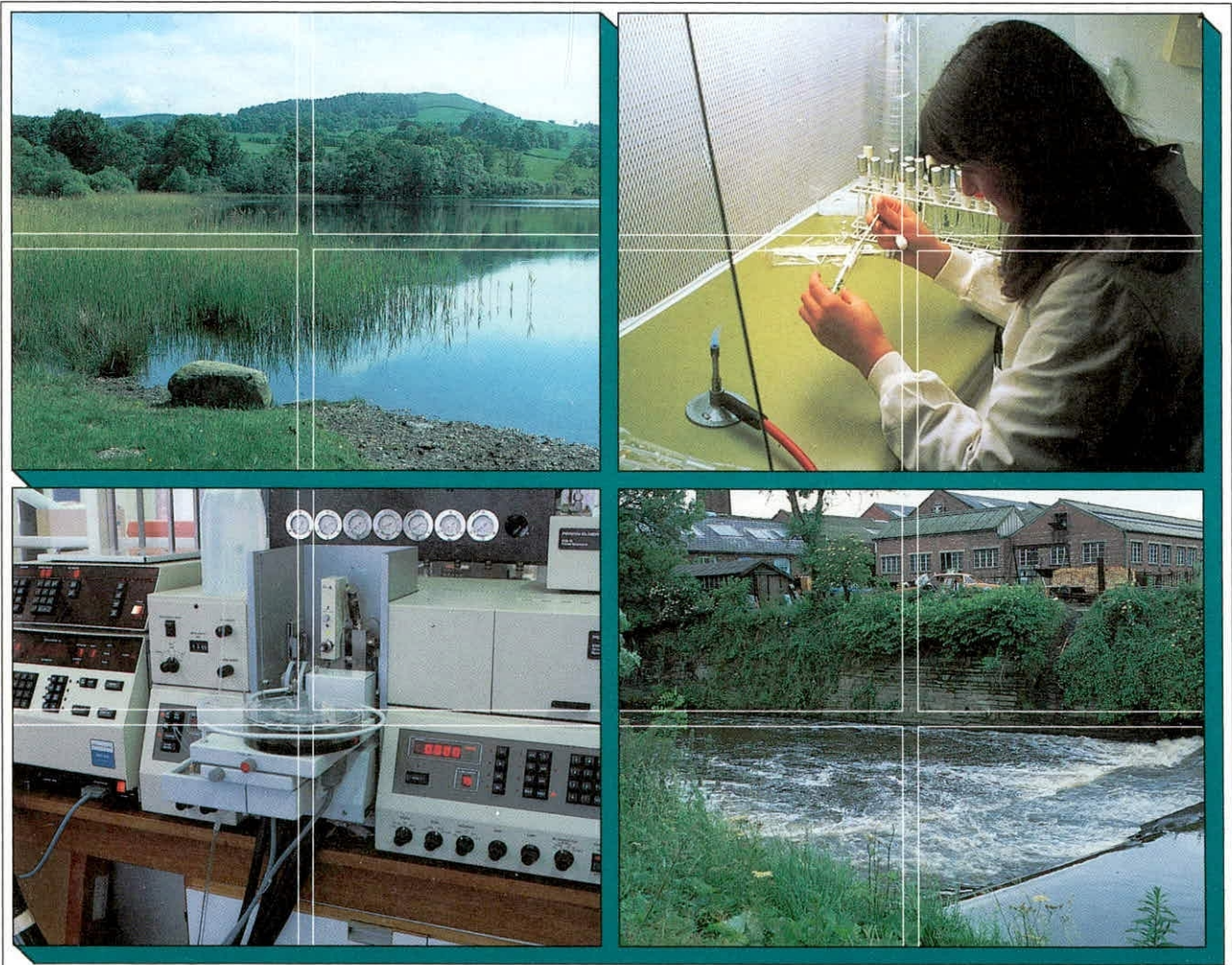
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## The status and conservation of British Freshwater Fish:

### Survey of freshwater fish in National Nature Reserves

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Report to the Nature Conservancy Council





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THE STATUS AND CONSERVATION OF  
BRITISH FRESHWATER FISH:

SURVEY OF FRESHWATER FISH IN  
NATIONAL NATURE RESERVES

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THE STATUS AND CONSERVATION OF BRITISH FRESHWATER FISH:  
SURVEY OF FRESHWATER FISH IN NATIONAL NATURE RESERVES

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## SUMMARY

To consider fully the conservation management of freshwater fish, it was important to know which fish were already in the protected environment of National Nature Reserves (NNRs) - the principal sites for nature conservation in Great Britain. For this reason 235 NNRs throughout Great Britain were surveyed for freshwater fish between 1987 and 1990 under contract to the Nature Conservancy Council (NCC). In the first instance information was collected by questionnaires sent to NNR wardens and was supplemented by data from published literature and other sources such as the National Rivers Authority (NRA). Where information on fish was lacking, or incomplete, field surveys were undertaken and in total 44 such surveys were required. In addition, the presence of fresh waters was recorded and classified into basic categories, i.e. lakes, ponds, rivers, streams. The survey was organised to follow the country and regional structure by which nature conservation was administered by the NCC so that the results could be considered accordingly. The NCC has subsequently been reorganised into three separate bodies, but the basic regional structure remains.

Seventy five percent of the NNRs contain fresh waters. When considered on an NCC regional basis, the overall distribution of these waters is not dissimilar to that for Great Britain - being clearly dominated by NW Scotland - with the exception that NW and NE England are poorly represented.

Of those NNRs with fresh water, just over 20% have no fish. There are currently 51 species of fish found in fresh waters in Great Britain, and 37

(73%) of these were recorded in NNRs during the survey; 24 in Scotland, 34 in England and 20 in Wales. NCC regions with most fish species in NNRs are: SW Scotland, West Midlands and East Anglia, but this is due mainly to the presence of a few individual sites with diverse fish populations, for example, Loch Lomond NNR alone has 19 species. If the frequency of occurrence of species in NNRs within regions is considered then NW Scotland, as with waters, is highest. In terms of both numbers of species and their frequency of occurrence, NW and NE England are notably the lowest.

The most common fish in NNRs are eels, brown trout and 3-spined sticklebacks. Distribution maps of the species recorded are included.

The results for species and for sites (NNRs) are discussed from the viewpoint of fish conservation. As might be expected, the majority of fish in NNRs are those most common in Great Britain and are of little immediate conservation concern. Two of the species recorded (pout and smelt) are currently important for conservation, but several of the most threatened British species do not occur in NNRs. Although a number of NNRs have diverse fish communities, only six have a definite fish conservation value, of which Loch Lomond NNR ranks as the most outstanding.

Further study and monitoring of fish communities in existing NNRs is recommended. It is suggested that there is considerable scope through NNR management to improve fish conservation and that the acquisition of new reserves for threatened species should be considered.

## INTRODUCTION

The purpose of the survey reported here is to determine the current distribution of fish species in fresh waters in the National Nature Reserves of Great Britain.

This study was undertaken as part of a larger project concerned with and entitled - THE STATUS AND CONSERVATION OF BRITISH FRESHWATER FISH. The project was commissioned by the Nature Conservancy Council to be carried out jointly by the Fish Conservation Centre, Stirling, and the Institute of Freshwater Ecology, Edinburgh (formerly part of the Institute of Terrestrial Ecology until April 1989) during the period November 1986 to October 1991 inclusive.

There are two parts to the main project: firstly, to assess the status and conservation aspects of certain endangered species and, where appropriate, take conservation action - this is reported separately by Maitland & Lyle (1991a); secondly, to survey fish species in fresh waters within the boundaries of National Nature Reserves throughout Great Britain, and this is the subject of this report.

In achieving the latter objective this survey will provide baseline data on fish species which are already afforded some protection under NNR status. It will also enable a better appraisal of the requirements for the conservation of rare and endangered species and important communities whose present or future vulnerability may require the implementation of protective measures.

The initial number of NNRs included in the survey is the 214 listed in the 1985/86 NCC Annual Report (Nature Conservancy Council 1986). Subsequently another 22 NNRs were declared - and one de-declared - during the period of the survey, as published in the 1989/90 NCC Annual Report (Nature Conservancy Council 1990), bringing the total to 235. For reasons of efficiency and continuity the latter 22 NNRs were dealt with, as a group, at the end of the survey. The NCC has recently been reorganised into three separate country organisations and in the (final) 1990/91 NCC Annual Report (Nature Conservancy Council 1991) 242 NNRs are listed. The additional seven are not considered in this report.

The NCC administrative organisation is shown in Figure 1. The 235 NNRs in Great Britain are divided by country; namely 68 in Scotland, 121 in England and 46 in Wales. The country totals are further subdivided into 4 regions in Scotland, 8 in England and 3 in Wales (Table 1).

The survey followed the above structure, partly because of its similarity to that of government bodies with legal responsibility for fresh waters and fishing, whose involvement was required throughout, and also for the efficiency of necessary liaison with NCC staff both administratively and in the field. The results for NNRs are presented here by country and by NCC regions. Although they are of limited ecological importance, these administrative divisions are important in relation to the application of the practical conservation management of fish.



## Index to NNR Numbers

<u>Scotland</u>		<u>England</u>	
<u>NW</u>		<u>NW</u>	
1	Achanarras Quarry	1	Ainsdale Sand Dunes
2	Alt nan Carnan	2	Asby Scar
3	Reinn Eithe	3	Blelham Bog
4	Ben Wyvis	4	Clawthorpe Fell
5	Blar Nam Faoileag	5	Gait Barrows
6	Claish Moss	6	Glasson Moss
7	Coille Thogabhaig	7	Moor House
8	Corrieshalloch	8	North Fen
9	Dunnet Links	9	Park Wood
10	Glen Roy	10	Ribble Marshes
11	Gualin	11	Roundsea Woods
12	Inchnadamph	12	Rusland Moss
13	Invernaver		
14	Inverpolly	<u>NE</u>	
15	L.A.Mhuilinn Wood	1	Castle Eden Dene
16	L.Druidibeg	2	Colt Park Wood
17	L.Maree Islands	3	Coom Rig Moss
18	L.Sunart Woodlands	4	Forge Valley Woods
19	Monach Isles	5	Grain Heads Moss
20	Mound Alderwoods	6	Lindisfarne
21	Nigg & Udale Bays	7	Ling Gill
22	N.Rona & Sula Sgeir	8	Newham Bog
23	Rassal Ashwood	9	Scar Close
24	Rhum	10	Upper Teesdale
25	St Kilda		
26	Strathfarrar	<u>SW</u>	
27	Strathy Bog	1	Arne
		2	Avon Gorge
		3	Axmouh - etc
		4	Barrington Hill
		5	Bovey Valley
		6	Braunton Barrow
		7	Bridgewater Bay
		8	Dengie
		9	Hales Wood
		10	Hamford Water
		11	Hickling Broad
		12	Holkham
		13	Leigh
		14	Ludham Marshes
		15	Orfordness-Havergate
		16	Scolt Head Island
		17	Swanton Novers Wood
		18	Thetford Heath
		19	Walberswick
		20	Weeting Heath
		21	Westleton Heath
		22	Winterton Dunes
		<u>Wales</u>	
		<u>N</u>	
		1	Cadair Idris
		2	Ceunnant Llennyrch
		3	Coed Camlyn
		4	Coed Cymerau
		5	Coed Dolgarrog
		6	Coed Ganllwyd
		7	Coed Gorswen
		8	Coed y Rhygen
		9	Coed Tremadoc
		10	Coedydd Aber
		11	Coedydd Maentwrog
		12	Cors Bodeilio
		13	Cors Erddreiniog
		14	Cors Geirch
		15	Cwm Glas Crafant
		16	Cwm Idwal
		17	Hafod Garregog
<u>NE</u>			
1	Abernethy Forest		
2	Cairngorms		
3	Craigellachie		
4	Creag Meagaidh		
5	Dinnet Oakwood		
6	Glen Tanar		
7	Hermaness		
8	Keen of Hamar		
9	Morrone Birkwood		
10	Muir of Dinnet		
11	Noss		
12	St Cyrus		
13	Sands of Forvie		
<u>SW</u>			
1	Ben Lui		
2	Braehead Moss		
3	Caerlaverock		
4	Cairnmore of Fleet		
5	Clyde Valley Woodlands		
6	Glasdrum		
7	Glen Diomhan		
8	Glen Nant		
9	Kirkconnel Flow		
10	L.Lomond		
11	Mealdarroch		
12	Moine Mhor		
13	Silver Flowe		
14	Taynish		
15	Tynron Juniper Wood		
<u>SE</u>			
1	Ben Lawers		
2	Blawhorn Moss		
3	Caenlochan		
4	Cragbank Wood		
5	Flanders Moss		
6	Isle of May		
7	L.Leven		
8	Milton Wood		
9	Morton Lochs		
10	Rannoch Moor		
11	St Abbs Head		
12	Tentsmuir Point		
13	Whitlaw Mosses		
<u>EA</u>			
1	Benacre		
2	Blackwater Estuary		
3	Brettenham Heath		
4	Bure Marshes		
5	Cavenham Heath		
6	Chippenham Fen		
7	Colne Estuary		
<u>Wales</u>			
<u>DP</u>			
1	Allt Rhyd y Groes		
2	Coed Rheidol		
3	Cors Caron		
4	Cors y Llyn		
5	Craig Cerrig Gleisaid		
6	Craig y Cilau		
7	Dyfi		
8	Nant Irfon		
9	Ogof Ffynnon-Ddu		
10	Rhos Goch		
11	Rhos Llawr Cwrst		
12	Skomer		
13	Stackpole		
14	Stanner Rocks		
15	Ty Canol		
<u>S</u>			
1	Coed y Cerrig		
2	Crymlyn Bog		
3	Cwm Clydach		
4	Gower Coast		
5	Kenfig		
6	Oxwich		
7	Penhow Woodlands		
8	Whiteford		

**Figure 1. The distribution of National Nature Reserves and NCC administrative areas in Great Britain.**

Regional abbreviations are given in full in Table 1.

<u>WM</u>		8	Dendles Wood	18	Morfa Dyffryn
1	Bredon Hill	9	Ebbor Gorge	19	Morfa Harlech
2	Chaddesley Moss	10	Gordano Valley	20	Newborough Warren
3	Chartley Moss	11	Hartland Moor	21	Rhinog
4	Cotswold Commons	12	Hog Cliff	22	Yns Enlli-Bardsey
5	Derbyshire Dales	13	Holt Heath	23	Y Wyddfa-Snowdon
6	Downton Gorge	14	Holton Heath		
7	Highbury Wood	15	The Lizard	<u>DP</u>	
8	Lady Park Wood	16	Morden Bog	1	Allt Rhyd y Groes
9	Moccas Park	17	Rodney Stoke	2	Coed Rheidol
10	Motsey Meadows	18	Shapwick Heath	3	Cors Caron
11	Rostherne Mere	19	Stoborough Heath	4	Cors y Llyn
12	Stiperstones	20	Studland Heath	5	Craig Cerrig Gleisaid
13	The Flits	21	Yarner Wood	6	Craig y Cilau
14	Wrens Nest			7	Dyfi
15	Wynbury Moss	<u>S</u>		8	Nant Irfon
16	Wyre Forest	1	Ashford Hill	9	Ogof Ffynnon-Ddu
		2	Aston Rowant	10	Rhos Goch
		3	Beacon Hill	11	Rhos Llawr Cwrst
		4	Cothill	12	Skomer
		5	Fyfield Down	13	Stackpole
		6	Martin Down	14	Stanner Rocks
		7	N. Meadow Cricklade	15	Ty Canol
		8	N. Solent		
		9	Old Winchester Hill	<u>S</u>	
		10	Parsonage Down	1	Coed y Cerrig
		11	Pewsey Down	2	Crymlyn Bog
		12	Prescombe Down	3	Cwm Clydach
		13	Wychwood	4	Gower Coast
		14	Wylie Down	5	Kenfig
		<u>SE</u>		6	Oxwich
		1	Blean Woods	7	Penhow Woodlands
		2	Castle Hill, Lewes	8	Whiteford
		3	Ham Street Woods		
		4	High Halstow		
		5	Kingley Vale		
		6	Lewes Downs		
		7	Lullington Heath		
		8	Pevensy Levels		
		9	Stodmarsh		

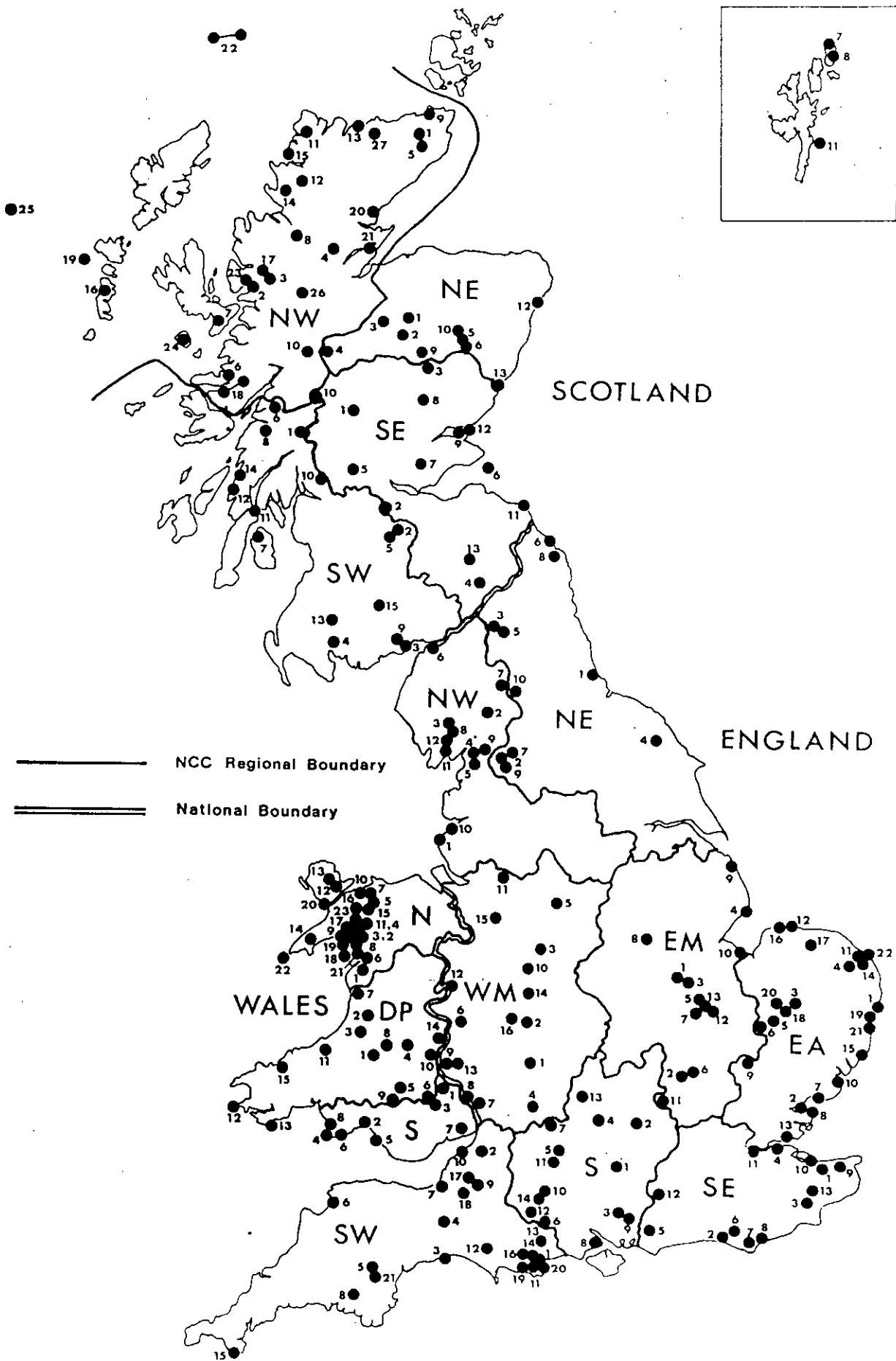


TABLE 1

The number of National Nature Reserves in Great Britain  
(Nature Conservancy Council 1990).

<u>Country</u>	<u>NCC Region</u>	<u>No. of NNRs</u>
SCOTLAND	North West (NW)	27
	North East (NE)	13
	South West (SW)	15
	South East (SE)	13
		<hr/> 68
ENGLAND	North West (NW)	12
	North East (NE)	10
	West Midlands (WM)	16
	East Midlands (EM)	13
	East Anglia (EA)	22
	South West (SW)	21
	South (S)	14
	South East (SE)	13
	<hr/> 121	
WALES	North (N)	23
	Dyfed Powys (DP)	15
	South (S)	8
	<hr/> 46	
GREAT BRITAIN TOTAL		235

NNRs are distributed throughout the full extent of Great Britain, as shown in Figure 1. Topographic variations included in these NNRs are representative of most, if not all, of those found in Great Britain and range from mountainous areas, such as the Cairngorms, to the fenlands of East Anglia. Within the 235 NNRs are many water bodies which represent the majority of freshwater habitats found in this country. There is a mixture of natural and man-made waters; large lakes, reservoirs and ponds; upland and lowland rivers; mountain streams and drainage dykes. The series includes waters from the full range of trophic conditions. However, as noted later, for some regions the NNRs do not give a good representation of all types of fresh waters present there.

In addition to factors related to geographic dispersal (Maitland 1985) the occurrence of fish is obviously dependent on and related to the variety and frequency of occurrence of fresh waters. For this reason basic information on waters within NNRs was collected as complimentary to the fish survey. It was impractical within the scope of this survey to consider detailing the actual numbers and types of all fresh waters present in NNRs, but information on the presence or absence of waters in four broad categories, i.e. lakes, ponds (< 1ha area), rivers and streams (< 1m width) was collected.

## SURVEY METHODS

Survey information came from four principal sources: questionnaires to NNR wardens, published literature, enquiries to organisations involved in fish studies plus local sources, and finally field surveys. These are described more fully below. Apart from the initial issue of questionnaires to all NCC regions the survey was conducted by country and was completed for Scotland before moving on to England then Wales.

### QUESTIONNAIRES

In December 1986, questionnaires for each NNR (an example is shown in Figure 2) were sent to each of the 15 NCC regional offices for distribution to NNR wardens. The questionnaires requested simple information on water types present, fishery interests as a source of further information, and more specific data on the 55 species of fish listed for fresh waters in the British Isles, see Maitland & Lyle (1991a & b). For the latter, information was requested as to which species were known with certainty to occur within the NNR (and taken as a definite record) and those only thought to occur (but requiring verification).

In general, the response was good with over 90% of questionnaires (or equivalent information by letter) returned within a few months. The informative content varied greatly for those NNRs with fresh water present. In some cases wardens were obviously interested in fish and gave comprehensive returns with additional information and comments that required no further action. Occasionally data were derived from previous studies (see below). For other NNRs there was no information on fish at all. The majority of returns, however, fell into an intermediate category where there was some, but incomplete knowledge of fish presence. For

NAME OF NNR \_\_\_\_\_ NAME OF WARDEN \_\_\_\_\_  
 ADDRESS \_\_\_\_\_ TEL. NO. \_\_\_\_\_ DATE \_\_\_\_\_

- |   | <u>YES</u> | <u>NO</u> |
|---|------------|-----------|
| 1. Were fresh waters a significant factor in declaring this NNR   | —          | —         |
| 2. Does this NNR contain <u>any</u> fresh water   |            |           |
| a) small streams (< 1 m)  | —          | —         |
| b) larger streams, rivers   | —          | —         |
| c) ponds (< 1 ha)   | —          | —         |
| d) lakes  | —          | —         |
| e) bogs, mires etc.   | —          | —         |
| 3. Is there any angling interest  |            |           |
| a) organised (i.e. clubs)   | —          | —         |
| b) casual   | —          | —         |
| 4. Have there been previous studies of fish in the NNR  | —          | —         |
| Do you know who carried them out and when   | —          | —         |
| 5. Which fish species on the list below (a) do you <u>KNOW</u> to exist, or (b) are thought to exist in this NNR. |            |           |

	(a)	(b)		(a)	(b)		(a)	(b)
Sea Lamprey	—	—	Common Carp	—	—	Danube Catfish	—	—
River Lamprey	—	—	Crucian Carp	—	—	Eel	—	—
Brook Lamprey	—	—	Goldfish	—	—	Three-sp.Stickleback	—	—
Sturgeon	—	—	Barbel	—	—	Ten-sp.Stickleback	—	—
Allis Shad	—	—	Gudgeon	—	—	Burbot	—	—
Twaite Shad	—	—	Tench	—	—	Sea Bass	—	—
Atlantic Salmon	—	—	Silver Bream	—	—	Largemouth Bass	—	—
Brown Trout	—	—	Common Bream	—	—	Pumpkinseed	—	—
Rainbow Trout	—	—	Bleak	—	—	Rock Bass	—	—
Pink Salmon	—	—	Minnow	—	—	Perch	—	—
Arctic Charr	—	—	Bitterling	—	—	Ruffe	—	—
Brook Charr	—	—	Rudd	—	—	Pike Perch	—	—
Powan	—	—	Roach	—	—	Common Goby	—	—
Pollan	—	—	Chub	—	—	Thicklipped Mullet	—	—
Vendace	—	—	Orfe	—	—	Thinlipped Mullet	—	—
Houting	—	—	Dace	—	—	Golden Mullet	—	—
Grayling	—	—	Spined Loach	—	—	Bullhead	—	—
Smelt	—	—	Stone Loach	—	—	Flounder	—	—
Pike	—	—						

6. Whose permission is required to fish this NNR \_\_\_\_\_

ANY ADDITIONAL COMMENTS

Figure 2. Example of the questionnaire sent to NNR wardens.

example in some sites angled fish (eg salmon, trout) were known, but other likely species (e.g. eel, bullhead) were not. All the questionnaires returned were carefully scrutinised and for those judged not to be fully adequate (i.e. the latter two categories above), or where no return had been made, further investigations were undertaken.

#### LITERATURE

The extent of published information on fish in individual NNRs varies enormously. For the great majority, nothing has been published on the fish communities. For others, there is casual mention of the fish species present (e.g. Nethersole-Thompson & Watson 1974). Occasionally broader based fish surveys include waters within NNRs (e.g. Shaw 1977, Gardiner & Egglisshaw 1986, Harriman *et al.* 1987 and Maitland *et al.* 1987) but very few deal specifically with individual reserves (e.g. Crisp *et al.* 1975). However, in a few reserves the fish communities are well known and have been studied over long periods; good examples are Loch Leven, Loch Lomond and Rostherne Mere NNRs, but these sites are the exception.

Published information on fish in Loch Leven goes back as far as the 14th Century (Thorpe 1973) and there have been a number of studies there recently. For Loch Lomond there are many old references to the fish (e.g. Monipenny 1612); the review of the status of the fish community by Maitland (1972) included 37 published references to fish there and several studies have been published since then. At Rostherne Mere the fish have been studied for several centuries (e.g. Ray 1686) and recent reviews include Ellison & Chubb 1968, Banks 1970, Goldspink 1983.

### FURTHER ENQUIRIES

Normally, as a first step, wardens were contacted to confirm or elaborate on their returns and also to identify local sources of information such as angling clubs, water bailiffs, game keepers etc. Concurrently enquiries were made to official organisations such as the SOAFD Freshwater Fisheries Laboratory, Pitlochry, River Purification Boards in Scotland, and Water Authorities - subsequently the National Rivers Authority - in England and Wales. A number of individuals in these organisations were particularly helpful and collectively contributed significantly to the survey. In addition the results of certain fish surveys undertaken by universities were obtained. Where these further enquiries showed that no, or inadequate, information on fish existed, field surveys were undertaken.

### FIELD SURVEYS

Field surveys were carried out at 25 NNRs in Scotland in 1987/88, 14 in England in 1989, and 5 in Wales in 1990 (Table 2). The proportional disparity between the number of NNRs requiring field surveys in Scotland (38%) compared to both England (13%) and Wales (14%) is perhaps because of the proportionately higher occurrence of fresh waters in NNRs in Scotland (see Results), allied to the better availability of data in England and Wales due to the existence of an official body (i.e. the NRA) with direct responsibility for fish.



Table 2 National Nature Reserves where field surveys for fish were conducted.

Country	NCC Region	NNR	Date of Survey	Consenting Organisation
Scotland	North West	Achanarras Quarry	4.8.88	Department of Agriculture and Fisheries for Scotland (now the Scottish Office Agriculture and Fisheries Department (SOAFD))
		Allt nan Carnan	6.6.88	
		Ben Wyvis	8-9.8.88	
		Blar nam Faoileag	4.8.88	
		Dunnet Links	3.8.88	
		Glen Roy	25.8.88	
	North East	Loch Maree Islands	7-8.6.88	
		Mound Alderwoods	6.8.88	
		Rassal Ashwood	6.6.88	
	South West	Abernethy Forest	13-14.9.88	
		Craigellachie	12-14.9.88	
		Creag Meagaidh	22-25.8.88	
		Morrone Birkwoods	15.9.88	
		Ben Lui	21.6.88	
	South East	Caerlaverock	30.7.87&29.8.87	
Clyde Valley Woodlands		4.5.88		
Glasdrum Wood		26.10.88		
Kirkconnell Flow		29-30.7.87&18.4.89		
Silver Flowe		30-31.7.87		
	Ben Lawers	22-23.6.88		
	Blawhorn Moss	5.5.88		
	Flanders Moss	13.5.88		
	Rannoch Moor	23-26.5.88		
	St Abb's Head	25.6.87&17.8.87		
	Whitlaw Mosses	19.7.87		

Table 2 (contd.)

England	North West	Gait Barrows	21-22.9.89	NRA.NW
	North East	Ling Gill	21.9.89	NRA.NW
	West Midlands	Mottey Meadows The Flits	25.8.89 10.7.90	NRA.Severn Trent NRA.SE Wales
	East Midlands	Barton Hills	6.9.89	NRA.E.Anglia
		Holme Fen	24.8.89	"
		Monks Wood	24.8.89	"
		Upwood Meadows	7.9.89	"
	East Anglia	Blackwater Estuary	5.9.89	"
		Chippenham Fen Leigh	7.9.89 5.9.89	"
	South West	Shapwick Heath	22.8.89	NRA.Wessex
South	Cothill	6.9.89	NRA.Thames	
	Wychwood	23.8.89	"	
Wales	North	Cors Erddreiniog Newborough Warren Snowdon	29-30.8.90 29-30.8.90 11-13.9.90	NRA.N.Wales " "
	Dyfed-Powys	Dyfi	28.8.90	"
	South	Craig Y Cilau	10.7.90	NRA.S.E. Wales

These surveys were mostly one- or two-day visits to specifically identified waters to establish the presence or absence of probable fish species. To aid site selection, standard NCC NNR maps, usually at a large scale, were obtained from NCC offices. On the occasions when no information on fish was available, surveys were broadened to encompass different freshwater habitats within the NNR. A wide range of habitats was encountered from large lochs and fast-flowing rivers to peat pools and overgrown ditches.

Throughout the field survey consent was required from the relevant authorities to use gill nets and electric fishing. The situation differs in Scotland from that in England and Wales. In Scotland permission was gained from the Secretary of State's office through the Department of Agriculture and Fisheries for Scotland (now SOAFD), and a blanket permit was granted for all relevant waters for the duration of the project (including the concurrent fish conservation work). In England and Wales the NRA has responsibility for freshwater fish. Consent to sample fish must be obtained from the relevant NRA regional office (see Table 2) for specified sites and dates given in advance. Such consent was granted, with a few exceptions for gill netting. Permission for access to sites and to sample fish was also required from NCC, land owners and holders of fishing rights, who on occasion, wished to be met on site. Consequently the planning and execution of some field surveys were extremely cumbersome.

The principal equipment used for standing waters was survey-type monofilament gill nets 50m long x 1.5m deep, which consist of 12 panels of mixed mesh sizes. These nets are specifically designed to sample the range of sizes and species of fish. Nets were normally set out overnight to take advantage of diurnal fish movements. However on occasion the period of

setting was much shorter and nets were checked frequently to avoid unnecessary over-fishing. Fish damage was kept to a minimum by careful handling and most catches were small. To a lesser extent hand nets, fyke nets and an assortment of traps were used.

For running waters, hand nets and back pack electric fishing apparatus (pulsed DC) were used. Electric fishing was carried out over measured lengths of stream and in different habitats. Some lake shores and shallow ponds were also sampled by this method. There was no problem regarding fish damage with this form of electric fishing and indeed the vast majority of fish caught by all methods were returned alive to their place of capture.

The field surveys were almost exclusively qualitative, the primary objective being to identify species presence, but the number of individuals of each species caught at each site was recorded (see Appendix I).

While on site the opportunity was taken, if possible, to contact local people (land owners, estate workers, anglers etc.) for any additional information on fish.

(In Scotland, most field sites were sampled for water chemistry. The site locations and results are given in Appendix I.)

## SURVEY RESULTS

For each NNR surveyed in the field (see Table 2) a brief individual report is given in Appendix I. This describes the purpose of visit, the sites sampled by name (if any) and by national grid reference (NGR), survey methods, and the numbers and species of fish caught, plus some additional comment. Maps of the NNRs obtained from NCC offices are included and show the specific sites sampled.

The full results of the survey, incorporating data from all sources for fresh waters and fish species, are given for each of the 235 NNRs in Appendix II. The presence of individual fish species is indicated by coded letters which refer to the source of information. NNRs are listed in alphabetical order and by NCC administrative region according to that given on the NCC map of National Nature Reserves produced in 1986.

Further summaries of the data are presented in Tables 3-5: types of fresh waters within NNRs (Table 3); regional fish distributions (Table 4); national fish distributions (Table 5).

Distribution maps have also been prepared: Figure 3 shows those NNRs with fresh water present; Appendix III, Figures IIIa-u, illustrate the distribution of the fish species recorded in Appendix II.

**Table 3** Summary of the number of National Nature Reserves and water types present, by NCC administrative regions.

NCC Regions	Number of NNRs	Number of NNRs with fresh waters present (%)	Number of NNRs containing specific types of fresh waters			
			Lakes (%)	Ponds (%)	Rivers (%)	Streams (%)
Scotland:						
North West	27	25 (93)	12 (44)	20 (74)	14 (52)	23 (85)
North East	13	10 (77)	6 (46)	9 (69)	4 (31)	10 (77)
South West	15	14 (93)	1 (7)	5 (33)	8 (53)	14 (93)
South East	13	13 (100)	5 (38)	5 (38)	3 (23)	13 (100)
<b>SCOTLAND TOTALS</b>	<b>68</b>	<b>62 (91)</b>	<b>24 (35)</b>	<b>39 (57)</b>	<b>29 (43)</b>	<b>60 (88)</b>
England:						
North West	12	3 (25)	1 (8)	1 (8)	1 (8)	2 (17)
North East	10	5 (50)	1 (10)	3 (30)	3 (30)	3 (30)
West Midlands	16	13 (81)	1 (6)	9 (56)	3 (19)	9 (56)
East Midlands	13	9 (69)	2 (15)	8 (62)	1 (8)	7 (54)
East Anglia	22	13 (59)	4 (18)	10 (45)	7 (32)	9 (41)
South West	21	14 (67)	1 (5)	10 (48)	4 (19)	9 (43)
South	14	8 (57)	1 (7)	7 (50)	1 (7)	4 (29)
South East	13	10 (77)	1 (8)	9 (69)	1 (8)	6 (46)
<b>ENGLAND TOTALS</b>	<b>121</b>	<b>75 (62)</b>	<b>12 (10)</b>	<b>57 (47)</b>	<b>21 (17)</b>	<b>49 (40)</b>
Wales:						
North	23	21 (91)	6 (26)	6 (26)	13 (57)	19 (83)
Dyfed-Powys	15	14 (93)	1 (7)	7 (47)	7 (47)	14 (93)
South	8	4 (50)	3 (38)	1 (13)	2 (25)	4 (50)
<b>WALES TOTALS</b>	<b>46</b>	<b>39 (85)</b>	<b>10 (22)</b>	<b>14 (30)</b>	<b>22 (48)</b>	<b>37 (80)</b>
<b>GREAT BRITAIN TOTALS</b>	<b>235</b>	<b>176 (75)</b>	<b>46 (20)</b>	<b>110 (47)</b>	<b>72 (31)</b>	<b>146(62)</b>

Table 4. Summary of the number of NNRs containing each of the 37 fish species recorded, by NCC regions.

NCC REGION	NUMBER OF NNRs FOR EACH SPECIES																																									
	Sea Lamprey	River Lamprey	Brook Lamprey	Atlantic Salmon	Brown Trout	Rainbow Trout	Arctic Charr	Powan	Grayling	Smelt	Pike	Common Carp	Crucian Carp	Goldfish	Barbel	Gudgeon	Tench	Silver Bream	Common Bream	Bleak	Minnow	Rudd	Roach	Chub	Dace	Stone Loach	El	3 sp. Stickleback	10sp. Stickleback	Sea Bass	Perch	Ruffe	Pikeperch	Common Goby	Thicklip Mullet	Bullhead	Flounder					
NW SCOTLAND		1	4	14	22		2			1											2					20	14	2							1			5				
NE SCOTLAND			3	4	8	1	1			4										4						5	5								1			1				
SW SCOTLAND	1	1	1	6	10		1			1						1					2					2	5	7	2						1	1			1			
SE SCOTLAND			1		5	1				2				1							2						1	6	6													
NW ENGLAND					1					1	1						1						1				1											1				
NE ENGLAND				2	2																							1											2			
WN ENGLAND	1	2	2	3				1			2	3	1	1	1	2	2	1	1			3	1	1	4	3	5													6		

Table 4 (cont'd)

NCC REGION	NUMBER OF NNRS FOR EACH SPECIES																																										
	Sea lamprey	River lamprey	Brook lamprey	Atlantic Salmon	Brown Trout	Rainbow Trout	Arctic Charr	Powan	Grayling	Smelt	Pike	Common Carp	Crucian Carp	Goldfish	Barbel	Gudgeon	Tench	Silver Bream	Common Bream	Bleak	Minnow	Rudd	Roach	Chub	Dace	Stone loach	Rel	3 Sp. stickleback	10Sp. stickleback	Sea Bass	Perch	Ruffe	Pikeperch	Common Goby	Thicklipped Mullet	Bullhead	Flounder						
EM ENGLAND											2	1				3	1	1	1			2	1		1		3	2	3						1	1	1						
EA ENGLAND			1	2	1				1	6					2	2	1	3			1	4	4		2	1	9	7	5	1	4	2			2	1	2	3					
SW ENGLAND				1	5					2	1				1	1		1			2	1	1		7	3	3		7	3	3		1	1						2			
S ENGLAND				3					1	1	1									2	1	1	1		1	3	1	1	1	1	1							1	1	2	1		
SE ENGLAND										2	1							1	1		1	3	2			4	2	2		4	2	2		2									
N WALES	1	1		5	17	1														3	1	1				15	4	2					1										
D-P WALES			1	1	3	8					2	1					1			5		1			2	7	5	1				2								5			
S WALES				1	1	1					2	1						2				3	2			1	4	2	1			1									1	1	1



Table 5. Summary of the number of NNRs containing each of the 37 fish species recorded, on a national basis.

COUNTRY	NUMBER OF NNRs FOR EACH SPECIES																																											
	Sea Lamprey	River Lamprey	Brook Lamprey	Atlantic Salmon	Brown Trout	Rainbow Trout	Arctic Char	Powan	Grayling	Smelt	Pike	Common Carp	Crucian Carp	Goldfish	Barbel	Gudgeon	Tench	Silver Bream	Common Bream	Bleak	Minnow	Rudd	Roach	Chub	Dace	Stone Loach	Eel	3 Sp. Stickleback	10sp. Stickleback	Sea Bass	Perch	Ruffe	Pikeperch	Common Goby	Thickkipped Mullet	Bullhead	Flounder							
SCOTLAND	1	2	9	24	45	2	3	1			8			1								10		1	1	1	3	36	32	4			7	1	2	1			7					
ENGLAND	1		3	5	16	1			1	2	16	8	1	1	1	5	9	3	7	2	2	7	11	13	3	5	5	28	23	14	2	12	5	1	3	2	15	4						
WALES	1	2	1	9	26	2					4	2					3					8	4	4																		1	6	1
GREAT BRITAIN TOTALS	3	4	13	38	87	5	3	1	1	2	28	10	1	2	1	6	12	3	7	2	25	15	18	4	6	11	90	66	22	2	23	6	1	5	4	21	12							

**Index to NNR Numbers on Figure**

**Scotland**

- NW**
- 1 Achanarras Quarry
  - 2 Alt nan Carnan
  - 3 Reinn Eighe
  - 4 Ben Wyvis
  - 5 Blar Nam Faoleag
  - 6 Claish Moss
  - 7 Coille Thogabhaig
  - 8 Corrieshalloch
  - 9 Dunnet Links
  - 10 Glen Roy
  - 11 Gualin
  - 12 Inchnadamph
  - 13 Invernaver
  - 14 Inverpoll
  - 15 L.A.Mhuilinn Wood
  - 16 L.Druidibeg
  - 17 L.Maree Islands
  - 18 L.Sunart Woodlands
  - 19 Monach Isles
  - 20 Mound Alderwoods
  - 21 Nigg & Udale Bays
  - 22 N.Rona & Sula Sgeir
  - 23 Rassal Ashwood
  - 24 Rhum
  - 25 St Kilda
  - 26 Strathfarrar
  - 27 Strathy Bog

**NE**

- 1 Abernethy Forest
- 2 Cairngorms
- 3 Craigellachie
- 4 Creag Meagaidh
- 5 Dinnet Oakwood
- 6 Glen Tanar
- 7 Hermaness
- 8 Keen of Hamar
- 9 Morrone Birkwood
- 10 Muir of Dinnet
- 11 Noss
- 12 St Cyrus
- 13 Sands of Forvie

**SW**

- 1 Ben Lui
- 2 Braehead Moss
- 3 Caerlaverock
- 4 Cairnmore of Fleet
- 5 Clyde Valley Woodlands
- 6 Glasdrum
- 7 Glen Diomhan
- 8 Glen Nant
- 9 Kirkconnel Flow
- 10 L.Lomond
- 11 Mealdarroch
- 12 Moine Mhor
- 13 Silver Flowe
- 14 Tavnish
- 15 Tynron Juniper Wood

**SE**

- 1 Ben Lawers
- 2 Blawhorn Moss
- 3 Caenlochan
- 4 Cragbank Wood
- 5 Flanders Moss
- 6 Isle of May
- 7 L.Leven
- 8 Milton Wood
- 9 Morton Lochs
- 10 Rannoch Moor
- 11 St Abbs Head
- 12 Tentsmuir Point
- 13 Whitlaw Mosses

**England**

- NW**
- 1 Ainsdale Sand Dunes
  - 2 Asby Scar
  - 3 Blelham Bog
  - 4 Clawthorpe Fell
  - 5 Gait Barrows
  - 6 Glasson Moss
  - 7 Moor House
  - 8 North Fen
  - 9 Park Wood
  - 10 Ribble Marshes
  - 11 Roundsea Woods
  - 12 Rusland Moss

**NE**

- 1 Castle Eden Dene
- 2 Colt Park Wood
- 3 Coom Rig Moss
- 4 Forge Valley Woods
- 5 Grain Heads Moss
- 6 Lindisfarne
- 7 Ling Gill
- 8 Newham Bog
- 9 Scar Close
- 10 Upper Teesdale

- 8 Dengie
- 9 Hales Wood
- 10 Hamford Water
- 11 Hickling Broad
- 12 Holkham
- 13 Leigh
- 14 Ludham Marshes
- 15 Orfordness-Havergate
- 16 Scolt Head Island
- 17 Swanton Novers Wood
- 18 Thetford Heath
- 19 Walberswick
- 20 Weeting Heath
- 21 Westleton Heath
- 22 Winterton Dunes

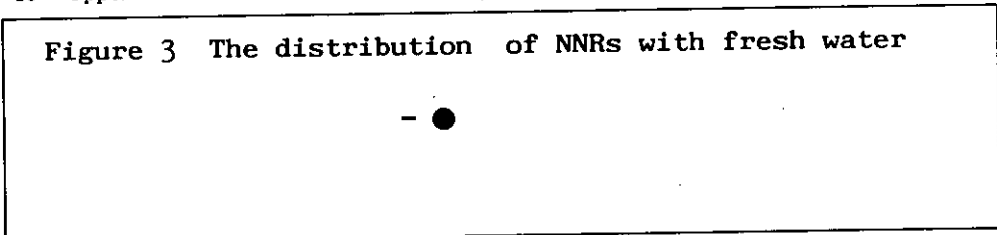
**SW**

- 1 Arne
- 2 Avon Gorge
- 3 Axmouth - etc
- 4 Barrington Hill
- 5 Bovey Valley
- 6 Branton Barrow
- 7 Bridgewater Bay

- 10 The Swale
- 11 Swanscombe Skull Site
- 12 Thursley
- 13 Wye

**Wales**

- N**
- 1 Cadair Idris
  - 2 CeunantLlennyrch
  - 3 Coed Camlyn
  - 4 Coed Cymerau
  - 5 Coed Dolgarrog
  - 6 Coed Ganllwyd
  - 7 Coed Gorswen
  - 8 Coed y Rhygen
  - 9 Coed Tremadoc
  - 10 Coedydd Aber
  - 11 Coedydd Maentwrog
  - 12 Cors Bodeilio
  - 13 Cors Erddreiniog
  - 14 Cors Geirch
  - 15 Cwm Glas Crafant
  - 16 Cwm Idwal
  - 17 Hafod Garregog



- WM**
- 1 Bredon Hill
  - 2 Chaddesley Moss
  - 3 Chartley Moss
  - 4 Cotswold Commons
  - 5 Derbyshire Dales
  - 6 Downton Gorge
  - 7 Highbury Wood
  - 8 Lady Park Wood
  - 9 Moccas Park
  - 10 Motte Meadows
  - 11 Rostherne Mere
  - 12 Stiperstones
  - 13 The Flits
  - 14 Wrens Nest
  - 15 Wynbury Moss
  - 16 Wyre Forest

**EM**

- 1 Barnack Hills & Holes
- 2 Barton Hills
- 3 Castor Hanglands
- 4 Gibraltar Point
- 5 Holme Fen
- 6 Knocking Hoe
- 7 Monks Wood
- 8 Muston Meadows
- 9 Saltfleetby etc.
- 10 The Wash
- 11 Tring Reservoirs
- 12 Upwood Meadows
- 13 Woodwalton Fen

**EA**

- 1 Benacre
- 2 Blackwater Estuary
- 3 Brettenham Heath
- 4 Bure Marshes
- 5 Cavenham Heath
- 6 Chippenham Fen
- 7 Colne Estuary

- 8 Dendles Wood
- 9 Ebbor Gorge
- 10 Gordano Valley
- 11 Hartland Moor
- 12 Hog Cliff
- 13 Holt Heath
- 14 Holton Heath
- 15 The Lizard
- 16 Morden Bog
- 17 Rodney Stoke
- 18 Shapwick Heath
- 19 Stoborough Heath
- 20 Studland Heath
- 21 Yarner Wood

**S**

- 1 Ashford Hill
- 2 Aston Rowant
- 3 Beacon Hill
- 4 Cothill
- 5 Fyfield Down
- 6 Martin Down
- 7 N. Meadow Cricklade
- 8 N. Solent
- 9 Old Winchester Hill
- 10 Parsonage Down
- 11 Pewsey Down
- 12 Prescombe Down
- 13 Wychwood
- 14 Wylie Down

**SE**

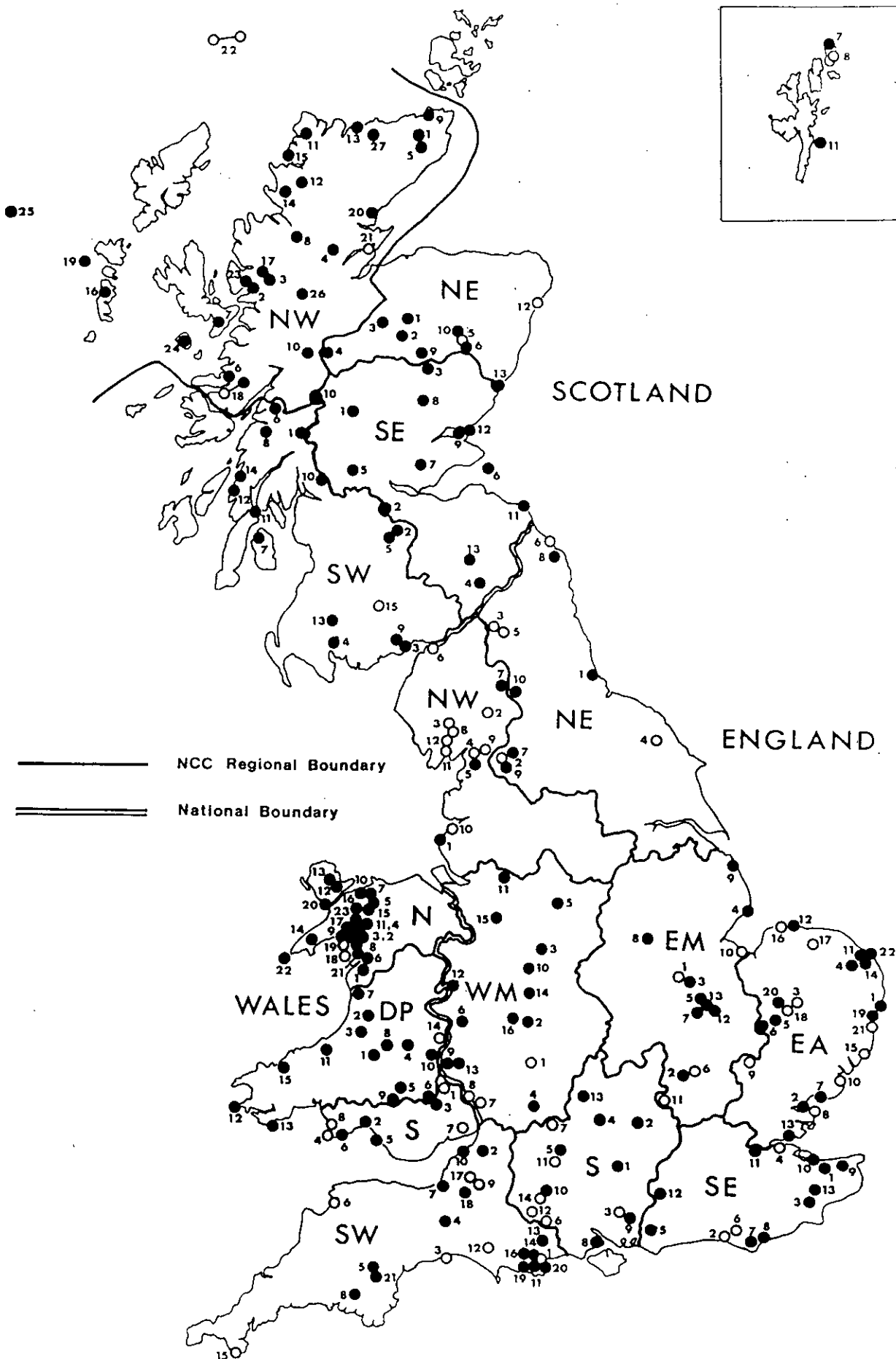
- 1 Blean Woods
- 2 Castle Hill, Lewes
- 3 Ham Street Woods
- 4 High Halstow
- 5 Kingley Vale
- 6 Lewes Downs
- 7 Lullington Heath
- 8 Pevensey Levels
- 9 Stodmarsh

**DP**

- 1 Ailt Rhyd y Groes
- 2 Coed Rheidol
- 3 Cors Caron
- 4 Cors y Llyn
- 5 Craig Cerrig Gleisaid
- 6 Craig y Cilau
- 7 Dyfi
- 8 Nant Irfon
- 9 Ogor Ffynnon-Ddu
- 10 Rhos Goch
- 11 Rhos Llaur Cwrt
- 12 Skomer
- 13 Stackpole
- 14 Stanner Rocks
- 15 Ty Canol

**S**

- 1 Coed y Cerrig
- 2 Crymlyn Bog
- 3 Cwm Clydach
- 4 Gower Coast
- 5 Kenfig
- 6 Oxwich
- 7 Penhow Woodlands
- 8 Whiteford



## DISCUSSION OF RESULTS

### FRESH WATERS

The information collected on fresh waters in NNRs was restricted to recording the presence of four broadly defined freshwater types. The task of quantifying them in more precise hydrological and ecological categories was not practical within the scope of this survey although the feasibility of doing so was investigated at an early stage. The data presented here on fresh waters are not an accurately quantitative description of their occurrence in NNRs since within each NNR it is the presence of a specific type which is noted, not the number of waters of that type. However, if the data are considered on an NCC regional basis, they are broadly indicative of the relative freshwater resources within NNRs - which are of course dependent on the frequency of water bodies in different geographic areas and the number and sizes of NNRs within each region. The sum of occurrences of all four water types in the NNRs of each region are illustrated in Figure 4 and, as might be expected, are clearly dominated by NW Scotland, not only in overall numbers but also in each of the four types (see Table 3). N. Wales is second to NW Scotland in these terms. A notable feature of this analysis is the very low numbers in northern England, particularly NW region which contains one of the best known areas for fresh waters in Great Britain - the English Lake District. With the exception of the latter region, this distribution is not dissimilar to that for all fresh waters in Great Britain (Smith & Lyle 1979).

### FISH DISTRIBUTION

The type of information on freshwater fish given here is similar to that for fresh waters above, in that it is confined to recording the presence,

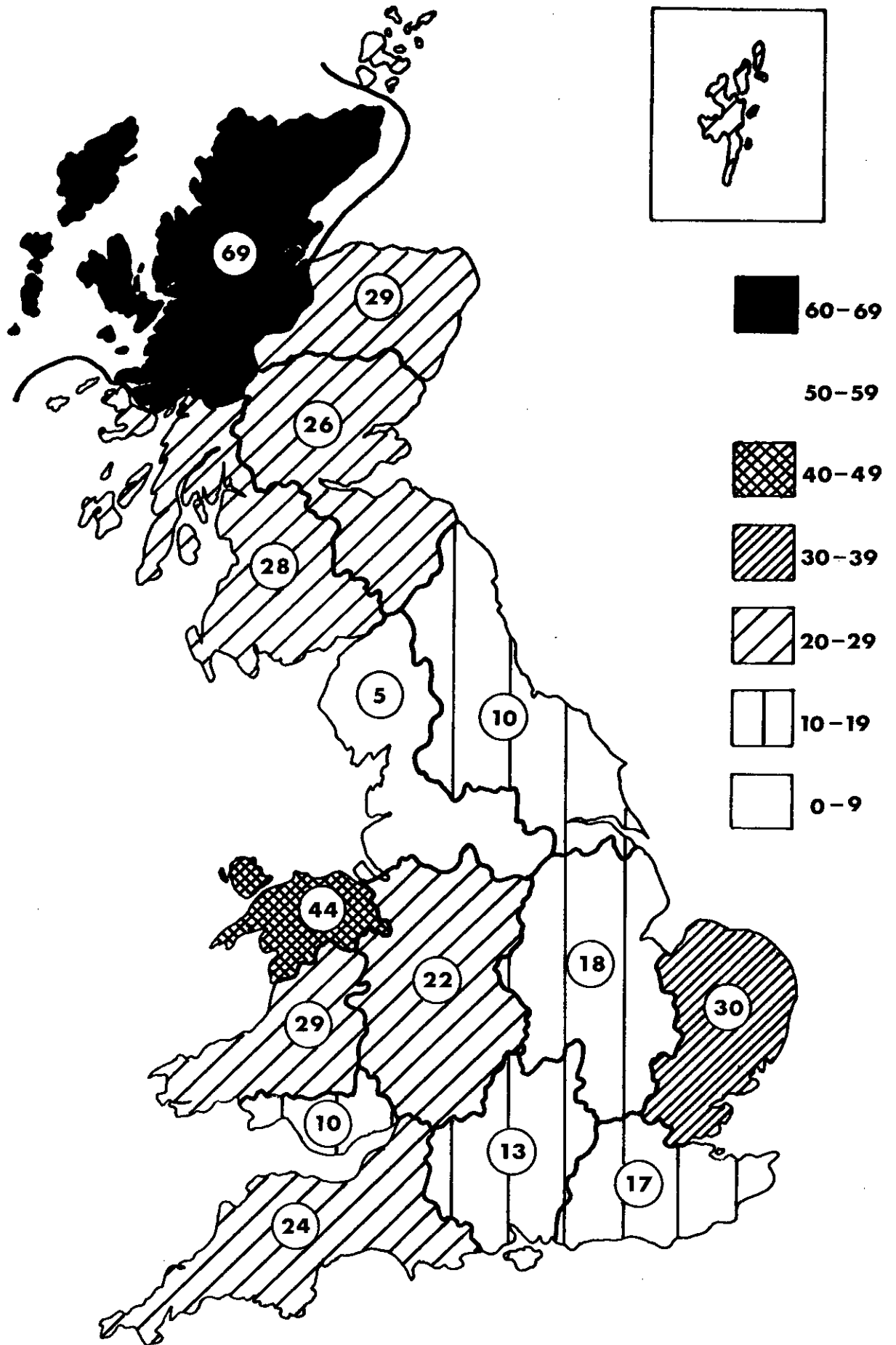


Figure 4. The sum of occurrences of all four water types recorded in the NNRs of each NCC region. NOTE: There were none in the 50-59 category.

not the number of separate stocks, of species within NNR boundaries. On a few occasions NNR boundaries were difficult to define accurately (e.g. river banks or centre-lines), some had been altered or expanded during the course of the survey, or information was confused with that for adjacent Sites of Special Scientific Interest (SSSIs). However, some effort has gone into ensuring the validity of the information reported here as shown by the duplicate and triplicate sources for individual species records (Appendix II). Other than for field surveys, no dates of record are given, although a number are held on file. The information from questionnaire returns was obtained in 1987, remaining Scottish records in 1988, NRA data for England in 1989 and for Wales in 1990. Additional information for Welsh NNRs was taken from a survey by the University of Wales (Shaw 1977) which should be valid at the date of publication.

Fish species have only been included if there is definite evidence of their occurrence; for example, those only thought to occur (from the questionnaires) are excluded in the absence of further confirmation. One of the features of some field surveys was unexpected catches. Also, there were occasions when species which were expected to be found were not. A minor source of inaccuracy is in questionable species identification by non-specialists in the cases of the lampreys and the mullets, and for this reason their distributions are shown collectively in Appendix III. In view of the above, therefore, the information given here should be regarded as a minimum species list for NNRs, although we believe that for the majority the records are complete.

Fifty-five fish species have been recorded in British fresh waters (Table 6). However the pollan is found only in Ireland, pink salmon, houting and burbot are no longer believed to occur here, and vendace has recently become extinct in its recorded sites in Scotland. This reduces the total numbers to 51 species for Great Britain; 40 for Scotland, 51 for England and 42 for Wales. The survey shows that the total number of species recorded in NNRs in Great Britain was 37 (or 73% of the total available); in Scotland 24 (60%) were recorded, in England 34 (67%) and in Wales 20 (48%). The corresponding numbers of species on an NCC regional basis are illustrated in Figure 5 where three regions are prominent, namely: SW Scotland, although this is almost entirely due to Loch Lomond NNR which alone has 19 species; West Midlands, England, due mainly to Wyre Forest NNR with 18 species and Rostherne Mere with 11 species; and East Anglia where there are four NNRs each containing 9-13 species. NW and NE England regions with only eight and four species respectively have by far the poorest representation.

The pattern changes if the relative frequency of occurrence of fish species in NNRs for each region is considered. This quantitative approach is subject to the same sort of limitations that applied to the distribution of fresh waters mentioned above, but it allows useful comparisons to be made. The results of this analysis are illustrated in Figure 6: NW Scotland now becomes dominant, with East Anglia ranking highly. Again, the NNRs of NW and NE England are clearly the poorest in terms of fish resources. In NW England the eight recorded species occur only once each in NNRs.

The frequency of occurrence in NNRs of each of the 51 British species is shown in Figure 7, subdivided by country, and the most common species are

TABLE 6 List of fish species recorded in British fresh waters. (From Maitland & Lyle (1991a))

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>	<u>SCOT</u>	<u>ENGL</u>	<u>WALES</u>
<i>Petromyzon marinus</i>	Sea Lamprey	+	+	+
<i>Lampetra fluviatilis</i>	River Lamprey	+	+	+
<i>Lampetra planeri</i>	Brook Lamprey	+	+	+
<i>Acipenser sturio</i>	Sturgeon	+	+	+
<i>Alosa alosa</i>	Allis Shad	+	+	+
<i>Alosa fallax</i>	Twaite Shad	+	+	+
<i>Salmo salar</i>	Atlantic Salmon	+	+	+
<i>Salmo trutta</i>	Brown Trout	+	+	+
<i>Oncorhynchus mykiss</i>	Rainbow Trout	+	+	+
<i>Oncorhynchus gorbuscha</i>	Pink Salmon	+	+	-
<i>Salvelinus alpinus</i>	Arctic Charr	+	+	+
<i>Salvelinus fontinalis</i>	Brook Charr	+	+	+
<i>Coregonus lavaretus</i>	Powan	+	+	+
<i>Coregonus autumnalis</i>	Pollan (Ireland only)	-	-	-
<i>Coregonus albula</i>	Vendace	+	+	-
<i>Coregonus oxyrinchus</i>	Houting	-	+	-
<i>Thymallus thymallus</i>	Grayling	+	+	+
<i>Osmerus eperlanus</i>	Smelt	+	+	+
<i>Esox lucius</i>	Pike	+	+	+
<i>Cyprinus carpio</i>	Common Carp	+	+	+
<i>Carassius carassius</i>	Crucian Carp	+	+	+
<i>Carassius auratus</i>	Goldfish	+	+	+
<i>Barbus barbus</i>	Barbel	-	+	+
<i>Gobio gobio</i>	Gudgeon	+	+	+
<i>Tinca tinca</i>	Tench	+	+	+
<i>Blicca bjoerkna</i>	Silver Bream	-	+	+
<i>Abramis brama</i>	Common Bream	+	+	+
<i>Alburnus alburnus</i>	Bleak	-	+	-
<i>Phoxinus phoxinus</i>	Minnow	+	+	+
<i>Rhodeus sericeus</i>	Bitterling	-	+	-
<i>Scardinius erythrophthalmus</i>	Rudd	+	+	+
<i>Rutilus rutilus</i>	Roach	+	+	+
<i>Leuciscus cephalus</i>	Chub	+	+	+
<i>Leuciscus idus</i>	Orfe	+	+	+
<i>Leuciscus leuciscus</i>	Dace	+	+	+
<i>Cobitis taenia</i>	Spined Loach	-	+	-
<i>Noemacheilus barbatulus</i>	Stone Loach	+	+	+
<i>Silurus glanis</i>	Danube Catfish	-	+	-
<i>Anguilla anguilla</i>	Eel	+	+	+
<i>Gasterosteus aculeatus</i>	3-spined Stickleback	+	+	+
<i>Pungitius pungitius</i>	10-spined Stickleback	+	+	+
<i>Lota lota</i>	Burbot	-	+	-
<i>Dicentrarchus labrax</i>	Sea Bass	+	+	+
<i>Micropterus salmoides</i>	Largemouth Bass	-	+	-
<i>Lepomis gibbosus</i>	Pumpkinseed	-	+	-
<i>Ambloplites rupestris</i>	Rock Bass	-	+	-
<i>Perca fluviatilis</i>	Perch	+	+	+
<i>Gymnocephalus cernua</i>	Ruffe	+	+	+
<i>Stizostedion lucioperca</i>	Pikeperch	-	+	-
<i>Pomatoschistus microps</i>	Common Goby	+	+	+
<i>Chelon labrosus</i>	Thicklipped Mullet	+	+	+
<i>Liza ramada</i>	Thinlipped Mullet	+	+	+
<i>Liza aurata</i>	Golden Mullet	+	+	+
<i>Cottus gobio</i>	Bullhead	+	+	+
<i>Platichthys flesus</i>	Flounder	+	+	+



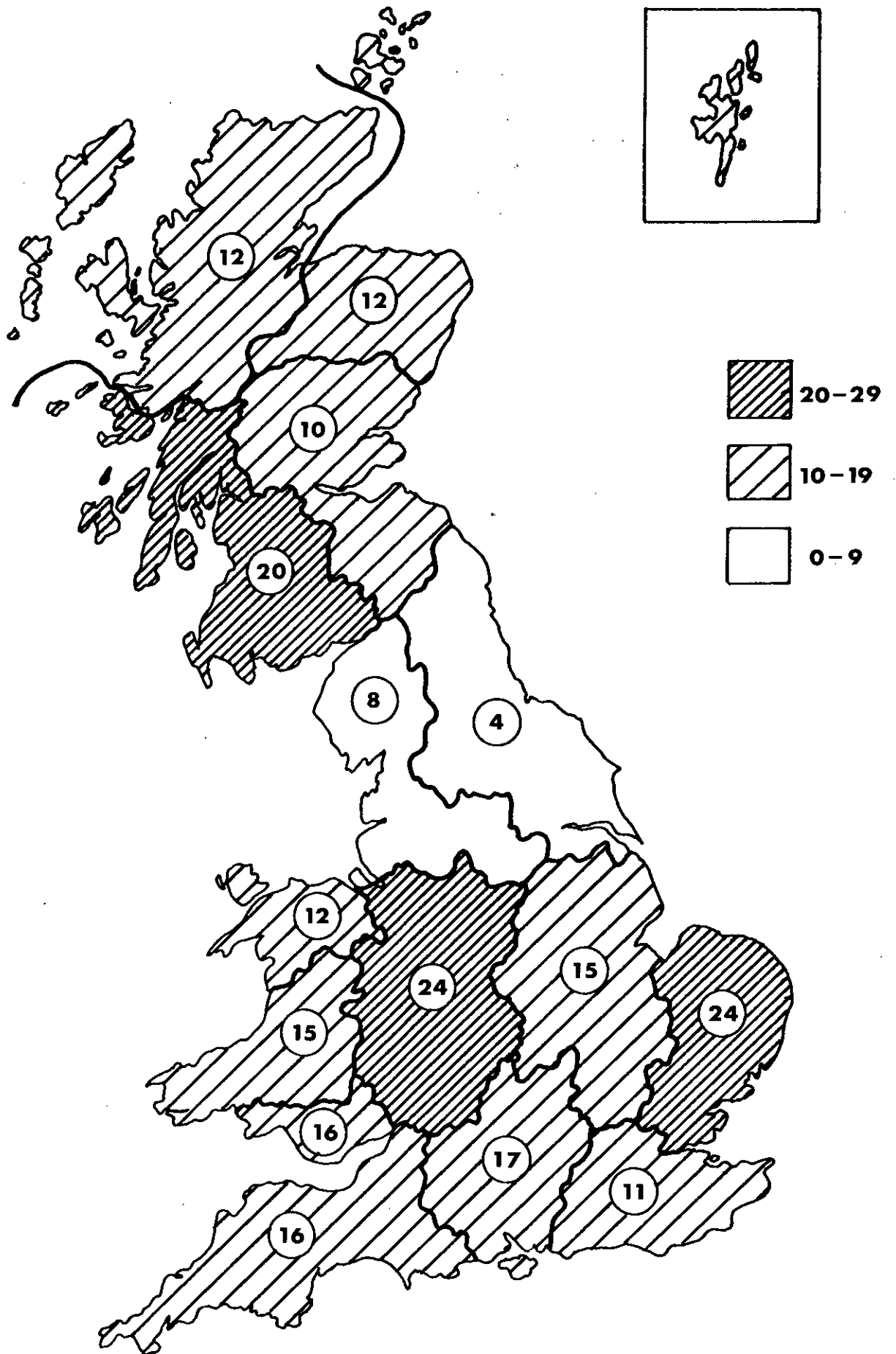


Figure 5. The number of fish species recorded in NNRs for each NCC region.

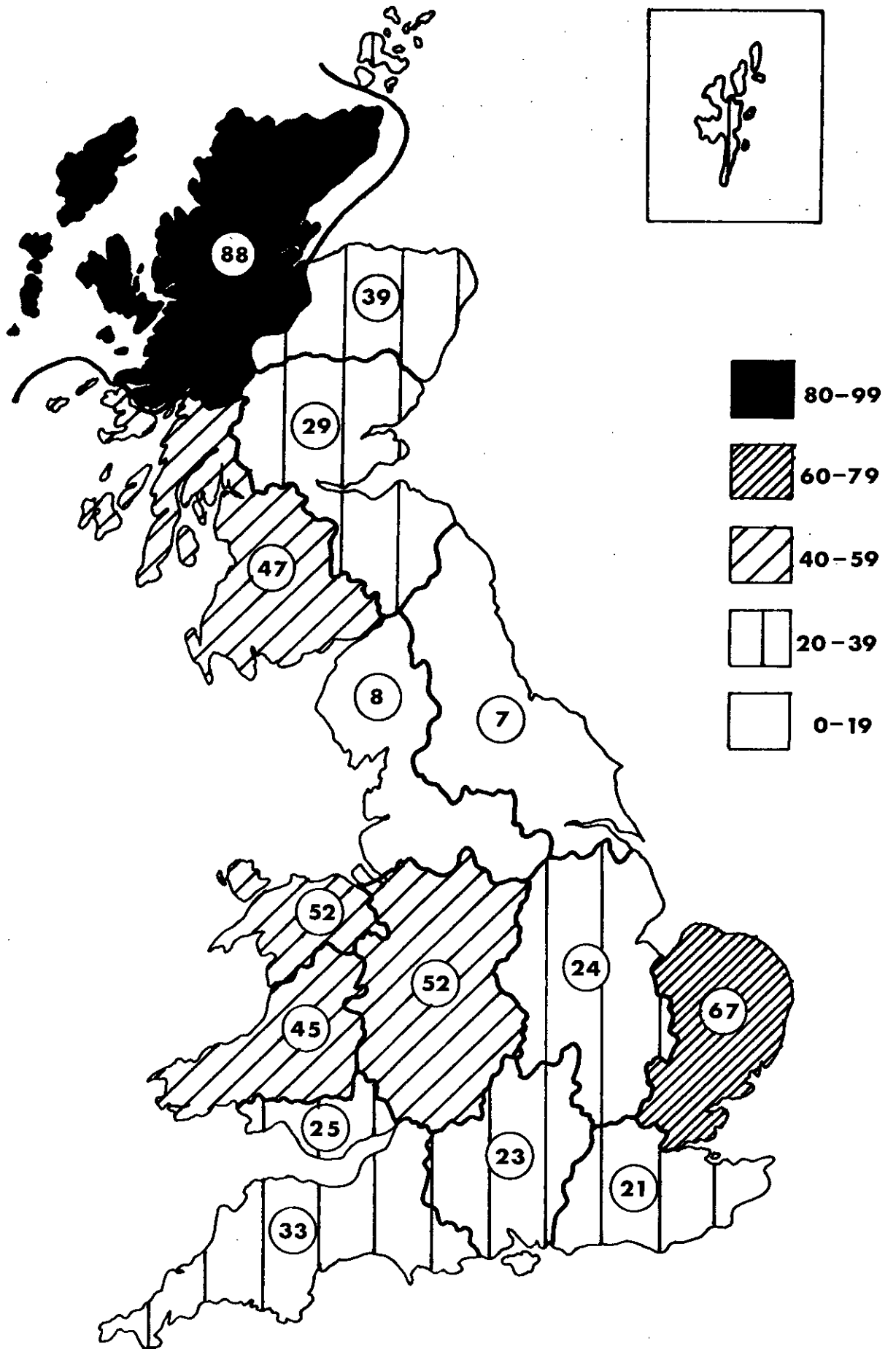
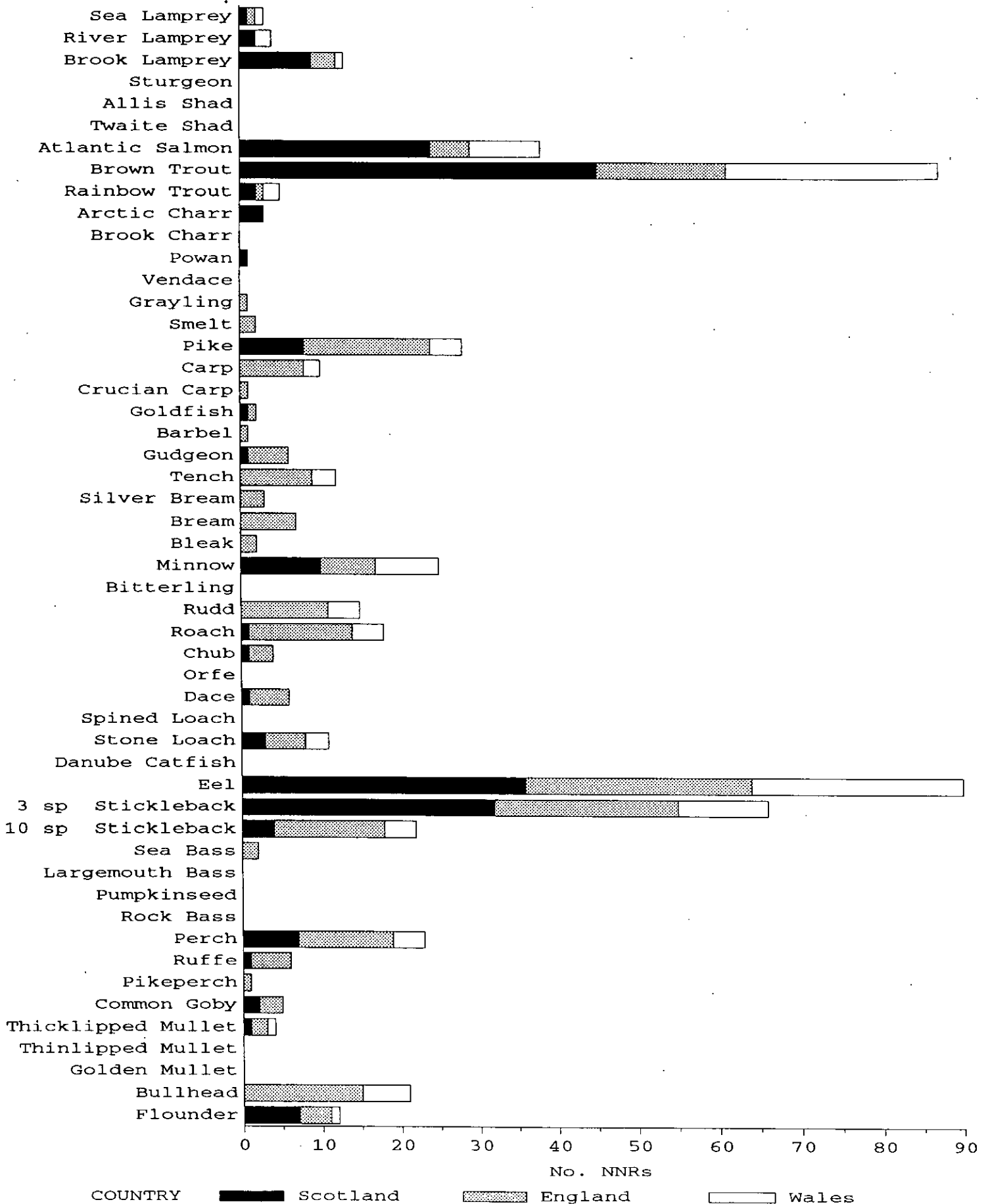


Figure 6. The sum of occurrences of all fish species recorded in the NNRs of each NCC region.

Figure 7. The total number of NNRs containing each of the 51 fish species currently found in Great Britain, subdivided by country.



clearly eels and brown trout with 3-spined sticklebacks next. Eels, however, may also be the most under-recorded species as they are more difficult to observe or catch than many others.

#### CONSERVATION

A conservation value for each species can be allocated according to the criteria in Maitland & Lyle (1991a & b) and is given in Table 7.

The occurrence of fish in NNRs in these conservation categories is given in Table 8, by NCC regions. Thus, 99% are in categories D and E, and are under no immediate threat. 0.5% are in category C which contains only Arctic charr, a species which presently merits conservation consideration, particularly in the southern range of its distribution (Maitland & Lyle, 1990). The final 0.5% are in category B which have an immediate conservation importance. These are the powan in Loch Lomond NNR (although the NNR includes only a small part of the loch) and the smelt in Hickling Broad NNR and North Solent NNR, about which more information is required.

Fourteen (27%) of the available species are not recorded in NNRs (see Figure 7). Of these, nine are category E species (seven of which have been introduced to this country and are therefore of questionable conservation concern - see Maitland & Lyle, 1991a & b) one is in category D (spined loach) and one is in category I (sturgeon). Significantly, none of the three category A species (allis shad, twaite shad and vendace) occur in NNRs. The most important of these is the vendace which is Britain's rarest freshwater fish and occurs in only two lakes in NW England.

Table 7

The conservation status of British freshwater fish.

## CONSERVATION CATEGORY

I	A	B	C	D
Sturgeon Houting* Burbot*	Allis shad Twaite shad Vendace	Powan Pollan* Smelt	Arctic charr	Sea lamprey River lamprey Brook lamprey Atlantic salmon Brown trout Spined loach 10 Sp.stickleback Sea bass

E		
Rainbow trout Pink salmon* Brook charr Grayling Pike Common carp Crucian carp Goldfish Barbel Gudgeon Tench Silver bream Common bream	Bleak Minnow Bitterling Rudd Roach Chub Orfe Dace Stone loach Danube catfish Eel 3 Sp. stickleback Largemouth bass	Pumpkinseed Rock bass Perch Ruffe Pikeperch Common goby Thicklipped mullet Thinlipped mullet Golden mullet Bullhead Flounder

\* - not available to this survey - see text

I	-	International action needed
A	-	Urgent conservation action needed now
B	-	A conservation management plan should be implemented soon
C	-	A conservation management plan should be prepared
D	-	A conservation management plan should be considered
E	-	No immediate action needed

Category I are not really relevant here since sturgeon is an occasional coastal vagrant and houting and burbot are believed to be extinct in Britain.

TABLE 8

The occurrence of freshwater fish species in NNRs by their conservation status, and by NCC administrative areas.

NCC REGION	Total occurrence of fish species in NNRs	Occurrence by conservation status categories (see Table 8)				
		A	B	C	D	E
Scotland NW	88	-	-	2	43	43
NE	39	-	-	1	15	23
SW	47	-	1	-	21	25
SE	29	-	-	-	6	23
<b>SCOTLAND TOTALS</b>	<b>203</b>	<b>-</b>	<b>1</b>	<b>3</b>	<b>85</b>	<b>114</b>
England NW	8	-	-	-	1	7
NE	7	-	-	-	4	3
WM	52	-	-	-	8	44
EM	24	-	-	-	3	21
EA	67	-	1	-	9	57
SW	33	-	-	-	9	24
S	23	-	1	-	5	17
SE	21	-	-	-	2	19
<b>ENGLAND TOTALS</b>	<b>235</b>	<b>-</b>	<b>2</b>	<b>-</b>	<b>41</b>	<b>192</b>
Wales N	52	-	-	-	26	26
DP	45	-	-	-	14	31
S	25	-	-	-	3	22
<b>WALES TOTALS</b>	<b>122</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>43</b>	<b>79</b>
<b>GREAT BRITAIN TOTALS</b>	<b>560</b>	<b>-</b>	<b>3</b>	<b>3</b>	<b>169</b>	<b>385</b>

In order to allocate a conservation value for fish to each NNR the criteria suggested by Maitland (1985) were considered. However, there are certain difficulties in applying these criteria here, partly because they were designed for discrete waters and many NNRs include several (either complete or in part) and also because they require information not available from this survey. Consequently an abbreviated version (Table 9) was applied under the following conditions: the answer to question 2 was always assumed to be yes; species considered as rare are those in categories A, B and C in Table 7; questions 4 and 5 are perhaps open to interpretation, but here only one instance was accepted for question 4 (the river lampreys of Loch Lomond) and one for question 5 (the river lamprey/powan relationship again at Loch Lomond). (There may be others of which we are currently unaware).

The criteria in Table 9 were applied to the data for individual NNRs given in Appendix II. The resulting categorisation of all 235 NNRs shows that 59 (25%) have no fresh waters; 37 (16%) are in category a; 133 (57%) are in category d (but see below); and the remaining 6 (2%) are in category c and have some definite fish conservation value. Of the latter, five have only one category c ranking: i.e. Inverpolly NNR, L. Maree Islands NNR and Cairngorms NNR - for rare species (Arctic charr); Hickling Broad NNR and North Solent NNR - for rare species (smelt); but one, Loch Lomond NNR, qualifies for a c ranking on all four counts - for rare species (powan) - for an unusual form (river lamprey) - for an unusual combination (river lamprey/powan) - for total number of species (i.e. > 12) and is the most outstanding NNR from a fish conservation aspect.

Although the majority of NNRs fall into category d, there are nevertheless interesting and diverse fish communities within that group. The survey shows that there are nine NNRs with 10 or more fish species (Table 10) and six of these are in category d.

TABLE 9. An abbreviated procedure for the selection of important NNRs for freshwater fish, following Maitland (1985).

	<u>Question</u>	<u>Answer</u>	<u>Check</u>
1.	Does the NNR have fish?	Y N	2 a
2.	Is sufficient information available for fish?	Y N	3 b
3.	Are any rare species present?	Y N	c* 4
4.	Are there any unusual forms of common species?	Y N	c* 5
5.	Are there any unusual combinations of species?	Y N	c* 6
6.	In relation to its geographical position (see below) in area i,ii,iii,iv has the NNR more than 8,12,16,20 species respectively	Y N	c* d
	i - Scotland NW of the Great Glen		
	ii - rest of Scotland		
	iii- Northumberland, Cumbria, W.Wales, Cornwall, Devon		
	iv - rest of England, E. Wales.		

Explanation of categories:

- a Site has no fish but may have aquatic interest because of that.
- b Further information required
- c\* Site important for fish conservation
- d Site has fish but is of limited conservation value at present

\* Site conservation importance increases with the number of c values applicable.



**TABLE 10** National Nature Reserves with 10 or more fish species present.

**LOCH LOMOND NNR, SW SCOTLAND. 19 SPECIES**

sea lamprey, river lamprey, brook lamprey, Atlantic salmon, brown trout, powan, pike, gudgeon, minnow, roach, chub, dace, stone loach, eel, 3-spined stickleback, 10-spined stickleback, perch, ruffe, flounder.

**WYRE FOREST NNR, WEST MIDLANDS. 18 SPECIES**

brook lamprey, Atlantic salmon, brown trout, pike, common carp, goldfish, barbel, gudgeon, bleak, minnow, roach, chub, stone loach, eel, 3-spined stickleback, perch, ruffe, bullhead.

**NORTH SOLENT NNR, S. ENGLAND. 15 SPECIES**

brown trout, smelt, pike, common carp, minnow, roach, chub, dace, eel, sea bass, perch, common goby, thicklipped mullet, bullhead, flounder.

**BURE MARSHES NNR, EAST ANGLIA. 13 SPECIES**

pike, gudgeon, tench, silver bream, common bream, rudd, roach, eel, 3-spined stickleback, 10-spined stickleback, perch, ruffe, flounder.

**WOODWALTON FEN NNR, EAST MIDLANDS. 13 SPECIES**

pike, tench, silver bream, common bream, bleak, rudd, roach, dace, eel, 10-spined stickleback, perch, ruffe, pikeperch.

**BRIDGEWATER BAY NNR, SW ENGLAND. 11 SPECIES.**

pike, common carp, gudgeon, tench, common bream, rudd, roach, chub, eel, perch, ruffe.

**HICKLING BROAD NNR, EAST ANGLIA. 11 SPECIES**

smelt, pike, common bream, minnow, rudd, roach, eel, 3-spined stickleback, perch, common goby, flounder.

**ROSTHERNE MERE NNR, WEST MIDLANDS., 11 SPECIES**

pike, common carp, crucian carp, tench, common bream, minnow, roach, stone loach, 3-spined stickleback, perch, bullhead.

**CORS CARON NNR, DYFED-POWYS. 10 SPECIES**

brook lamprey, Atlantic salmon, brown trout, pike, minnow, stone loach, eel, 3-spined stickleback, perch, bullhead.

Because of the reported decline of sea trout (e.g. Walker 1984) it is interesting to note that this migratory form of the brown trout was reported in 25 NNRs (Table 11). This is certainly an underestimate since there is an association between the occurrence of sea trout and that of salmon - the latter being recorded in 36 NNRs, all in association with brown trout. In addition, five NNRs have sea trout but not salmon, so, there is potential to offer some measure of conservation to this important fish.

Thus some NNRs afford protection at the sub-specific level to valuable local races of fish. Other examples are the unique, exclusively freshwater, race of river lampreys in Loch Lomond, and the stocks of Arctic charr in Cairngorms NNR, Inverpolly NNR and Loch Maree Islands NNR - the latter stock was unknown before this study. Arctic charr were also previously known from Loch Laidon (Rannoch Moor NNR) but their presence there could not be confirmed during the survey. This loch has recently become acidified (Flower *et al.* 1987) and the stock may have disappeared as it has at other acidified lochs in Scotland, e.g. Loch Grannoch (Maitland *et al.* 1987).

Thus NNR protection does not necessarily guarantee survival in the face of events outwith local control, but if attention is focussed on the status of fish, then stocks could be preserved by appropriate management. Firstly, however, rare and threatened species, races and communities must be brought into a situation of some control. For example, as mentioned earlier, NW England region has amongst the lowest inclusion of fresh waters and fish in its NNRs, but within the regional boundary are waters

TABLE 11 National Nature Reserves reported to have sea trout.

<u>NCC region</u>	<u>NNRs with sea trout</u>
NW Scotland	Beinn Eighe Claish Moss Coile Thogabhaig Glen Roy Invernaver Inverpolly Loch Druidibeg Loch Sunart Woodlands (Ariundle) Strathfarrar
NE Scotland	Cairngorms Forvie
SW Scotland	Loch Lomond Moin Mhor
NE England	Ling Gill
EA England	Holkham
SW England	Bovey Valley Dendles Wood
S England	North Solent
N Wales	Coed Aber Coed Ganllwyd Coed Gorswen Cors Geirch
DP Wales	Allt Rhyd y Groes Coed Rheidol Cors Caron

containing some of Britain's rarest fish, i.e. vendace, powan (known locally as schelly) and Arctic charr.

Further aspects of fish species and community conservation are discussed in detail in the accompanying report for this project by Maitland & Lyle (1991a).

## CONCLUDING REMARKS

This survey has shown that although fresh waters figure little as the primary reason for NNR declarations, NNRs contain many of the freshwater habitat types found in Great Britain.

Similarly, although no NNR has been declared because of a specific interest in fish, almost three-quarters of the available species are represented and afforded some protection within NNRs. However, the survey also shows that the less common, rare and endangered species most in need of such protection are inadequately represented in NNRs. In addition, this work has demonstrated the need for improved knowledge of the status and ecology of fish communities in NNRs beyond the basic recording of species presence. There are, of course, other protected areas such as SSSIs and local nature reserves, many of which are relevant to fish conservation. Information has not been collected for these, but such a study would be a useful, though formidable, task.

Within Great Britain the range of fish communities is most typically associated with oligotrophic, eutrophic and brackish conditions. Superimposed on these associations are the distinctions created by lotic conditions on the one hand and lentic on the other. As well as taking protective measures for individual species there should be an adequate series of nature reserves for fish that reflects this national range of fish community types. Some waters naturally have no fish and these are often of intrinsic scientific importance and worthy of conservation in their own right; it is important that fish are not introduced there.

There is at present considerable scope through the management of existing NNRs to contribute to the preservation and safeguarding of British freshwater fish stocks - but it may be necessary to consider creating new reserves for our most vulnerable species. In some cases, the creation of new populations by strategic introduction may be necessary (Maitland & Lyle 1990).

By contrast, in the United States, a number of aquatic sites have been given such protection entirely because they contain populations of endangered or rare fish species (Williams & Finney 1977, Johnson & Rinne 1982). Also there are state hatcheries devoted entirely to the breeding and rearing of endangered fish species with the sole objective of enhancing wild stocks.

As mentioned above for Loch Lomond, some NNRs include only part of a water body, so management of the reserve section will have a limited influence on what happens in the rest of it. Moreover, the conservation of fresh waters ideally involves control over their catchments - a practical difficulty which can rarely be completely overcome.

If fish species and communities are to be given adequate consideration then appropriate management plans should be prepared for each water considered to be of importance and active monitoring should be carried out to assess any changes in the fish community. An approach and methodology for this are discussed in Maitland and Lyle (1990, 1991a).

## ACKNOWLEDGEMENTS

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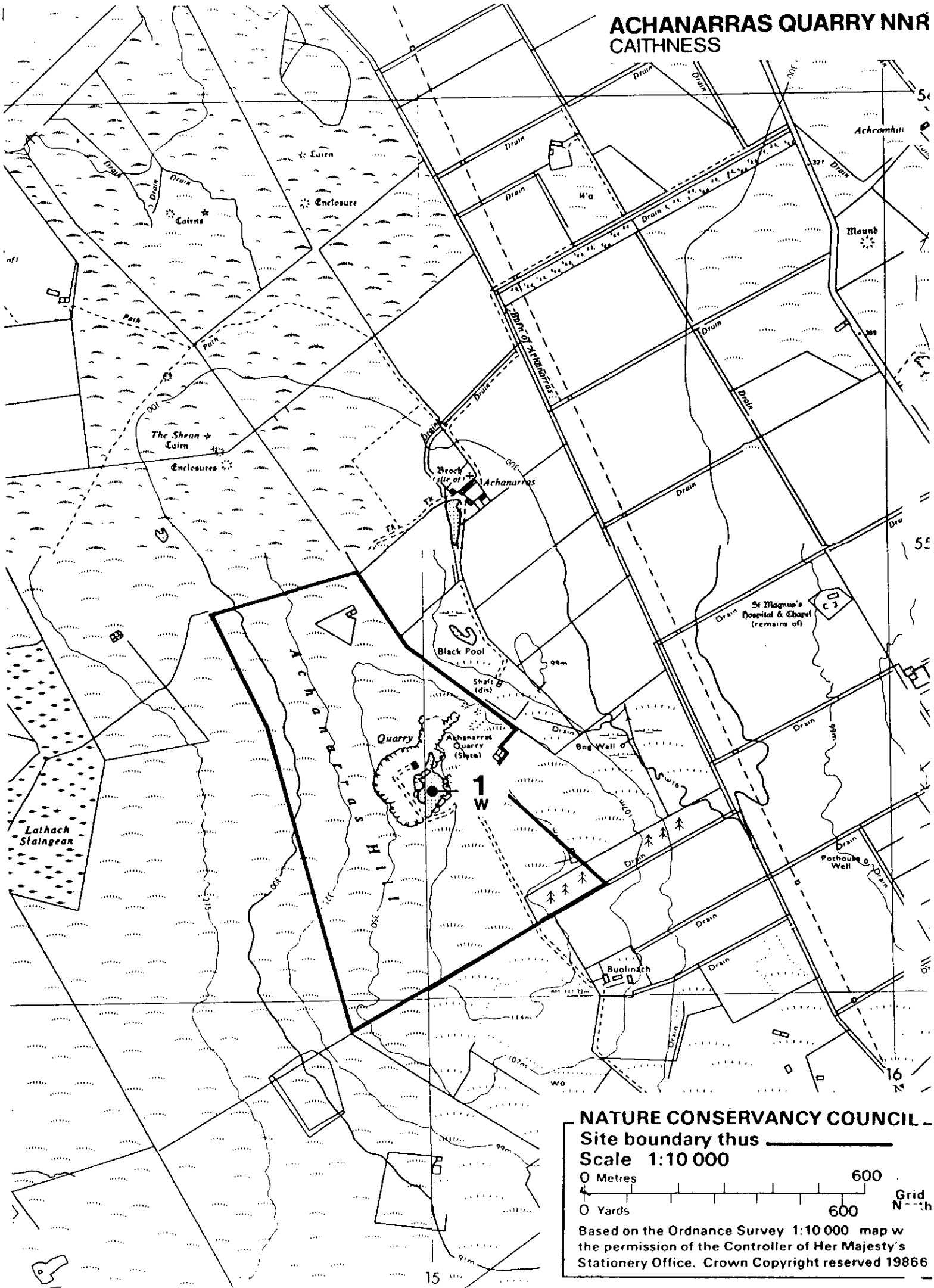
# APPENDIX I

Field Survey Maps and Reports

Listed as in Table 2

Water chemistry results for field sites in Scotland are given in Table Ia.

# ACHANARRAS QUARRY NNR CAITHNESS



**NATURE CONSERVANCY COUNCIL**

Site boundary thus

Scale 1:10 000

0 Metres 600

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Grid N 16 h

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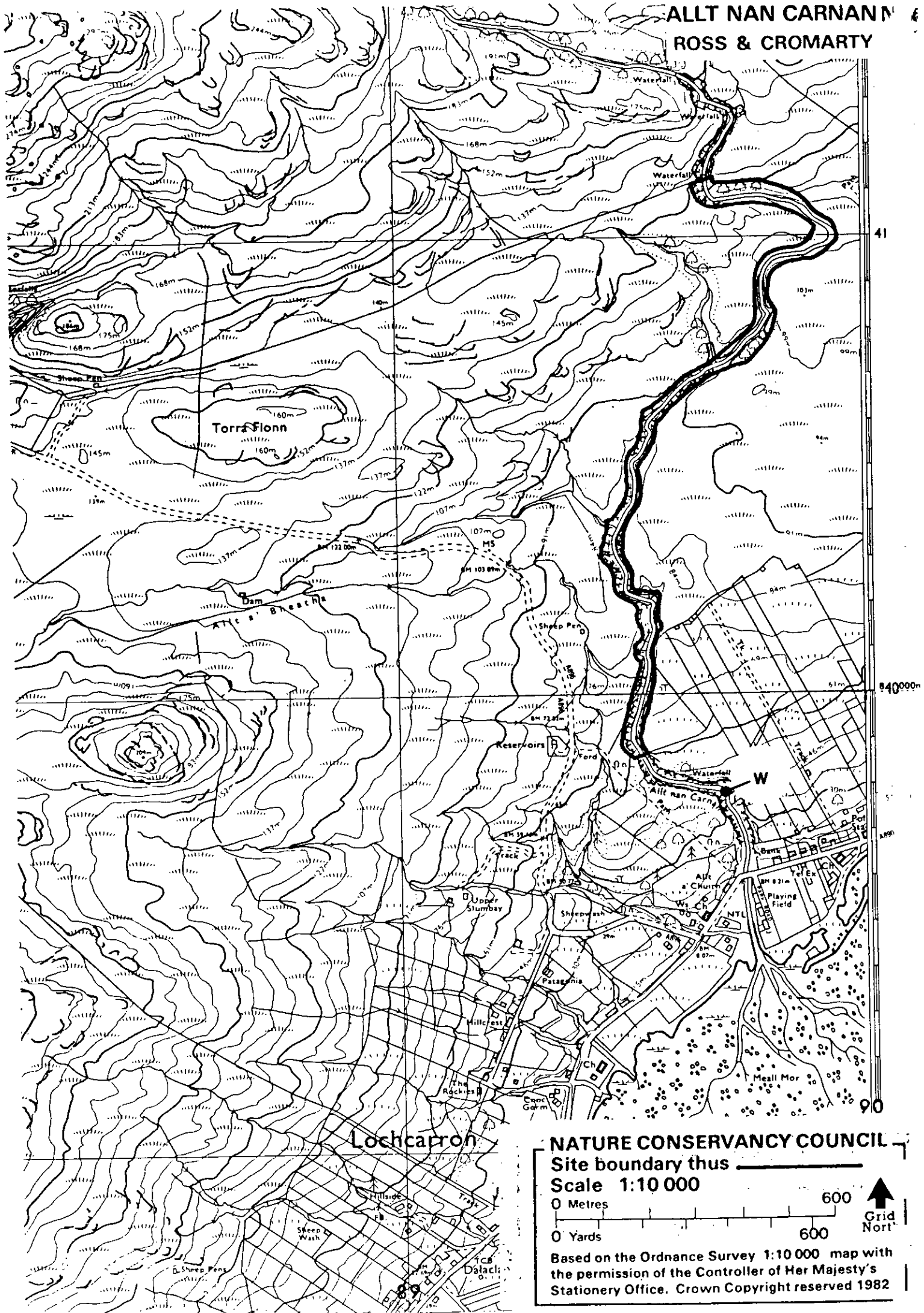
FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY REPORT FOR ACHANARRAS QUARRY NNR



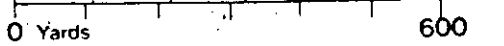
The quarry was previously drained for geological inspection but has been water filled for approximately 10 years and had been stocked with Brown Trout some time in the past. Date of survey 4.8.88.

Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Achanarras Quarry ND 150 542	FN, T, GN (40 mins)	4. 3. Sp. Sticklebacks 2. B. Trout	

W on map indicates water chemistry sampling site.

\* FN - fyke net; T - trap; GN - gill net.



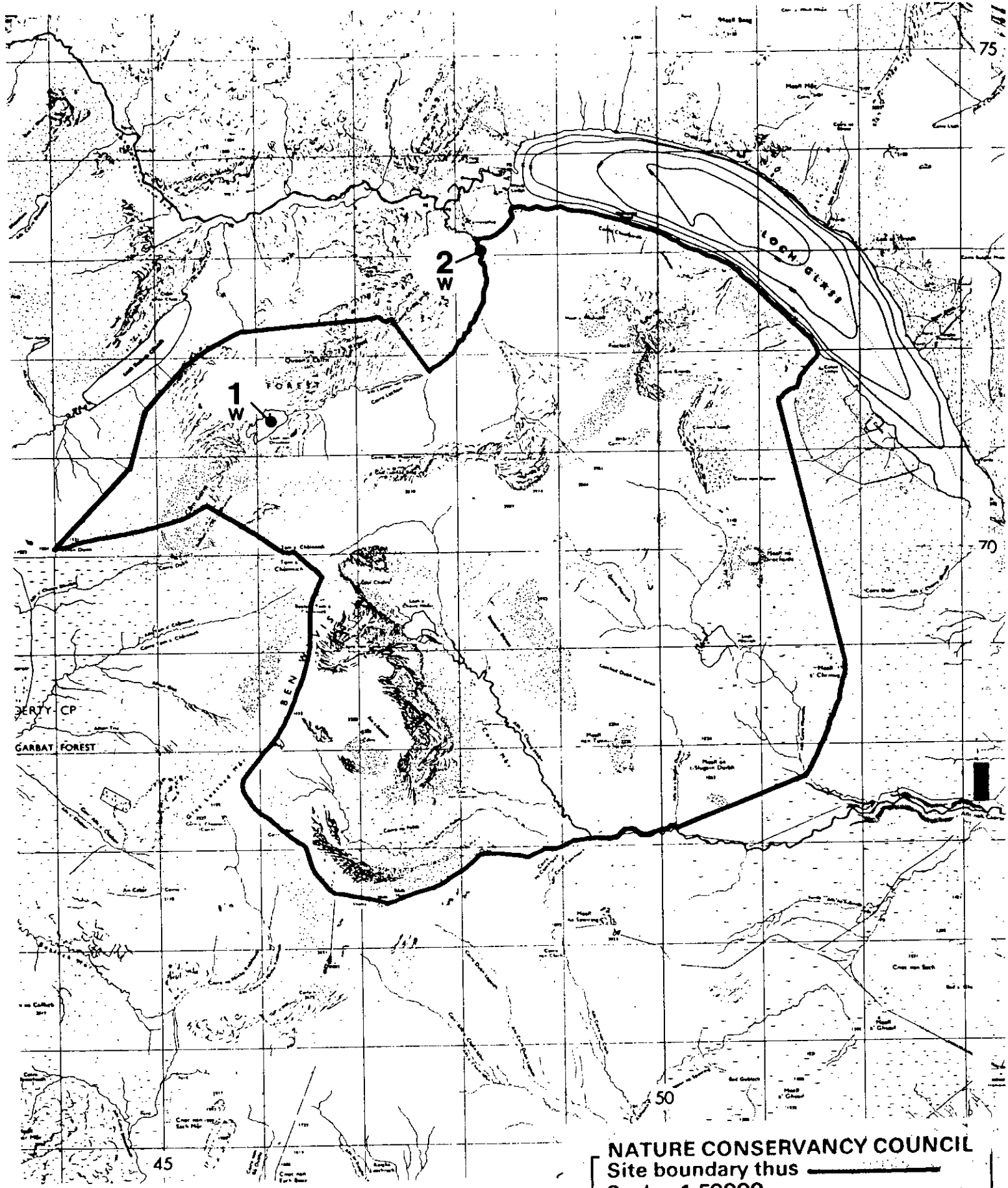
**NATURE CONSERVANCY COUNCIL**  
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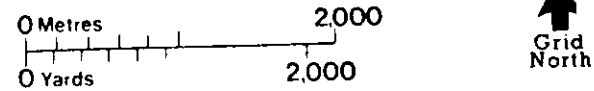
FRESHWATER FISH IN NATIONAL NATURE RESERVES  
FIELD SURVEY REPORT FOR ALLT NAN CARNAN NNR

Brown Trout were confirmed to occur within the NNR, but Salmon and Eels were questioned. The FFL, Pitlochry, Salmon distribution map shows that Salmon only occur up to the falls below the NNR boundary. The purpose of the visit was to inspect the falls, which confirmed that they are impassable to likely migratory fish. A water sample was taken at the falls. Date of visit 6.6.88.

# BEN WYVIS NNR ROSS & CROMARTY



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FRESHWATER FISH IN NATIONAL NATURE RESERVES  
FIELD SURVEY REPORT FOR BEN WYVIS NNR

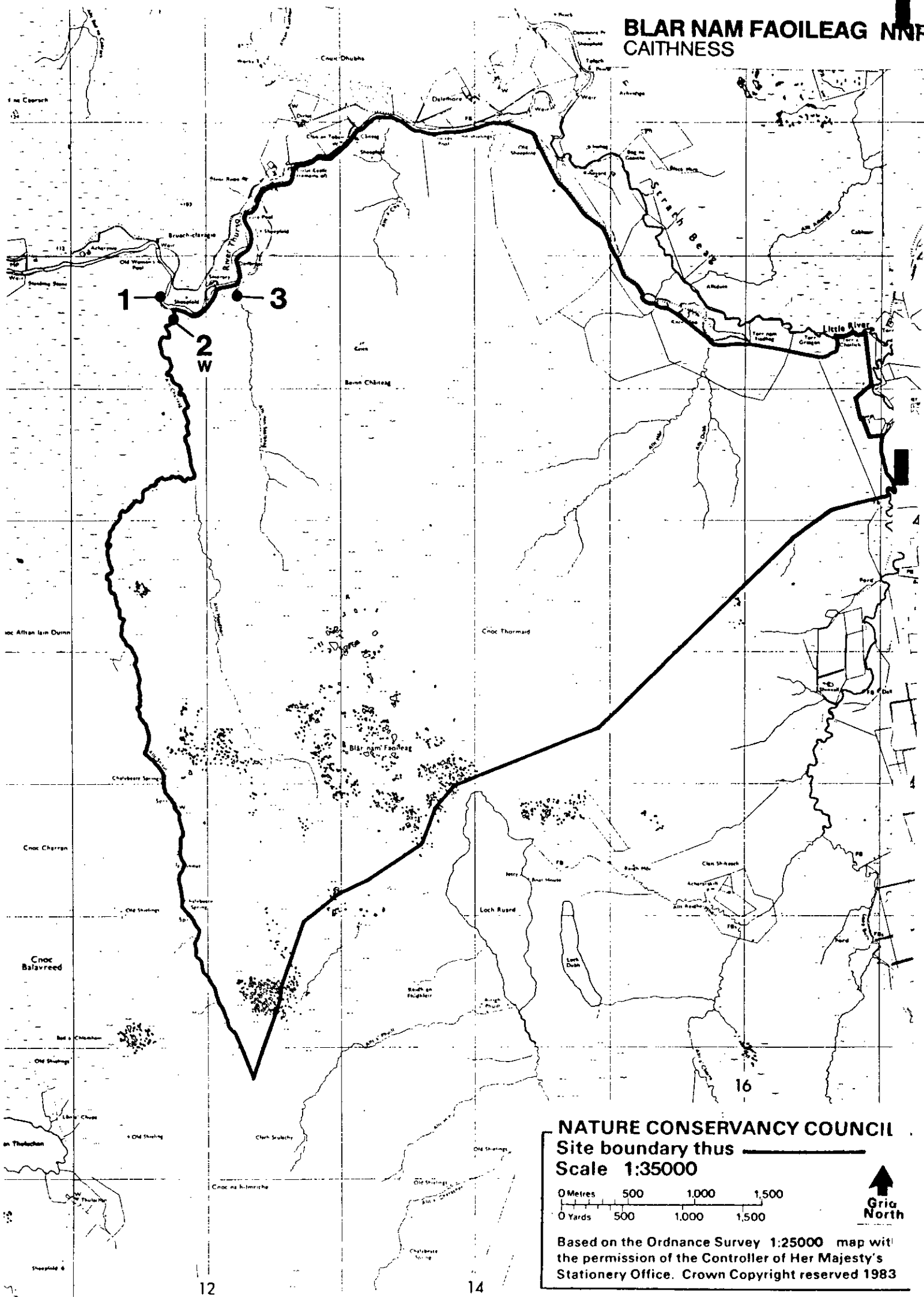
The reserve contains two high altitude lochs and a number of large and small streams. Brown Trout has been confirmed throughout the NNR with the exception of L.nan Druidean and its outflow where it was suggested that other species may occur, e.g. Charr, Eels and Sticklebacks and Minnows. Dates of survey 8 & 9.8.88.


Map No.	Site Name & NGR	Method*	Catch	Comment
1.	L.nan Druidean NH 462 713	GN x 2	69. B.Trout	None of the other species suggested were found, although specifically looked for.
2.	Allt Corrachie NH 486 731	EF 100m	34. B.Trout	

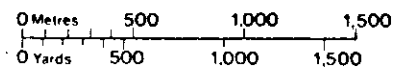
W on map indicates water chemistry sampling sites.

\* GN - gill nets; EF - electric fishing.

# BLAR NAM FAOILEAG NNE CAITHNESS



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FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY REPORT FOR BLAR NAM FAOILEAG NNR

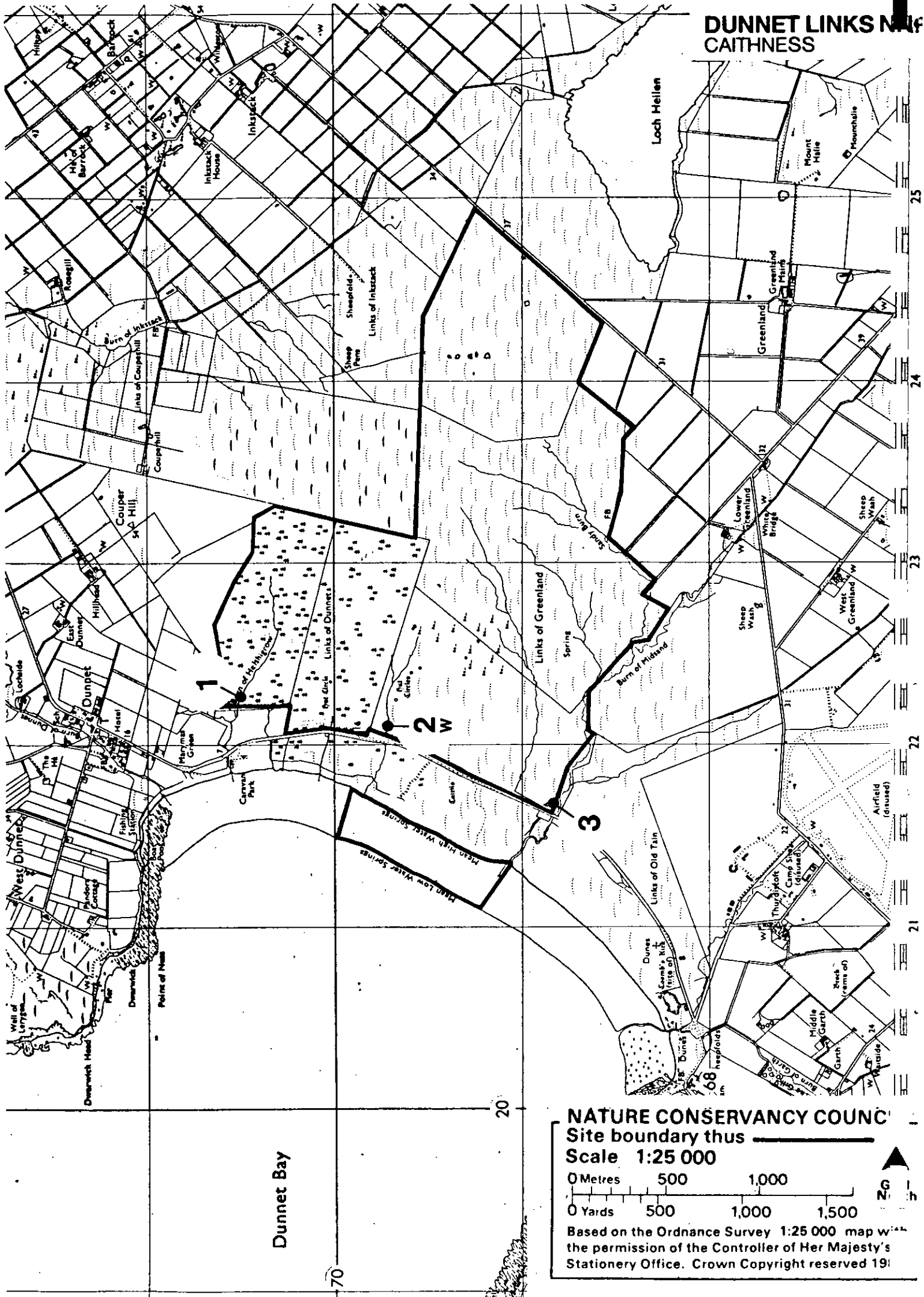
Salmon, Brown Trout and Eels had been confirmed to be present, so a short survey only was undertaken in different habitat types in the R. Thurso and two tributaries. Date of survey 4.8.88.

Map No.	Site Name & NGR	Method*	Catch	Comment
1.	R. Thurso ND 117 476	EF 25m	3. 3 Sp.Stickleback	
2.	Allt Chaitteag ND 118 475	EF 30m	4. 3 Sp.Stickleback 15. B. Trout	A local report of lampreys could not be confirmed
3.	Allt nan Sealbhag ND 123 477	EF 30m	8. B. Trout	

W on map indicates water chemistry sampling site.

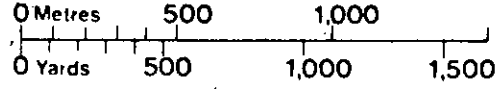
\* EF - electric fishing.

# DUNNET LINKS NIP CAITHNESS



**NATURE CONSERVANCY COUNCIL**  
Site boundary thus

Scale 1:25 000



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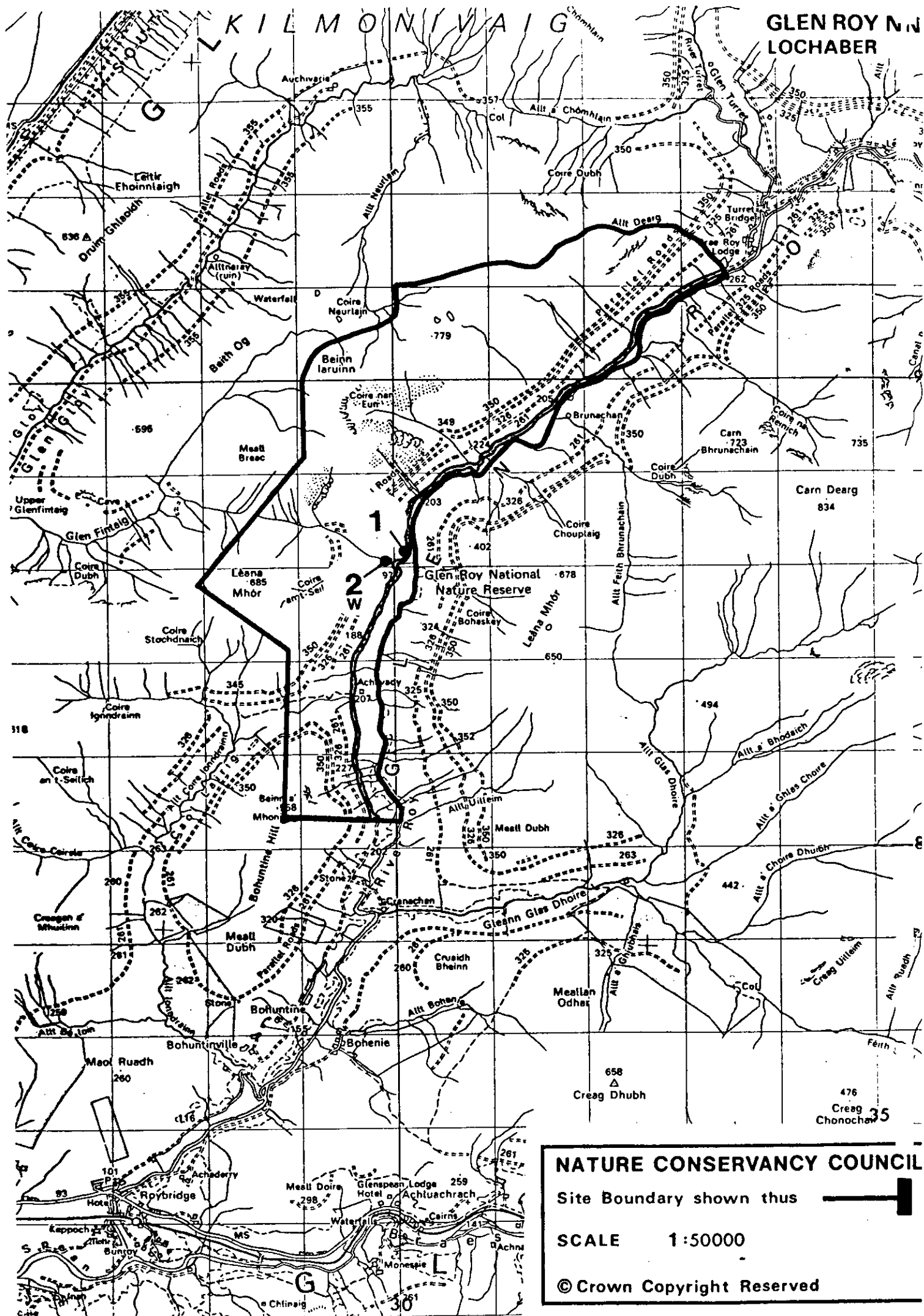
FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY REPORT FOR DUNNET LINKS NNR

No fish were previously known on this reserve which is drained by three ditch/streams from afforsted and moorland catchments. Date of survey 3.8.88.

Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Burn of Helshigrow	-	-	Dry
2.	Stream ND 221 697	EF 50m	2. Eels	
3.	Burn of Midsand ND 217 689	EF 20m	NIL	Appears polluted

W on map indicates water chemistry sampling site.

\* EF - electric fishing.



**GLEN ROY N.N.  
LOCHABER**

**NATURE CONSERVANCY COUNCIL**

Site Boundary shown thus

SCALE 1:50000

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FRESHWATER FISH IN NATIONAL NATURE RESERVES  
FIELD SURVEY REPORT FOR GLEN ROY NNR

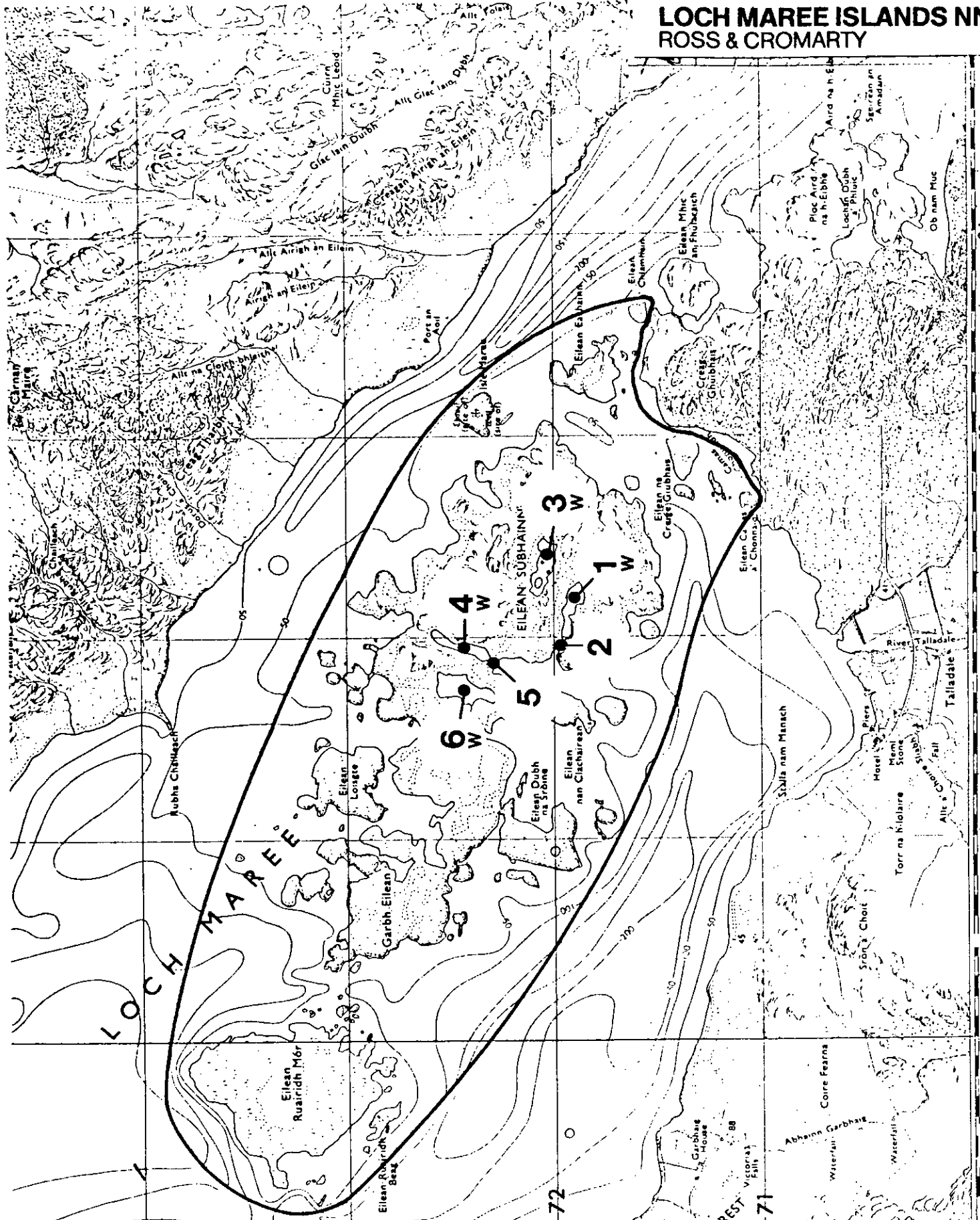
The R. Roy which runs through the NNR was known to have Salmon, Brown Trout and Eels. There was also a report that 3 Sp. Sticklebacks occurred. A very brief visit was undertaken to try and locate the latter, although it was impractical to inspect the full length of river within the NNR. Date of visit 28.8.88.

Map No.	Site Name & NGR	Method*	Catch	Comment
1.	R. Roy NN 301 881	EF 50m, bank	9. B. Trout	At this time the R. Roy was running full and there seemed few places likely for sticklebacks.
2.	Allt Bhreac Achaidh NN 301 880	EF 50m	7. B. Trout	

W on map indicates water chemistry sampling site.

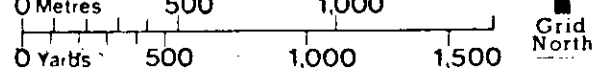
\* EF - electric fishing.

**LOCH MAREE ISLANDS NNR  
ROSS & CROMARTY**



**NATURE CONSERVANCY COUNCIL**  
Site boundary thus

Scale 1:25 000



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FRESH WATER FISH IN NATIONAL NATURE RESERVES  
FIELD SURVEY REPORT FOR LOCH MAREE ISLANDS NNR

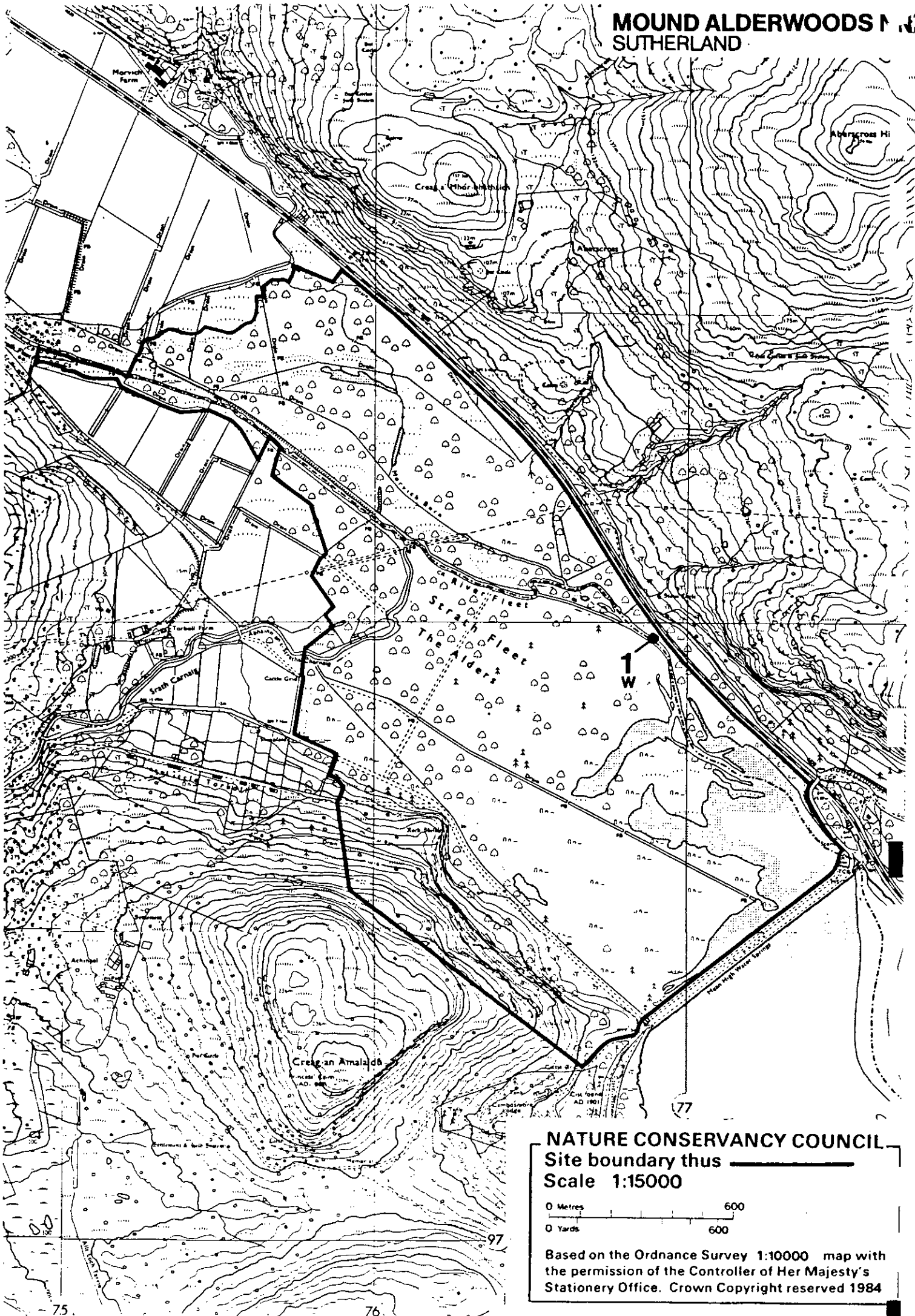
The only freshwaters of significance are on Eilean Subhainn and are four lochans and associated stream connections to Loch Maree. Dates of survey 7 & 8.6.88.

Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Lochan NG 921 719	GN x 2, FN, T	13. B. Trout 5. A. Charr	Known in L. Maree
2.	Lochan outflow NG 919 720	EF 50m	6. 3 Sp. Stickleback	
3.	Lochan NG 924 720	GN, T	NIL	No connection to L. Maree
4.	Lochan NG 919 724	GN, FN, T	8. B. Trout 1. A. Charr	Sea Trout
5.	Lochan outflow NG 919 723	EF 50m	2. Eels 4. 3 Sp. Sticklebacks	
6.	Lochan NG 917 724	GN, EF shore 50m	4. Eels 2. 3 Sp. Sticklebacks	

W on map indicates water chemistry sampling sites.

\* EF - electric fishing; GN - gill net; FN - fyke net; T - trap.

# MOUND ALDERWOODS N. SUTHERLAND



**NATURE CONSERVANCY COUNCIL**  
Site boundary thus   
Scale 1:15000



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FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY REPORT FOR MOUND ALDERWOODS NNR

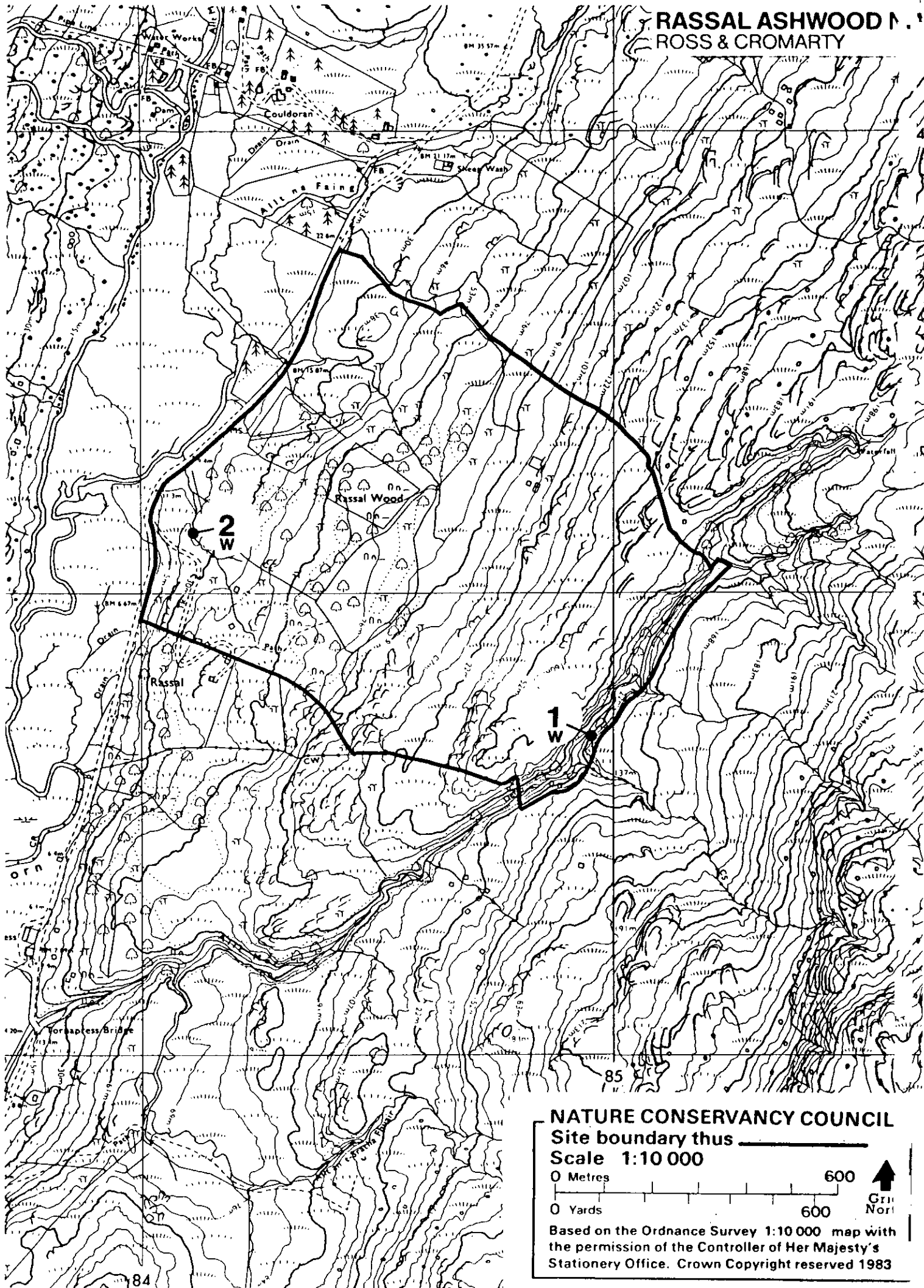
Salmon, Brown Trout, Minnows and 3 Sp. Sticklebacks were already confirmed to be present in the R. Fleet which runs through the NNR. There is some doubt over lampreys and a very limited survey was undertaken to try and confirm their presence. Date of survey 6.8.88.

Map No.	Site Name & NGR	Method*	Catch	Comments
1.	R. Fleet NH 769 989	EF 40m (sand/silt area)	4. Flounders 16. Eels	Lampreys not found

W on map indicates water chemistry sampling site.

\* EF - electric fishing.

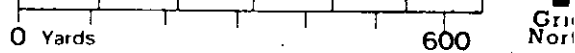
RASSAL ASHWOOD N.S.I.  
ROSS & CROMARTY



**NATURE CONSERVANCY COUNCIL**  
Site boundary thus 

Scale 1:10 000

0 Metres  600

0 Yards  600



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FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY REPORT FOR RASSAL ASHWOOD NNR

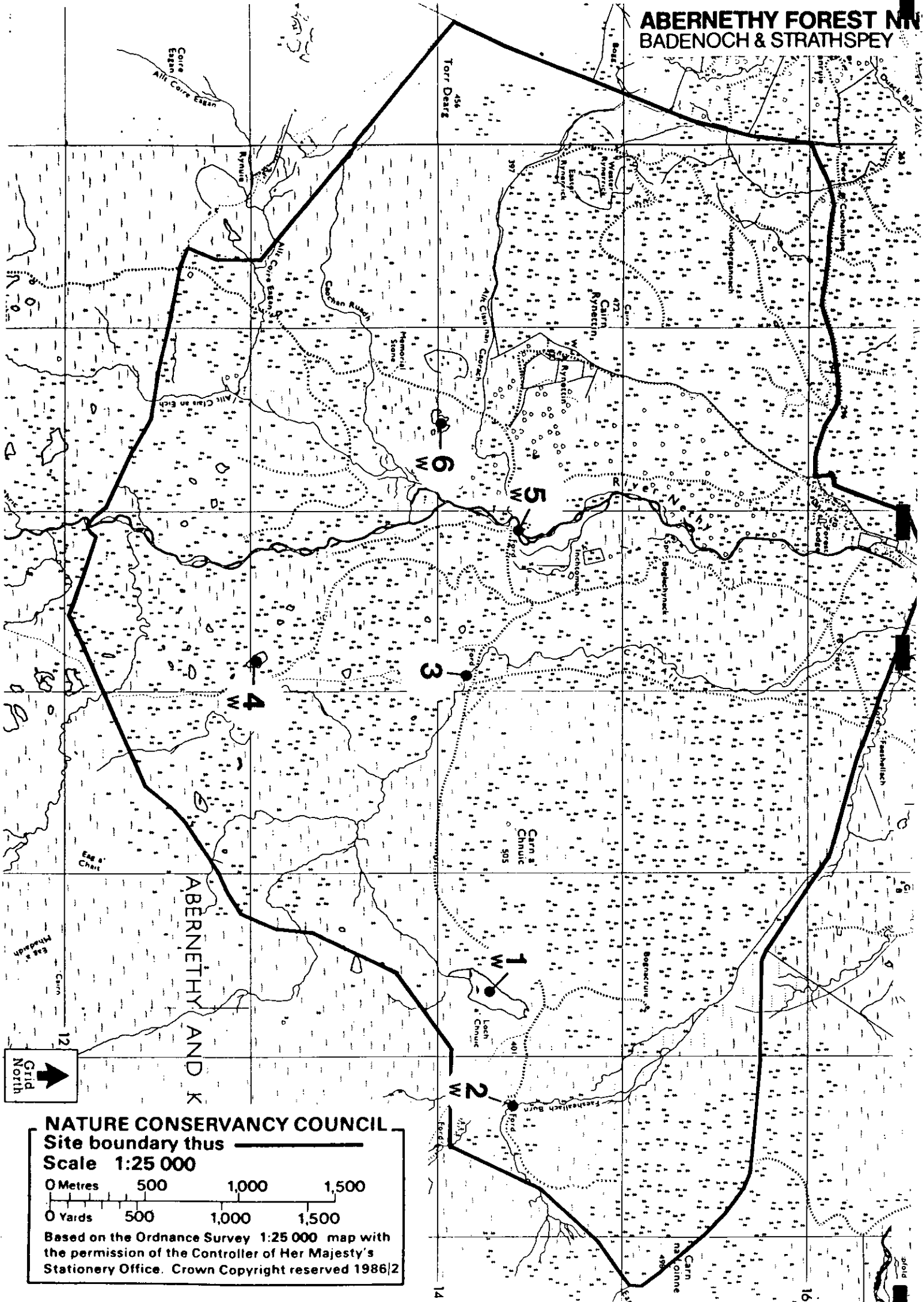
The main water is the Allt Mor on the eastern boundary. A few small streams also drain the reserve to the north west. No previous records of fish. Date of survey 6.6.88.


Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Allt Mor NG 849 427	EF 50m	20. B. Trout	
2.	Stream NG 841 431	EF 100m	4. B. Trout	Eels reported by Hon. Warden but none found.

W on map indicates water chemistry sampling site.

\* EF - electric fishing.

**ABERNETHY FOREST NW  
BADENOCH & STRATHSPEY**



**NATURE CONSERVANCY COUNCIL**  
 Site boundary thus   
 Scale 1:25 000  
 0 Metres 500 1,000 1,500  
 0 Yards 500 1,000 1,500  
 Based on the Ordnance Survey 1:25 000 map with  
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FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY REPORT FOR ABERNETHY FOREST NNR

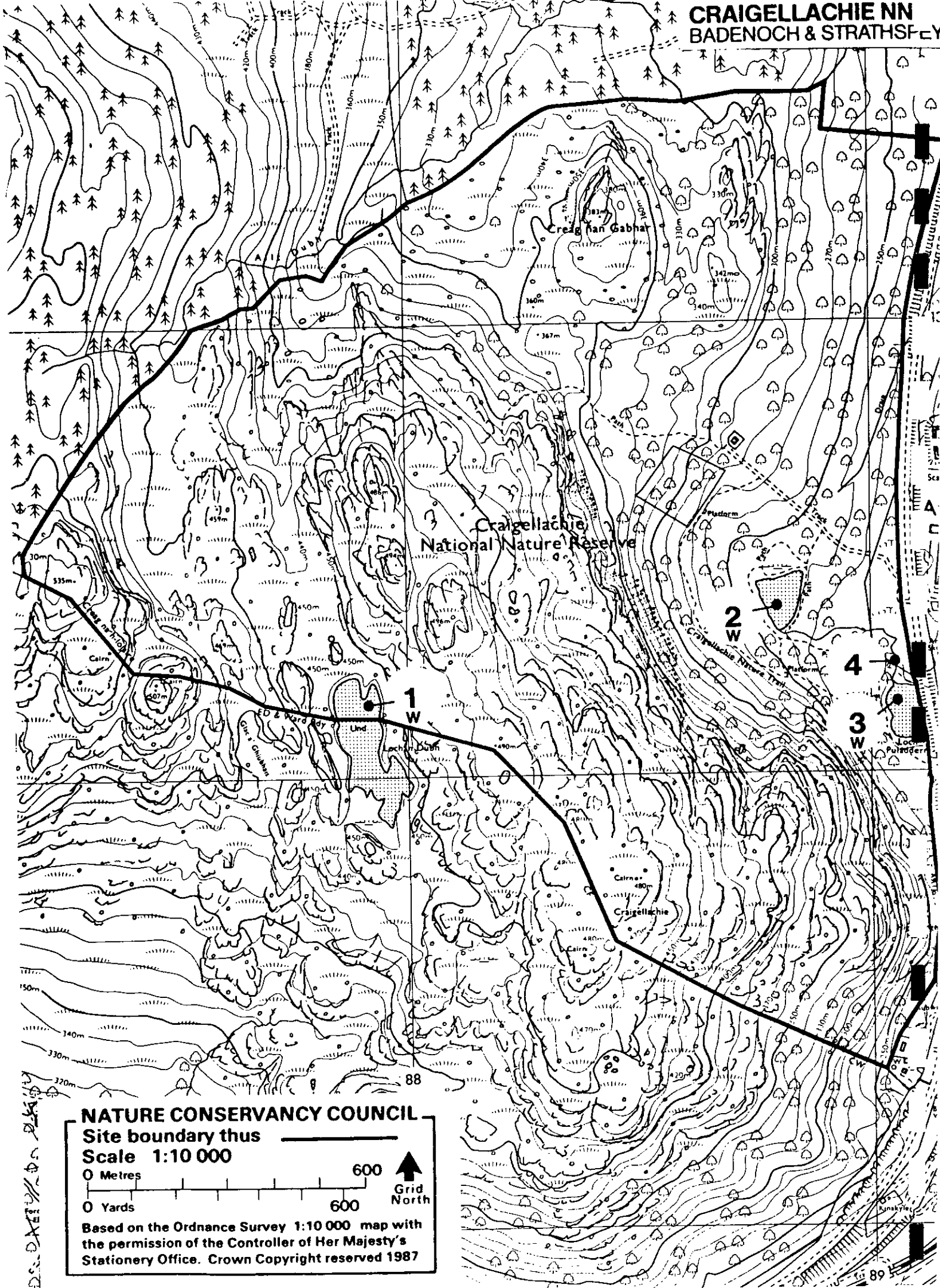
This reserve contains one main river (R. Nethy) and numerous streams. The main standing water is L.a'Chnuic and there are several ponds. These waters have afforested moorland, and mixed catchments and the survey attempted to sample waters with different characteristics. Dates of survey 13 & 14.9.88.

Map No	Site Name & NGR	Method*	Catch	Comment
1.	L.a'Chnuic NJ 047 143	GN x 2	4. B.Trout	Adults - stocked in the past
2.	Faesheallach Burn NJ 053 144	EF 60m	22. B.Trout	Young fish
3.	Crom Allt NJ 029 141	EF 50m	16. B.Trout 4. Lampreys	Young fish
4.	'Forest pond' NJ 028 130	GN,T,EF shore	NIL	
5.	R. Nethy & backwater NJ 021 144  (Note: Salmon presence confirmed by FFL, Pitlochry)	EF 30m EF 30m	21. B.Trout 13. B.Trout/Salmon - 3. Salmon 1. Eel 8. Lampreys	Mostly young fish hence difficulty in identification
6.	'Moor pool' NJ 015 140	GN,T,EF shore	NIL	

W on map; indicates water chemistry sampling sites.

\*GN - gill net; T - trap; EF - electric fishing.

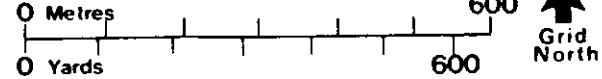
**CRAIGELLACHIE NN  
BADENOCH & STRATHSPEY**



**NATURE CONSERVANCY COUNCIL**

Site boundary thus

Scale 1:10 000



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FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY REPORT FOR CRAIGELLACHIE NNR

The principal water features are two artificial lochs with an inter-linking stream and woodland catchments, plus the northern part of the high altitude Lochan Dubh. Dates of survey 12 & 13.9.88.

Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Lochan Dubh NH 879 122	GN x 2	NIL	Angled in the past
2.	'Old reservoir' NH 888 124	GN, T, EF shore	4. B.Trout - 3. 3 Sp.Sticklebacks	Adults. Dense macrophyte growth
3.	L. Puladdern NH 891 121	GN, T, EF shore	8. B. Trout - 20. Minnows 2. 3 Sp.Sticklebacks	1 Ferox
4.	L. Puladdern inflow NH 891 122	EF 10m	6. B.Trout	Young fish

W on map indicates water chemistry sampling sites.

\* GN - gill net; T - trap; EF - electric fishing.



FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY REPORT FOR CREAG MEAGALDH NNR

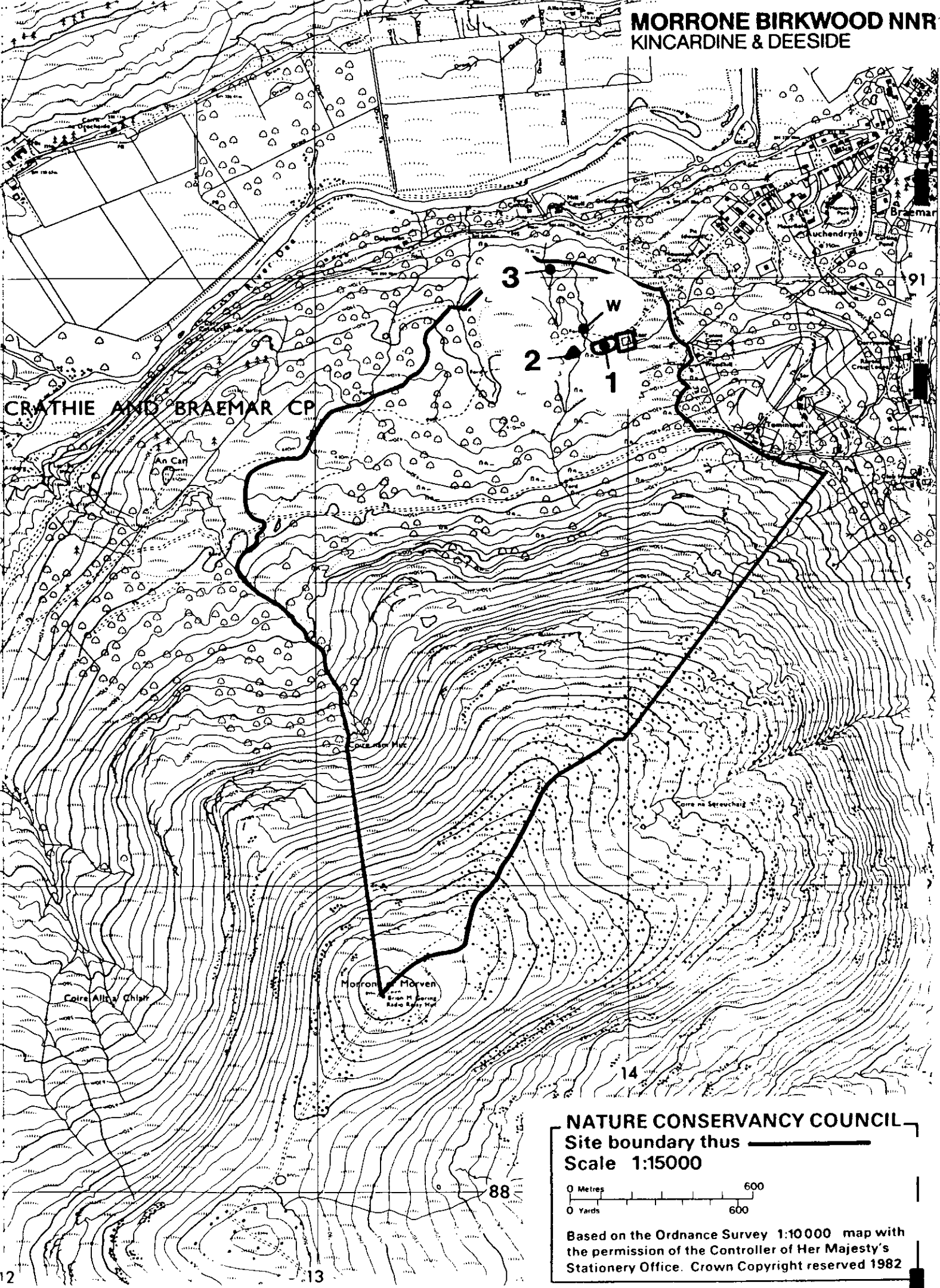
This reserve contains three main standing waters, two of which are deep, high altitude corrie lochs. There are numerous large and small, fast flowing streams. Dates of survey 22-25.8.88.

Map No.	Site Name & NGR	Method*	Catch	Comment
1.	L.na Cailliche NN 412 833	GN x 2, FN, EF shore	44. B.Trout	
2.	L.a'Choire NN 438 882	GN x 2	61. B.Trout	Adults but small
3.	L.Coire Choille-rais NN 433 867	GN x 2	NIL	Perhaps too high for trout.
4.	Moy Burn NN 421 828	EF around and in deep pool	7. B. Trout	
5.	Stream NN 480 870	EF 100m in slower areas	2. Lampreys 13. B. Trout 2. Minnows 19. 3 Sp.Sticklebacks	Pike reported to enter from L. Laggan but not found.

W on map indicates water chemistry sampling sites.

\* GN - gill net; FN - fyke net; EF - electric fishing.

**MORRONE BIRKWOOD NNR**  
**KINCARDINE & DEESIDE**



CRATHIE AND BRAEMAR CP

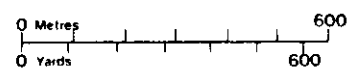
Braemar

91

14

88

**NATURE CONSERVANCY COUNCIL**  
Site boundary thus   
Scale 1:15000



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12

13

FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY REPORT FOR MORRONE BIRKWOOD NNR

The two upper pools contain no fish and occasionally dry out. The two ponds adjacent to the reservoir are marked as being excluded from the NNR but were sampled anyway. The main stream was sampled at its lowest point next to the NNR boundary. Date of survey 15.9.88.

Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Pond NO 139 908	EF throughout	5. Eels	Very shallow, silty.
2.	Pond NO 138 908	EF throughout	1. Eel 1. B. Trout	Very shallow, silty. Young
3.	Stream NO 137 911	EF 60m	3. B. Trout	Mixed ages.

W on map indicates water chemistry sampling sites.

\* EF - electric fishing.



FRESHWATER FISH IN NATIONAL NATURE RESERVES  
FIELD SURVEY REPORT FOR BEN LUI NNR

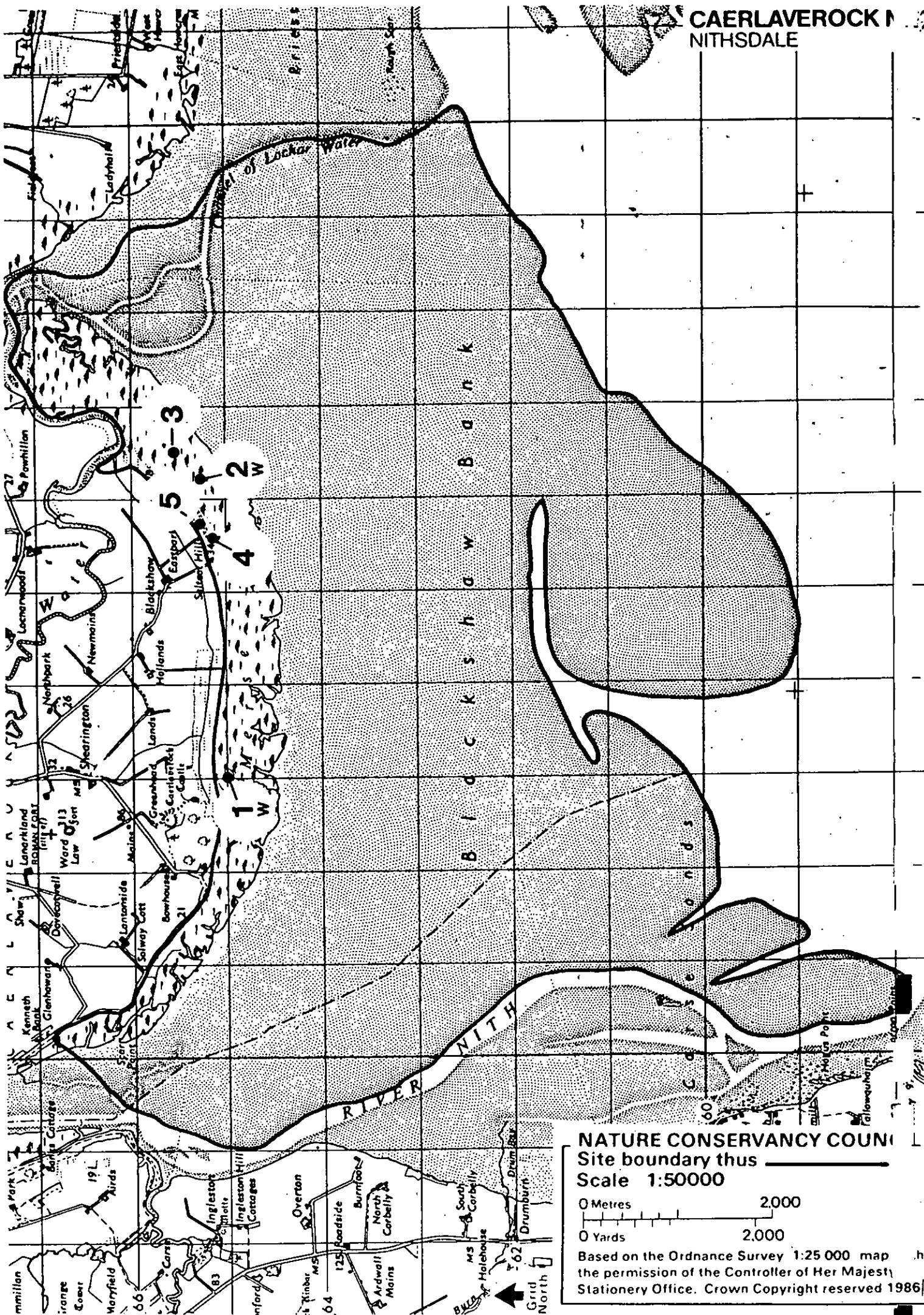
The reserve contains numerous fast flowing mountain streams most of which are unlikely to support fish. Sampling concentrated on the lower areas and on tributaries of the R. Cononish - the south bank of which is the NNR boundary. A substantial waterfall occurs at NN 290 272 - Salmon are known to run up to, but not beyond this point. Sampling was carried out above and below the waterfall. Date of survey 21.6.88.


Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Allt Coire Laoigh NN 285 270	EF 50m	NIL	Above waterfall
2.	Allt an Rund NN 285 272	EF 30m	NIL	Above waterfall
3.	Stream NN 293 274	EF 50m	8. Salmon/B.Trout	Below waterfall
4.	Stream NN 296 274	EF 40m	20. Salmon/B.Trout	Below waterfall

The fish caught at sites 3 and 4 were all young fish hence difficulty in positive identification. It appears that the waterfall is an effective barrier to migratory salmon, and that flows and winter conditions in the upper streams are too severe for other fish.

W on map indicates water chemistry sampling sites.

\* EF - electric fishing



**NATURE CONSERVANCY COUNCIL**  
Site boundary thus   
Scale 1:50000

0 Metres 2000  
0 Yards 2000

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FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY REPORT FOR CAERLAVEROCK NNR

There are a large number of shallow freshwater/brackish pools and streams within the reserve boundary. Dates of surveys 30.7.87 and 29.8.87.

Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Small pools and streams at NY 030 650 (30.7.87)	EF, HN	2. 3 Sp.Stickleback 26. 10 Sp.Stickleback 5. Common Goby	
2.	Pool NY 063 653	EF, HN	3. 3 Sp.Stickleback 5. 10 Sp.Stickleback 24. Common Goby	
3.	Pool NY 065 655	EF, HN	39. 10 Sp.Stickleback 4. Common Goby	
4.	Sm. Pool NY 056 652	EF, HN	NIL	
5.	Sm. Pool NY 057 653	EF, HN	11. 10 Sp.Stickleback	

Note: Salmon, Trout, Flounder, Plaice, Eels and Sea Lampreys are caught in nets offshore but within the NNR boundary (Warden).

W on map indicates water chemistry sampling sites

\* EF - electric fishing; HN - hand net.

# NATURE CONSERVANCY COUNCIL

Site boundary thus 

Scale 1:10 000

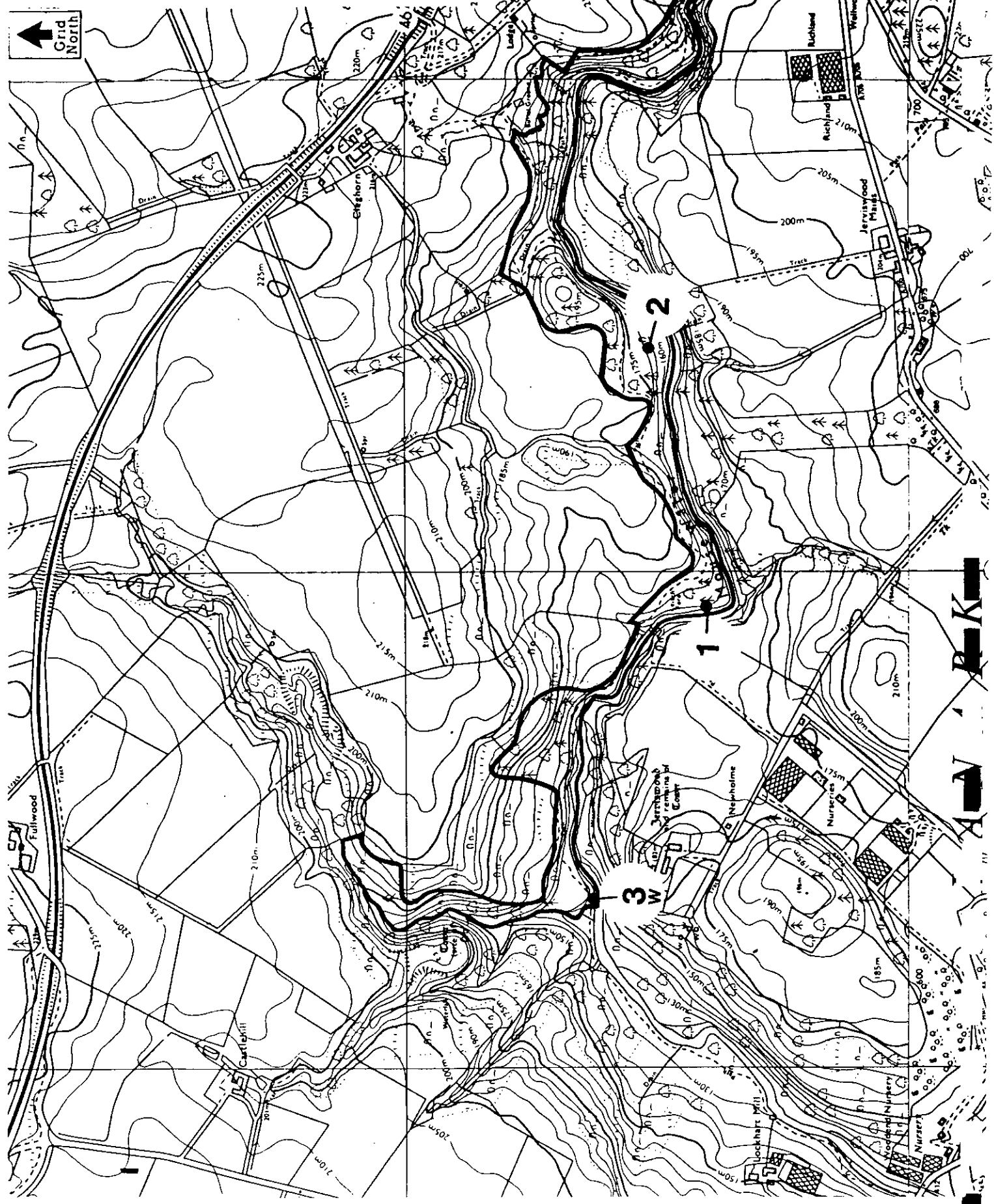
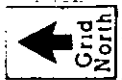
0 Metres  600

0 Yards  600

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# CLYDE VALLEY WOODLANDS N

## CLYDESDALE



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A  
K

FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY FOR CLYDE VALLEY WOODLANDS NNR

The Mouse Water (river) runs through the reserve and was in full flow at the time of sampling. Three separate sections were sampled containing different habitat types. Date of survey 4.5.88.

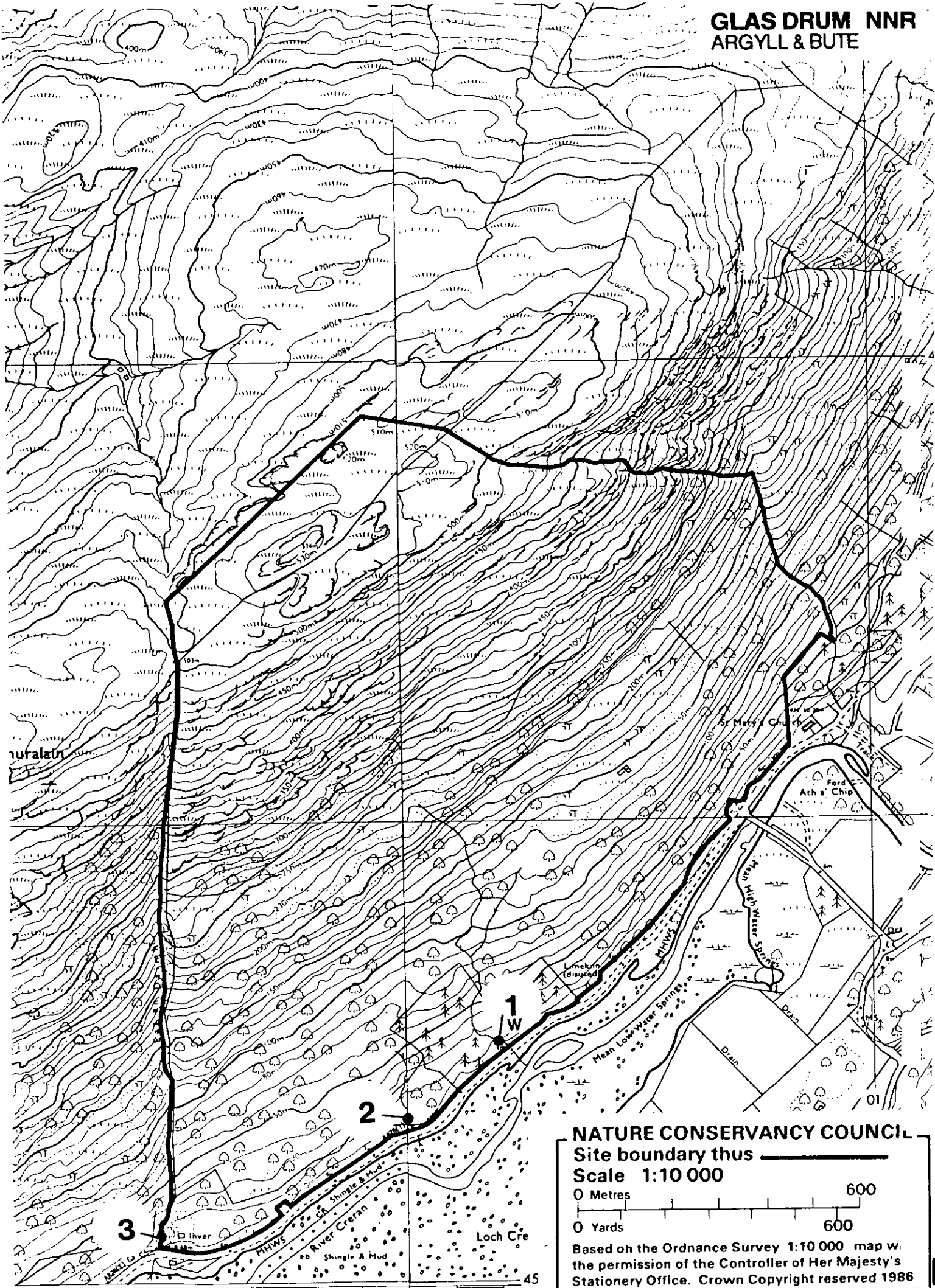
Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Mouse Water NS 889 444	EF 120m	1. B. Trout 8. Stone Loach 1. Minnow	
2.	Mouse Water NS 895 445	EF 150m	9. B. Trout 16. Stone Loach 76. Minnow 1. 3 Sp.Stickleback	
3.	Mouse Water NS 883 446	EF 90m	7. B. Trout 13. Stone Loach 12. Minnow	

Note: Grayling are believed to be likely here by Clyde River Purification Board and FFL, Pitlochry, but none were found during this survey.

W on map indicates water chemistry sampling sites.

\* EF - electric fishing.

**GLAS DRUM NNR  
ARGYLL & BUTE**



**NATURE CONSERVANCY COUNCIL**

Site boundary thus

Scale 1:10 000

0 Metres 600

0 Yards 600

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FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY REPORT FOR GLASDRUM NNR

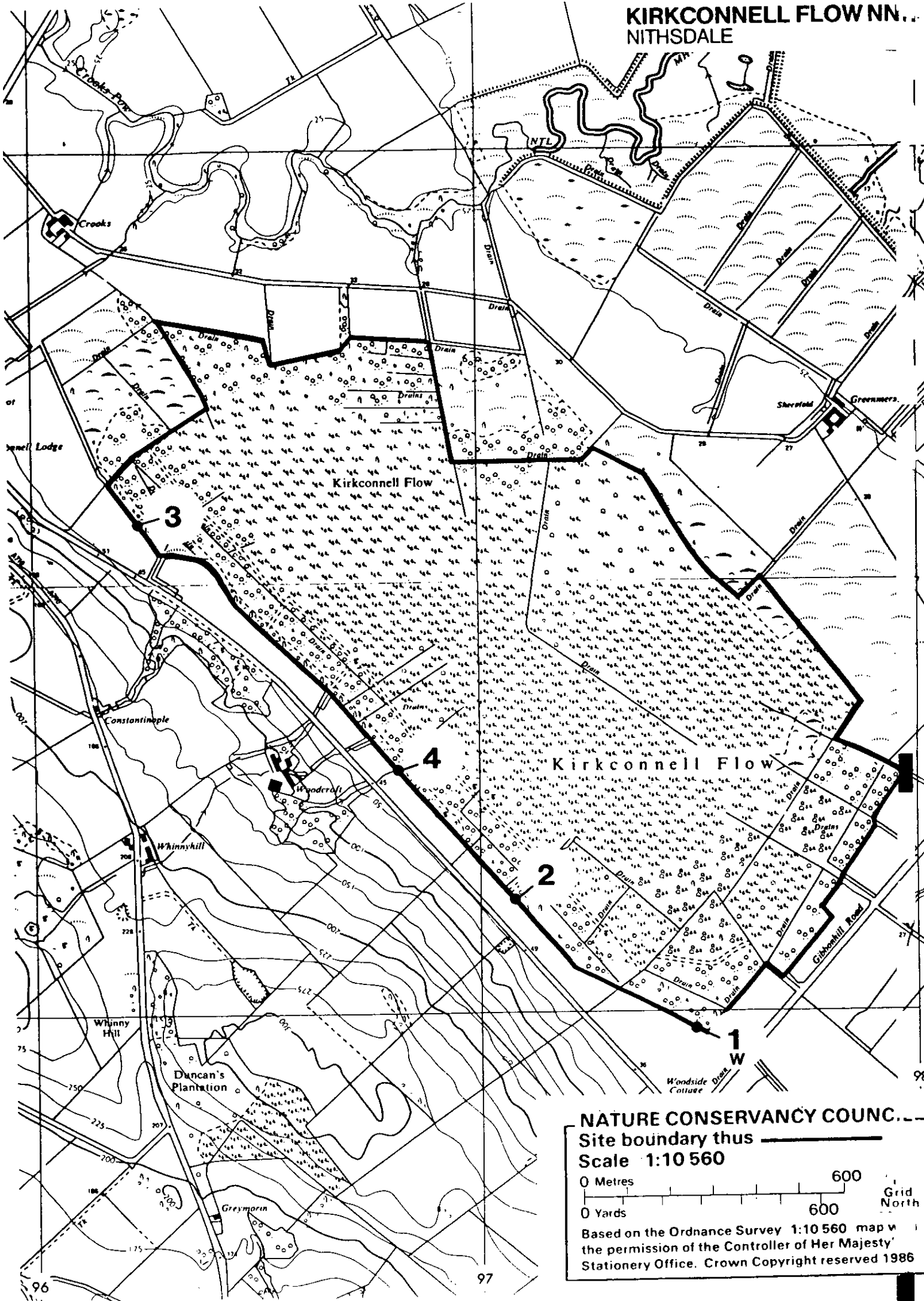
Only three, small, fast flowing streams drain this reserve. Date of survey 26.10.88.




Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Stream NN 002 455	EF 20m	NIL	Trout seen in stream below NNR.
2.	Stream NN 000 454	EF 30m	NIL	
3.	Eas an Daimh NM 995 451	EF 30m	NIL	

W on map indicates water chemistry sampling site.

\* EF - electric fishing.

**KIRKCONNELL FLOW NN.  
NITHSDALE**



**NATURE CONSERVANCY COUNCIL**  
 Site boundary thus   
 Scale 1:10 560  
 0 Metres  600  
 0 Yards  600  
 Grid North  
 Based on the Ordnance Survey 1:10 560 map with the permission of the Controller of Her Majesty's Stationary Office. Crown Copyright reserved 1986

FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY REPORT FOR KIRKCONNEL FLOW NNR

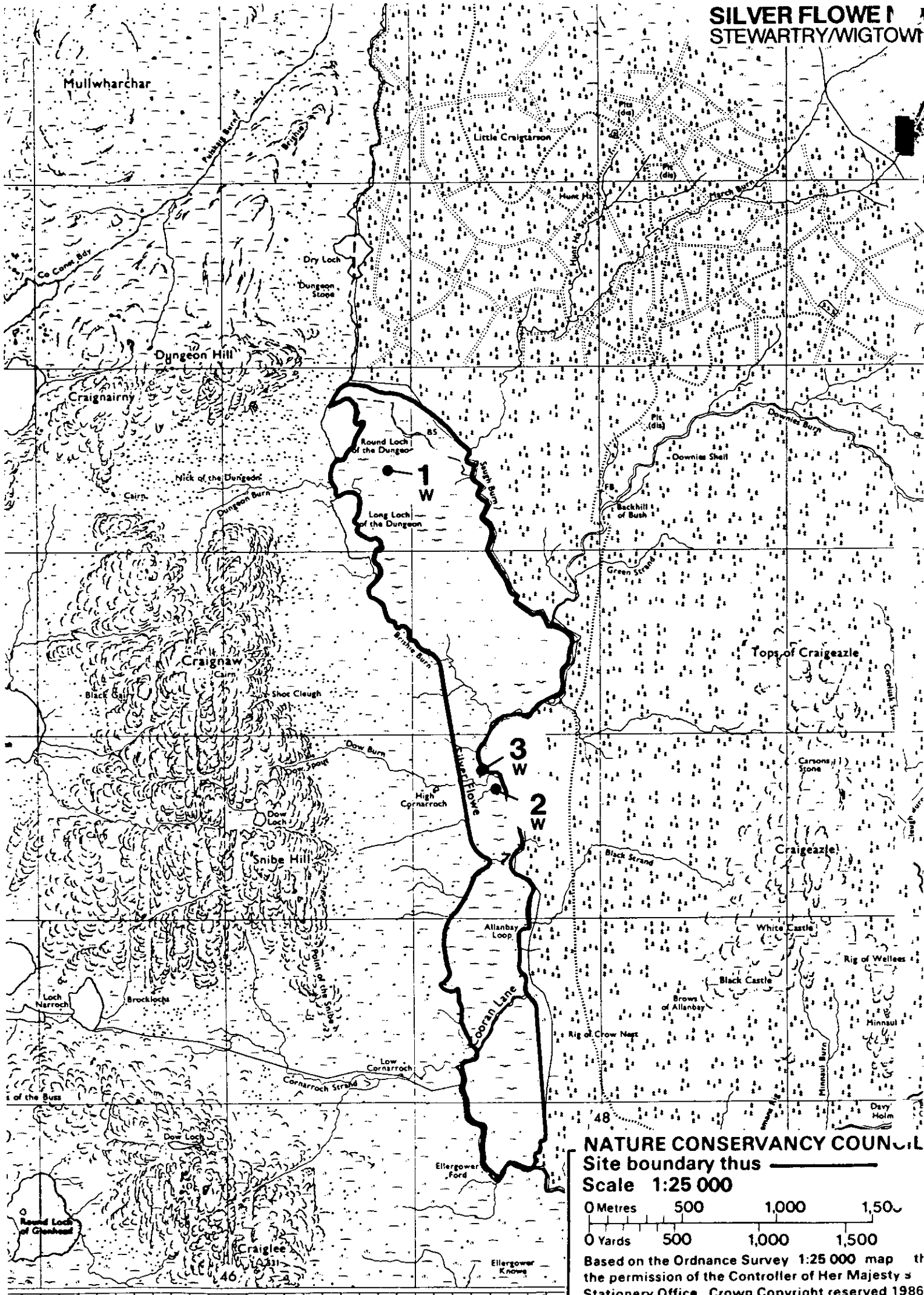
The reserve is drained by numerous small ditches which were heavily overgrown on the first visit in July 1987 which made fishing unsatisfactory. A second visit was therefore undertaken in April 1989. Dates of surveys 29 & 30.7.87, 18.4.89.


Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Drain NX 975 689	EF 35m, HN	NIL	
2.	Drain NX 971 693	EF 5m, HN, T	NIL	
3.	Drain NX 962 702	HN	NIL	Almost dry
4.	Drain NX 968 695 (18.4.89)	EF 50m, HN	1. 3 Sp.Stickleback	

W on map indicates water chemistry sampling sites.

\* EF - electric fishing; HN - hand net; T - trap.

**SILVER FLOWE I  
STEWARTRY/WIGTOWN**



**NATURE CONSERVANCY COUNCIL**  
 Site boundary thus   
 Scale 1:25 000  
 0 Metres 500 1,000 1,500  
 0 Yards 500 1,000 1,500  
 Based on the Ordnance Survey 1:25 000 map with the permission of the Controller of Her Majesty's Stationery Office. Crown Copyright reserved 1986



FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY REPORT FOR SILVER FLOWE NNR

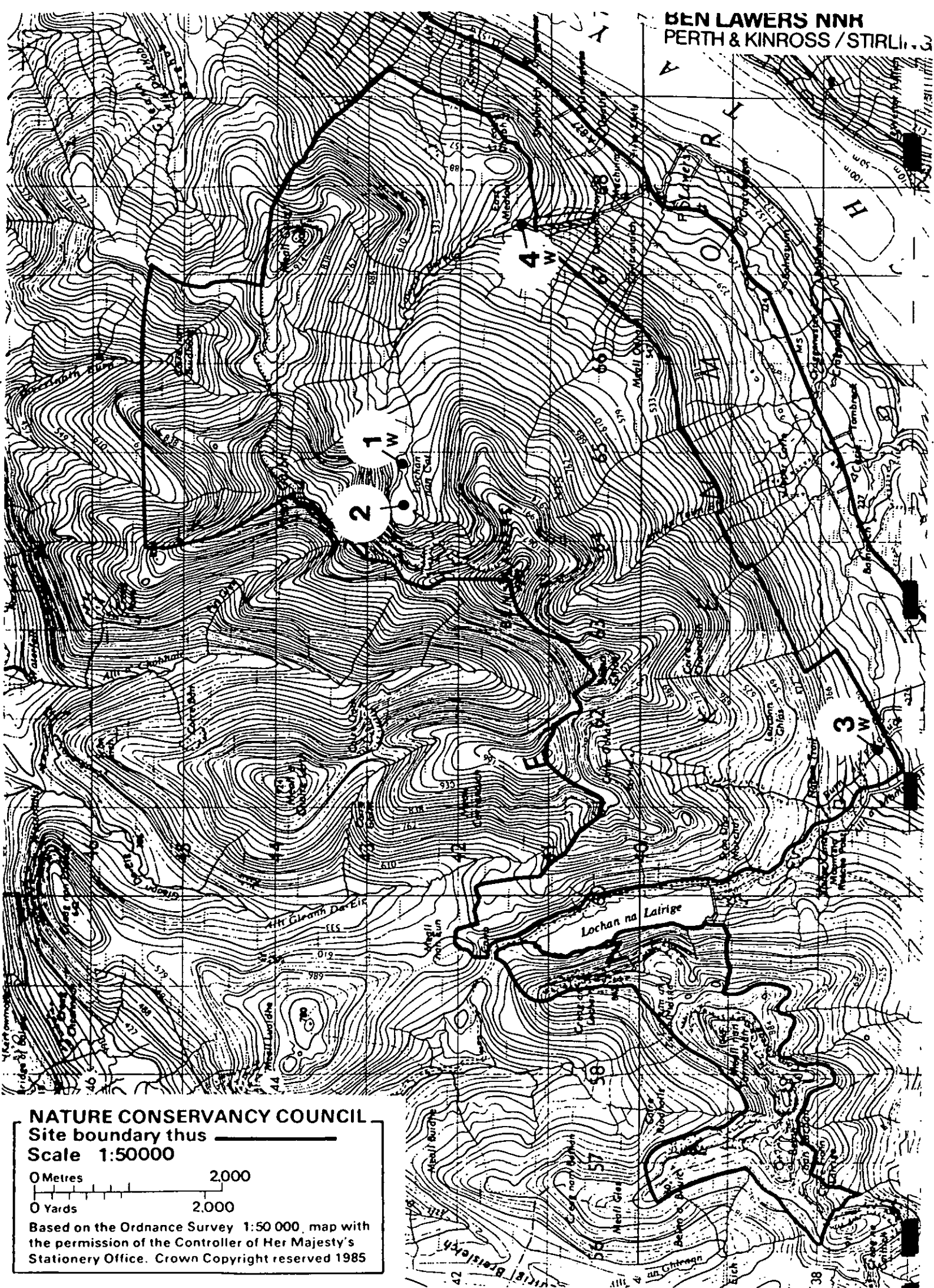
Although the boundaries of this reserve are predominantly fresh waters, there is relatively little within the NNR - these include small peat pools, streams and parts of the Cooran Lane River. Dates of survey 30 & 31.7.87.

Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Pools (4) NX 469 844	EF	NIL	
2.	Pool NX 474 827	GN, EF shore	2. B. Trout	Deformities - due to acidification (see ref below)
3.	Cooran Lane NX 474 828	GN, EF 200m	22. B. Trout	Pike reported in lower regions of this river, also in L.L. of the Dungeon on NNR boundary

W on map indicates water chemistry sampling sites.

\* EF - electric fishing; GN - gill net.

Reference: Lyle, A.A. & Maitland, P.S. (1991). Tail deformities in Brown Trout: A further observation. Scot. Nat. in press.



**NATURE CONSERVANCY COUNCIL**

Site boundary thus 

Scale 1:50000

0 Metres  2000

0 Yards  2000

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FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY REPORT FOR ABERNETHY FOREST NNR

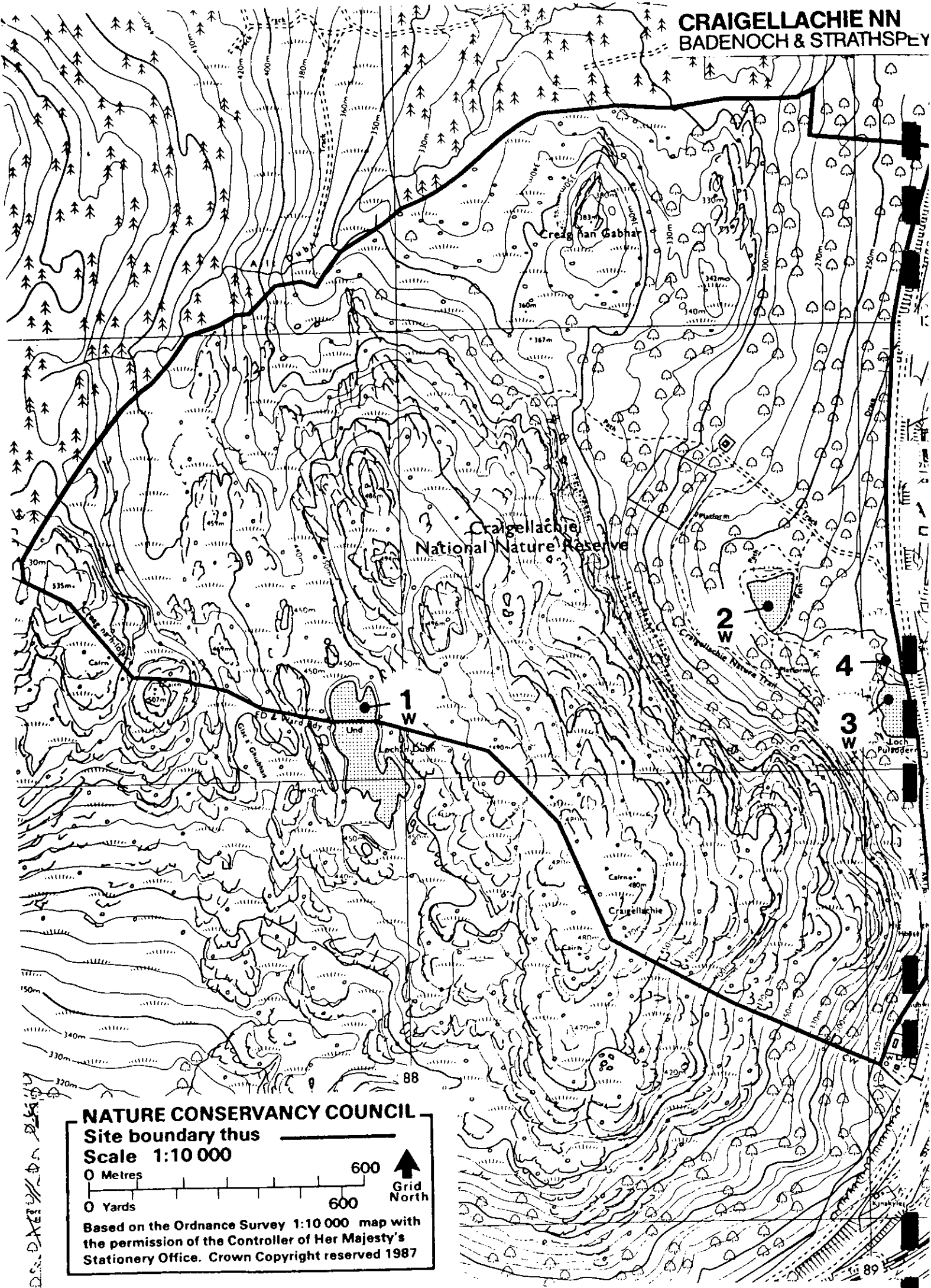
This reserve contains one main river (R. Nethy) and numerous streams. The main standing water is L.a'Chnuic and there are several ponds. These waters have afforested moorland, and mixed catchments and the survey attempted to sample waters with different characteristics. Dates of survey 13 & 14.9.88.





Map No	Site Name & NGR	Method*	Catch	Comment
1.	L.a'Chnuic NJ 047 143	GN x 2	4. B.Trout	Adults - stocked in the past
2.	Faesheallach Burn NJ 053 144	EF 60m	22. B.Trout	Young fish
3.	Crom Allt NJ 029 141	EF 50m	16. B.Trout 4. Lampreys	Young fish
4.	'Forest pond' NJ 028 130	GN,T,EF shore	NIL	
5.	R. Nethy & backwater NJ 021 144  (Note: Salmon presence confirmed by FFL, Pitlochry)	EF 30m EF 30m	21. B.Trout 13. B.Trout/Salmon - 3. Salmon 1. Eel 8. Lampreys	Mostly young fish hence difficulty in identification
6.	'Moor pool' NJ 015 140	GN,T,EF shore	NIL	

W on map; indicates water chemistry sampling sites.

\*GN - gill net; T - trap; EF - electric fishing.

# CRAIGELLACHIE NN BADENOCH & STRATHSPEY



**NATURE CONSERVANCY COUNCIL**  
Site boundary thus   
Scale 1:10 000  
0 Metres  600  Grid North  
0 Yards  600  
Based on the Ordnance Survey 1:10 000 map with  
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FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY REPORT FOR CRAIGELLACHIE NNR

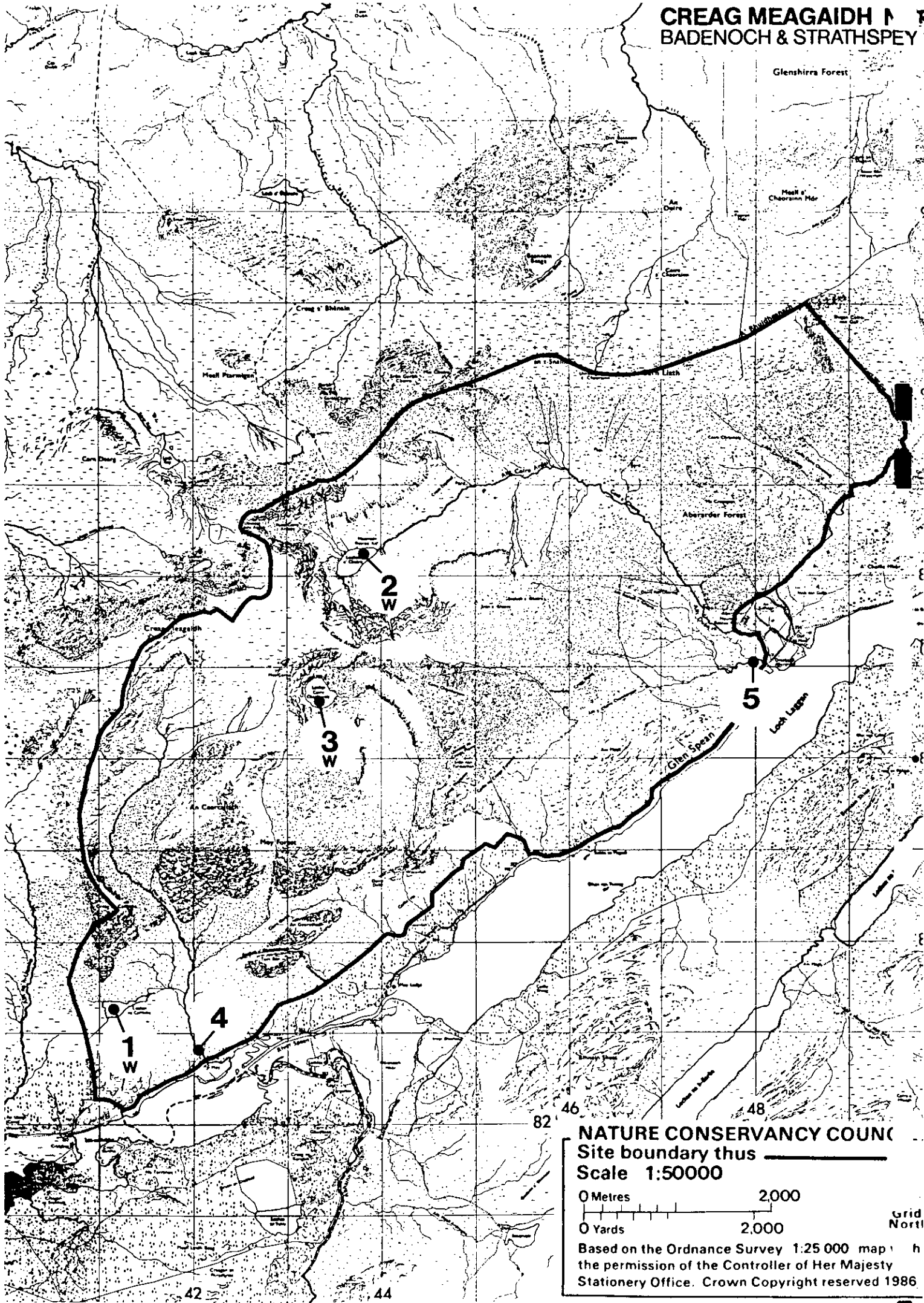
The principal water features are two artificial lochs with an inter-linking stream and woodland catchments, plus the northern part of the high altitude Lochan Dubh. Dates of survey 12 & 13.9.88.

Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Lochan Dubh NH 879 122	GN x 2	NIL	Angled in the past
2.	'Old reservoir' NH 888 124	GN, T, EF shore	4. B.Trout - 3. 3 Sp.Sticklebacks	Adults. Dense macrophyte growth
3.	L. Puladdern NH 891 121	GN, T, EF shore	8. B. Trout - 20. Minnows 2. 3 Sp.Sticklebacks	1 Ferrox
4.	L. Puladdern inflow NH 891 122	EF 10m	6. B.Trout	Young fish

W on map indicates water chemistry sampling sites.

\* GN - gill net; T - trap; EF - electric fishing.

**CREAG MEAGOIDH M<sup>Y</sup>  
BADENOCH & STRATHSPEY**



**NATURE CONSERVANCY COUNCIL**  
 Site boundary thus   
 Scale 1:50000

0 Metres 2000  
 0 Yards 2000

Grid North

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FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY REPORT FOR CREAG MEAGAIDH NNR

This reserve contains three main standing waters, two of which are deep, high altitude corrie lochs. There are numerous large and small, fast flowing streams. Dates of survey 22-25.8.88.

Map No.	Site Name & NGR	Method*	Catch	Comment
1.	L.na Cailliche NN 412 833	GN x 2, FN, EF shore	44. B.Trout	
2.	L.a'Choire NN 438 882	GN x 2	61. B.Trout	Adults but small
3.	L.Coire Choille-rai NN 433 867	GN x 2	NIL	Perhaps too high for trout.
4.	Moy Burn NN 421 828	EF around and in deep pool	7. B. Trout	
5.	Stream NN 480 870	EF 100m in slower areas	2. Lampreys 13. B. Trout 2. Minnows 19. 3 Sp.Sticklebacks	Pike reported to enter from L. Laggan but not found.

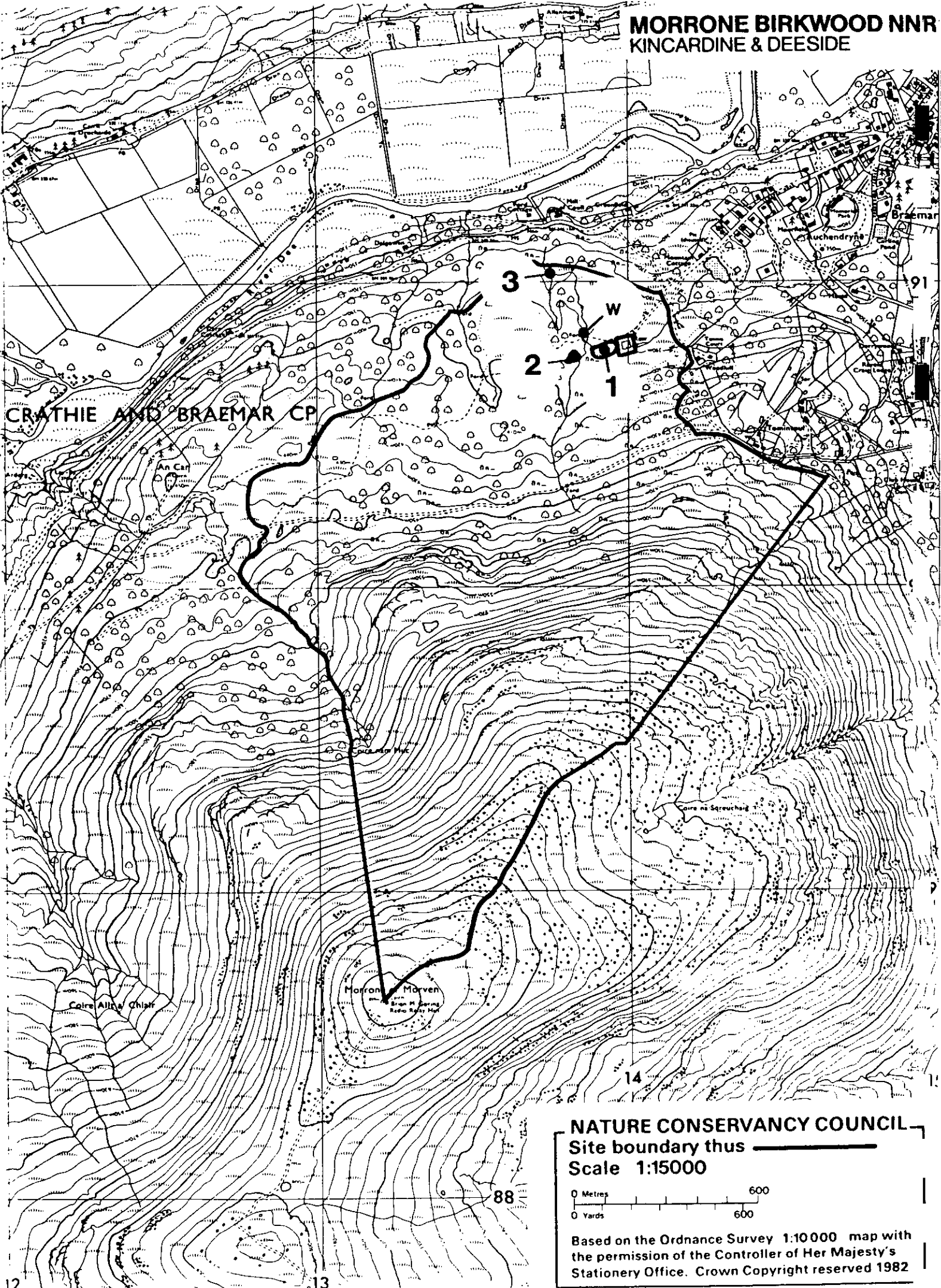
W on map indicates water chemistry sampling sites.

\* GN - gill net; FN - fyke net; EF - electric fishing.



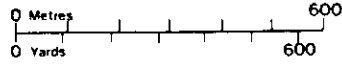
**MORRONE BIRKWOOD NNR**  
KINCARDINE & DEESIDE

CRATHIE AND BRAEMAR CP



**NATURE CONSERVANCY COUNCIL**  
Site boundary thus 

Scale 1:15000



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FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY REPORT FOR MORRONE BIRKWOOD NNR

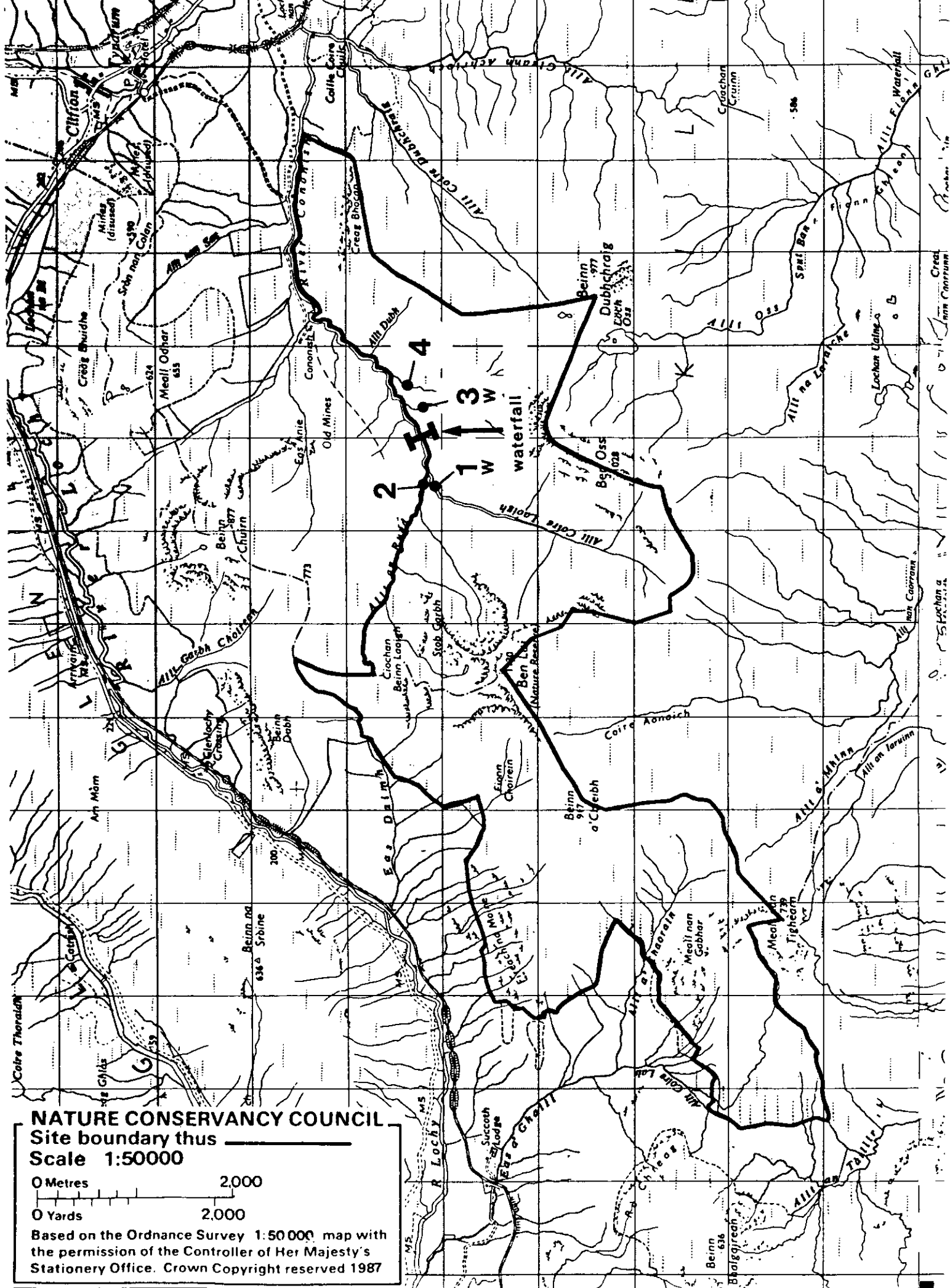
The two upper ponds contain no fish and occasionally dry out. The two ponds adjacent to the reservoir are marked as being excluded from the NNR but were sampled anyway. The main stream was sampled at its lowest point next to the NNR boundary. Date of survey 15.9.88.


Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Pond NO 139 908	EF throughout	5. Eels	Very shallow, silty.
2.	Pond NO 138 908	EF throughout	1. Eel 1. B. Trout	Very shallow, silty. Young
3.	Stream NO 137 911	EF 60m	3. B. Trout	Mixed ages.

W on map indicates water chemistry sampling sites.

\* EF - electric fishing.

# BEN LUI NNR STIRLING/ARGYLL & BUT



**NATURE CONSERVANCY COUNCIL**  
Site boundary thus   
Scale 1:50000

0 Metres 2000  
0 Yards 2000

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FRESHWATER FISH IN NATIONAL NATURE RESERVES  
FIELD SURVEY REPORT FOR BEN LUI NNR

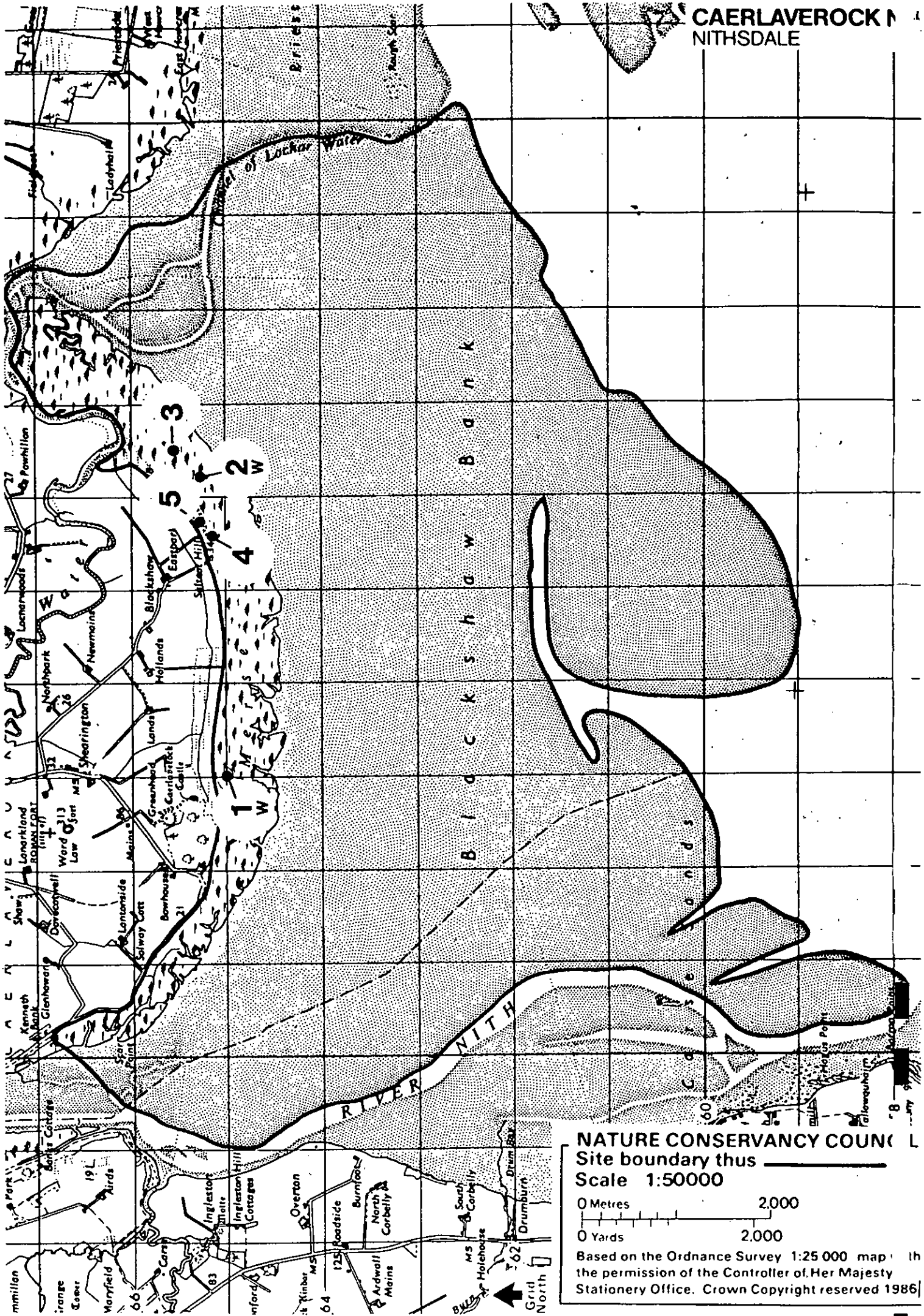
The reserve contains numerous fast flowing mountain streams most of which are unlikely to support fish. Sampling concentrated on the lower areas and on tributaries of the R. Cononish - the south bank of which is the NNR boundary. A substantial waterfall occurs at NN 290 272 - Salmon are known to run up to, but not beyond this point. Sampling was carried out above and below the waterfall. Date of survey 21.6.88.


Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Allt Coire Laoigh NN 285 270	EF 50m	NIL	Above waterfall
2.	Allt an Rund NN 285 272	EF 30m	NIL	Above waterfall
3.	Stream NN 293 274	EF 50m	8. Salmon/B.Trout	Below waterfall
4.	Stream NN 296 274	EF 40m	20. Salmon/B.Trout	Below waterfall

The fish caught at sites 3 and 4 were all young fish hence difficulty in positive identification. It appears that the waterfall is an effective barrier to migratory salmon, and that flows and winter conditions in the upper streams are too severe for other fish.

W on map indicates water chemistry sampling sites.

\* EF - electric fishing



NATURE CONSERVANCY COUNCIL  
Site boundary thus   
Scale 1:50000

0 Metres 2000  
0 Yards 2000

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FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY REPORT FOR CAERLAVEROCK NNR

There are a large number of shallow freshwater/brackish pools and streams within the reserve boundary. Dates of surveys 30.7.87 and 29.8.87.

Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Small pools and streams at NY 030 650 (30.7.87)	EF, HN	2. 3 Sp.Stickleback 26. 10 Sp.Stickleback 5. Common Goby	
2.	Pool NY 063 653	EF, HN	3. 3 Sp.Stickleback 5. 10 Sp.Stickleback 24. Common Goby	
3.	Pool NY 065 655	EF, HN	39. 10 Sp.Stickleback 4. Common Goby	
4.	Sm. Pool NY 056 652	EF, HN	NIL	
5.	Sm. Pool NY 057 653	EF, HN	11. 10 Sp.Stickleback	

Note: Salmon, Trout, Flounder, Plaice, Eels and Sea Lampreys are caught in nets offshore but within the NNR boundary (Warden).

W on map indicates water chemistry sampling sites

\* EF - electric fishing; HN - hand net.

# NATURE CONSERVANCY COUNCIL

Site boundary thus 

Scale 1:10 000

0 Metres

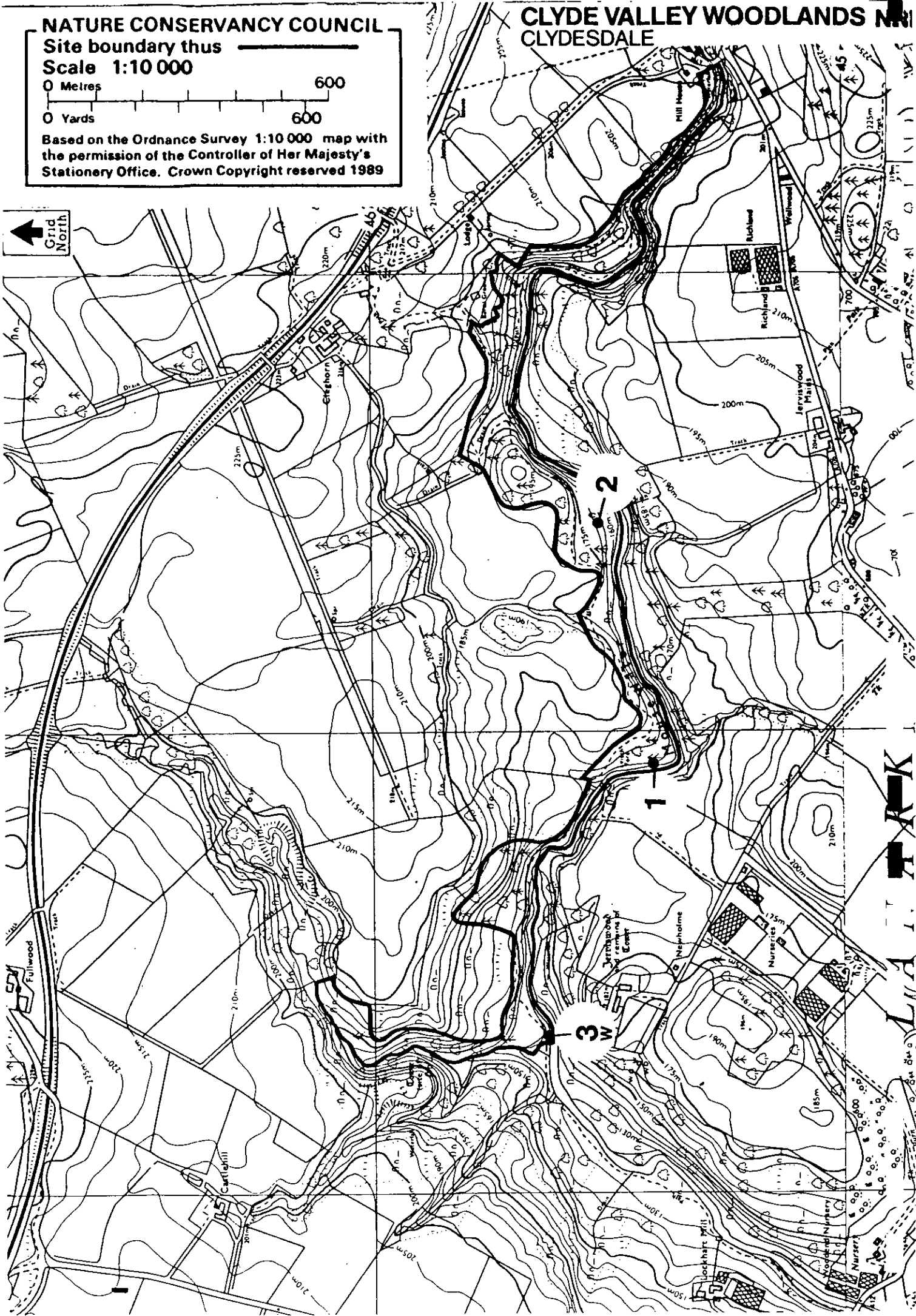
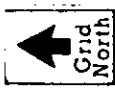
600

0 Yards

600

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# CLYDE VALLEY WOODLANDS NNR CLYDESDALE



LA TARK

FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY FOR CLYDE VALLEY WOODLANDS NNR

The Mouse Water (river) runs through the reserve and was in full flow at the time of sampling. Three separate sections were sampled containing different habitat types. Date of survey 4.5.88.

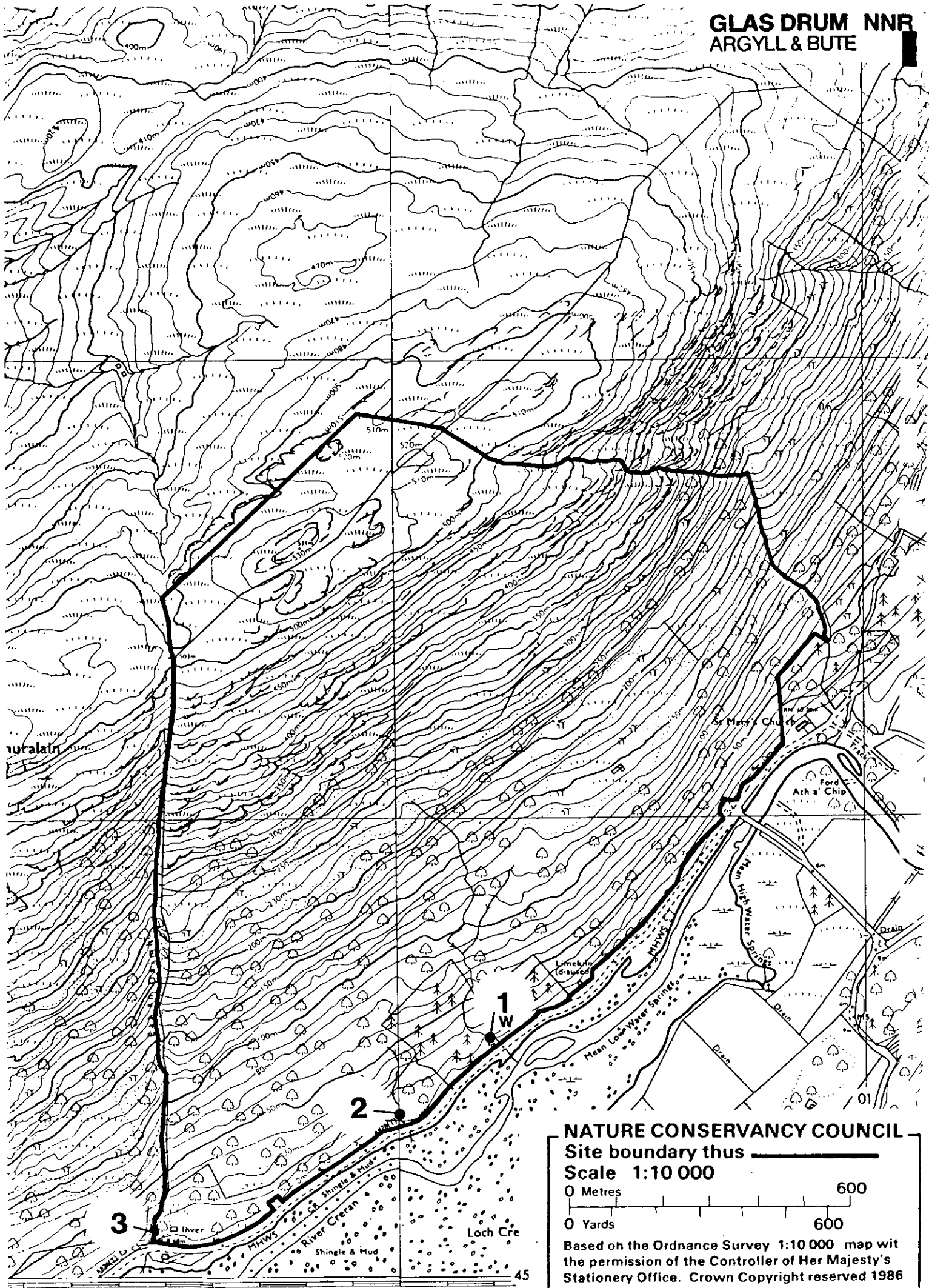
Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Mouse Water NS 889 444	EF 120m	1. B. Trout 8. Stone Loach 1. Minnow	
2.	Mouse Water NS 895 445	EF 150m	9. B. Trout 16. Stone Loach 76. Minnow 1. 3 Sp. Stickleback	
3.	Mouse Water NS 883 446	EF 90m	7. B. Trout 13. Stone Loach 12. Minnow	

Note: Grayling are believed to be likely here by Clyde River Purification Board and FFL, Pitlochry, but none were found during this survey.

W on map indicates water chemistry sampling sites.

\* EF - electric fishing.

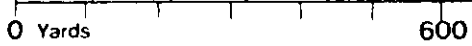
**GLAS DRUM NNR**  
**ARGYLL & BUTE**



**NATURE CONSERVANCY COUNCIL**  
 Site boundary thus 

Scale 1:10 000

0 Metres  600

0 Yards  600

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FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY REPORT FOR GLASDRUM NNR

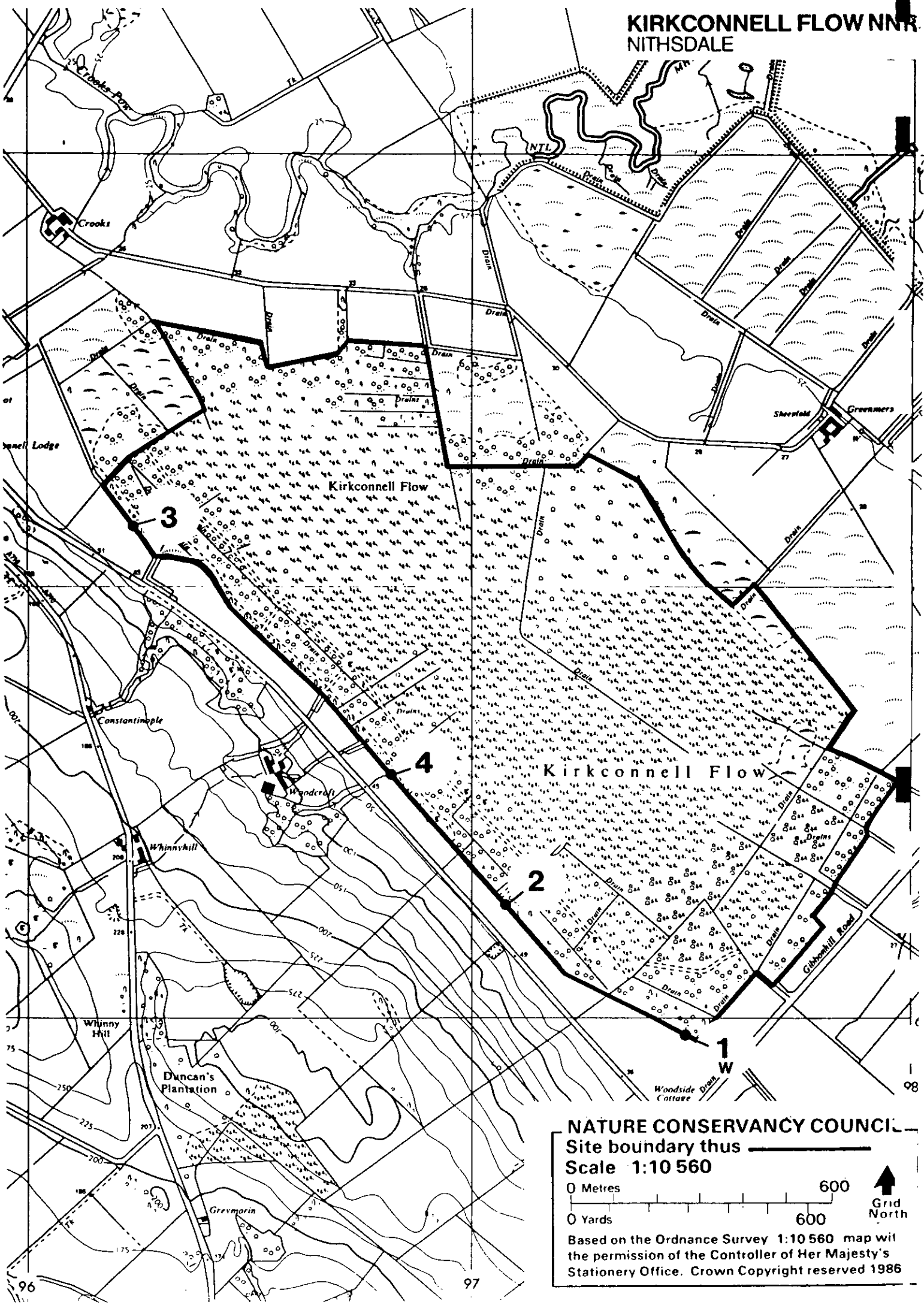
Only three, small, fast flowing streams drain this reserve. Date of survey 26.10.88.


Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Stream NN 002 455	EF 20m	NIL	Trout seen in stream below NNR.
2.	Stream NN 000 454	EF 30m	NIL	
3.	Eas an Daimh NM 995 451	EF 30m	NIL	


W on map indicates water chemistry sampling site.

\* EF - electric fishing.

# KIRKCONNELL FLOW NNR NITHSDALE



**NATURE CONSERVANCY COUNCIL**  
Site boundary thus   
Scale 1:10 560

0 Metres 600  
0 Yards 600   
Grid North

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FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY REPORT FOR KIRKCONNEL FLOW NNR

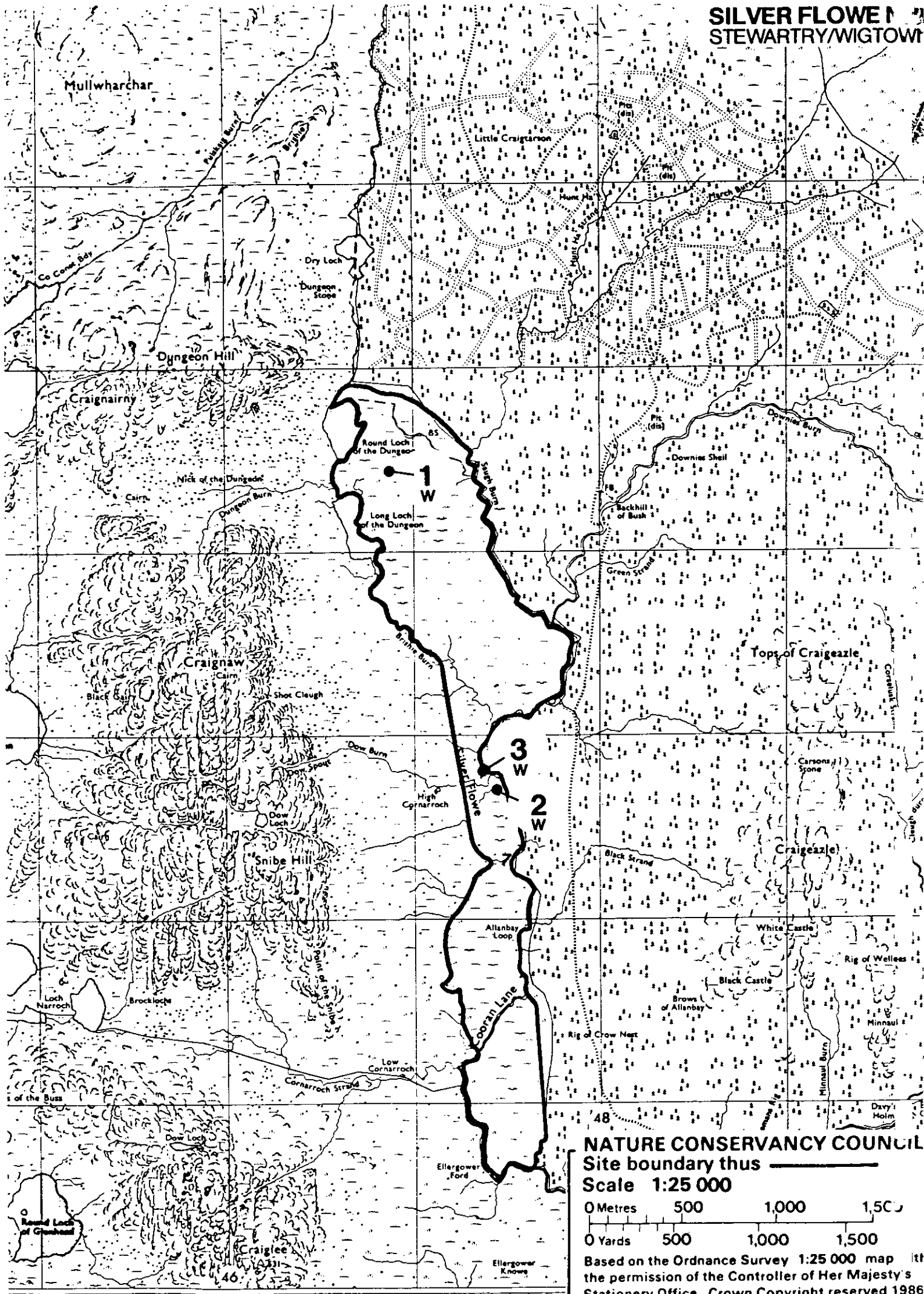
The reserve is drained by numerous small ditches which were heavily overgrown on the first visit in July 1987 which made fishing unsatisfactory. A second visit was therefore undertaken in April 1989. Dates of surveys 29 & 30.7.87, 18.4.89.


Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Drain NX 975 689	EF 35m, HN	NIL	
2.	Drain NX 971 693	EF 5m, HN, T	NIL	
3.	Drain NX 962 702	HN	NIL	Almost dry
4.	Drain NX 968 695 (18.4.89)	EF 50m, HN	1. 3 Sp.Stickleback	

W on map indicates water chemistry sampling sites.

\* EF - electric fishing; HN - hand net; T - trap.

**SILVER FLOWE N  
STEWARTRY/WIGTOWN**



**NATURE CONSERVANCY COUNCIL**  
 Site boundary thus   
 Scale 1:25 000  
 0 Metres 500 1,000 1,500  
 0 Yards 500 1,000 1,500  
 Based on the Ordnance Survey 1:25 000 map with the permission of the Controller of Her Majesty's Stationery Office. Crown Copyright reserved 1986

FRESHWATER FISH IN NATIONAL NATURE RESERVES  
FIELD SURVEY REPORT FOR SILVER FLOWE NNR

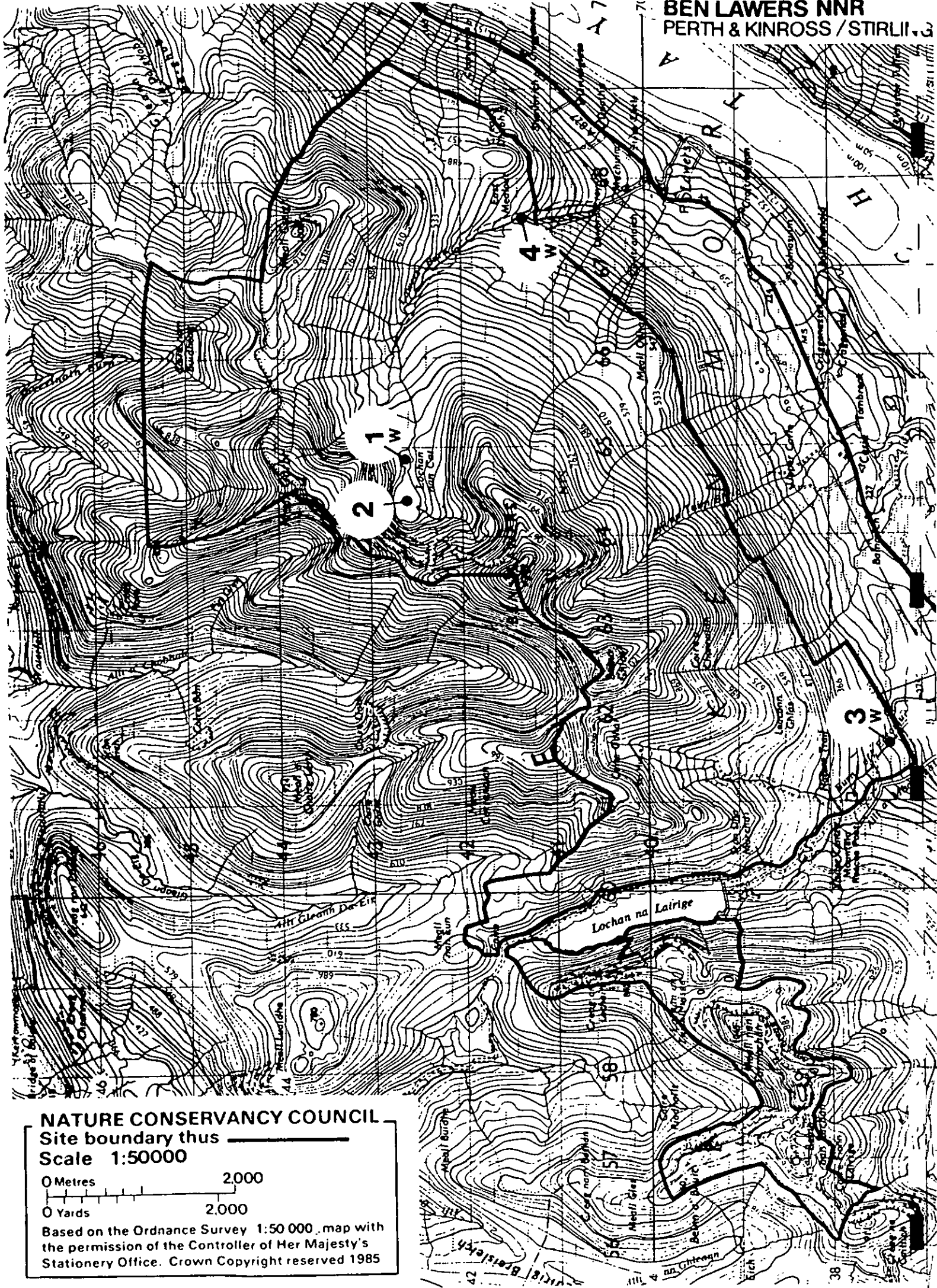
Although the boundaries of this reserve are predominantly fresh waters, there is relatively little within the NNR - these include small peat pools, streams and parts of the Cooran Lane River. Dates of survey 30 & 31.7.87.

Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Pools (4) NX 469 844	EF	NIL	
2.	Pool NX 474 827	GN, EF shore	2. B. Trout	Deformities - due to acidification (see ref below)
3.	Cooran Lane NX 474 828	GN, EF 200m	22. B. Trout	Pike reported in lower regions of this river, also in L.L. of the Dungeon on NNR boundary

W on map indicates water chemistry sampling sites.

\* EF - electric fishing; GN - gill net.

Reference: Lyle, A.A. & Maitland, P.S. (1991). Tail deformities in Brown Trout: A further observation. Scot. Nat. in press.



**NATURE CONSERVANCY COUNCIL**

Site boundary thus **—————**

Scale 1:50000

0 Metres 2000

0 Yards 2000

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FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY REPORT FOR BEN LAWYERS NNR

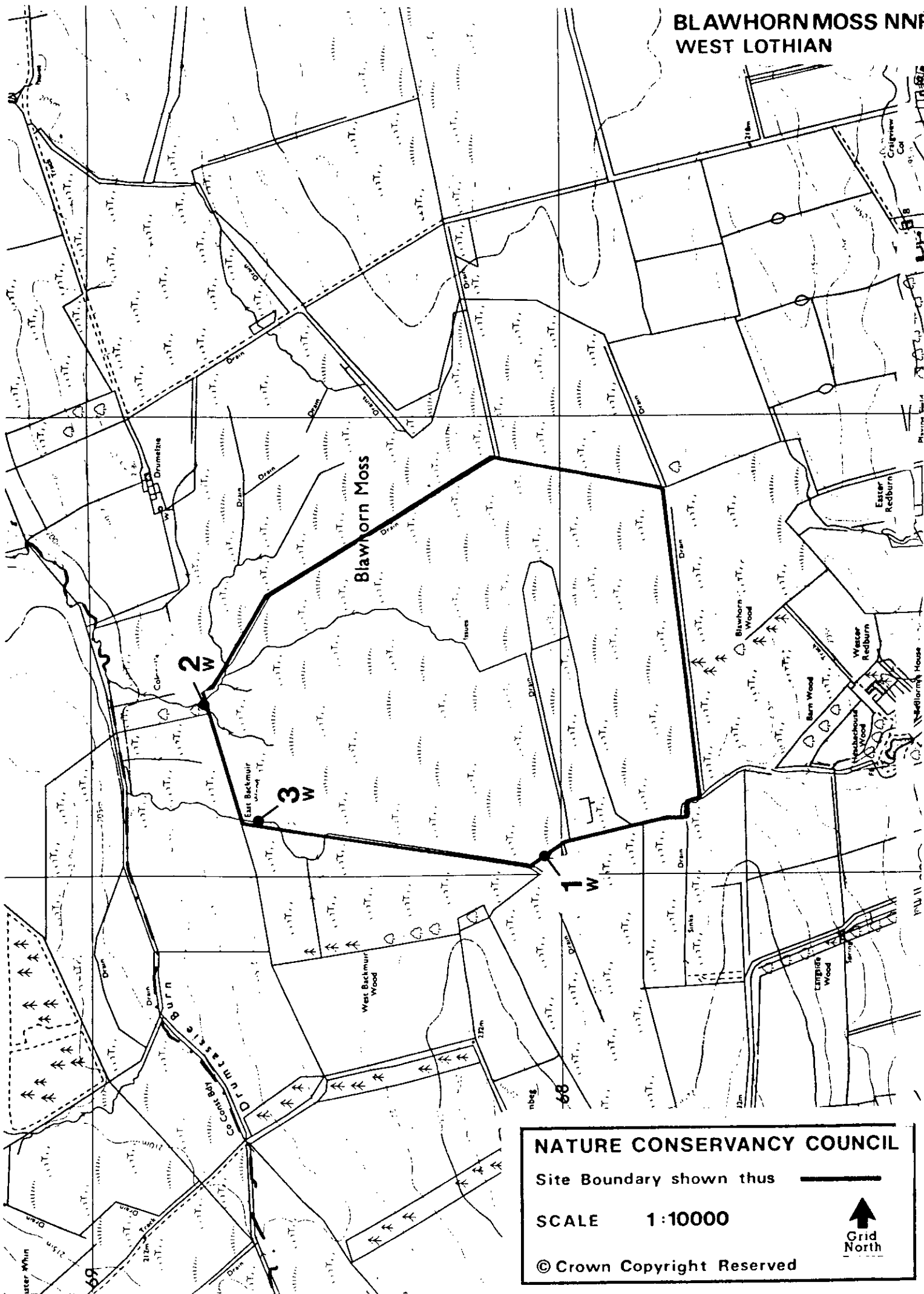
The reserve features a number of fast flowing streams, the larger two - Burn of Edramucky and Lawers Burn - were sampled. There is also a deep, high altitude corrie loch, Lochan nan Cat, which runs in the shallower Lochan nan Uan - these were also sampled. Dates of survey 22 & 23.6.88.



Map No.	Site Name & NGR	Method*	Catch	Comment
1.	L.nan Uan NN 649 426	GN	23. B. Trout	
2.	L.nan Cat NN 645 426	GN x 2	65. B. Trout	
3.	B. of Edramucky NN 617 373	EF 50m	NIL	
4.	Lawers Burn NN 676 412	EF 35m	9. B. Trout	

w on map indicates water chemistry sampling sites.

\* GN - gill net; EF - electric fishing.

**BLAWHORN MOSS NNF  
WEST LoTHIAN**



**NATURE CONSERVANCY COUNCIL**  
Site Boundary shown thus   
**SCALE 1:10000**  
 Grid North  
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FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY REPORT FOR BLAWHORN MOSS\_NNR

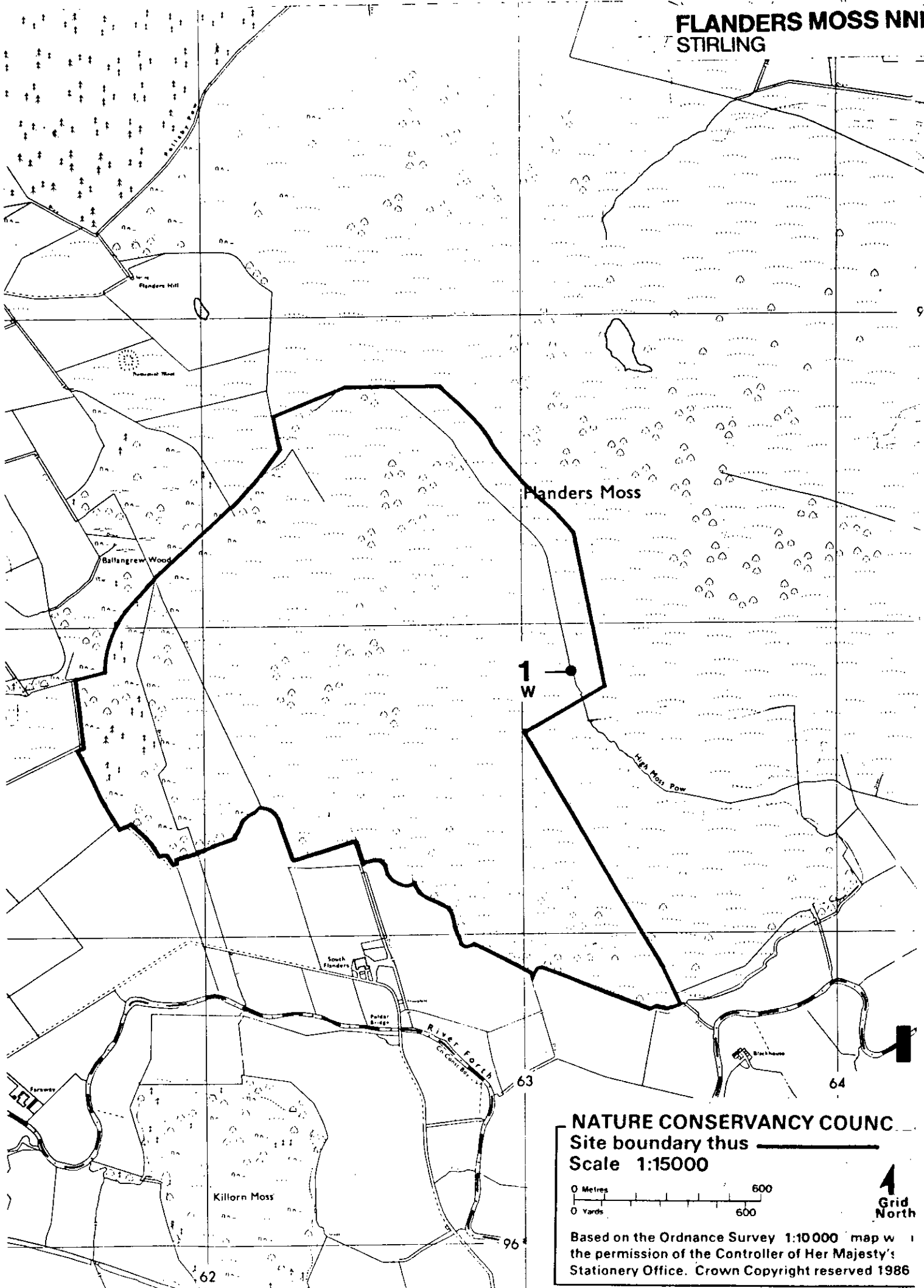
A pond, which is not marked on the map, now exists on the southern reserve boundary. The stream(s) which exit the reserve on the western boundary are mostly overgrown, so sampling also took place just outside the NNR. Date of survey 5.5.88.

Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Pond NS 880 680	GN (2hrs) EF shore	26. Perch	Mature but small
2.	Stream NS 884 688	EF 50m	NIL	
3.	Ditch NS 881 687	EF 40m	NIL	

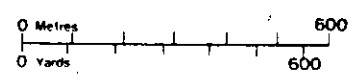
W on map indicates water chemistry sampling sites.

\* GN - gill net; EF - electric fishing.

**FLANDERS MOSS NNI  
STIRLING**



**NATURE CONSERVANCY COUNCIL**  
Site boundary thus   
Scale 1:15000



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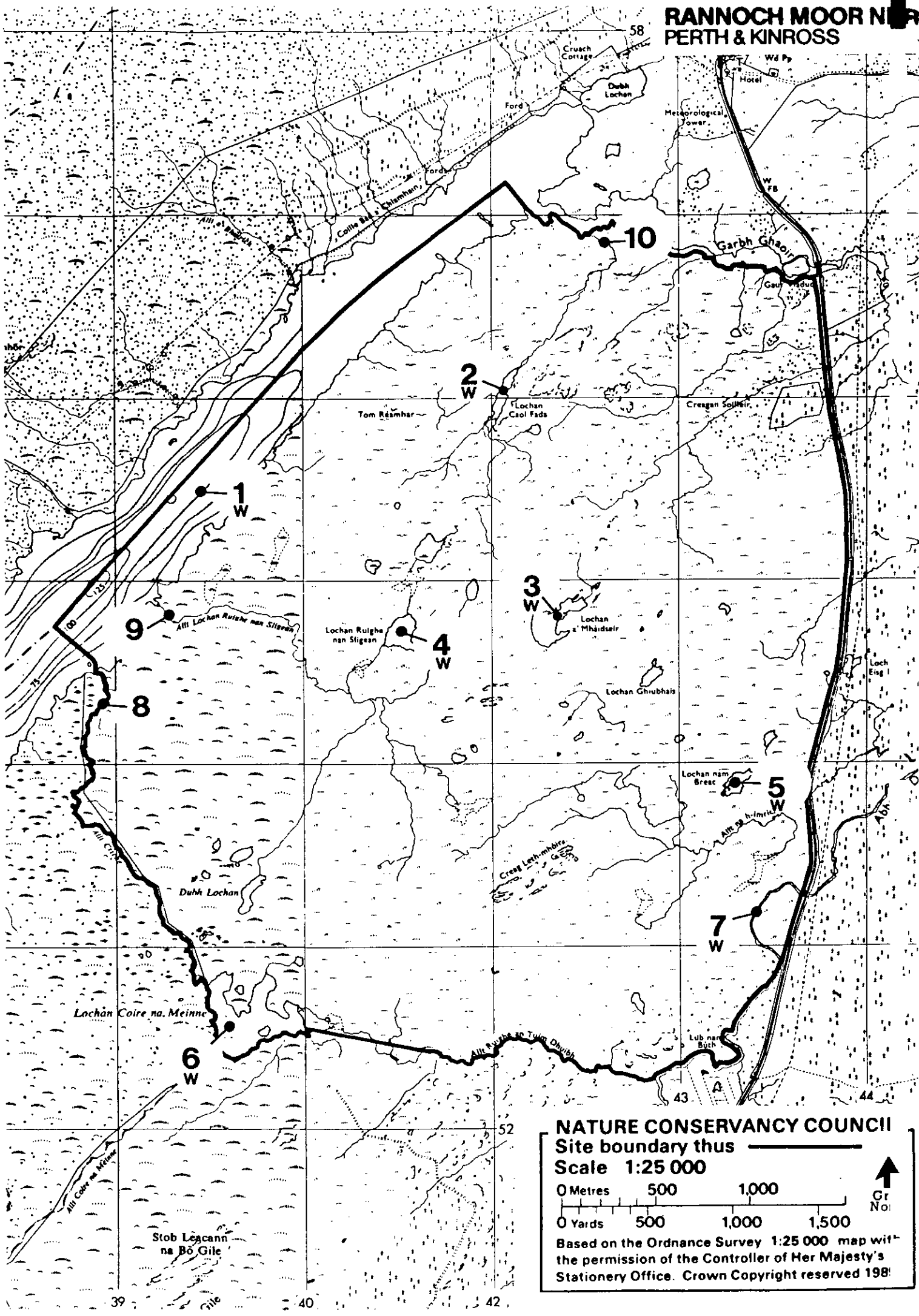
FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY REPORT FOR FLANDERS MOSS NNR


The only water here is a single ditch which leads into High Moss Pow. Date of survey 13.5.88.


Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Ditch NS 632 978	EF 170m	NIL	

W on map indicates water chemistry sampling site.

\* EF - electric fishing.



**NATURE CONSERVANCY COUNCIL**  
**Site boundary thus**   
**Scale 1:25 000**

0 Metres 500 1,000   
 0 Yards 500 1,000 1,500 Gr No

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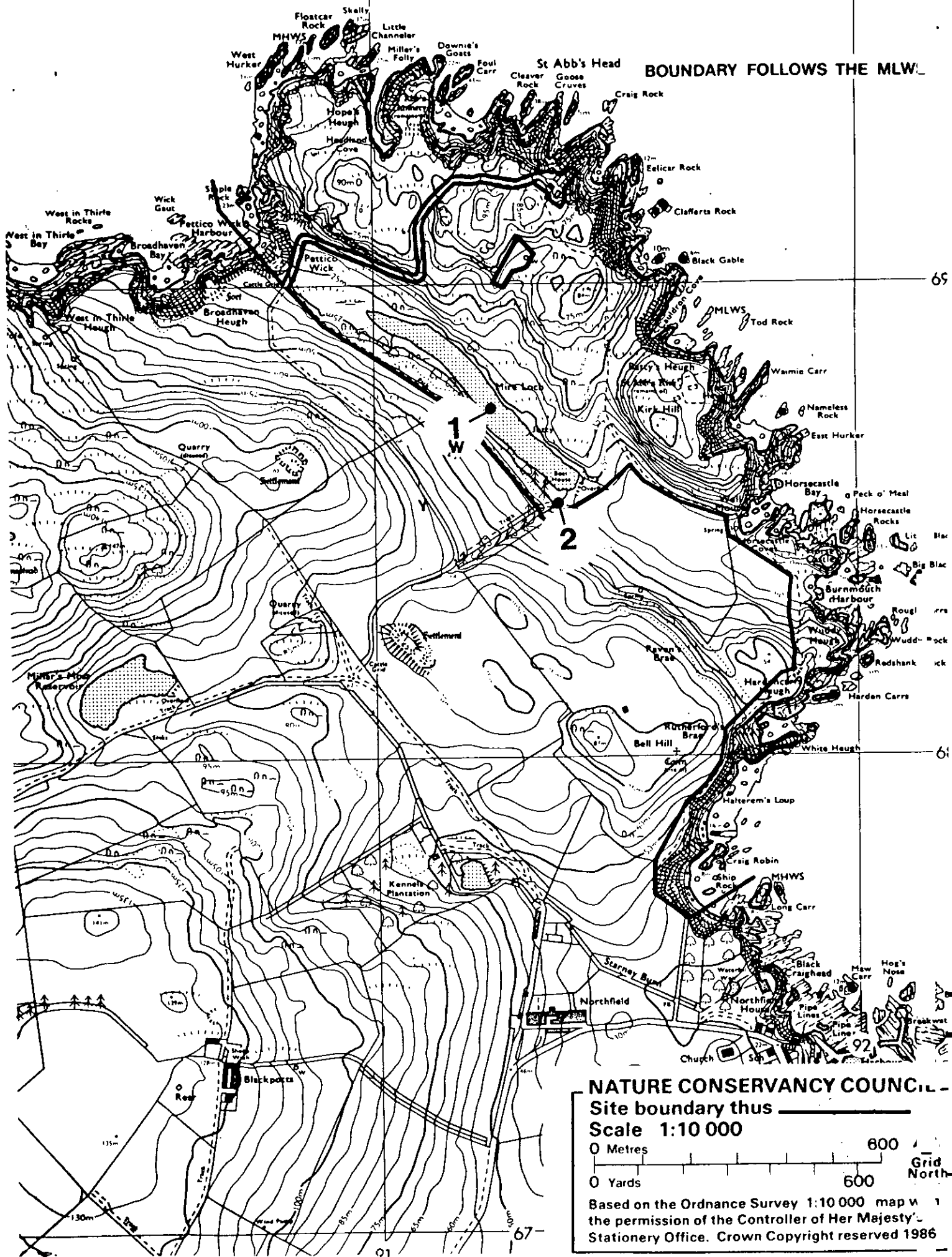
FRESHWATER FISH IN NATIONAL NATURE RESERVES  
FIELD SURVEY REPORT FOR RANNOCH MOOR NNR

This reserve contains numerous small lochans and streams, and a section of the large and deep Loch Laidon. Other than in size and shape there is little difference in the characteristics of the lochans but the survey attempted to show the distribution of fish throughout the reserve. Dates of survey 23-26.5.88.

Map No.	Site Name & NGR	Method*	Catch	Comment
1.	L.Laidon NN 394 554	GN x 4, FN, T x 2	97. B. Trout 11. Perch	2 nets were set in deep water for Arctic Charr but caught no fish at all.
2.	L. Caol Fada NN 411 560	GN	18. B. Trout	
3.	L.a'Mhaidser NN 413 547	GN	13. B. Trout	
4.	L. Ruighe nan Sligean NN 405 547	GN	16. B. Trout	
5.	L.nam Breac NN 423 539	GN	17. B. Trout	
6.	L. Coire na Meinne NN 396 526	GN	90. B. Trout	
7.	Abhainn Dubhie NN 424 532	GN, EF 10m	33. B. Trout	
8.	Allt Criche NN 389 544	EF 80m	9. B. Trout 65. Minnows 1. 3 Sp. Stickleback	
9.	Allt. L.R. nan Sligean NN 393 548	EF 70m	12. B. Trout 10. Minnows	
10.	Stream at NN 416 568	EF 50m	10. Minnows 13. 3 Sp. Sticklebacks	

Note: Brown trout are extensive and numerous at the reserve. They are mostly small fish but occasional feroc occur. W on map indicates water chemistry sampling sites. \* GN - gill net; FN - fyke net; T - traps; EF - electric fishing.

BOUNDARY FOLLOWS THE MLW



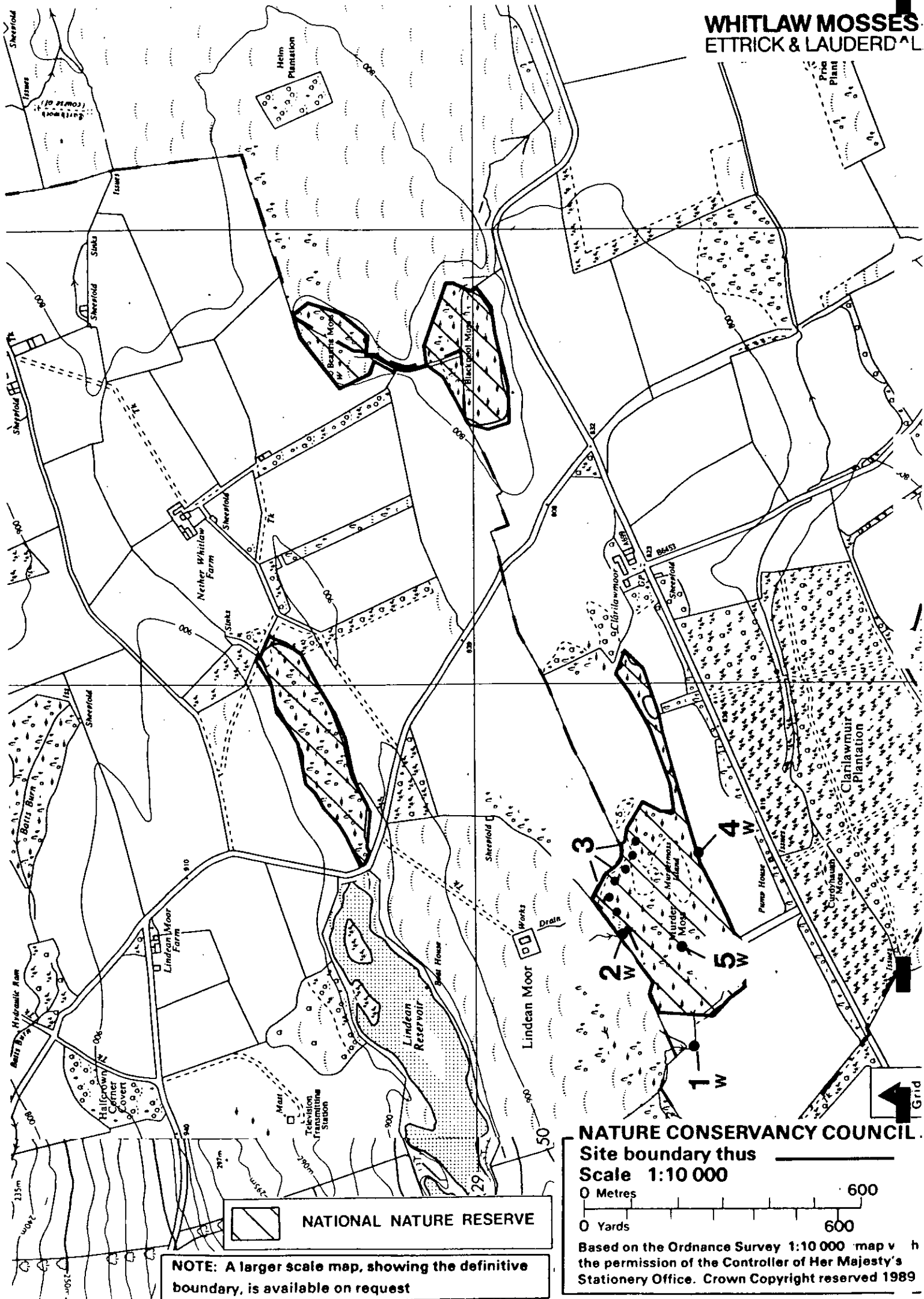
FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY REPORT FOR ST ABBS HEAD NNR

The artificially constructed Mire Loch is the only significant water here, although there is a very small inflow stream - the outflow is piped. Stocked with B. Trout in the past, these are now believed to be extinct. Dates of survey 25.6.87, 17 & 18.8.87.

Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Mire Loch NT 912 687	GN (2 hrs) FN, T x 4 EF shore	40. Perch 2. 3 Sp. Stickleback	Net patrolled to keep off wild fowl
2.	Stream NT 914 685	EF 20m	NIL	Eels reported to have been caught in recent years but none found during survey.

W on map indicates water chemistry sampling site.

\* GN - gill net; FN - fyke net; T - traps; EF - electric fishing.



**NOTE: A larger scale map, showing the definitive boundary, is available on request**

 **NATIONAL NATURE RESERVE**

**NATURE CONSERVANCY COUNCIL**

**Site boundary thus**

**Scale 1:10 000**

0 Metres 600

0 Yards 600

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FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY REPORT FOR WHITLAW MOSSES NNR

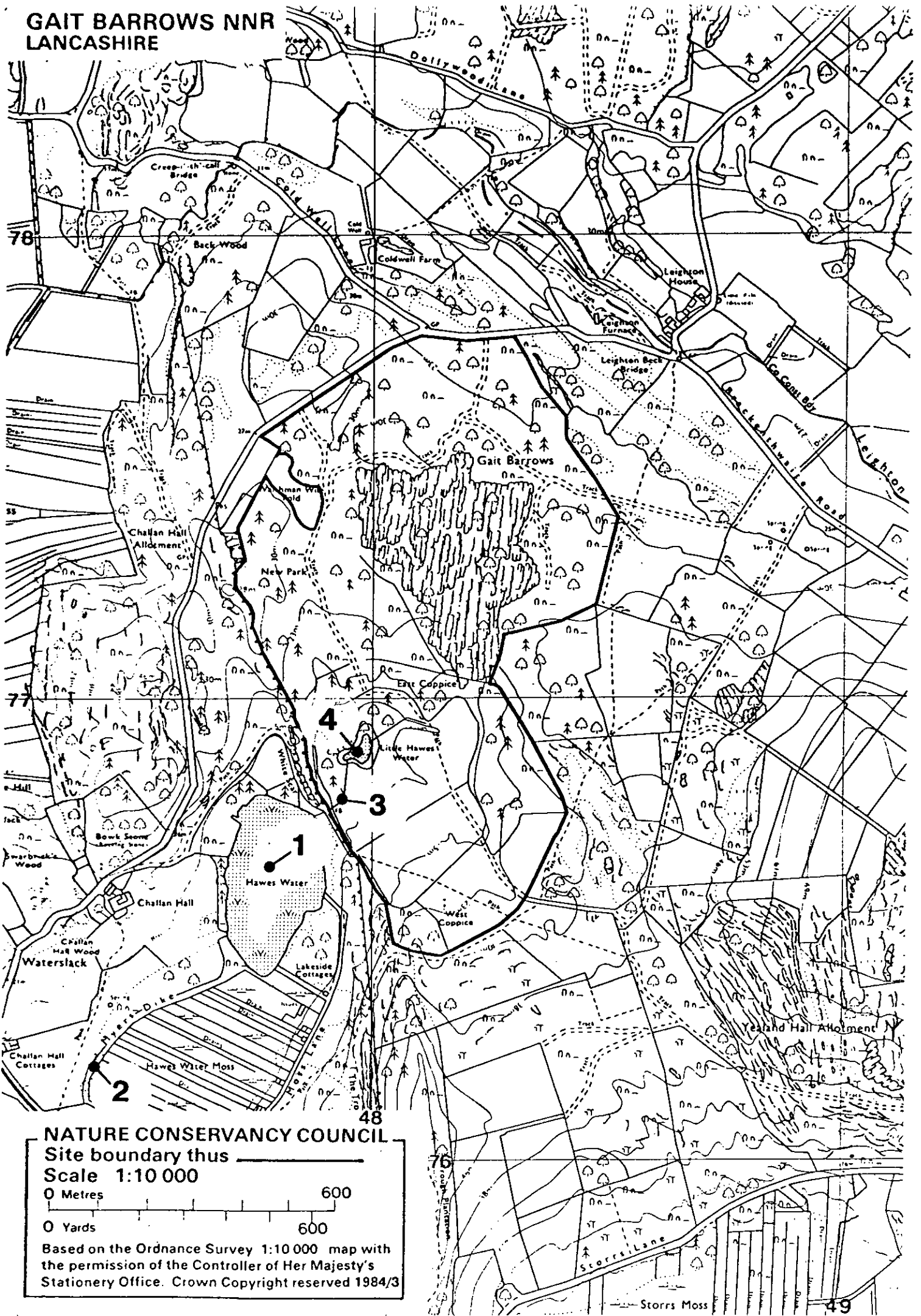
The survey concentrated solely on the waters in Murder Moss where there are numerous, very small pools around the periphery of the north and east boundaries, plus larger pools within the reserve. None of these are shown on the accompanying map. Inlet and outlet streams were also sampled. Date of survey 9.7.87.


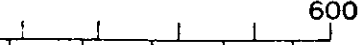

Map No.	Site Name & NGR	Method*	Catch	Comment
1.	W inflow NT 502 285	EF 50m	6. 3 Sp. Stickleback	
2.	NE inflow NT 504 287	EF 10m	4. 3 Sp. Stickleback	
3.	'Peripheral pools' (6) NT 505 287	EF	n. 3 Sp. Stickleback	Fish easily seen, only a few caught for identification
4.	Outflow NT 506 285	EF	25. 3 Sp. Stickleback 4. B. Trout	
5.	Central pool (largest) NT 504 286	EF, GN (2 hrs)	3. Pike 1. Eel	

W on map indicates water chemistry sampling sites.

\* EF - electric fishing; GN - gill net.

# GAIT BARROWS NNR LANCASHIRE



**NATURE CONSERVANCY COUNCIL**  
 Site boundary thus   
 Scale 1:10 000  
 0 Metres  600  
 0 Yards  600  
 Based on the Ordnance Survey 1:10 000 map with  
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FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY REPORT FOR GAIT BARROWS NNR

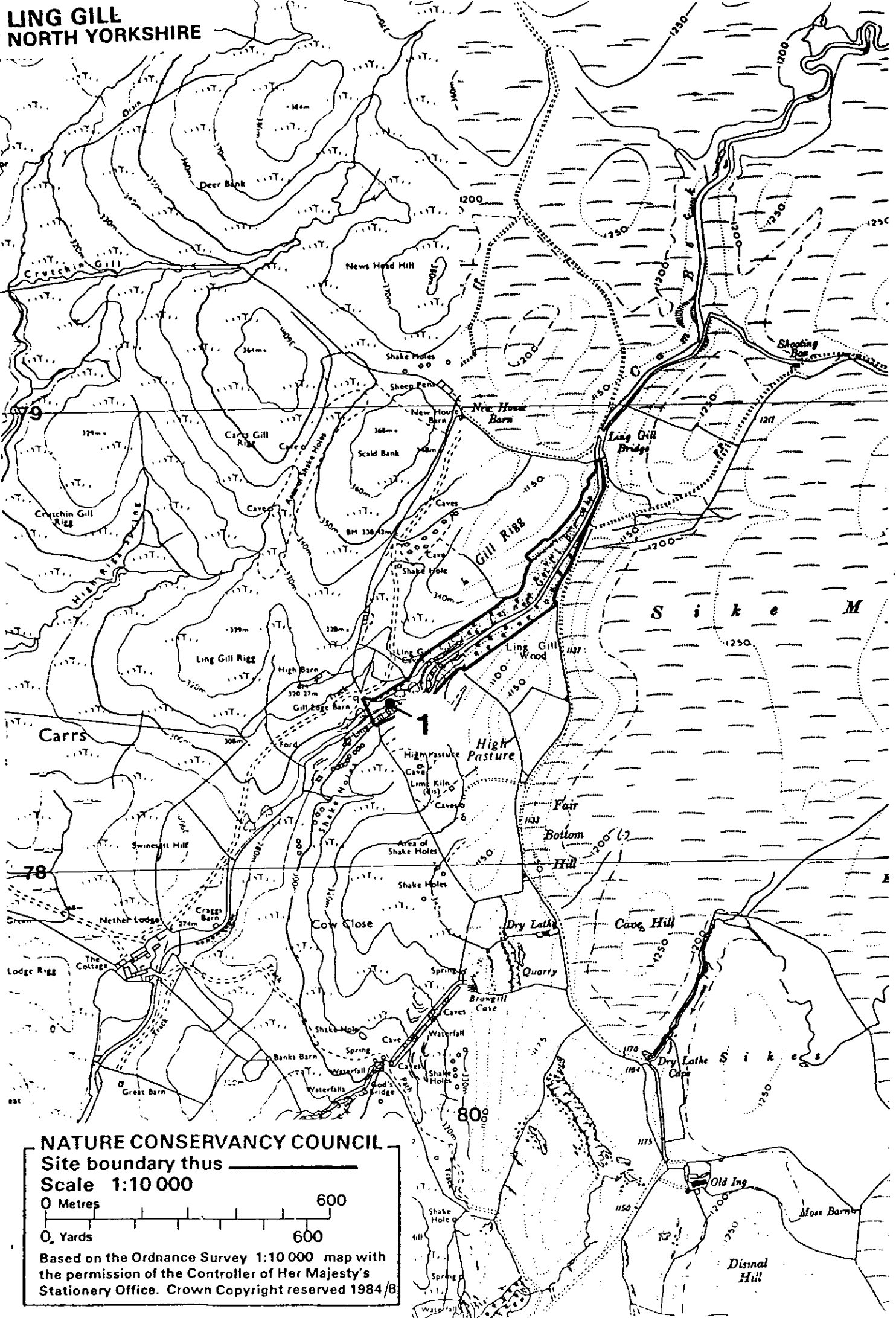
The NNR has recently been extended and now includes Hawes Water, Little Hawes Water, which is spring fed, and associated streams. No information on fish was previously available. Dates of survey 21 & 22.9.89.

Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Hawes Water SD 478 766	GN x 3, EF shore, HN, T	1. Tench 1. Pike 20. Perch 9. Roach 1. Eel	Eel damage to some fish in the nets.
2.	Outflow at SD 474 762	EF 20m	Eels	
3.	Stream at SD 479 768	EF 20m	Eels	
4.	Little Hawes Water SD 480 769	EF shore	Eels	

Note: A survey by Dr P Byle of the outflow earlier in 1989 also produced only eels.

\* GN - gill net; EF - electric fishing; HN - hand net; T - trap.

# LING GILL NORTH YORKSHIRE



**NATURE CONSERVANCY COUNCIL**

Site boundary thus

Scale 1:10 000

0 Metres

600

0 Yards

600

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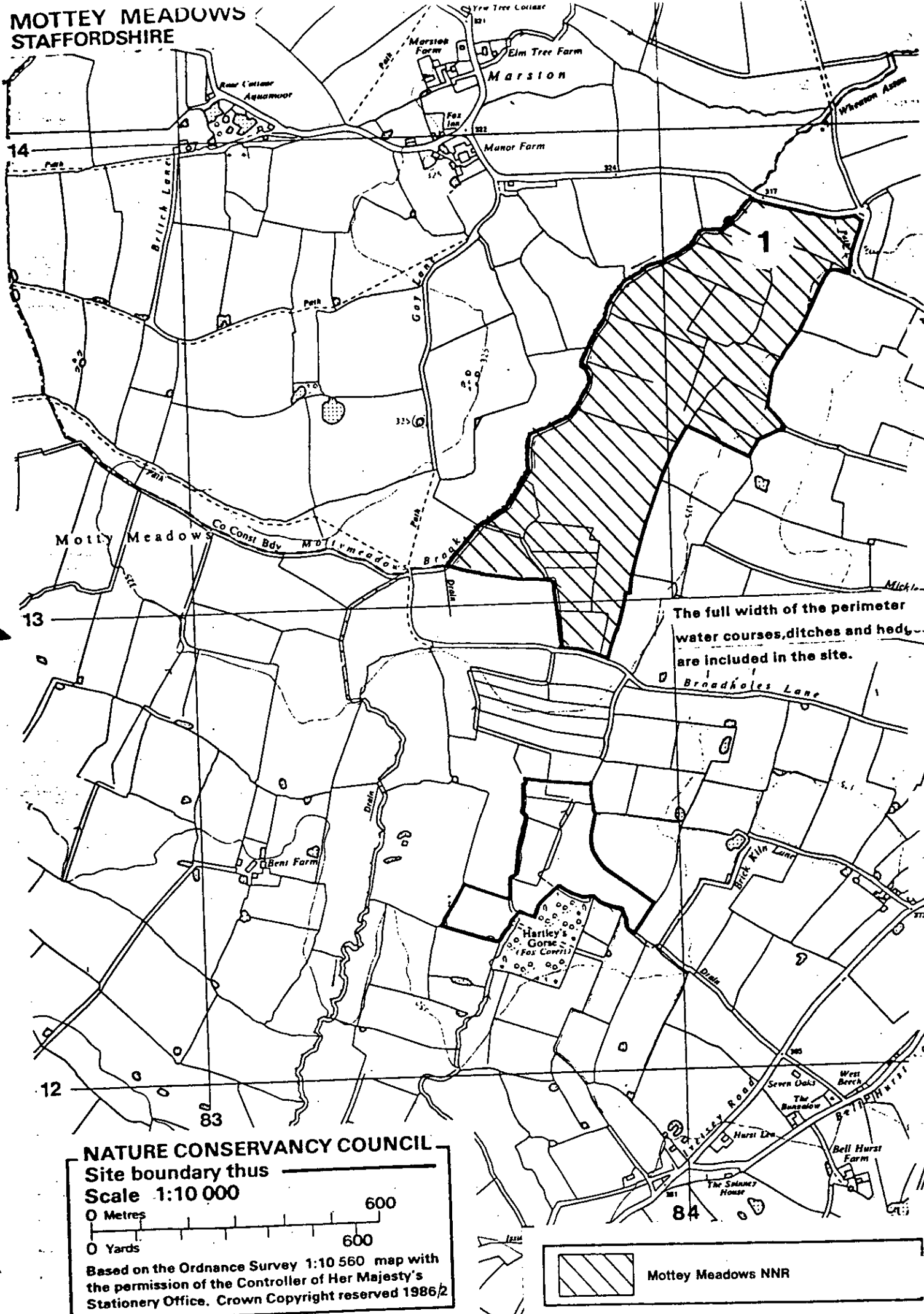
FRESHWATER FISH IN NATIONAL NATURE RESERVES  
FIELD SURVEY REPORT FOR LING GILL NNR

The reserve contains a single large stream - Gill Beck. The lower stretch has small pools, riffles, weedy banks and sand/gravel areas - all of which were sampled. Date of survey 21.9.89.


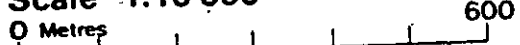

Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Gill Beck at SD 798 783	EF 100m	19. B. Trout 5. Bullhead	Salmon fry had been previously introduced but none found during survey.

\* EF - electric fishing.

**MOTTEY MEADOWS  
STAFFORDSHIRE**



The full width of the perimeter water courses, ditches and hedges are included in the site.

**NATURE CONSERVANCY COUNCIL**  
 Site boundary thus   
 Scale 1:10 000  
 0 Metres  600  
 0 Yards  600  
 Based on the Ordnance Survey 1:10 560 map with the permission of the Controller of Her Majesty's Stationery Office. Crown Copyright reserved 1986/2

 Mottey Meadows NNR

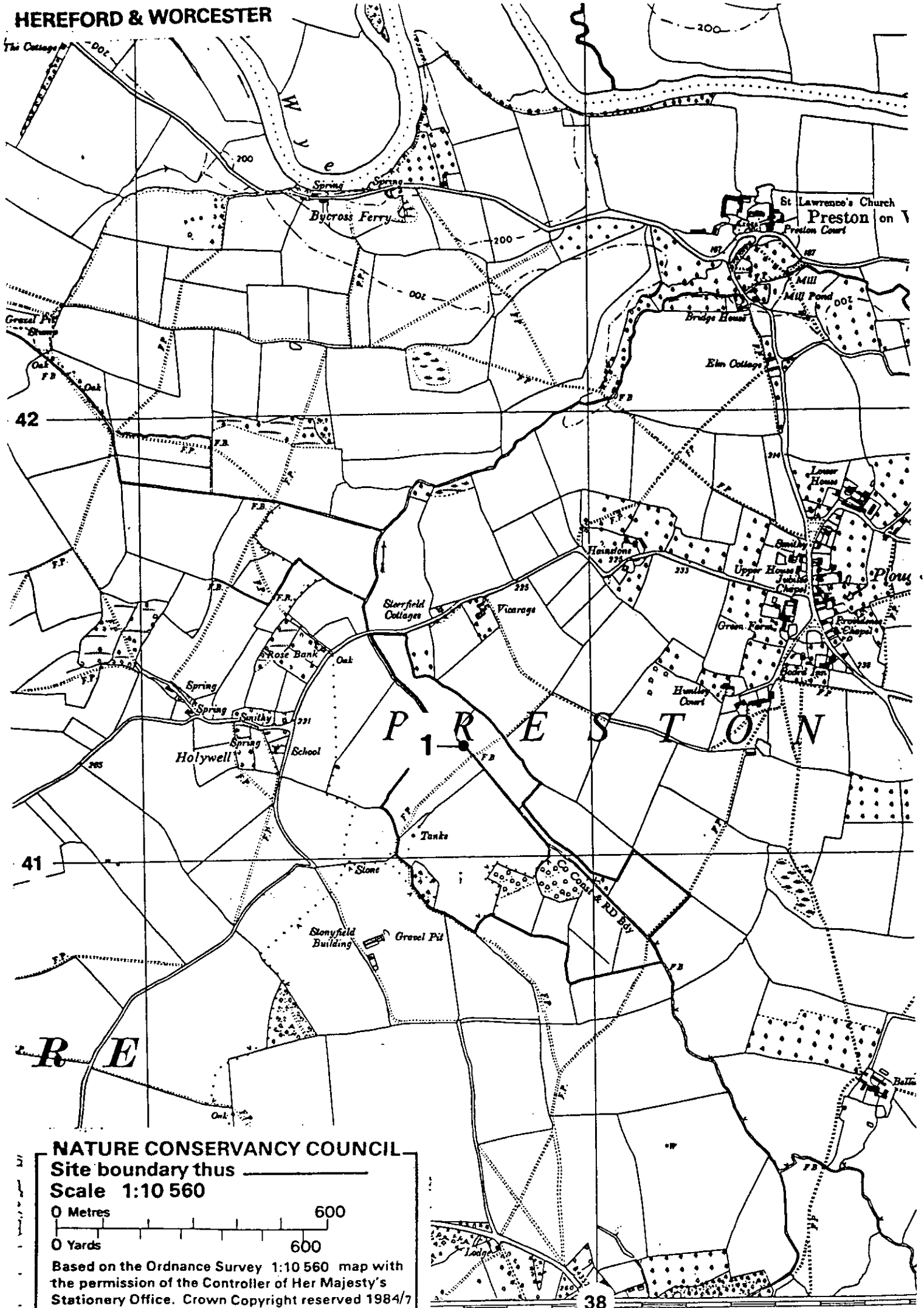
FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY REPORT FOR MOTTEY MEADOWS NNR

The NNR boundary is formed by a small stream - Mottey Meadows Brook. Date of survey 25.8.89.

Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Mottey Meadows Brook SJ 841 138	EF 40m	1. Stone loach 38. 3 Sp. Sticklebacks 1. Bullhead	

\* EF - electric fishing.

# HEREFORD & WORCESTER

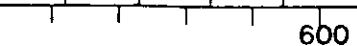


**NATURE CONSERVANCY COUNCIL**

Site boundary thus 

Scale 1:10 560

0 Metres  600

0 Yards  600

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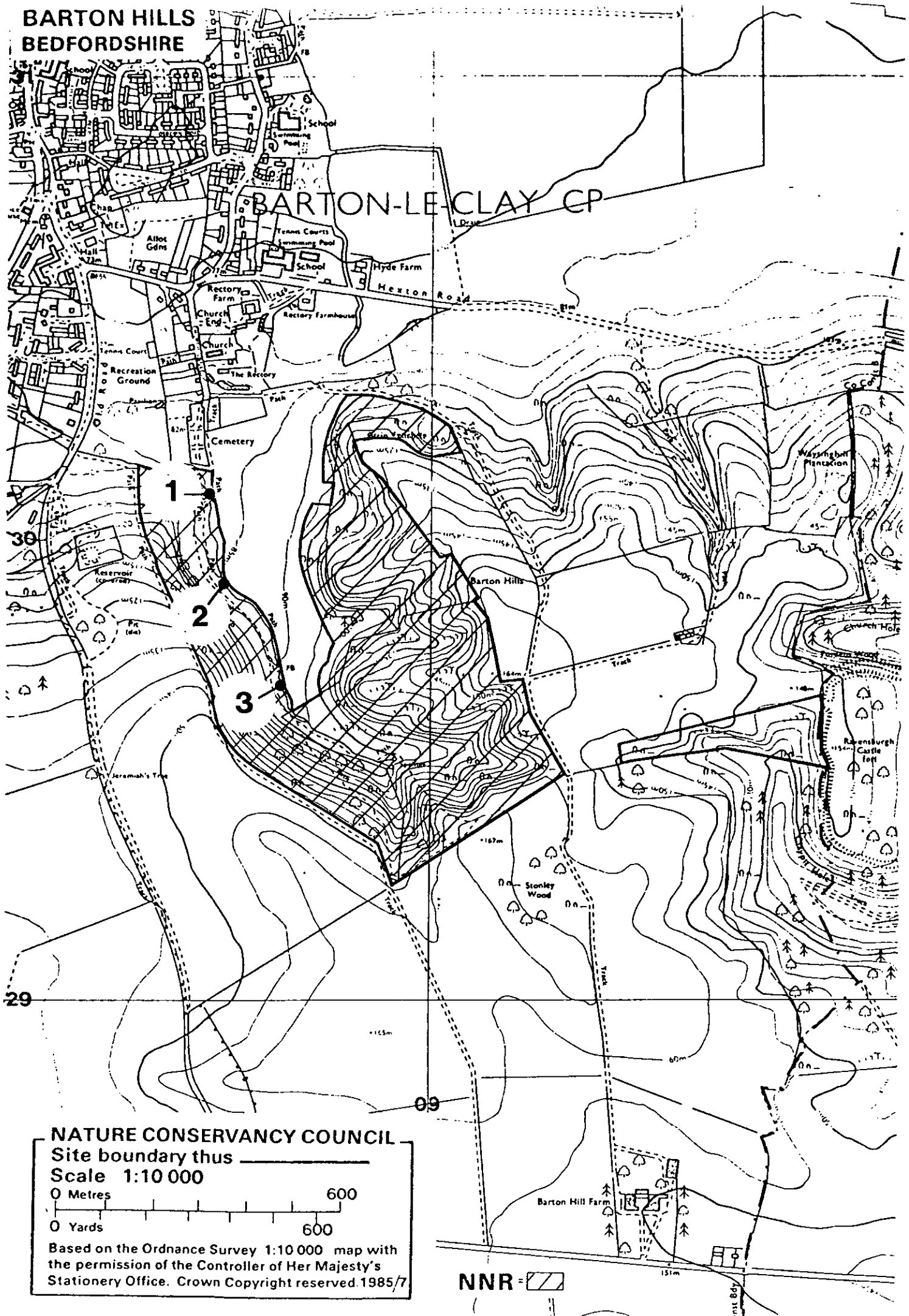
FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY REPORT FOR THE FLITS NNR

A single stream runs through the reserve and only speculative information on fish was available. Date of survey 10.7.90.

Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Stream SO 377 413	EF 180m	4. Lamprey 4. 3 Sp. Sticklebacks 43. Bullhead	1 Sea Lamprey

\* EF - electric fishing.

**BARTON HILLS  
BEDFORDSHIRE**



**NATURE CONSERVANCY COUNCIL**

Site boundary thus ———

Scale 1:10 000

0 Metres 600

0 Yards 600

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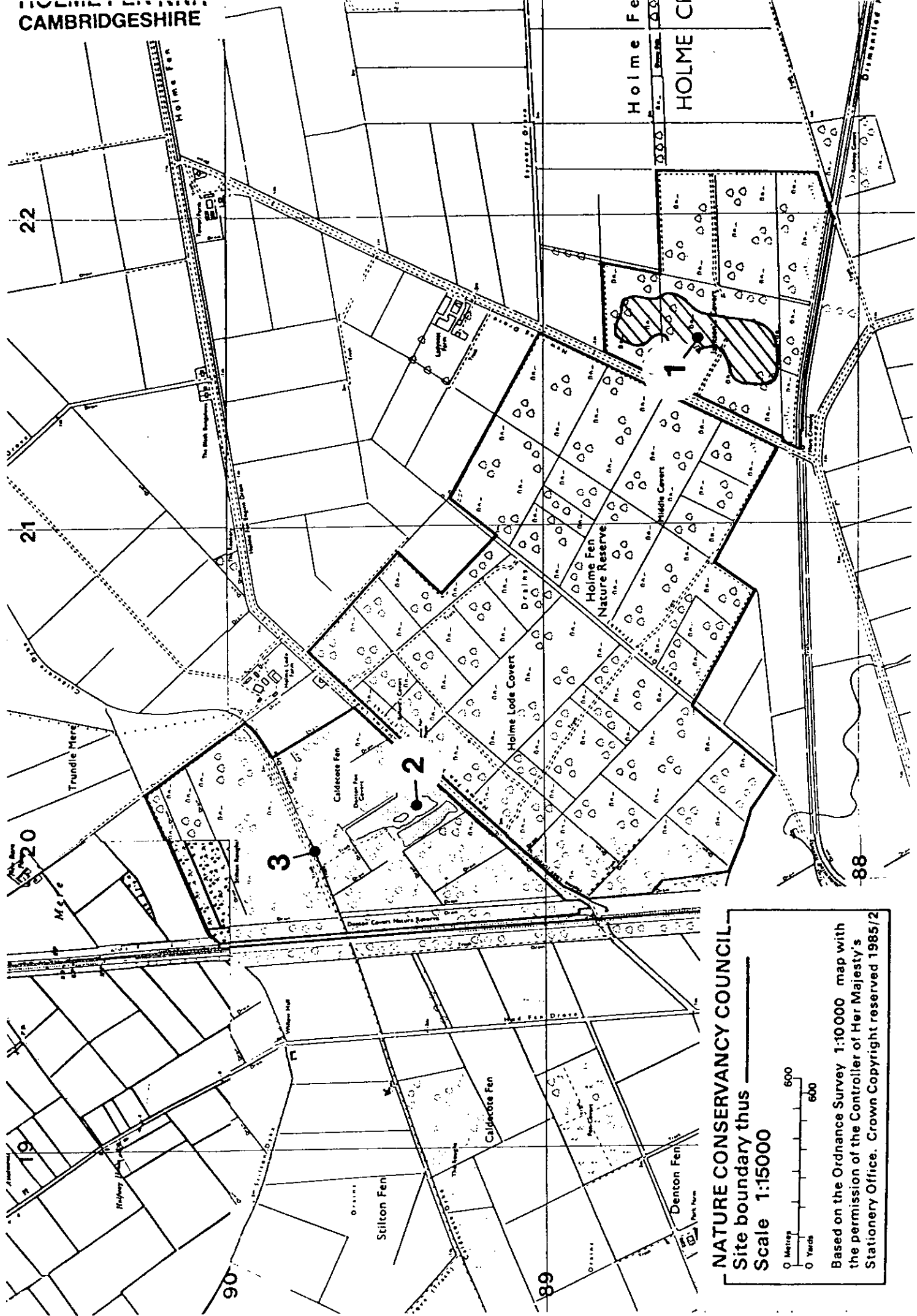
NNR = 151m

FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY REPORT FOR BARTON HILLS NNR

The NNR contains a single, spring fed stream and runs continuously. Date of survey 6.9.89.

Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Stream at TL 085 301	EF 20m	NIL	
2.	Stream at TL 086 299	EF 30m	NIL	
3.	Stream at TL 087 297	EF 15m	NIL	

Note: The stream is heavily used by local children so disturbance may be the reason for the absence of fish.



**NATURE CONSERVANCY COUNCIL**  
Site boundary thus ———  
Scale 1:15000



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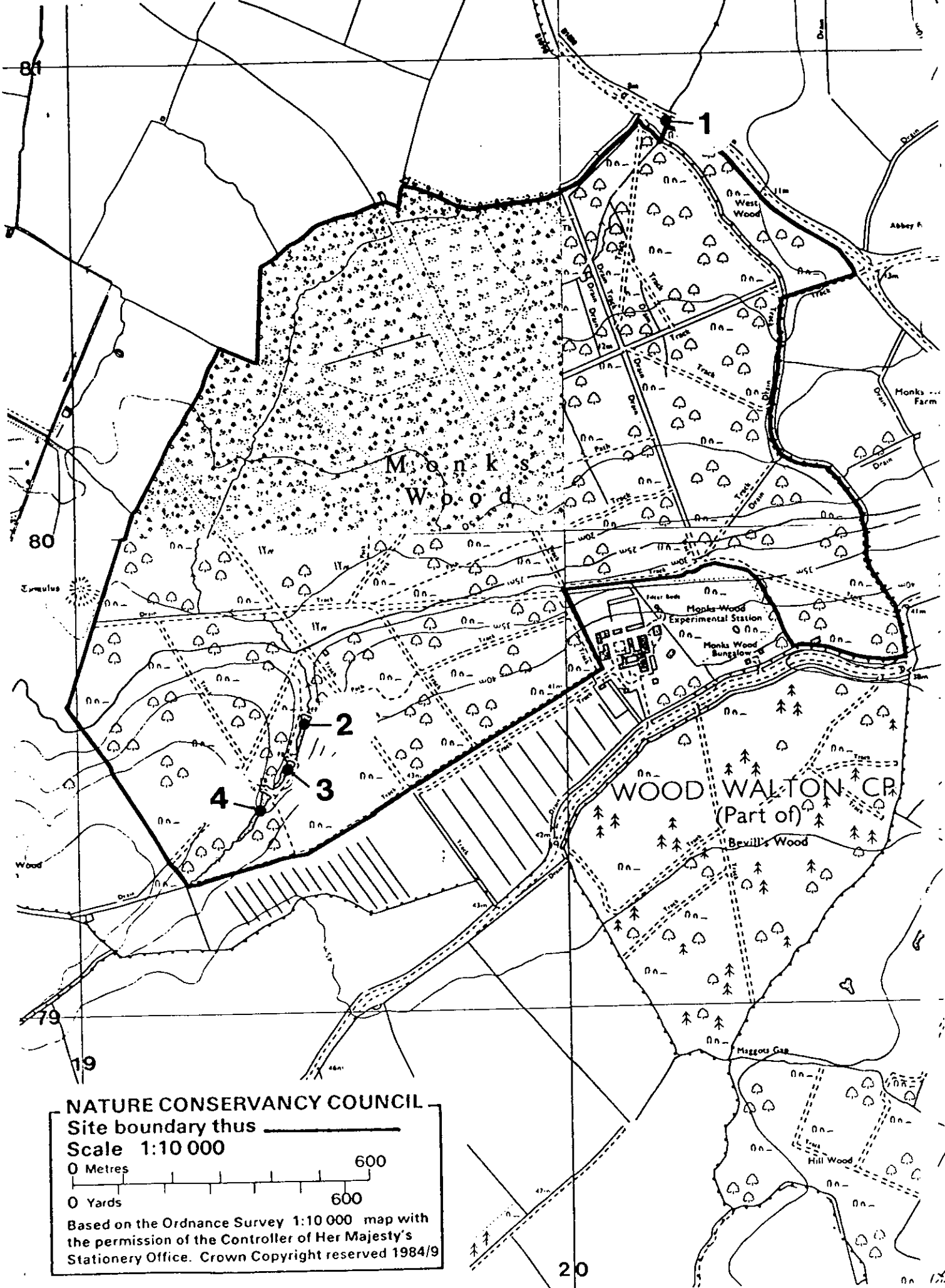
FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY REPORT FOR HOLME FEN NNR


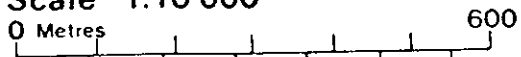

The reserve contains two meres developed from old peat cuttings, there is also a large dyke within the NNR boundary. Gill netting consent was refused by the NRA for this site which seriously curtailed the effectiveness of the survey - only shoreline sampling could be carried out. Date of survey 24.8.89.

Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Bostons Mere TL 216 885	EF (shore)	NIL	Fish unlikely
2.	Burnham's Mere TL 201 895	EF (shore)	NIL	Mirror carp reported
3.	Dyke TL 199 897	EF	NIL	Heavy duckweed cover - fish (pike?) seen but not caught.

\* EF - electric fishing.

**MONKS WOOD NNH  
CAMBRIDGESHIRE**



**NATURE CONSERVANCY COUNCIL**  
 Site boundary thus   
 Scale 1:10 000  
 0 Metres  600  
 0 Yards  600  
 Based on the Ordnance Survey 1:10 000 map with  
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FRESHWATER FISH IN NATIONAL NATURE RESERVES  
FIELD SURVEY REPORT FOR MONKS WOOD NNR

The reserve contains small ditches and streams, but these were mostly dry at the time of visit. Gill netting consent refused for this site by the NRA. There is also a string of three artificial ponds which were reported to contain fish. Date of survey 24.8.89.

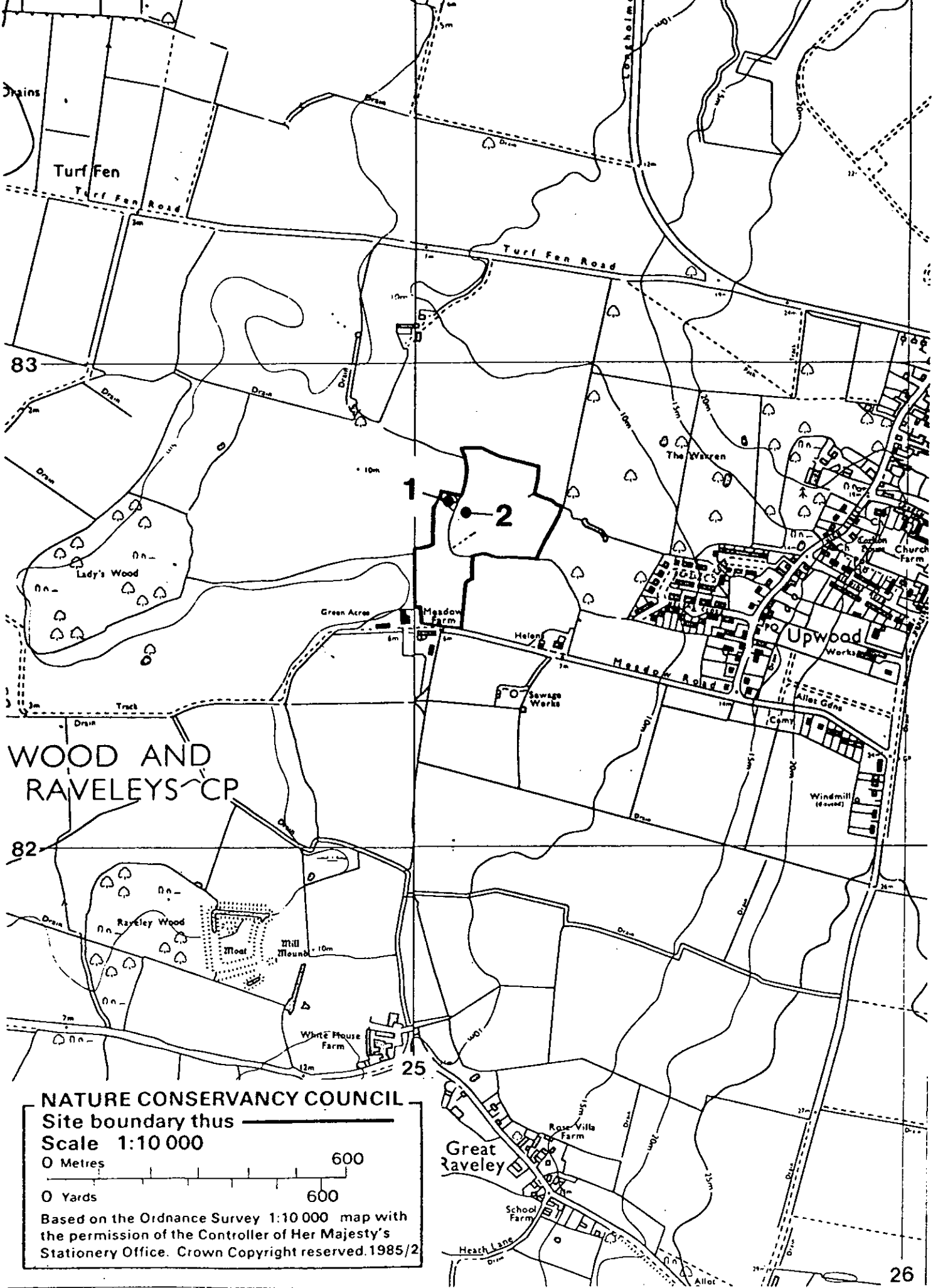
Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Streams at TL 202 808	-	-	Dry
2.	Pond at TL 195 796	EF	4. Rudd	
3.	Pond at TL 194 795	EF	NIL	Rudd? seen.
4.	Pond at TL 194 794	EF	NIL	

Note: 3 Sp. Sticklebacks in stream (1) just outside NNR - assumed to occur within NNR when water available.

\* EF - electric fishing.

# CAMBRIDGESHIRE

NOTE: The NNR and SSSI boundaries are coincident






Turf Fen

83

WOOD AND  
RAVELEYS CP

82

**NATURE CONSERVANCY COUNCIL**  
Site boundary thus   
Scale 1:10 000  
0 Metres  600  
0 Yards  600  
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Great Raveley

26

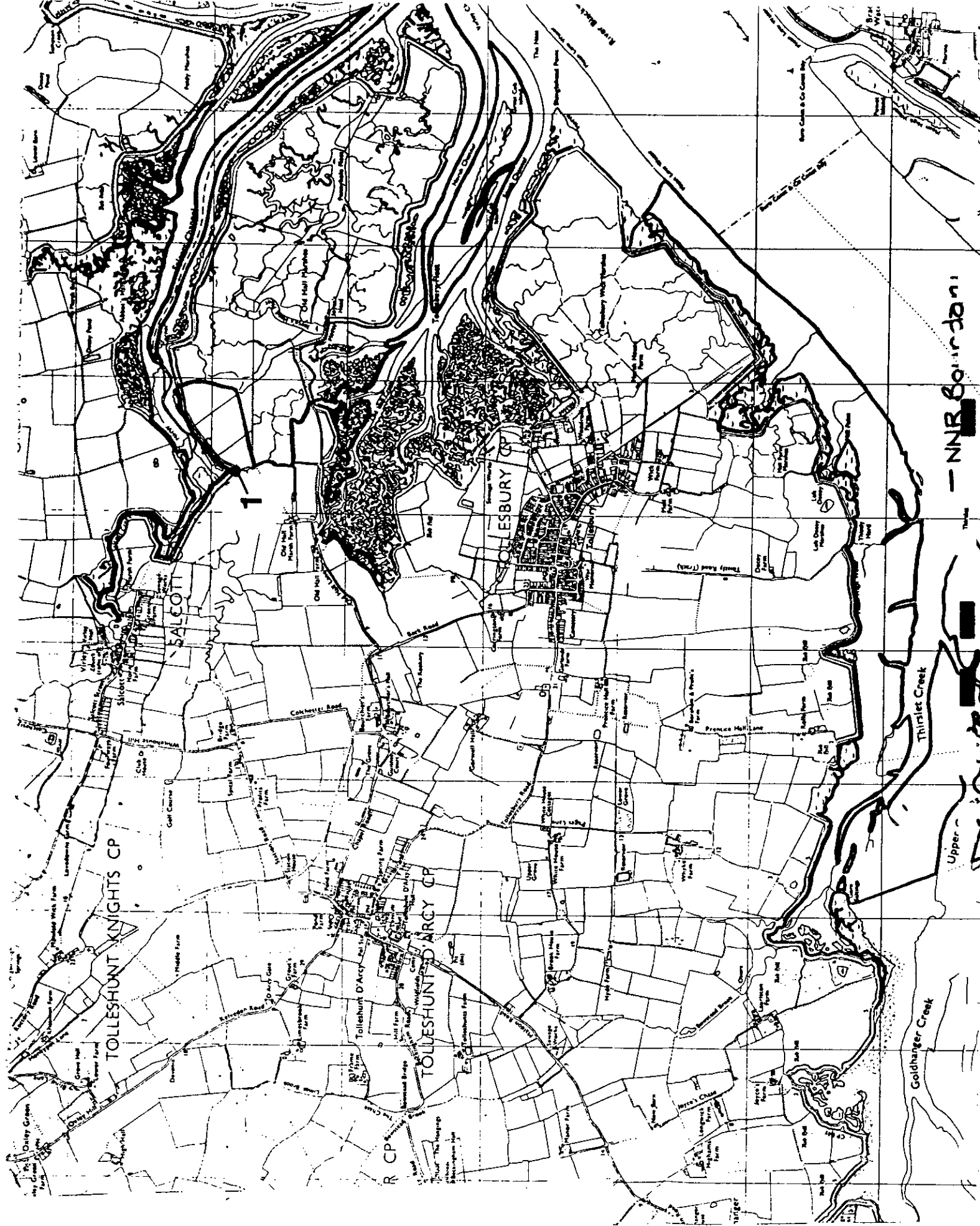


FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY REPORT FOR UPWOOD MEADOWS NNR

There are two very small ponds on this NNR, a third occasionally dries up. Date of survey 7.9.89

Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Pond at TL 251 827 (west)	EF	25. 10 Sp.Stickleback	
2.	Pond at TL 251 827 (east)	EF	16. 10 Sp.Stickleback 3. Tench	

\* EF - electric fishing



BLACKWATER ESTUARY NNR

— NNR boundary

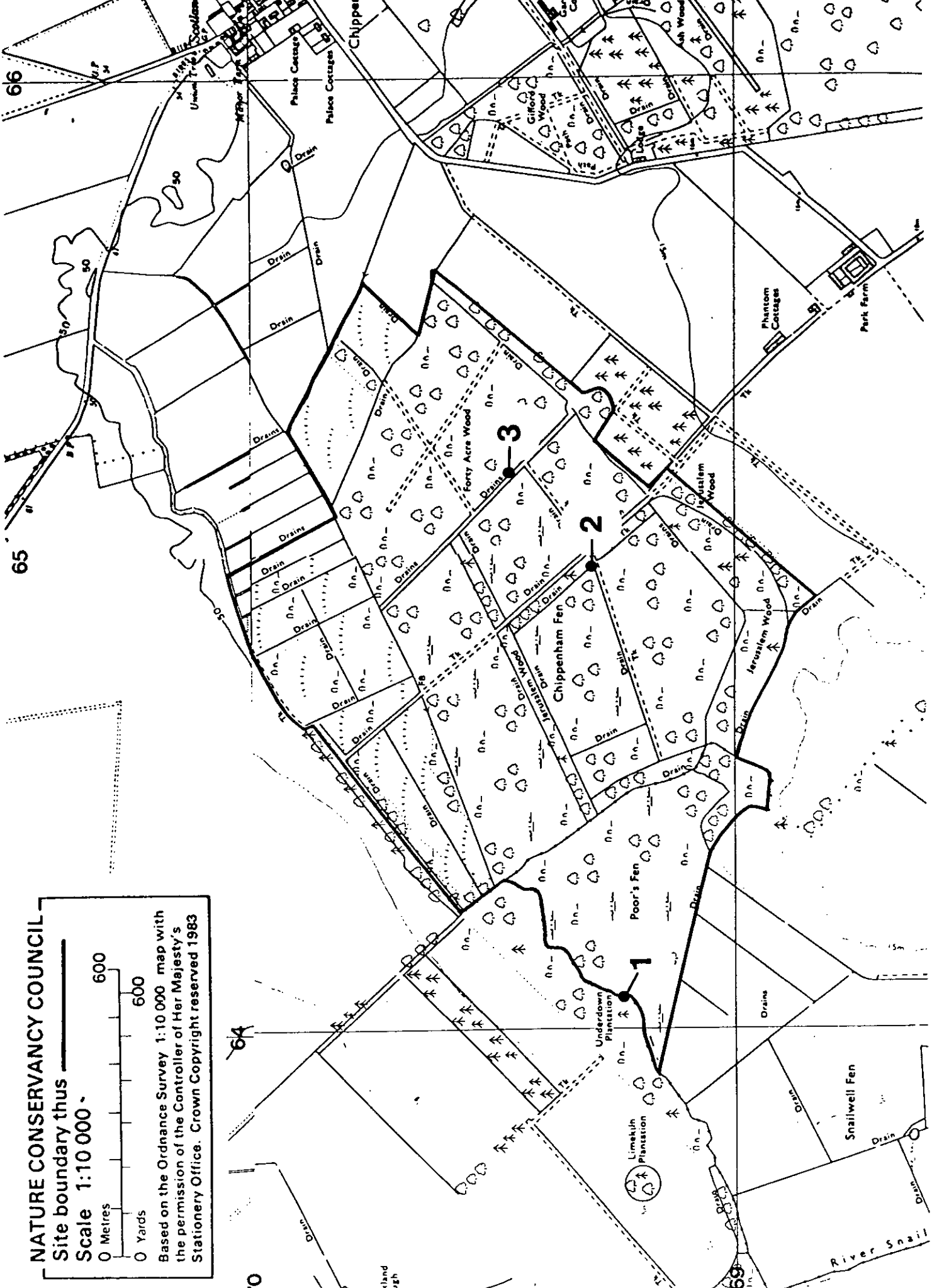
FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY REPORT FOR BLACKWATER ESTUARY NNR



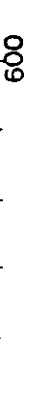
The only fresh water on this NNR is part of a small stream on the western boundary. It was suggested by the warden, that some of the extensive lagoons on the reserve were fresh, but are in fact brackish. Date of survey 5.9.89.

Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Stream at TL 963 127	EF 50m	1. 10. Sp.Stickleback	Very overgrown

Note: 3 and 10 Sp. Sticklebacks, and eels caught in lagoons.

\*EF - electric fishing.



**NATURE CONSERVANCY COUNCIL**  
Site boundary thus   
Scale 1:10 000  
0 Metres   
0 Yards   
Based on the Ordnance Survey 1:10 000 map with the permission of the Controller of Her Majesty's Stationery Office. Crown Copyright reserved 1983

70

ickland  
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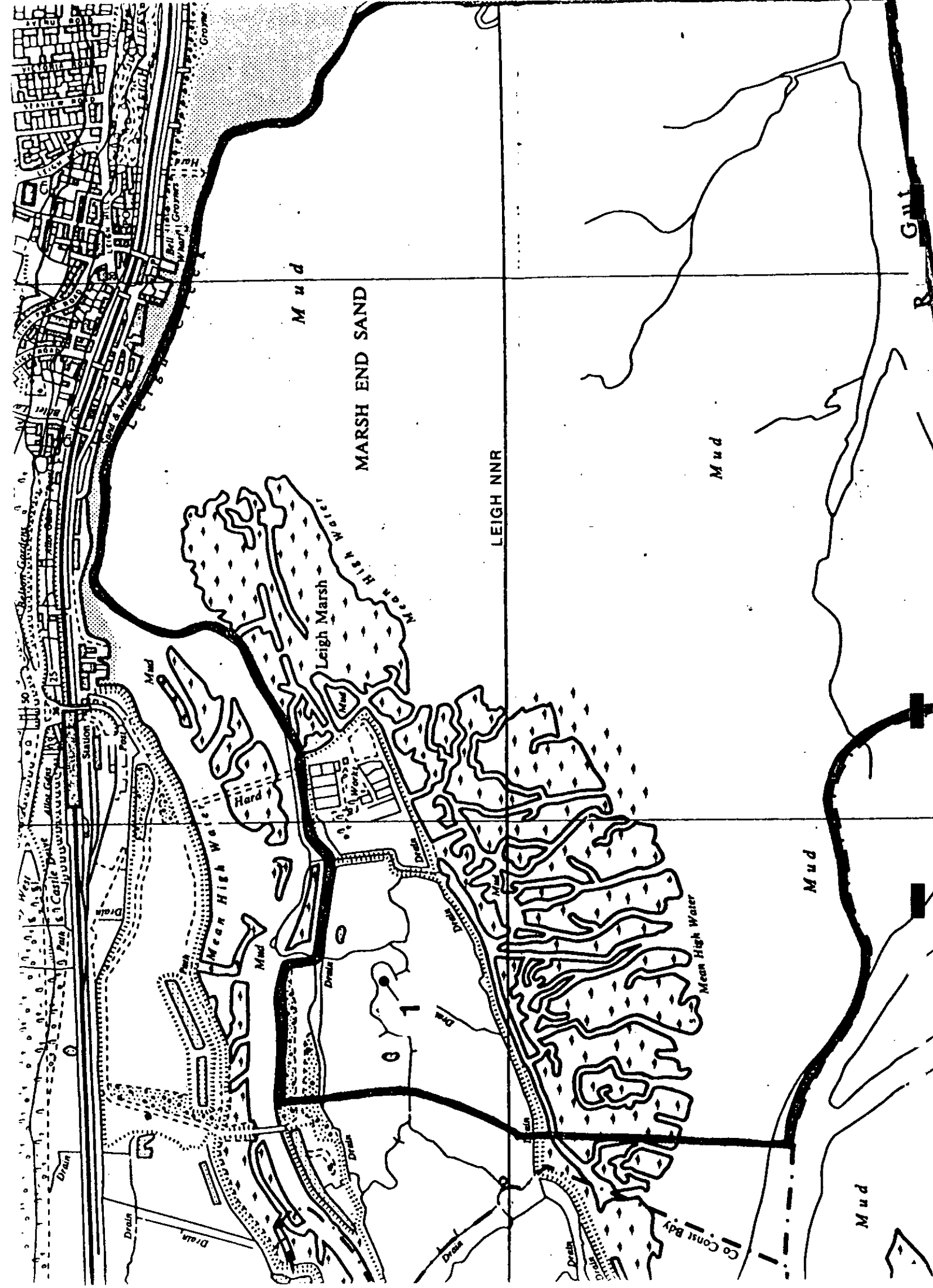
69

FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY REPORT FOR CHIPPENHAM FEN NNR

The freshwater on this NNR is predominantly in drainage dykes, although the Chippenham River also runs through part of the reserve. Date of survey 7.9.89.

Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Chippenham R. TL 641 692	EF	6. Bullhead 2. 3 Sp. Stickleback 3. 10 Sp. Stickleback 1. Lamprey	Trout suggested by warden but not found.
2.	Dyke TL 650 693	EF	1. Pike	
3.	Dyke TL 652 695	EF	1. Pike	

\* EF - electric fishing



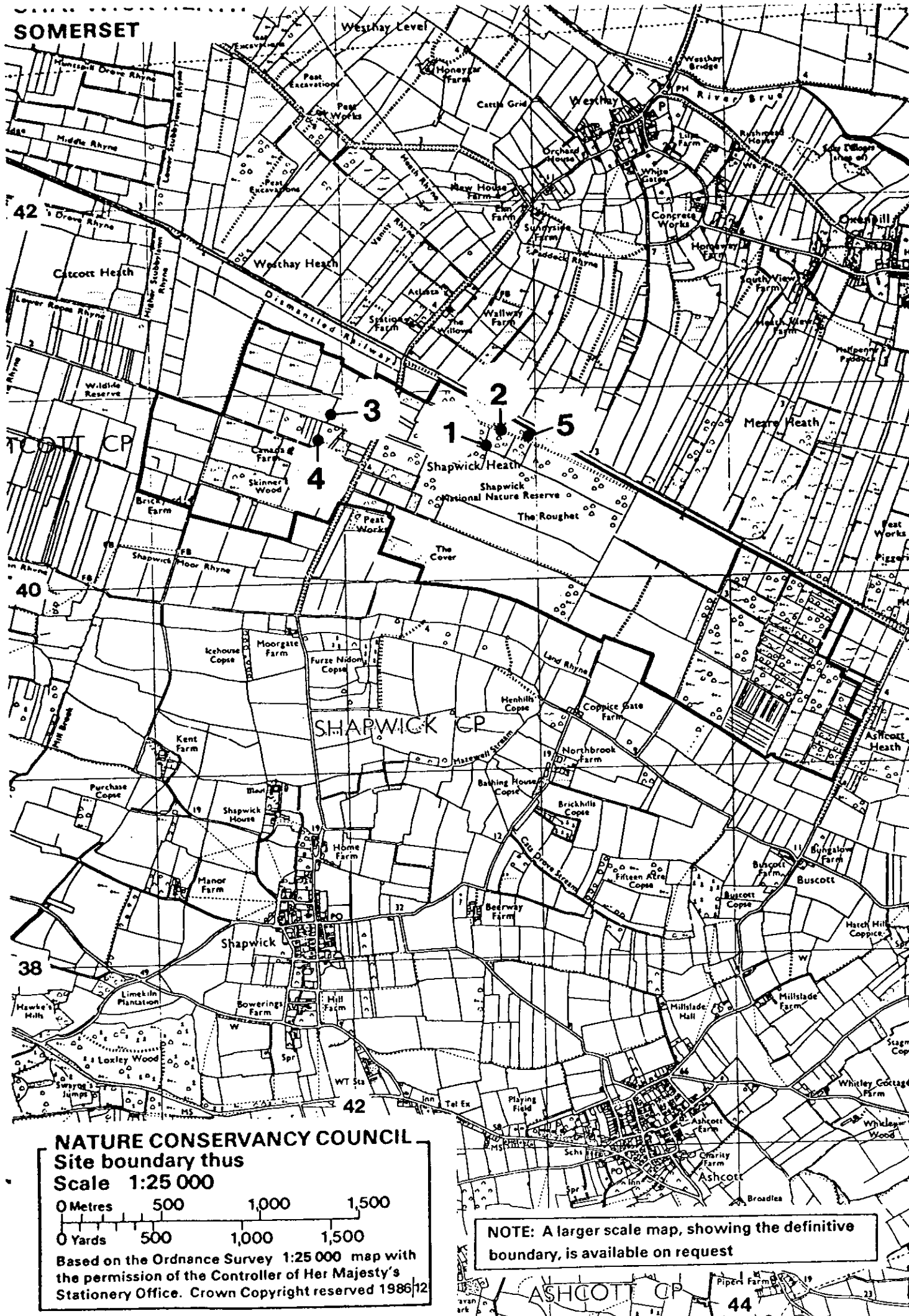
FRESHWATER FISH IN NATIONAL NATURE RESERVES  
SIELD SURVEY REPORT FOR LEIGH NNR

There is a single man-made pond for wild fowl, but the water is probably brackish. Date of survey 5.9.89.

Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Pond TQ 827 852	EF	NIL	

\* EF - electric fishing

# SOMERSET



**NATURE CONSERVANCY COUNCIL**  
 Site boundary thus  
 Scale 1:25 000  
 0 Metres 500 1,000 1,500  
 0 Yards 500 1,000 1,500  
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 the permission of the Controller of Her Majesty's  
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**NOTE: A larger scale map, showing the definitive  
 boundary, is available on request**

ASHCOTT CP

44



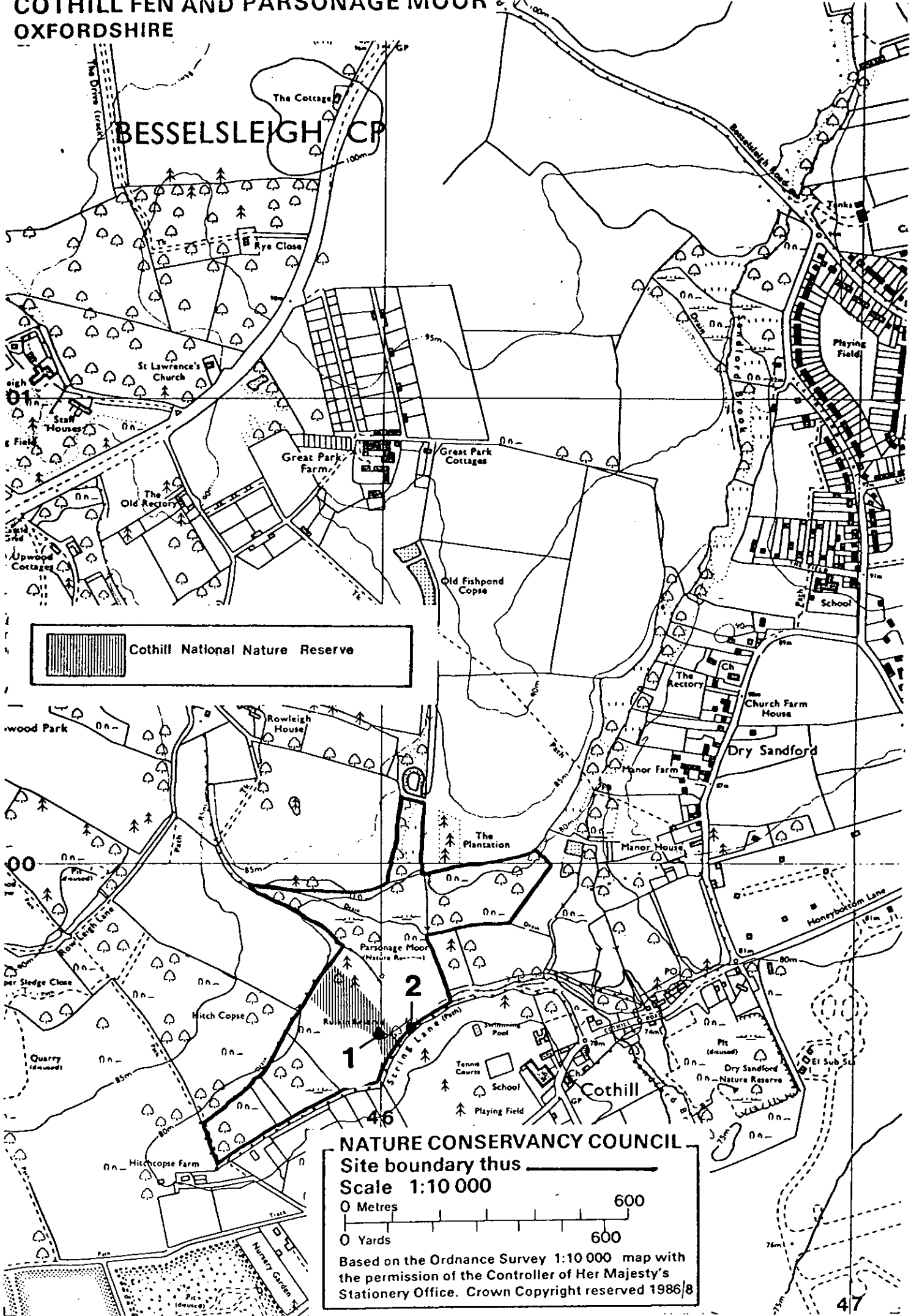
FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY REPORT FOR SHAPWICK HEATH NNR

The extension drainage dyke system at this NNR was mostly dry at the time of visit. Fish most likely enter with water pumped in from the South Drain, and many may not survive dry periods other than in isolated pools - in which sticklebacks are numerous.


Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Dyke (pool) ST 427 407	HN	3 Sp. Sticklebacks 10 Sp. Sticklebacks	Numerous "
2.	Dyke (pool) ST 428 408	HN	3 Sp. Sticklebacks 10 Sp. Sticklebacks	Numerous "
3.	Dyke ST 419 409	EF, HN	3 Sp. Sticklebacks 10 Sp. Sticklebacks	Numerous "
4.	Dyke ST 418 407	EF, HN	3 Sp. Sticklebacks 10 Sp. Sticklebacks	Numerous "
5.	Pond ST 429 408	HN	3 Sp. Sticklebacks 10 Sp. Sticklebacks	Difficult access Eels reported by warden but none found during survey.




\* EF - electric fishing; HN - hand net.

**COTHILL FEN AND PARSONAGE MOOR  
OXFORDSHIRE**



**BESSELSLEIGH CP**

 **Cotthill National Nature Reserve**

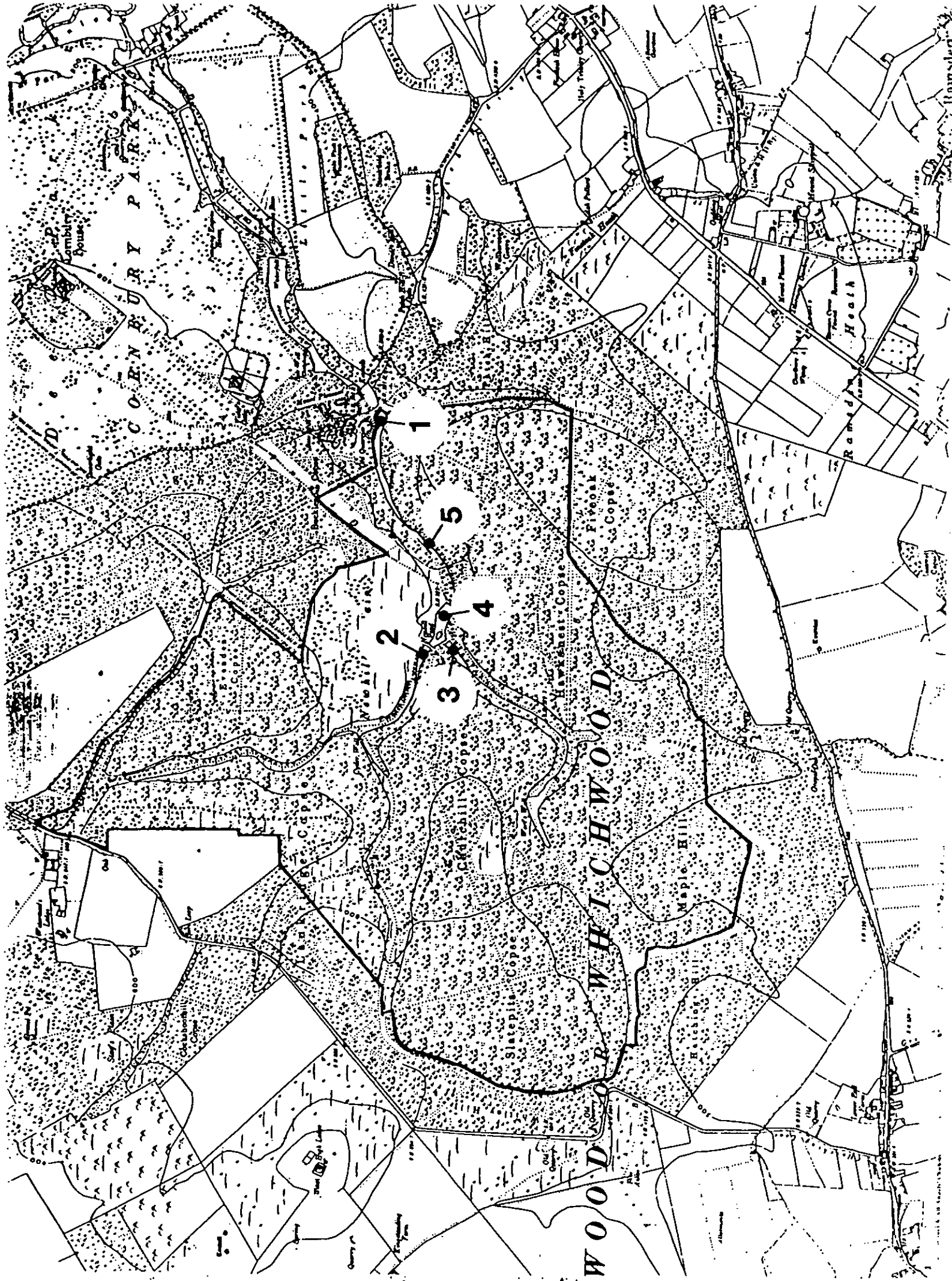
**NATURE CONSERVANCY COUNCIL**  
 Site boundary thus   
 Scale 1:10 000  
 0 Metres  600  
 0 Yards  600  
 Based on the Ordnance Survey 1:10 000 map with  
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FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY REPORT FOR COTHILL NNR

There is a single pond and stream outflow on the reserve. The pond, an old peat digging, is silting up and access to the deeper water was difficult because of the marshy surround. Date of survey 6.9.89.

Map No.	Site Name & NGR	Method*	Catch	Comment
1	Pond SU 460 996	EF	6. 10 Sp. Sticklebacks 5. 3 Sp. Sticklebacks	
2.	Stream SU 461 996	EF	3. 10 Sp. Sticklebacks 1. 3 Sp. Sticklebacks	

\* EF - electric fishing.



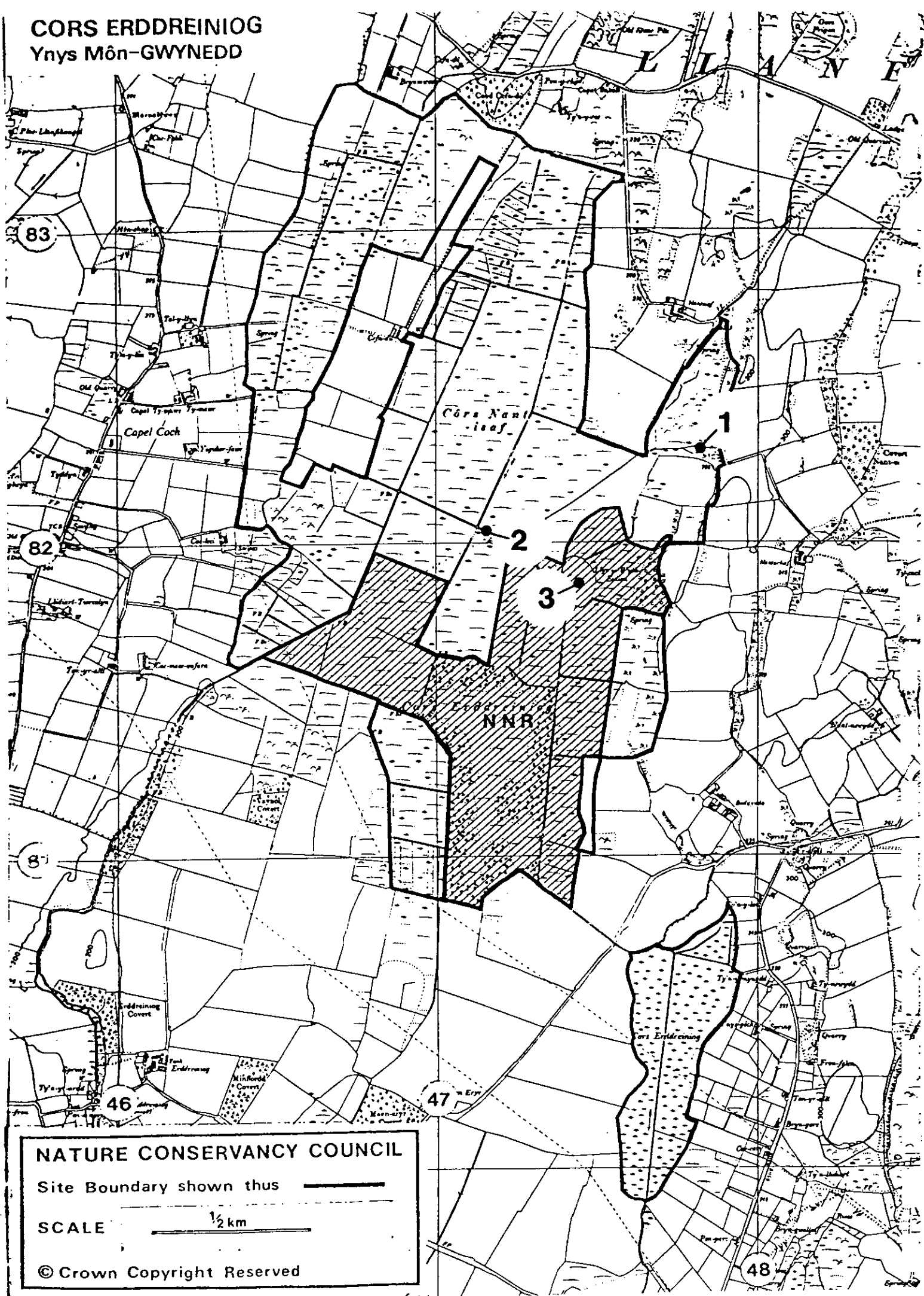
FRESHWATER FISH IN NATIONAL NATURE RESERVES  
FIELD SURVEY REPORT FOR WYCHWOOD NNR

There is a system of artificial ponds, lakes and streams controlled by sluice gates on this NNR. Date of survey 23.8.89.

Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Lake SP 346 171	GN (4 hrs) EF	n. 3 Sp. Sticklebacks 12. Bullhead	Numerous
2.	Pond SP 339 170	EF	2. B. Trout 7. 3 Sp. Sticklebacks	
3.	Pond SP 338 169	EF	NIL	
4.	Lake SP 340 169	GN (2 hrs) EF	1. B. Trout 7. 3 Sp. Sticklebacks 12. Bullhead	
5.	Stream SP 342 169	EF	4. B. Trout 18. 3 Sp. Sticklebacks 20. Bullheads	

\* GN - gill net; EF - electric fishing.

# CORS ERDDREINIOG Ynys Môn-GWYNEDD



NATURE CONSERVANCY COUNCIL

Site Boundary shown thus 

SCALE  1/2 km

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FRESHWATER FISH IN NATIONAL NATURE RESERVES  
FIELD SURVEY REPORT FOR CORs ERDDREINIOG NNR

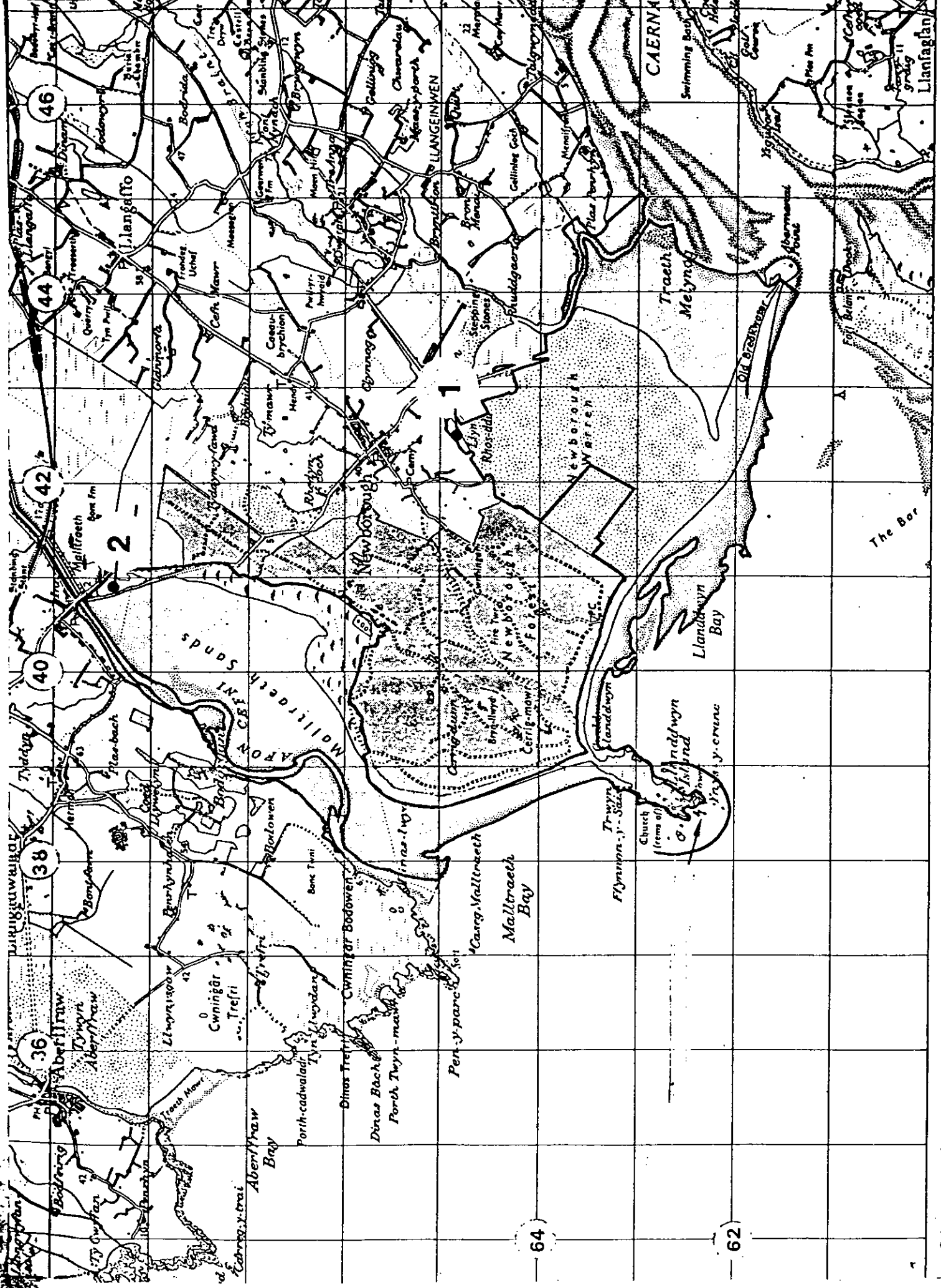
The reserve boundary has been expanded from that shown on the map. Freshwaters consist of large and small ditches and Llyn yr Wyth-Eidion. A previous electric fishing survey found B. Trout, Eels and and Sticklebacks but this excluded the lake where coarse fish were thought to occur. Dates of survey 29 and 30.8.90.

Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Sm. ditch SH 478 823	EF 50m	1. Eel 23. 3 Sp. Sticklebacks 8. 10 Sp. Sticklebacks	
2.	L. ditch SH 472 820	EF 20m	1. Eel 4. 10 Sp. Sticklebacks	No coarse fish found, result as previous survey
3.	Llyn yr Wyth-Eidion SH 474 818	GN x 3	8. B. Trout	

\* GN - gill net; EF - electric fishing.

NEWBOROUGH WARREN - YNYS LLANDDWYN NNR

Ynys Môn - GWYNEDD



TO 7  
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41  
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7 31 40 45

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62



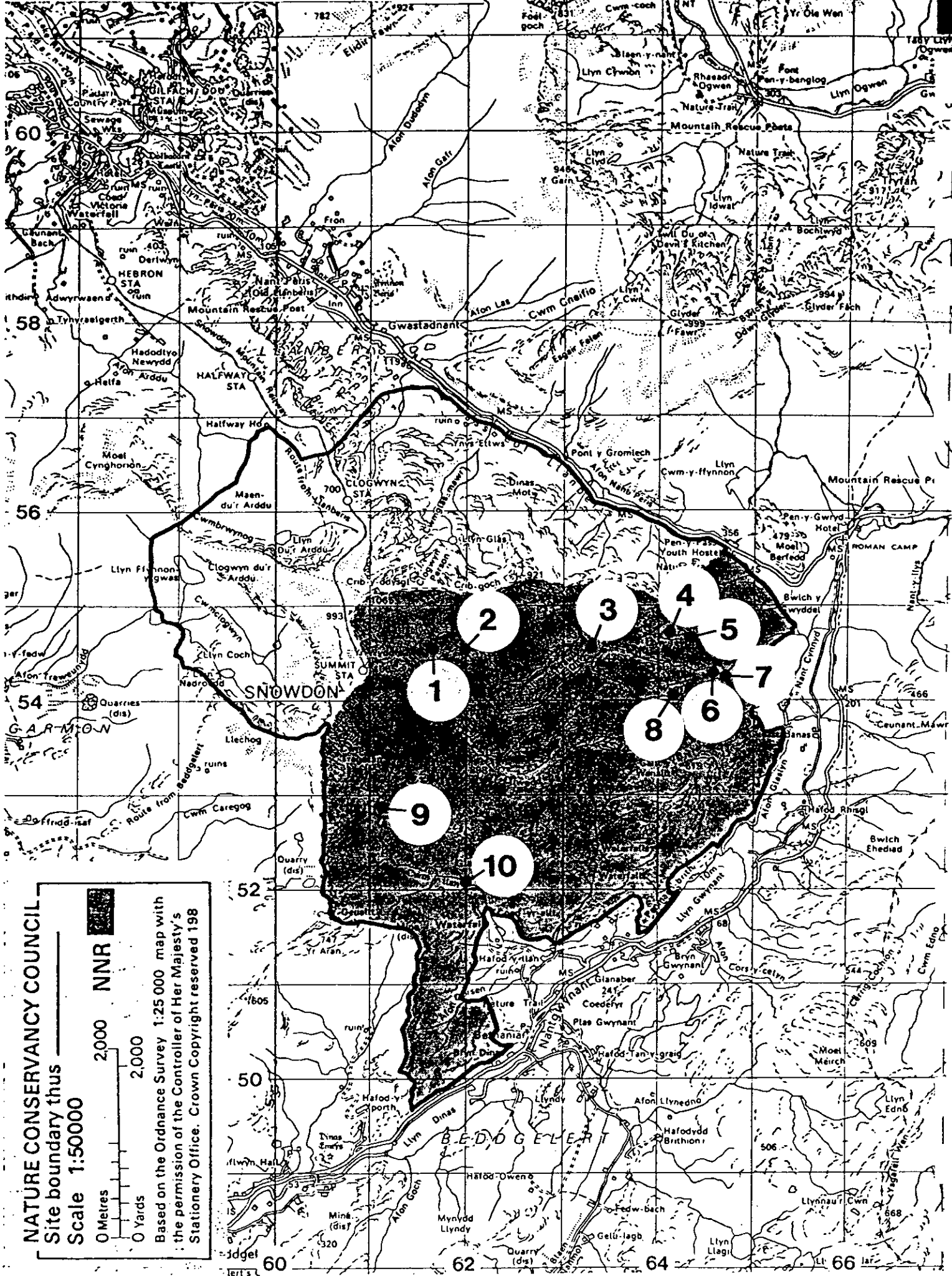
FRESHWATER FISH IN NATIONAL NATURE RESERVES  
FIELD SURVEY REPORT FOR NEWBOROUGH WARREN - YNYS LLANDWYN NNR


The only relevant fresh water on the reserve is Llyn Rhos-ddu, about which there was no fish information. A lake at Malltraeth was sampled but found to be brackish and connected to tidal waters, the results are therefore not included in the final species tables. Dates of survey 29 & 30.8.90.

Map No.	Site Name & NGR	Method*	Catch	Comment
1.	L. Rhos-ddu SH 425 648	GN x 2	2. 3 Sp. Sticklebacks	Eel damage
2.	Lake Malltraeth SH 409 684	GN (20 mins), HN, EF	n. 3 Sp. Sticklebacks n. Common Goby 8. Golden mullet	Numerous Numerous Eels and flounders seen.

\* GN - gill net; HN - hand net; EF - electric fishing.

**Y WYDDFA: SNOWDON S.S.S.I./N.N.R.**  
**Arfon/Dwyfor - GWYNEDD**



**NATURE CONSERVANCY COUNCIL**  
 Site boundary thus   
 Scale 1:50000  
 0 Metres 2000 2000  
 0 Yards  
 Based on the Ordnance Survey 1:25 000 map with the permission of the Controller of Her Majesty's Stationery Office. Crown Copyright reserved 198

FRESHWATER FISH IN NATIONAL NATURE RESERVES  
FIELD SURVEY REPORT FOR Y WYDFFA-SNOWDON NNR

The NNR contains 3 lakes and 2 stream systems. The area is reported to be affected by acidification. There are historical records of Brown Trout in the lakes but no current information on fish status. Dates of survey 11, 12 & 13.9.90.

Map No.	Site Name & NGR	Method*	Catch	Comment
1.	L.Glaslyn SH 617 545	GN	NIL	Echo sounding (see below)
2.	L.Glaslyn outflow SH 620 545	EF 40m	NIL	
3.	L.Llydaw SH 633 545	GN	NIL	Echo sounding (see below). Outflow dry.
4.	L.Teyrn SH 641 547	GN	NIL	Echo sounding (see below)
5.	L.Teyrn outflow SH 643 546	EF 50m	NIL	
6.	L.Teyrn outflow SH 646 543	EF 60m	1. B. Trout	At junction with A. Glaslyn.
7.	A.Glaslyn SH 646 543	EF 100m	12. B. Trout	B.Trout found in 7 out of 8 pools between these sites.
8.	A.Glaslyn SH 641 541	EF 85m	7. B. Trout	
9.	A. Cwm Llan SH 611 528	EF 75m	24. B. Trout	
10.	A. Cwm Llan SH 620 521	EF	2. B. Trout	Spot sample - single pool

Note: Short echo sounding surveys were carried out on all 3 lakes and recorded corixid presence in open water - itself an indication of fishlessness.

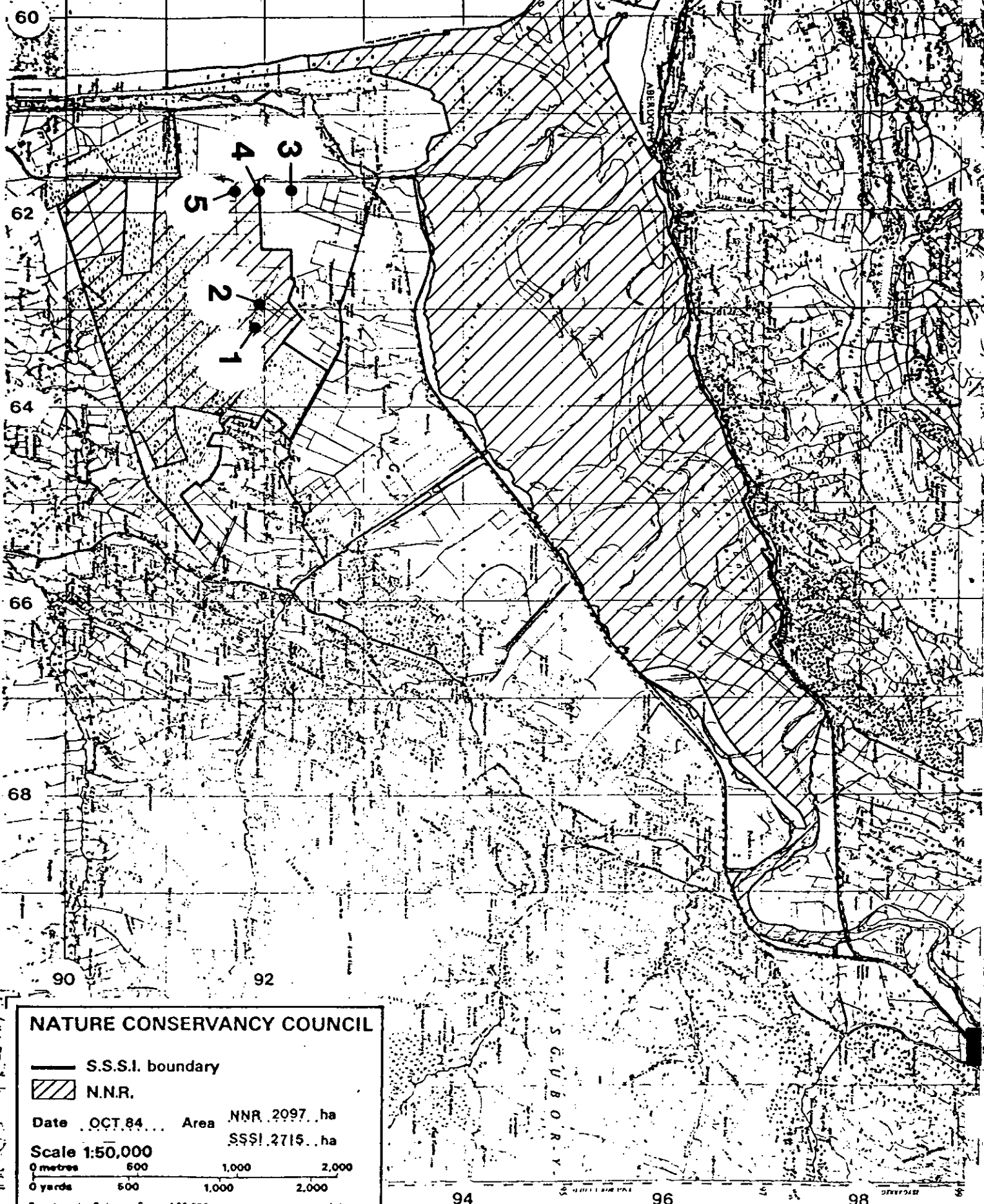
\* GN - gill net; EF - electric fishing.

DYFI

Ceredigion-DYFED

Meirionnydd-GWYNEDD

Montgomery-POWYS



**NATURE CONSERVANCY COUNCIL**

— S.S.S.I. boundary

▨ N.N.R.

Date OCT. 84 Area NNR 2097 ha

SSSI 2715 ha

Scale 1:50,000

0 metres 500 1,000 2,000

0 yards 500 1,000 2,000

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FRESHWATER FISH IN NATIONAL NATURE RESERVES  
FIELD SURVEY REPORT FOR DYFI NNR

Only the Borth Bog section of the NNR contains freshwaters (dykes). No information on fish in this section was available. The R. Dovey which runs through the main section of the reserve is tidal within the NNR boundary and not considered. Date of survey 28.8.90.

Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Pond SN 632 919	GN (4½ hrs)	NIL	
2.	Dyke SN 630 919	EF around bridge, HN	NIL	
3.	Dyke SN 618 923	EF 50m, HN	1. Eel 1. 10 Sp.Sticklebacks	
4.	Dyke SN 618 919	EF around dam, HN	NIL	
5.	Dyke SN 618 917	EF 50m, HN	1. Eel 2. 10 Sp.Sticklebacks	


Note: Very difficult site to survey - deep, steep sided dykes and dark water.

\* GN - gill net; EF - electric fishing; HN - hand net.

**CRAIG Y CILAU  
BRECKNOCK / POWYS**



**PART OF MYNYDD LLANGATWG SSSI**

**NATURE CONSERVANCY COUNCIL**  
Site Boundary shown thus   
**SCALE 1:10560**  
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FRESHWATER FISH IN NATIONAL NATURE RESERVES  
 FIELD SURVEY REPORT FOR CRAIG Y CILAU NNR

The reserve contains about 200m of the headwater of the Nant Onneu. No definite information on fish was available. Date of Survey 10.7.90.

Map No.	Site Name & NGR	Method*	Catch	Comment
1.	Nant Onneu SO 186 164	EF 50m	6. B. Trout 4. Eels	

\* EF - electric fishing.

**Table Ia.** Chemical analysis of water samples taken during field surveys of National Nature Reserves in Scotland (see field survey maps for location of Site Numbers).

NCC Region	National Nature Reserve	Site Number	Water Chemistry							
			Hazen	Alk. mg/l Ca CO <sub>3</sub>	Acid. mg/l H <sub>2</sub> SO <sub>4</sub>	Cond. µS/cm	Org.N NH <sub>4</sub> -N mg/l	Total P mg/l	Ca mg/l	pH
NW	Achanarras Quarry	1	5	90		300	0.30	0.039	49	8.1
	Alt Nan Carnan	W	30	24		85	0.45	<0.005	7	6.9
	Ben Wyvis	1	30	2		23	0.38	0.320	0.66	6.0
		2	50	0.8		26	0.16	0.015	1.1	6.5
	Blar nam Faoilleag	2	150	84		220	0.36	0.011	25	8.0
	Dunnet Links	2	20	280		660	0.73	0.010	100	8.4
	Glen Roy	2	10	14		40	<0.10	<0.005	4.4	7.4
	Loch Maree Islands	1	60	1.5		51	0.31	0.009	0.96	6.7
		3	40	0.3		48	0.10	0.007	0.51	5.5
		4	50	0.3		47	0.20	<0.005	0.81	5.4
		6	60	0.1		61	0.60	0.005	0.60	5.3
	Mound Alderwoods	1	130	24		180	0.60	0.022	8.3	7.3
	Rassal Ashwood	1	15	30		91	<0.10	<0.005	7.6	7.3
		2	10	200		390	0.15	0.006	38	8.3



Table Ia (cont'd)

NE	Abernethy Forest	1	10	1.8		21	0.23	0.011	0.18	5.0
		2	180	2.4		25	0.25	0.019	1.4	6.2
		4	15	11		47	0.16	0.011	3.6	7.4
		5	10	34		97	<0.10	<0.005	14	7.7
		6	60	4.2		26	<0.10	0.008	1.6	7.0
	Craigellachie	1	100		√	25	0.18	0.011	0.30	4.7
		2	15	11		47	0.18	0.006	3.6	7.3
		3	70		√	34	0.30	0.009	0.69	4.9
	Creag Meagaidh	1	60	4		21	0.13	<0.005	2.0	6.6
		2	5	2.2		16	<0.10	<0.005	0.9	6.6
		3	5	2.2		18	<0.10	<0.005	0.99	6.6
	Morrone Birkwood	W	50	9.2		42	0.40	0.011	43	7.2
SW	Ben Lui	1	5	6.7		34	0.12	<0.005	2.9	6.8
		3	10	7.8		46	<0.10	0.010	4.6	6.9
	Caerlaverock	1	125	390		12000	0.73	0.140	140	8.6
		2	>250	190		2600	5.3	0.580	39	8.6
	Clyde Valley Woodlands	3	130	51		270	0.82	0.055	29	8.1
	Glasdrum	1	10	2.6		39	0.18	<0.005	1.5	6.0
	Kirkconnell Flow	1	180		0.20	160	0.40	<0.005	13	6.9
Silver Flowe	1	180		0.20	29	0.50	<0.005	0.51	5.0	
	2	100		0.14	83	0.26	<0.005	0.27	4.9	
	3	60		0.12	43	0.14	<0.005	1.1	4.9	



## APPENDIX II

Tables of the water types, and fish species recorded  
for the 235 NNRs in Great Britain

NNRs are listed, alphabetically, by NCC regions in the following order:-

NW Scotland  
NE Scotland  
SW Scotland  
SE Scotland  
NW England  
NE England  
W Midlands, England  
E Midlands, England  
E Anglia, England  
SW England  
S England  
SE England  
N Wales  
Dyfed-Powys, Wales  
S Wales



NCC REGION - <b>NORTH WEST SCOTLAND(2) NATIONAL NATURE RESERVES</b>	WATER TYPES PRESENT			FISH SPECIES RECORDED																																																
	Lakes	Ponds	Rivers	Streams	Sea Lamprey	River Lamprey	Brook Lamprey	Atlantic Salmon	Brown Trout	Rainbow Trout	Arctic Char	Powan	Grayling	Smelt	Pike	Common Carp	Crucian Carp	Goldfish	Barbel	Gudgeon	Tench	Silver Bream	Common Bream	Bleak	Minnow	Rudd	Roach	Chub	Dace	Stone loach	Eel	3 Sp. Stickleback	10sp. Stickleback	Sea Bass	Perch	Ruffe	Pikeperch	Common Goby	Thicklip Mullet	Bullhead	Flounder											
Glen Roy	*	*	*	*				Q F																																												
Gualin	*	*	*	*		Q		Q	Q																					Q																			S			
Inchnadamph	*	*	*	*				S Q	Q																						S																		S			
Invernaver	*	*	*	*				Q S																							S																					
Inverpolly	*	*	*	*				Q	Q		Q																					S																				
L. a Mhuilinn Wood	*	*	*	*				Q	Q																																											
L.Druidibeg	*	*	*	*				S Q																																												
L. Maree Islands	*	*	*	*				F																																												
L. Sunart Woodlands		*	*	*				Q S	Q																																											

SOURCES OF INFORMATION: Q - QUESTIONNAIRE; F - FIELD SURVEY; W - WATER AUTHORITY/NRA; S - OTHER SOURCES

NCC REGION -  NORTH WEST SCOTLAND(3) NATIONAL NATURE RESERVES	FISH SPECIES RECORDED			
	Lakes	Ponds	Rivers	Streams
Monach Isles	*	*	*	*
Mound Alderwoods	*	*	*	*
Nigg & Udale Bays	NO FRESH WATER			
N. Rona & Sula Sgeir	NO FRESH WATER			
Rassal Ashwood	*	*	*	*
Rhum	*	*	*	*
St Kilda	*	*	*	*
Strath-Farrar	*	*	*	*
Strathy Bog	*	*	*	*

FISH SPECIES RECORDED	Lakes	Ponds	Rivers	Streams
Sea Lamprey				
River Lamprey				
Brook Lamprey				
Atlantic Salmon			Q Q Q	
Brown Trout				
Rainbow Trout				
Arctic Char				
Powan				
Grayling				
Smelt				
Pike				
Common Carp				
Crucian Carp				
Goldfish				
Barbel				
Gudgeon				
Tench				
Silver Bream				
Common Bream				
Bleak				
Minnow				Q
Rudd				
Roach				
Chub				
Dace				
Stone loach				
Bel	Q	Q	Q F	
3 Sp. Stickleback	Q			
10sp. Stickleback				
Sea Bass				
Perch				
Ruffe				
Pikeperch				
Common Goby				
Thicklipped Mullet				
Bullhead				
Flounder				

SOURCES OF INFORMATION: Q - QUESTIONNAIRE; F - FIELD SURVEY; W - WATER AUTHORITY/NRA; S - OTHER SOURCES

NCC REGION -  NORTH EAST SCOTLAND(1) NATIONAL NATURE RESERVES	WATER TYPES PRESENT			FISH SPECIES RECORDED																																																							
	Lakes	Ponds	Rivers	Streams	Sea Lamprey	River Lamprey	Brook Lamprey	Atlantic Salmon	Brown Trout	Rainbow Trout	Arctic Charr	Powan	Grayling	Smelt	Pike	Common Carp	Crucian Carp	Goldfish	Barbel	Gudgeon	Tench	Silver Bream	Common Bream	Bleak	Minnow	Rudd	Roach	Chub	Dace	Stone loach	Eel	3 Sp. Stickleback	10sp. Stickleback	Sea Bass	Perch	Ruffe	Pikeperch	Common Goby	Thicklipped Mullet	Bullhead	Flounder																		
	*	*	*	*				F S S	F S S	Q S S	Q				Q																																												
Abernethy Forest	*	*	*	*				F S S	F S S	Q S S	Q																																																
Cairngorms	*	*	*	*				Q S S	Q S S	Q																																																	
Craigellachie	*	*	*	*						Q F	Q F																																																
Creag Meagaidh	*	*	*	*						Q F	Q F																																																
Dinnet Oakwood	NO FRESH WATER																																																										
Glen Tanar		*	*	*						Q S S	Q S S																																																
Hermaness		*	*	*						NO FISH - Q																																																	
Keen of Hamar	NO FRESH WATER																																																										
Morrone Birkwoods		*	*	*							F																																																

NCC REGION -	WATER TYPES PRESENT			FISH SPECIES RECORDED																																															
	Lakes	Rivers	Streams	Sea Lamprey	River Lamprey	Brook Lamprey	Atlantic Salmon	Brown Trout	Rainbow Trout	Arctic Charr	Powan	Grayling	Smelt	Pike	Common Carp	Crucian Carp	Goldfish	Barbel	Gudgeon	Tench	Silver Bream	Common Bream	Bleak	Minnow	Rudd	Roach	Chub	Dace	Stone loach	Rel	3 Sp. Stickleback	10sp. Stickleback	Sea Bass	Perch	Ruffe	Pikeperch	Common Goby	Thicklippled Mullet	Bullhead	Flounder											
Muir of Dinnet	*	*	*					♂					♂	♂																																					
Noss	*	*	*																												♀																				
St Cyrus																																																			
Sands of Forvie	*	*	*										♀	♀																																					
NOTE: -	HAAF GRUNEY NNR was de-declared and not considered																																																		

SOURCES OF INFORMATION: Q - QUESTIONNAIRE; F - FIELD SURVEY; W - WATER AUTHORITY/NRA; S - OTHER SOURCES



NCC REGION - SOUTH WEST SCOTLAND(1) NATIONAL NATURE RESERVES	WATER TYPES PRESENT		FISH SPECIES RECORDED
	Lakes	Ponds	
Ben Lui	*	*	River Lamprey Sea Lamprey Atlantic Salmon Brown Trout Rainbow Trout Arctic Char Powan Graying Smelt Pike Common Carp Crucian Carp Goldfish Barbel Gudgeon Tench Silver Bream Common Bream Bleak Minnow Rudd Roach Chub Dace Stone Loach Eel 3 Sp. Stickleback 10sp. Stickleback Sea Bass Perch Ruffe Pikeperch Common Goby Thicklip Mullet Bullhead Rounder
Braehead Moss			NO FISH - Q
Caerlaverock	*	*	Q F F
Cairnmore of Fleet	*	*	Q S S
Clyde Valley Woodlands	*	*	F F
Glasdrum			NO FISH - F
Glen Diomhan	*	*	S S
Glen Nant	*	*	S S
Kirkconnel Flow		*	Q F

SOURCES OF INFORMATION: Q - QUESTIONNAIRE; F - FIELD SURVEY; W - WATER AUTHORITY/NRA; S - OTHER SOURCES



NCC REGION - SOUTH EAST SCOTLAND(1) NATIONAL NATURE RESERVES	WATER TYPES PRESENT			FISH SPECIES RECORDED
	Lakes	Rivers	Streams	
Ben Lawers	*	*	*	Sea Lamprey River Lamprey Brook Lamprey Atlantic Salmon Brown Trout Rainbow Trout Arctic Char Powan Grayling Smelt Pike Common Carp Crucian Carp Goldfish Barbel Gudgeon Tench Silver Bream Common Bream Bleak Minnow Rudd Roach Chub Dace Stone Loach Eel 3 sp. stickleback 10sp. stickleback Sea Bass Perch Ruffe Pikeperch Common Goby Thicklipped Mullet Bullhead Flounder
Blawhorn Moss	*		*	
Caenlochan			*	
Cragbank Wood			*	NO FISH - Q
Flanders Moss			*	NO FISH - F
Isle of May	*		*	
L. Leven	*	*	*	
Milton Wood			*	NO FISH - Q
Morton Lochs	*		*	

SOURCES OF INFORMATION: Q - QUESTIONNAIRE; F - FIELD SURVEY; W - WATER AUTHORITY/NRA; S - OTHER SOURCES





NCC REGION - <b>NORTH WEST ENGLAND(2)</b> NATIONAL NATURE RESERVES	WATER TYPES PRESENT Lakes Ponds Rivers Streams	FISH SPECIES RECORDED
Ribble Marshes	NO FRESH WATER	Sea Lamprey River Lamprey Brook Lamprey Atlantic Salmon Brown Trout Rainbow Trout Arctic Char Povan Grayling Smelt Pike Common Carp Crucian Carp Goldfish Barbel Gudgeon Tench Silver Bream Common Bream Bleak Minnow Rudd Roach Chub Dace Stone Loach Eel 3 Sp. stickleback 10Sp. stickleback Sea Bass Perch Ruffe Pikeperch Common Goby Thicklipped Mullet Bullhead Flounder
Roundsea Woods	NO FRESH WATER	
Rusland Moss	NO FRESH WATER	

SOURCES OF INFORMATION: Q - QUESTIONNAIRE; F - FIELD SURVEY; W - WATER AUTHORITY/NRA; S - OTHER SOURCES



NCC REGION -	WATER TYPES PRESENT	FISH SPECIES RECORDED																								
		Upper Teesdale																								
NORTH EAST ENGLAND (2) NATIONAL NATURE RESERVES	Lakes	*																								
	Ponds	*																								
	Rivers	*																								
	Streams	*																								
	Sea Lamprey																									
	River Lamprey																									
	Brook Lamprey																									
	Atlantic Salmon	W																								
	Brown Trout	W S																								
	Rainbow Trout																									
	Arctic Charr																									
	Powan																									
	Grayling																									
	Smelt																									
	Pike																									
	Common Carp																									
	Crucian Carp																									
	Goldfish																									
	Barbel																									
	Gudgeon																									
	Tench																									
	Silver Bream																									
	Common Bream																									
	Bleak																									
	Minnow																									
	Rudd																									
Roach																										
Chub																										
Dace																										
Stone Loach																										
Eel																										
3 Sp. Stickleback																										
10 Sp. Stickleback																										
Sea Bass																										
Perch																										
Ruffe																										
Pikeperch																										
Common Goby																										
Thicklipped Mullet																										
Bullhead	W																									
Flounder																										

SOURCES OF INFORMATION: Q - QUESTIONNAIRE; F - FIELD SURVEY; W - WATER AUTHORITY/NRA; S - OTHER SOURCES



NCC REGION - WEST MIDLANDS ENGLAND (1) NATIONAL NATURE RESERVES	WATER TYPES PRESENT Lakes Ponds Rivers Streams	FISH SPECIES RECORDED																						
Bredon Hill	NO FRESH WATER																							
Chaddesley Woods	*	NO FISH - S																						
Chartley Moss	*	NO FISH - Q																						
Cotswold Commons	*	NO FISH - Q																						
Derby Dale	*																				Q			
Downton Gorge	*						W														W			
Highbury Wood	NO FRESH WATER																							
Lady Park Wood	NO FRESH WATER																							
Moccas Park	*																				Q			

SOURCES OF INFORMATION: Q - QUESTIONNAIRE; F - FIELD SURVEY; W - WATER AUTHORITY/NRA; S - OTHER SOURCES

NCC REGION - <b>WEST MIDLANDS</b> ENGLAND(2) NATIONAL NATURE RESERVES	WATER TYPES PRESENT			FISH SPECIES RECORDED																																																							
	Lakes	Ponds	Rivers	Streams	Sea Lamprey	River Lamprey	Brook Lamprey	Atlantic Salmon	Brown Trout	Rainbow Trout	Arctic Char	Powan	Grayling	Smelt	Pike	Common Carp	Crucian Carp	Goldfish	Barbel	Gudgeon	Tench	Silver Bream	Common Bream	Bleak	Minnow	Rudd	Roach	Chub	Dace	Stone Loach	Bel	3 Sp. Stickleback	10 Sp. Stickleback	Sea Bass	Perch	Ruffe	Pikeperch	Common Goby	Thicklipped Mullet	Bullhead	Flounder																		
Mottey Meadows				*																																F	Q							F	Q														
Rostherne Mere	*			*																																																							
Stiperstones				*																																																							
The Flits		*		*	F																																																						
Wren's Nest		*																																																									
Wynbury Moss		*		*																																																							
Wyre Forest		*	*	*	Q	Q	Q	Q	Q	Q																																																	

SOURCES OF INFORMATION: Q - QUESTIONNAIRE; F - FIELD SURVEY; W - WATER AUTHORITY/NRA; S - OTHER SOURCES

NCC REGION - EAST MIDLANDS ENGLAND (1) NATIONAL NATURE RESERVES	WATER TYPES PRESENT		FISH SPECIES RECORDED																																																									
	Lakes	Rivers	Streams	Sea Lamprey	River Lamprey	Brook Lamprey	Atlantic Salmon	Brown Trout	Rainbow Trout	Arctic Char	Powan	Grayling	Smelt	Pike	Common Carp	Crucian Carp	Goldfish	Barbel	Gudgeon	Tench	Silver Bream	Common Bream	Bleak	Minnow	Rudd	Roach	Chub	Dace	Stone Loach	Rel	3 Sp. Stickleback	10 Sp. Stickleback	Sea Bass	Perch	Ruffe	Pikeperch	Common Goby	Thicklip Mullet	Bullhead	Flounder																				
Barnack Hills & Holes																																																												
Barton Hills		*																																																										
Castor Hanglands		*																																																										
Gibraltar Point		*																																																										
Holme Fen		*																																																										
Knocking Hoe																																																												
Monks Wood		*																																																										
Muston Meadows		*																																																										
Saltfleetby etc.		*																																																										

SOURCES OF INFORMATION: Q - QUESTIONNAIRE; F - FIELD SURVEY; W - WATER AUTHORITY/NRA; S - OTHER SOURCES



NCC REGION - <b>EAST ANGLIA ENGLAND (1) NATIONAL NATURE RESERVES</b>	WATER TYPES PRESENT		FISH SPECIES RECORDED	
	Lakes	Rivers	Streams	
Benacre	*	*	*	
Blackwater Estuary		*	*	
Brettenham Heath	NO FRESH WATER			
Bure Marshes	*	*	*	
Cavenham Heath	*	*		
Chippenham Fen	*	*	*	
Colne Estuary	*	*	*	
Dengie	NO FRESH WATER			
Hales Wood	NO FRESH WATER			
				Sea Lamprey
				River Lamprey
				Brook Lamprey
				Atlantic Salmon
				Brown Trout
				Rainbow Trout
				Arctic Char
				Powan
				Grayling
				Smelt
				Pike
				Common Carp
				Crucian Carp
				Goldfish
				Barbel
				Gudgeon
				Tench
				Silver Bream
				Common Bream
				Bleak
				Minnow
				Rudd
				Roach
				Chub
				Dace
				Stone loach
				Bel
				3 Sp. Stickleback
				10 Sp. Stickleback
				Sea Bass
				Perch
				Ruffe
				Pikeperch
				Common Goby
				Thicklip Mullet
				Bullhead
				Flounder

SOURCES OF INFORMATION: Q - QUESTIONNAIRE; F - FIELD SURVEY; W - WATER AUTHORITY/NRA; S - OTHER SOURCES

NCC REGION - EAST ANGLIA ENGLAND (2) NATIONAL NATURE RESERVES	WATER TYPES PRESENT Lakes Ponds Streams	FISH SPECIES RECORDED
Hamford Water	NO FRESH WATER	Sea lamprey River lamprey Brook lamprey Atlantic salmon Brown trout Rainbow trout Arctic char Powan Grayling Smelt Pike Common carp Crucian carp Goldfish Barbel Gudgeon Tench Silver bream Common bream Bleak Minnow Rudd Roach Chub Dace Stone loach Eel 3 sp. stickleback 10 sp. stickleback Sea bass Perch Ruffe Pikeperch Common goby Thicklipped mullet Bullhead Flounder
Hickling Broad	*	Sea lamprey River lamprey Brook lamprey Atlantic salmon Brown trout Rainbow trout Arctic char Powan Grayling Smelt Pike Common carp Crucian carp Goldfish Barbel Gudgeon Tench Silver bream Common bream Bleak Minnow Rudd Roach Chub Dace Stone loach Eel 3 sp. stickleback 10 sp. stickleback Sea bass Perch Ruffe Pikeperch Common goby Thicklipped mullet Bullhead Flounder
Holkam	*	Sea lamprey River lamprey Brook lamprey Atlantic salmon Brown trout Rainbow trout Arctic char Powan Grayling Smelt Pike Common carp Crucian carp Goldfish Barbel Gudgeon Tench Silver bream Common bream Bleak Minnow Rudd Roach Chub Dace Stone loach Eel 3 sp. stickleback 10 sp. stickleback Sea bass Perch Ruffe Pikeperch Common goby Thicklipped mullet Bullhead Flounder
Leigh	*	NO FISH - F
Ludham Marshes	*	Sea lamprey River lamprey Brook lamprey Atlantic salmon Brown trout Rainbow trout Arctic char Powan Grayling Smelt Pike Common carp Crucian carp Goldfish Barbel Gudgeon Tench Silver bream Common bream Bleak Minnow Rudd Roach Chub Dace Stone loach Eel 3 sp. stickleback 10 sp. stickleback Sea bass Perch Ruffe Pikeperch Common goby Thicklipped mullet Bullhead Flounder
Orfordness-Havergate	NO FRESH WATER	Sea lamprey River lamprey Brook lamprey Atlantic salmon Brown trout Rainbow trout Arctic char Powan Grayling Smelt Pike Common carp Crucian carp Goldfish Barbel Gudgeon Tench Silver bream Common bream Bleak Minnow Rudd Roach Chub Dace Stone loach Eel 3 sp. stickleback 10 sp. stickleback Sea bass Perch Ruffe Pikeperch Common goby Thicklipped mullet Bullhead Flounder
Scolt Head Island	NO FRESH WATER	Sea lamprey River lamprey Brook lamprey Atlantic salmon Brown trout Rainbow trout Arctic char Powan Grayling Smelt Pike Common carp Crucian carp Goldfish Barbel Gudgeon Tench Silver bream Common bream Bleak Minnow Rudd Roach Chub Dace Stone loach Eel 3 sp. stickleback 10 sp. stickleback Sea bass Perch Ruffe Pikeperch Common goby Thicklipped mullet Bullhead Flounder
Swanton Novers Wood	NO FRESH WATER	Sea lamprey River lamprey Brook lamprey Atlantic salmon Brown trout Rainbow trout Arctic char Powan Grayling Smelt Pike Common carp Crucian carp Goldfish Barbel Gudgeon Tench Silver bream Common bream Bleak Minnow Rudd Roach Chub Dace Stone loach Eel 3 sp. stickleback 10 sp. stickleback Sea bass Perch Ruffe Pikeperch Common goby Thicklipped mullet Bullhead Flounder
Thetford Heath	NO FRESH WATER	Sea lamprey River lamprey Brook lamprey Atlantic salmon Brown trout Rainbow trout Arctic char Powan Grayling Smelt Pike Common carp Crucian carp Goldfish Barbel Gudgeon Tench Silver bream Common bream Bleak Minnow Rudd Roach Chub Dace Stone loach Eel 3 sp. stickleback 10 sp. stickleback Sea bass Perch Ruffe Pikeperch Common goby Thicklipped mullet Bullhead Flounder

SOURCES OF INFORMATION: Q - QUESTIONNAIRE; F - FIELD SURVEY; W - WATER AUTHORITY/NRA; S - OTHER SOURCES







NCC REGION -	WATER TYPES PRESENT			FISH SPECIES RECORDED																																													
	Lakes	Rivers	Streams	Sea Lamprey	River Lamprey	Brook Lamprey	Atlantic Salmon	Brown Trout	Rainbow Trout	Arctic Charr	Powan	Grayling	Smelt	Pike	Common Carp	Crucian Carp	Goldfish	Barbel	Gudgeon	Tench	Silver Bream	Common Bream	Bleak	Minnow	Rudd	Roach	Chub	Dace	Stone Loach	Eel	3 sp. stickleback	10sp. stickleback	Sea Bass	Perch	Ruffe	Pikeperch	Common Goby	Thicklipped Mullet	Bullhead	Flounder									
SOUTH WEST ENGLAND(2) NATIONAL NATURE RESERVES		*	*					S						Q											Q	Q				S	Q	Q																	
Gordano Valley		*	*											Q											Q	Q				S	Q	Q																	
Hartland Moor		*	*					S																		Q	Q				S	Q	Q																
Hog Cliff		NO FRESH WATER																																															
Holt Heath		*																																															
Holton Heath			*																																														
The Lizard		NO FRESH WATER																																															
Morden Bog		*	*																																														
Rodney Stoke		NO FRESH WATER																																															
Shapwick Heath		*	*																																														

SOURCES OF INFORMATION: Q - QUESTIONNAIRE; F - FIELD SURVEY; W - WATER AUTHORITY/NRA; S - OTHER SOURCES





NCC REGION -  SOUTH ENGLAND (2) NATIONAL NATURE RESERVES	WATER TYPES PRESENT		FISH SPECIES RECORDED																																								
	Lakes	Ponds Rivers Streams	Atlantic Salmon	Brown Trout	Rainbow Trout	Arctic Char	Powan	Grayling	Smelt	Pike	Common Carp	Crucian Carp	Goldfish	Barbel	Gudgeon	Tench	Silver Bream	Common Bream	Bleak	Minnow	Rudd	Roach	Chub	Dace	Stone loach	Eel	3 Sp. Stickleback	10sp. stickleback	Sea Bass	Perch	Ruffe	Pikeperch	Common Goby	Thicklipped Mullet	Bullhead	Flounder							
Parsonage Down	*		NO FISH - Q																																								
Pewsey Downs	NO FRESH WATER																																										
Prescombe Down	NO FRESH WATER																																										
Wychwood	*	*																																									
Wylie Down	NO FRESH WATER																																										

SOURCES OF INFORMATION: Q - QUESTIONNAIRE; F - FIELD SURVEY; W - WATER AUTHORITY/NRA; S - OTHER SOURCES













NCC REGION - DYFED-POYTS WALES (1) NATIONAL NATURE RESERVES	WATER TYPES PRESENT		FISH SPECIES RECORDED																																										
	Lakes	Rivers	Streams	Sea Lamprey	River Lamprey	Brook Lamprey	Atlantic Salmon	Brown Trout	Rainbow Trout	Arctic Charr	Powan	Grayling	Smelt	Pike	Common Carp	Crucian Carp	Goldfish	Barbel	Gudgeon	Tench	Silver Bream	Common Bream	Bleak	Minnow	Rudd	Roach	Chub	Dace	Stone Loach	Eel	3 Sp. Stickleback	10sp. Stickleback	Sea Bass	Perch	Ruffe	Pikeperch	Common Goby	Thicklipped Mullet	Bullhead	Flounder					
Allt Rhyd y Groes	*	*	*	Q	Q	Q	Q	Q															Q	Q																Q					
Coed Rheidol		*	*	Q	Q	Q	Q	Q															Q	Q																		Q			
Cors Çaron		*	*	Q	Q	Q	Q	Q						Q	Q								Q	Q																		Q			
Cors y Llyn	*	*	*	NO FISH - Q																																									
Craig Cerrig gleisiad	*	*	*		S			S																S	S																S				
Craig y Cilau			*					F																																					
Dyfi		*	*																																										
Nant Irfon		*	*					Q																																					
Ogof Ffynnon Ddu			*	NO FISH - Q																																									

SOURCES OF INFORMATION: Q - QUESTIONNAIRE; F - FIELD SURVEY; W - WATER AUTHORITY/NRA; S - OTHER SOURCES

NCC REGION - DYED-POYS VALS (2) NATIONAL NATURE RESERVES	FISH SPECIES RECORDED		WATER TYPES PRESENT	Lakes Ponds Rivers Streams	Atlantic Salmon Brown Trout Rainbow Trout Arctic Charr Powan Grayling Smelt Pike Common Carp Crucian Carp Goldfish Barbel Gudgeon Tench Silver Bream Common Bream Bleak Minnow Rudd Roach Chub Dace Stone loach Eel 3 sp. Stickleback 10sp. Stickleback Sea Bass Perch Ruffe Pikeperch Common Goby Thicklipped Mullet Bullhead Flounder
	NO FISH - S				
Rhos Goch	*		*		Q
Rhos Llawr. Cwrt.	*		*		
Skomer			*		
Stackpole	*		*		Q W
Stanner Rocks			NO FRESH WATER		
Ty Canal	*		*		Q

SOURCES OF INFORMATION: Q - QUESTIONNAIRE; F - FIELD SURVEY; W - WATER AUTHORITY/NRA; S - OTHER SOURCES



## APPENDIX III

Distribution maps of freshwater fish species in NNRs.

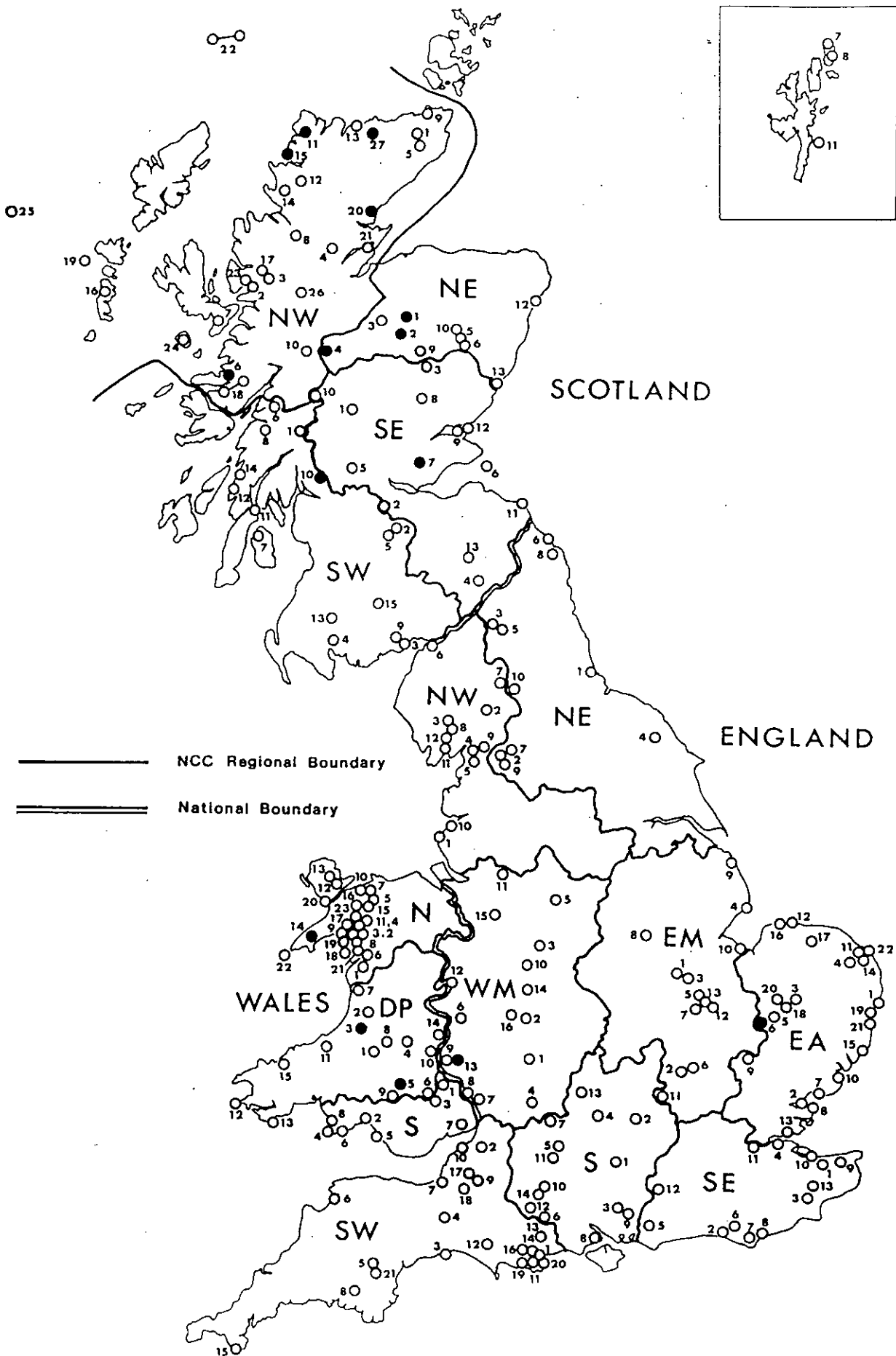
Figure III a-u

**Index to NNR Numbers on Figure**

<b>Scotland</b>	<b>England</b>		
<b>NW</b>	<b>NW</b>		
1 Achanarras Quarry	1 Ainsdale Sand Dunes	8 Dengie	10 The Swale
2 Alt nan Carnan	2 Asby Scar	9 Hales Wood	11 Swanscombe Skull Site
3 Reinn Eighe	3 Blelham Bog	10 Hamford Water	12 Thursley
4 Ben Wyvis	4 Clawthorpe Fell	11 Hickling Broad	13 Wye
5 Blar Nam Faoleag	5 Gait Barrows	12 Holkham	
6 Claish Moss	6 Glasson Moss	13 Leigh	<b>Wales</b>
7 Coille Thogabhaig	7 Moor House	14 Ludham Marshes	<b>N</b>
8 Corrieshalloch	8 North Fen	15 Orfordness-Havergate	1 Cadair Idris
9 Dunnet Links	9 Park Wood	16 Scolt Head Island	2 Ceunant Llennyrch
10 Glen Roy	10 Ribble Marshes	17 Swanton Novers Wood	3 Coed Camlyn
11 Gualin	11 Roundsea Woods	18 Thetford Heath	4 Coed Cymerau
12 Inchnadamph	12 Rusland Moss	19 Walberswick	5 Coed Dolgarrog
13 Invernaver		20 Weeting Heath	6 Coed Ganllwyd
14 Inverpolly	<b>NE</b>	21 Westleton Heath	7 Coed Gorswen
15 L.A.Mhuilinn Wood	1 Castle Eden Dene	22 Winterton Dunes	8 Coed y Rhygen
16 L.Druidibeg	2 Colt Park Wood		9 Coed Tremadoc
17 L.Maree Islands	3 Coom Rig Moss	<b>SW</b>	10 Coedydd Aber
18 L.Sunart Woodlands	4 Forge Valley Woods	1 Arne	11 Coedydd Maentwrog
19 Monach Isles	5 Grain Heads Moss	2 Avon Gorge	12 Cors Bodeilio
20 Mound Alderwoods	6 Lindisfarne	3 Axmouth - etc	13 Cors Erddreiniog
21 Nigg & Udale Bays	7 Ling Gill	4 Barrington Hill	14 Cors Geirch
22 N.Rona & Sula Sgeir	8 Newham Bog	5 Bovey Valley	15 Cwm Glas Crafant
23 Rassal Ashwood	9 Scar Close	6 Braunton Barrow	16 Cwm Idwal
24 Rhum	10 Upper Teesdale	7 Bridgewater Bay	17 Hafod Garregog
25 St Kilda			
26 Strathfarrar			
27 Strathy Bog			
<b>NE</b>			
1 Abernethy Forest			
2 Cairngorms			
3 Craigellachie			
4 Creag Meagaidh			
5 Dinnet Oakwood			
6 Glen Tanar			
7 Hermaness			
8 Keen of Hamar			
9 Morrone Birkwood			
10 Muir of Dinnet			
11 Noss			
12 St Cyrus			
13 Sands of Forvie			
<b>SW</b>			
1 Ben Lui			
2 Braehead Moss			
3 Caerlaverock			
4 Cairnsmore of Fleet			
5 Clyde Valley Woodlands			
6 Glasdrum			
7 Glen Diomhan			
8 Glen Nant			
9 Kirkconnel Flow			
10 L.Lomond			
11 Mealdarroch			
12 Moine Mhor			
13 Silver Flowe			
14 Taynish			
15 Tynron Juniper Wood			
<b>SE</b>			
1 Ben Lawers			
2 Blawhorn Moss			
3 Caenlochan			
4 Cragbank Wood			
5 Flanders Moss			
6 Isle of May			
7 L.Leven			
8 Milton Wood			
9 Morton Lochs			
10 Rannoch Moor			
11 St Abbs Head			
12 Tentsmuir Point			
13 Whitlaw Mosses			
	<b>WM</b>		
	1 Bredon Hill	8 Dendles Wood	18 Morfa Dyffryn
	2 Chaddesley Moss	9 Ebbor Gorge	19 Morfa Harlech
	3 Chartley Moss	10 Gordano Valley	20 Newborough Warren
	4 Cotswold Commons	11 Hartland Moor	21 Rhinog
	5 Derbyshire Dales	12 Hog Cliff	22 Yns Enlli-Bardsey
	6 Downton Gorge	13 Holt Heath	23 Y Wyddfa-Snowdon
	7 Highbury Wood	14 Holton Heath	
	8 Lady Park Wood	15 The Lizard	<b>DP</b>
	9 Moccas Park	16 Morden Bog	1 Allt Rhyd y Groes
	10 Motte Meadows	17 Rodney Stoke	2 Coed Rheidol
	11 Rostherne Mere	18 Shapwick Heath	3 Cors Caron
	12 Stiperstones	19 Stoborough Heath	4 Cors y Llyn
	13 The Flits	20 Studland Heath	5 Craig Cerrig Gleisaid
	14 Wrens Nest	21 Yarner Wood	6 Craig y Cilau
	15 Wynbury Moss		7 Dyfi
	16 Wyre Forest		8 Nant Irfon
	<b>EM</b>		9 Ogor Ffynnon-Ddu
	1 Barnack Hills & Holes	<b>S</b>	10 Rhos Goch
	2 Barton Hills	1 Ashford Hill	11 Rhos Llaur Cwrt
	3 Castor Hanglands	2 Aston Rowant	12 Skomer
	4 Gibraltar Point	3 Beacon Hill	13 Stackpole
	5 Holme Fen	4 Cothill	14 Stanner Rocks
	6 Knocking Hoe	5 Fyfield Down	15 Ty Canol
	7 Monks Wood	6 Martin Down	
	8 Muston Meadows	7 N. Meadow Cricklade	<b>S</b>
	9 Saltfleetby etc.	8 N. Solent	1 Coed y Cerrig
	10 The Wash	9 Old Winchester Hill	2 Crymlyn Bog
	11 Tring Reservoirs	10 Parsonage Down	3 Cwm Clydach
	12 Upwood Meadows	11 Pewsey Down	4 Gower Coast
	13 Woodwalton Fen	12 Prescombe Down	5 Kenfig
	<b>EA</b>	13 Wychwood	6 Oxwich
	1 Benacre	14 Wylie Down	7 Penhow Woodlands
	2 Blackwater Estuary		8 Whiteford
	3 Brettenham Heath	<b>SE</b>	
	4 Bure Marshes	1 Blean Woods	
	5 Cavenham Heath	2 Castle Hill, Lewes	
	6 Chippenham Fen	3 Ham Street Woods	
	7 Colne Estuary	4 High Halstow	
		5 Kingley Vale	
		6 Lewes Downs	
		7 Lullington Heath	
		8 Pevensey Levels	
		9 Stodmarsh	

**Figure IIIa The distribution of freshwater fish in NNRs**

LAMPREYS - ●



**Index to NNR Numbers on Figure**

- Scotland**
- NW**
- 1 Achanarras Quarry
  - 2 Alt nan Carnan
  - 3 Reinn Eighe
  - 4 Ben Wyvis
  - 5 Blar Nam Faoileag
  - 6 Claish Moss
  - 7 Coille Thogabhaig
  - 8 Corrieshalloch
  - 9 Dunnet Links
  - 10 Glen Roy
  - 11 Gualin
  - 12 Inchnadamph
  - 13 Invernaver
  - 14 Inverpolly
  - 15 L.A.Mhullinn Wood
  - 16 L.Druidibeg
  - 17 L.Maree Islands
  - 18 L.Sunart Woodlands
  - 19 Monach Isles
  - 20 Mound Alderwoods
  - 21 Nigg & Udale Bays
  - 22 N.Rona & Sula Sgeir
  - 23 Rassal Ashwood
  - 24 Rhum
  - 25 St Kilda
  - 26 Strathfarrar
  - 27 Strathy Bog

- NE**
- 1 Abernethy Forest
  - 2 Cairngorms
  - 3 Craigellachie
  - 4 Creag Meagaidh
  - 5 Dinnert Oakwood
  - 6 Glen Tanar
  - 7 Hermaness
  - 8 Keen of Hamar
  - 9 Morrone Birkwood
  - 10 Muir of Dinnet
  - 11 Noss
  - 12 St Cyrus
  - 13 Sands of Forvie

- SW**
- 1 Ben Lui
  - 2 Braehead Moss
  - 3 Caerlaverock
  - 4 Cairnsmore of Fleet
  - 5 Clyde Valley Woodlands
  - 6 Glasdrum
  - 7 Glen Diomhan
  - 8 Glen Nant
  - 9 Kirkconnel Flow
  - 10 L.Lomond
  - 11 Mealdarroch
  - 12 Moine Mhor
  - 13 Silver Flowe
  - 14 Taynish
  - 15 Tynron Juniper Wood

- SE**
- 1 Ben Lawers
  - 2 Blawhorn Moss
  - 3 Caenlochan
  - 4 Cragbank Wood
  - 5 Flanders Moss
  - 6 Isle of May
  - 7 L.Leven
  - 8 Milton Wood
  - 9 Morton Lochs
  - 10 Rannoch Moor
  - 11 St Abbs Head
  - 12 Tentsmuir Point
  - 13 Whitlaw Mosses

- England**
- NW**
- 1 Ainsdale Sand Dunes
  - 2 Asby Scar
  - 3 Blelham Bog
  - 4 Clawthorpe Fell
  - 5 Gait Barrows
  - 6 Glasson Moss
  - 7 Moor House
  - 8 North Fen
  - 9 Park Wood
  - 10 Ribble Marshes
  - 11 Roundsea Woods
  - 12 Rusland Moss

- NE**
- 1 Castle Eden Dene
  - 2 Colt Park Wood
  - 3 Coom Rig Moss
  - 4 Forge Valley Woods
  - 5 Grain Heads Moss
  - 6 Lindisfarne
  - 7 Ling Gill
  - 8 Newham Bog
  - 9 Scar Close
  - 10 Upper Teesdale

- WM**
- 1 Bredon Hill
  - 2 Chaddesley Moss
  - 3 Chartley Moss
  - 4 Cotswold Commons
  - 5 Derbyshire Dales
  - 6 Downton Gorge
  - 7 Highbury Wood
  - 8 Lady Park Wood
  - 9 Moccas Park
  - 10 Motte Meadows
  - 11 Rostherne Mere
  - 12 Stiperstones
  - 13 The Flits
  - 14 Wrens Nest
  - 15 Wynbury Moss
  - 16 Wyre Forest

- EM**
- 1 Barnack Hills & Holes
  - 2 Barton Hills
  - 3 Castor Hanglands
  - 4 Gibraltar Point
  - 5 Holme Fen
  - 6 Knocking Hoe
  - 7 Monks Wood
  - 8 Muston Meadows
  - 9 Saltfleetby etc.
  - 10 The Wash
  - 11 Tring Reservoirs
  - 12 Upwood Meadows
  - 13 Woodwalton Fen

- EA**
- 1 Benacre
  - 2 Blackwater Estuary
  - 3 Brettenham Heath
  - 4 Bure Marshes
  - 5 Cavenham Heath
  - 6 Chippenham Fen
  - 7 Colne Estuary

- 8 Dengie
- 9 Hales Wood
- 10 Hamford Water
- 11 Hickling Broad
- 12 Holkham
- 13 Leigh
- 14 Ludham Marshes
- 15 Orfordness-Havergate
- 16 Scolt Head Island
- 17 Swanton Novers Wood
- 18 Thetford Heath
- 19 Walberswick
- 20 Weeting Heath
- 21 Westleton Heath
- 22 Winterton Dunes

- SW**
- 1 Arne
  - 2 Avon Gorge
  - 3 Axmouth - etc
  - 4 Barrington Hill
  - 5 Bovey Valley
  - 6 Braunton Barrow
  - 7 Bridgewater Bay

- 10 The Swale
- 11 Swanscombe Skull Site
- 12 Thursley
- 13 Wye

- Wales**
- N**
- 1 Cadair Idris
  - 2 Ceunant Llennyrch
  - 3 Coed Camlyn
  - 4 Coed Cymerau
  - 5 Coed Dolgarrog
  - 6 Coed Ganllwyd
  - 7 Coed Gorswen
  - 8 Coed y Rhygen
  - 9 Coed Tremadoc
  - 10 Coedydd Aber
  - 11 Coedydd Maentwrog
  - 12 Cors Bodeilio
  - 13 Cors Erddreiniog
  - 14 Cors Geirch
  - 15 Cwm Glas Crafant
  - 16 Cwm Idwal
  - 17 Hafod Garregog

**Figure IIIb The distribution of freshwater fish in NNRs**

**ATLANTIC SALMON - ●**

- 8 Dendles Wood
- 9 Ebbor Gorge
- 10 Gordano Valley
- 11 Hartland Moor
- 12 Hog Cliff
- 13 Holt Heath
- 14 Holton Heath
- 15 The Lizard
- 16 Morden Bog
- 17 Rodney Stoke
- 18 Shapwick Heath
- 19 Stoborough Heath
- 20 Studland Heath
- 21 Yarner Wood

- S**
- 1 Ashford Hill
  - 2 Aston Rowant
  - 3 Beacon Hill
  - 4 Cothill
  - 5 Fyfield Down
  - 6 Martin Down
  - 7 N. Meadow Cricklade
  - 8 N. Solent
  - 9 Old Winchester Hill
  - 10 Parsonage Down
  - 11 Pewsey Down
  - 12 Prescombe Down
  - 13 Wychwood
  - 14 Wylie Down

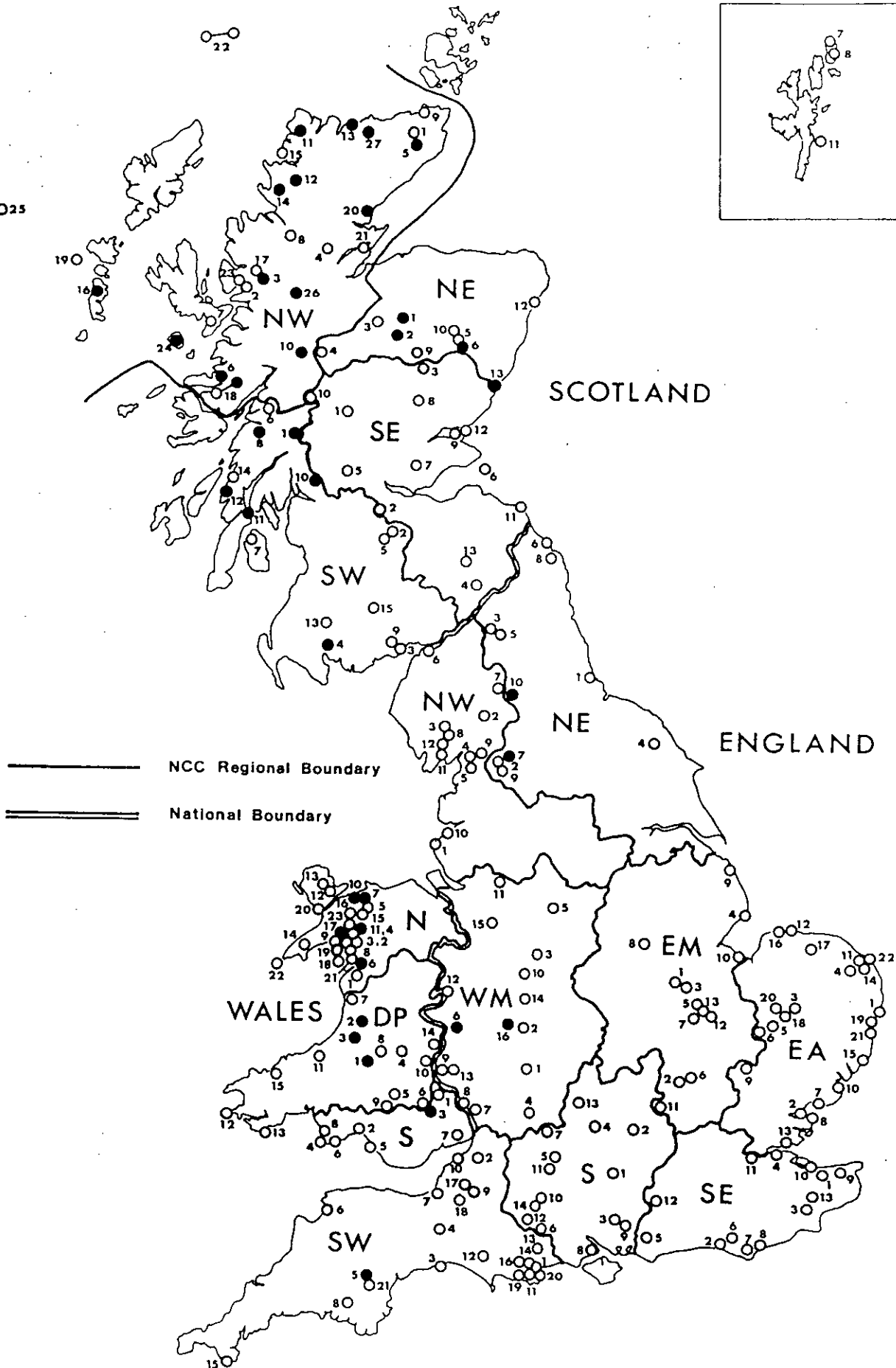
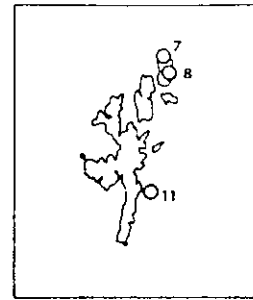
- SE**
- 1 Blean Woods
  - 2 Castle Hill, Lewes
  - 3 Ham Street Woods
  - 4 High Halstow
  - 5 Kingley Vale
  - 6 Lewes Downs
  - 7 Lullington Heath
  - 8 Pevensey Levels
  - 9 Stodmarsh

- DP**
- 1 Allt Rhyd y Groes
  - 2 Coed Rheidol
  - 3 Cors Caron
  - 4 Cors y Llyn
  - 5 Craig Cerrig Gleisaid
  - 6 Craig y Cilau
  - 7 Dyfi
  - 8 Nant Irfon
  - 9 Ogor Ffynnon-Ddu
  - 10 Rhos Goch
  - 11 Rhos Llaur Cwrst
  - 12 Skomer
  - 13 Stackpole
  - 14 Stanner Rocks
  - 15 Ty Canol

- S**
- 1 Coed y Cerrig
  - 2 Crymlyn Bog
  - 3 Cwm Clydach
  - 4 Gower Coast
  - 5 Kenfig
  - 6 Oxwich
  - 7 Penhow Woodlands
  - 8 Whiteford



O25



NCC Regional Boundary

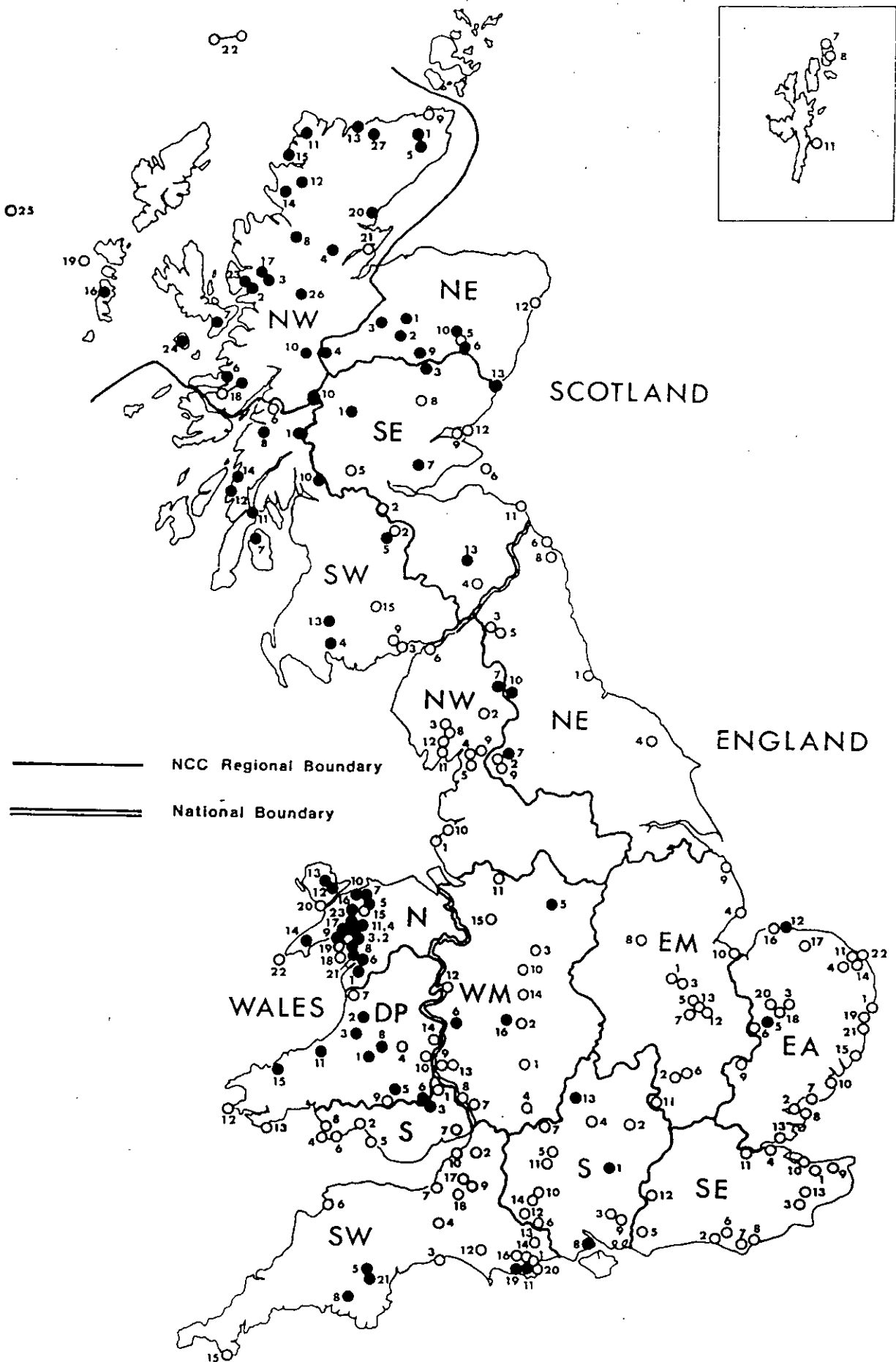
National Boundary

**Index to NNR Numbers on Figure**

<b>Scotland</b>	<b>England</b>		
<b>NW</b>	<b>NW</b>		
1 Achanarras Quarry	1 Ainsdale Sand Dunes	8 Dengie	10 The Swale
2 Alt nan Carnan	2 Asby Scar	9 Hales Wood	11 Swanscombe Skull Site
3 Reinn Eighe	3 Blelham Bog	10 Hamford Water	12 Thursley
4 Ben Wyvis	4 Clawthorpe Fell	11 Hickling Broad	13 Wye
5 Blar Nam Faioleag	5 Gait Barrows	12 Holkham	
6 Claish Moss	5 Glasson Moss	13 Leigh	<b>Wales</b>
7 Coille Thogabhaig	6 Moor House	14 Ludham Marshes	<b>N</b>
8 Corrieshalloch	8 North Fen	15 Orfordness-Havergate	1 Cadair Idris
9 Dunnet Links	9 Park Wood	16 Scolt Head Island	2 Ceunant Llennyrch
10 Glen Roy	10 Ribble Marshes	17 Swanton Novers Wood	3 Coed Camlyn
11 Gualin	11 Roundsea Woods	18 Thetford Heath	4 Coed Cymerau
12 Inchnadamph	12 Rusland Moss	19 Walberswick	5 Coed Dolgarrog
13 Invernaver		20 Weeting Heath	6 Coed Ganllwyd
14 Inverpolly	<b>NE</b>	21 Westleton Heath	7 Coed Gorswen
15 L.A.Mhuilinn Wood	1 Castle Eden Dene	22 Winterton Dunes	8 Coed y Rhygen
16 L.Druidibeg	2 Colt Park Wood		9 Coed Tremadoc
17 L.Maree Islands	3 Coom Rig Moss	<b>SW</b>	10 Coedydd Aber
18 L.Sunart Woodlands	4 Forge Valley Woods	1 Arne	11 Coedydd Maentwrog
19 Monach Isles	5 Grain Heads Moss	2 Avon Gorge	12 Cors Bodeilio
20 Mound Alderwoods	6 Lindisfarne	3 Axmouth - etc	13 Cors Erddreiniog
21 Nigg & Udale Bays	7 Ling Gill	4 Barrington Hill	14 Cors Geirch
22 N.Rona & Sula Sgeir	8 Newham Bog	5 Bovey Valley	15 Cwm Glas Crafant
23 Rassal Ashwood	9 Scar Close	6 Braunton Barrow	16 Cwm Idwal
24 Rhum	10 Upper Teesdale	7 Bridgewater Bay	17 Hafod Garregog
25 St Kilda			
26 Strathfarrar			
27 Strathy Bog			
	<b>NE</b>		
	1 Abernethy Forest		
	2 Cairngorms		
	3 Craigellachie		
	4 Creag Meagaidh		
	5 Dinnet Oakwood		
	6 Glen Tanar		
	7 Hermaness		
	8 Keen of Hamar		
	9 Morrone Birkwood		
	10 Muir of Dinnet		
	11 Noss		
	12 St Cyrus		
	13 Sands of Forvie		
	<b>SW</b>		
	1 Ben Lui		
	2 Braehead Moss		
	3 Caerlaverock		
	4 Cairnmore of Fleet		
	5 Clyde Valley Woodlands		
	6 Glasdrum		
	7 Glen Diomhan		
	8 Glen Nant		
	9 Kirkconnel Flow		
	10 L.Lomond		
	11 Mealdarroch		
	12 Moine Mhor		
	13 Silver Flowe		
	14 Taynish		
	15 Tynron Juniper Wood		
	<b>SE</b>		
	1 Ben Lawers		
	2 Blawhorn Moss		
	3 Caenlochan		
	4 Cragbank Wood		
	5 Flanders Moss		
	6 Isle of May		
	7 L.Leven		
	8 Milton Wood		
	9 Morton Lochs		
	10 Rannoch Moor		
	11 St Abbs Head		
	12 Tentsmuir Point		
	13 Whitlaw Mosses		
	<b>EM</b>		
	1 Barnack Hills & Holes		
	2 Barton Hills		
	3 Castor Hanglands		
	4 Gibraltar Point		
	5 Holme Fen		
	6 Knocking Hoe		
	7 Monks Wood		
	8 Muston Meadows		
	9 Saltfleetby etc.		
	10 The Wash		
	11 Tring Reservoirs		
	12 Upwood Meadows		
	13 Woodwalton Fen		
	<b>EA</b>		
	1 Benacre		
	2 Blackwater Estuary		
	3 Brettenham Heath		
	4 Bure Marshes		
	5 Cavenham Heath		
	6 Chippenham Fen		
	7 Colne Estuary		
	<b>WM</b>		
	1 Bredon Hill		
	2 Chaddesley Moss		
	3 Chartley Moss		
	4 Cotswold Commons		
	5 Derbyshire Dales		
	6 Downton Gorge		
	7 Highbury Wood		
	8 Lady Park Wood		
	9 Moccas Park		
	10 Motte Meadows		
	11 Rostherne Mere		
	12 Stiperstones		
	13 The Flits		
	14 Wrens Nest		
	15 Wynbury Moss		
	16 Wyre Forest		
	<b>S</b>		
	1 Ashford Hill		
	2 Aston Rowant		
	3 Beacon Hill		
	4 Cothill		
	5 Fyfield Down		
	6 Martin Down		
	7 N. Meadow Cricklade		
	8 N. Solent		
	9 Old Winchester Hill		
	10 Parsonage Down		
	11 Pewsey Down		
	12 Prescombe Down		
	13 Wychwood		
	14 Wylie Down		
	<b>SE</b>		
	1 Blean Woods		
	2 Castle Hill, Lewes		
	3 Ham Street Woods		
	4 High Halstow		
	5 Kingley Vale		
	6 Lewes Downs		
	7 Lullington Heath		
	8 Pevensey Levels		
	9 Stodmarsh		
	<b>DP</b>		
	1 Allt Rhyd y Groes		
	2 Coed Rheidol		
	3 Cors Caron		
	4 Cors y Llyn		
	5 Craig Cerrig Gleisaid		
	6 Craig y Cilau		
	7 Dyfi		
	8 Nant Irfon		
	9 Ogor Ffynnon-Ddu		
	10 Rhos Goch		
	11 Rhos Llawr Cwrt		
	12 Skomer		
	13 Stackpole		
	14 Stanner Rocks		
	15 Ty Canol		
	<b>S</b>		
	1 Coed y Cerrig		
	2 Crymlyn Bog		
	3 Cwm Clydach		
	4 Gower Coast		
	5 Kenfig		
	6 Oxwich		
	7 Penhow Woodlands		
	8 Whiteford		

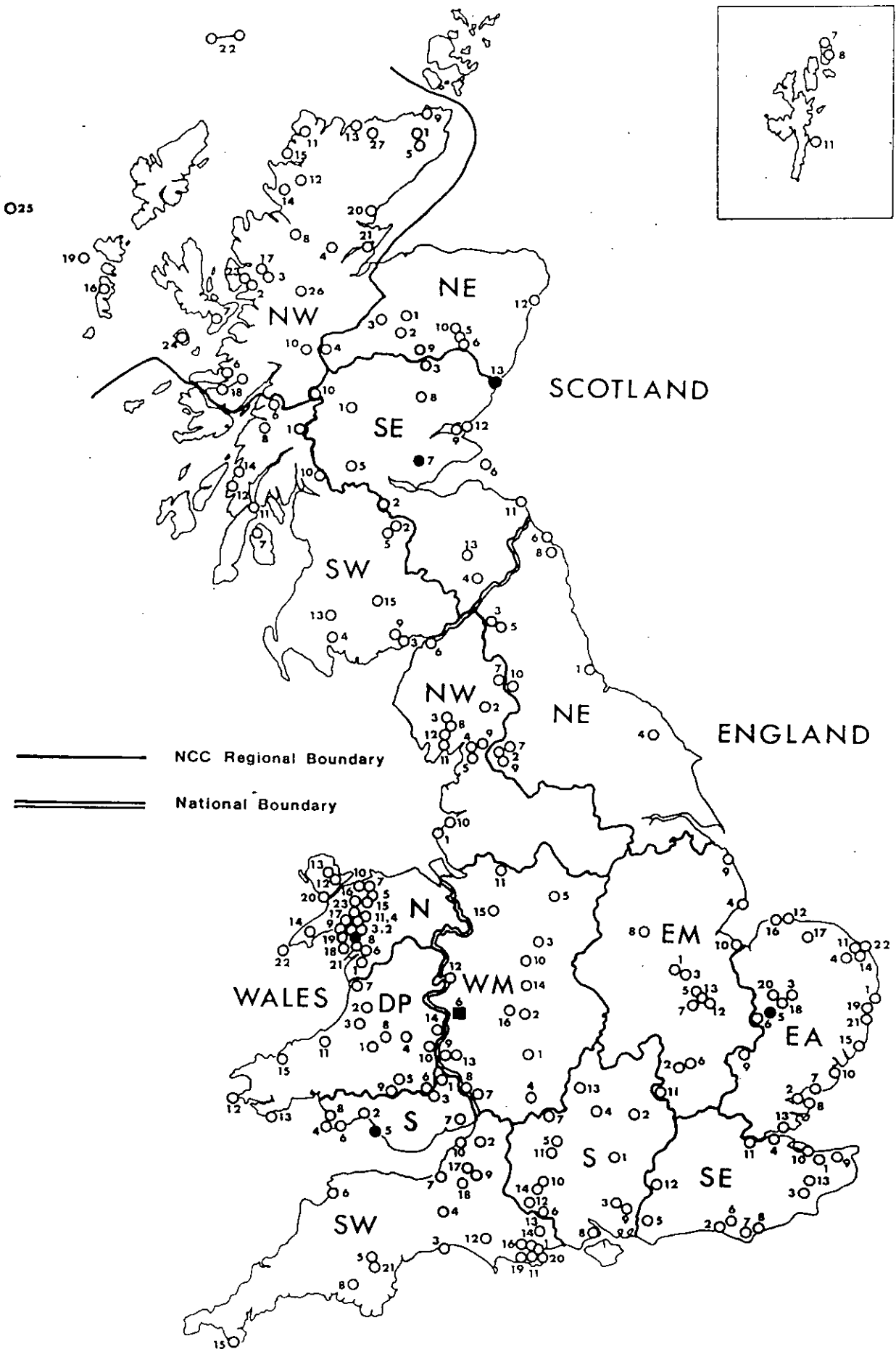
**Figure IIIc The distribution of freshwater fish in NNRs**

**BROWN TROUT - ●**

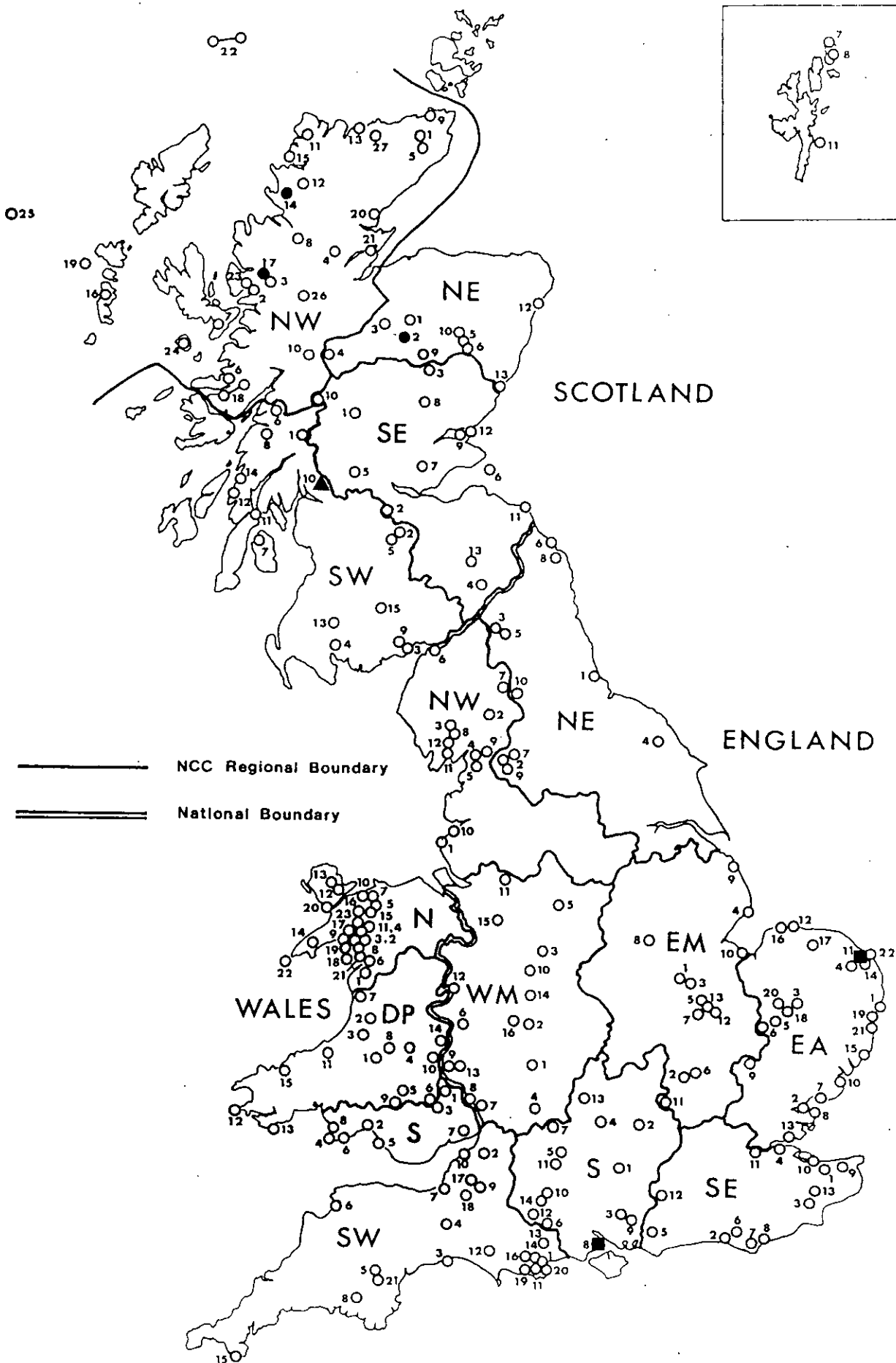


Index to NNR Numbers on Figure

Scotland		England		Wales	
<u>NW</u>		<u>NW</u>		<u>N</u>	
1	Achanarras Quarry	1	Ainsdale Sand Dunes	1	Cadair Idris
2	Alt nan Carnan	2	Asby Scar	2	Ceunnant Llennyrch
3	Reinn Eighe	3	Blelham Bog	3	Coed Camlyn
4	Ben Wyvis	4	Clawthorpe Fell	4	Coed Cymerau
5	Blar Nam Faicileag	5	Gait Barrows	5	Coed Dolgarrog
6	Claish Moss	6	Glasson Moss	6	Coed Ganllwyd
7	Coille Thogabhaig	7	Moor House	7	Coed Gorswen
8	Corrieshalloch	8	North Fen	8	Coed y Rhygen
9	Dunnet Links	9	Park Wood	9	Coed Tremadoc
10	Glen Roy	10	Ribble Marshes	10	Coedydd Aber
11	Gualin	11	Roundsea Woods	11	Coedydd Maentwrog
12	Inchnadamp	12	Rusland Moss	12	Cors Bodeilio
13	Invernaver	<u>NE</u>		13	Cors Erddreiniog
14	Inverpollly	1	Castle Eden Dene	14	Cors Geirch
15	L.A.Mhuilinn Wood	2	Colt Park Wood	15	Cwm Glas Crafant
16	L.Druidibeg	3	Coom Rig Moss	16	Cwm Idwal
17	L.Maree Islands	4	Forge Valley Woods	17	Hafod Garregog
18	L.Sunart Woodlands	5	Grain Heads Moss	<u>SW</u>	
19	Monach Isles	6	Lindisfarne	1	Arne
20	Mound Alderwoods	7	Ling Gill	2	Avon Gorge
21	Nigg & Udale Bays	8	Newham Bog	3	Axmouth - etc
22	N.Rona & Sula Sgeir	9	Scar Close	4	Barrington Hill
23	Rassal Ashwood	10	Upper Teesdale	5	Bovey Valley
24	Rhum	<u>SW</u>		6	Braunton Barrow
25	St Kilda	1	Arne	7	Bridgewater Bay
26	Strathfarrar	2	Avon Gorge	Figure III d The distribution of freshwater fish in NNRs	
27	Strathy Bog	3	Axmouth - etc	RAINBOW TROUT - ●	
<u>NE</u>		4	Barrington Hill	GRAYLING - ■	
1	Abernethy Forest	5	Bovey Valley		
2	Cairngorms	6	Braunton Barrow		
3	Craigellachie	7	Bridgewater Bay		
4	Creag Meagaidh	<u>SW</u>			
5	Dinnet Oakwood	1	Bredon Hill		
6	Glen Tanar	2	Chaddesley Moss		
7	Hermaness	3	Chartley Moss		
8	Keen of Hamar	4	Cotswold Commons		
9	Morrone Birkwood	5	Derbyshire Dales		
10	Muir of Dinnet	6	Downton Gorge		
11	Noss	7	Highbury Wood		
12	St Cyrus	8	Lady Park Wood		
13	Sands of Forvie	9	Moccas Park		
<u>SW</u>		10	Mottey Meadows		
1	Ben Lui	11	Rostherne Mere		
2	Braehead Moss	12	Stiperstones		
3	Caerlaverock	13	The Flits		
4	Cairnsmore of Fleet	14	Wrens Nest		
5	Clyde Valley Woodlands	15	Wynbury Moss		
6	Glasdrum	16	Wyre Forest		
7	Glen Diomhan	<u>EM</u>			
8	Glen Nant	1	Barnack Hills & Holes		
9	Kirkconnel Flow	2	Barton Hills		
10	L.Lomond	3	Castor Hanglands		
11	Mealdarroch	4	Gibralter Point		
12	Moine Mhor	5	Holme Fen		
13	Silver Flowe	6	Knocking Hoe		
14	Taynish	7	Monks Wood		
15	Tynron Juniper Wood	8	Muston Meadows		
<u>SE</u>		9	Saltfleetby etc.		
1	Ben Lawers	10	The Wash		
2	Blawhorn Moss	11	Tring Reservoirs		
3	Caenlochan	12	Upwood Meadows		
4	Cragbank Wood	13	Woodwalton Fen		
5	Flanders Moss	<u>EA</u>			
6	Isle of May	1	Benacre		
7	L.Leven	2	Blackwater Estuary		
8	Milton Wood	3	Brettenham Heath		
9	Morton Lochs	4	Bure Marshes		
10	Rannoch Moor	5	Cavenham Heath		
11	St Abbs Head	6	Chippenham Fen		
12	Tentsmuir Point	7	Colne Estuary		
13	Whitlaw Mosses	<u>SE</u>			
		1	Blean Woods		
		2	Castle Hill, Lewes		
		3	Ham Street Woods		
		4	High Halstow		
		5	Kingley Vale		
		6	Lewes Downs		
		7	Lullington Heath		
		8	Pevensey Levels		
		9	Stodmarsh		
		<u>SW</u>			
		8	Dendles Wood		
		9	Ebbor Gorge		
		10	Gordano Valley		
		11	Hartland Moor		
		12	Hog Cliff		
		13	Holt Heath		
		14	Holton Heath		
		15	The Lizard		
		16	Morden Bog		
		17	Rodney Stoke		
		18	Shapwick Heath		
		19	Stoborough Heath		
		20	Studland Heath		
		21	Yarner Wood		
		<u>S</u>			
		1	Ashford Hill		
		2	Aston Rowant		
		3	Beacon Hill		
		4	Cothill		
		5	Fyfield Down		
		6	Martin Down		
		7	N. Meadow Cricklade		
		8	N. Solent		
		9	Old Winchester Hill		
		10	Parsonage Down		
		11	Pewsey Down		
		12	Prescombe Down		
		13	Wychwood		
		14	Wylie Down		
		<u>SE</u>			
		1	Blean Woods		
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		4	High Halstow		
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		7	Lullington Heath		
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		9	Stodmarsh		
		10	The Swale		
		11	Swanscombe Skull Site		
		12	Thursley		
		13	Wye		
		<u>Wales</u>			
		<u>N</u>			
		1	Cadair Idris		
		2	Ceunnant Llennyrch		
		3	Coed Camlyn		
		4	Coed Cymerau		
		5	Coed Dolgarrog		
		6	Coed Ganllwyd		
		7	Coed Gorswen		
		8	Coed y Rhygen		
		9	Coed Tremadoc		
		10	Coedydd Aber		
		11	Coedydd Maentwrog		
		12	Cors Bodeilio		
		13	Cors Erddreiniog		
		14	Cors Geirch		
		15	Cwm Glas Crafant		
		16	Cwm Idwal		
		17	Hafod Garregog		
		18	Morfa Dyffryn		
		19	Morfa Harlech		
		20	Newborough Warren		
		21	Rhinog		
		22	Yns Enlli-Bardsey		
		23	Y Wyddfa-Snowdon		
		<u>DP</u>			
		1	Allt Rhyd y Groes		
		2	Coed Rheidol		
		3	Cors Caron		
		4	Cors y Llyn		
		5	Craig Cerrig Gleisaid		
		6	Craig y Cilau		
		7	Dyfi		
		8	Nant Irfon		
		9	Ogof Ffynnon-Ddu		
		10	Rhos Goch		
		11	Rhos Llwr Cwrt		
		12	Skomer		
		13	Stackpole		
		14	Stanner Rocks		
		15	Ty Canol		
		<u>S</u>			
		1	Coed y Cerrig		
		2	Crymlyn Bog		
		3	Cwm Clydach		
		4	Gower Coast		
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**Index to NNR Numbers on Figure**

**Scotland**

- NW**
- 1 Achanarras Quarry
  - 2 Alt nan Carnan
  - 3 Reinn Eighe
  - 4 Ben Wyvis
  - 5 Blar Nam Faoleag
  - 6 Claish Moss
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  - 8 Corrieshalloch
  - 9 Dunnet Links
  - 10 Glen Roy
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  - 21 Nigg & Udale Bays
  - 22 N.Rona & Sula Sgeir
  - 23 Rassal Ashwood
  - 24 Rhum
  - 25 St Kilda
  - 26 Strathfarrar
  - 27 Strathy Bog

**NE**

- 1 Abernethy Forest
- 2 Cairngorms
- 3 Craigellachie
- 4 Creag Meagaidh
- 5 Dinnet Oakwood
- 6 Glen Tanar
- 7 Hermaness
- 8 Keen of Hamar
- 9 Morrone Birkwood
- 10 Muir of Dinnet
- 11 Noss
- 12 St Cyrus
- 13 Sands of Forvie

**SW**

- 1 Ben Lui
- 2 Braehead Moss
- 3 Caerlaverock
- 4 Cairnmore of Fleet
- 5 Clyde Valley Woodlands
- 6 Glasdrum
- 7 Glen Diomhan
- 8 Glen Nant
- 9 Kirkconnel Flow
- 10 L.Lomond
- 11 Mealdarroch
- 12 Moine Mhor
- 13 Silver Flowe
- 14 Taynish
- 15 Tynron Juniper Wood

**SE**

- 1 Ben Lawers
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- 5 Flanders Moss
- 6 Isle of May
- 7 L.Leven
- 8 Milton Wood
- 9 Morton Lochs
- 10 Rannoch Moor
- 11 St Abbs Head
- 12 Tentsmuir Point
- 13 Whitlaw Mosses

**England**

**NW**

- 1 Ainsdale Sand Dunes
- 2 Asby Scar
- 3 Blelham Bog
- 4 Clawthorpe Fell
- 5 Gait Barrows
- 6 Glasson Moss
- 7 Moor House
- 8 North Fen
- 9 Park Wood
- 10 Ribble Marshes
- 11 Roundsea Woods
- 12 Rusland Moss

**NE**

- 1 Castle Eden Dene
- 2 Colt Park Wood
- 3 Coom Rig Moss
- 4 Forge Valley Woods
- 5 Grain Heads Moss
- 6 Lindisfarne
- 7 Ling Gill
- 8 Newham Bog
- 9 Scar Close
- 10 Upper Teesdale

**WM**

- 1 Bredon Hill
- 2 Chaddesley Moss
- 3 Chartley Moss
- 4 Cotswold Commons
- 5 Derbyshire Dales
- 6 Downton Gorge
- 7 Highbury Wood
- 8 Lady Park Wood
- 9 Moccas Park
- 10 Motte Meadows
- 11 Rostherne Mere
- 12 Stiperstones
- 13 The Flits
- 14 Wrens Nest
- 15 Wynbury Moss
- 16 Wyre Forest

**EM**

- 1 Barnack Hills & Holes
- 2 Barton Hills
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- 4 Gibraltar Point
- 5 Holme Fen
- 6 Knocking Hoe
- 7 Monks Wood
- 8 Muston Meadows
- 9 Saltfleetby etc.
- 10 The Wash
- 11 Tring Reservoirs
- 12 Upwood Meadows
- 13 Woodwalton Fen

**EA**

- 1 Benacre
- 2 Blackwater Estuary
- 3 Brettenham Heath
- 4 Bure Marshes
- 5 Cavenham Heath
- 6 Chippenham Fen
- 7 Colne Estuary

- 8 Dengie
- 9 Hales Wood
- 10 Hamford Water
- 11 Hickling Broad
- 12 Holkham
- 13 Leigh
- 14 Ludham Marshes
- 15 Orfordness-Havergate
- 16 Scolt Head Island
- 17 Swanton Novers Wood
- 18 Thetford Heath
- 19 Walberswick
- 20 Weeting Heath
- 21 Westleton Heath
- 22 Winterton Dunes

**SW**

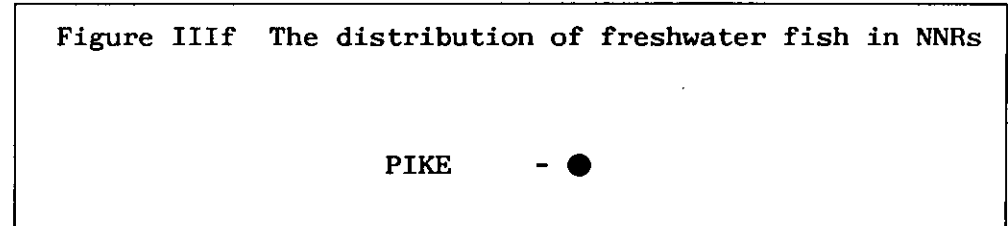
- 1 Arne
- 2 Avon Gorge
- 3 Axmouth - etc
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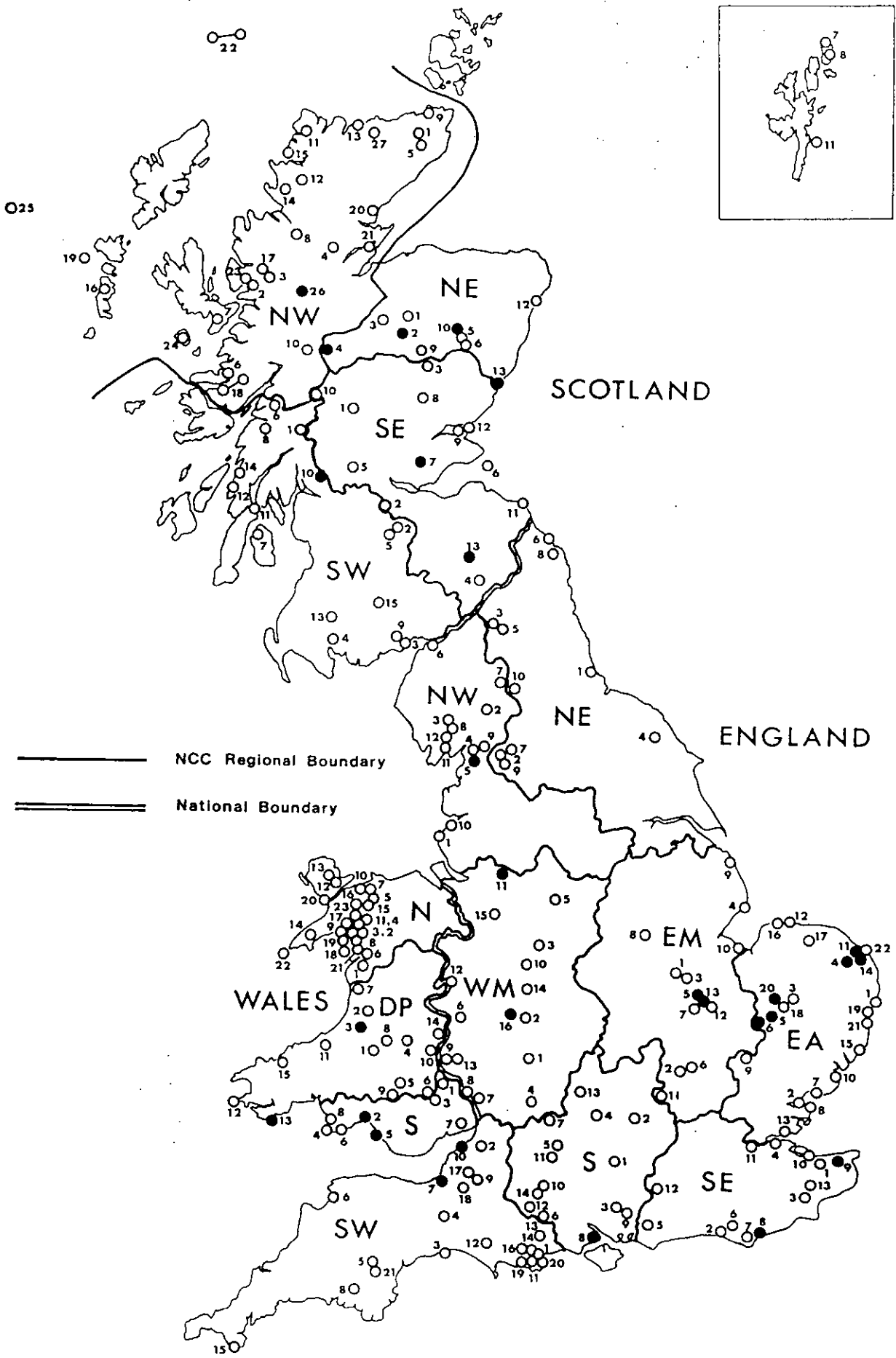
**DP**

- 1 Allt Rhyd y Groes
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- 3 Cors Caron
- 4 Cors y Llyn
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- 6 Craig y Cilau
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**SW**

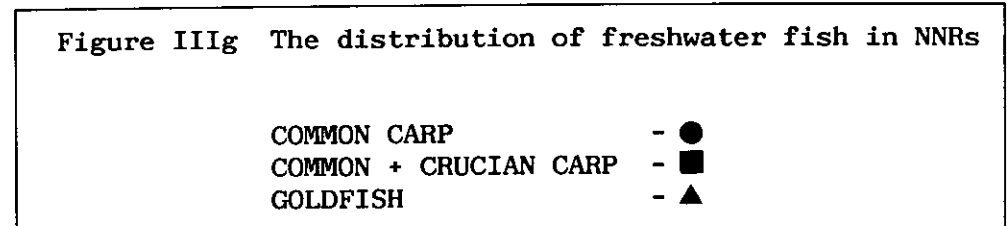
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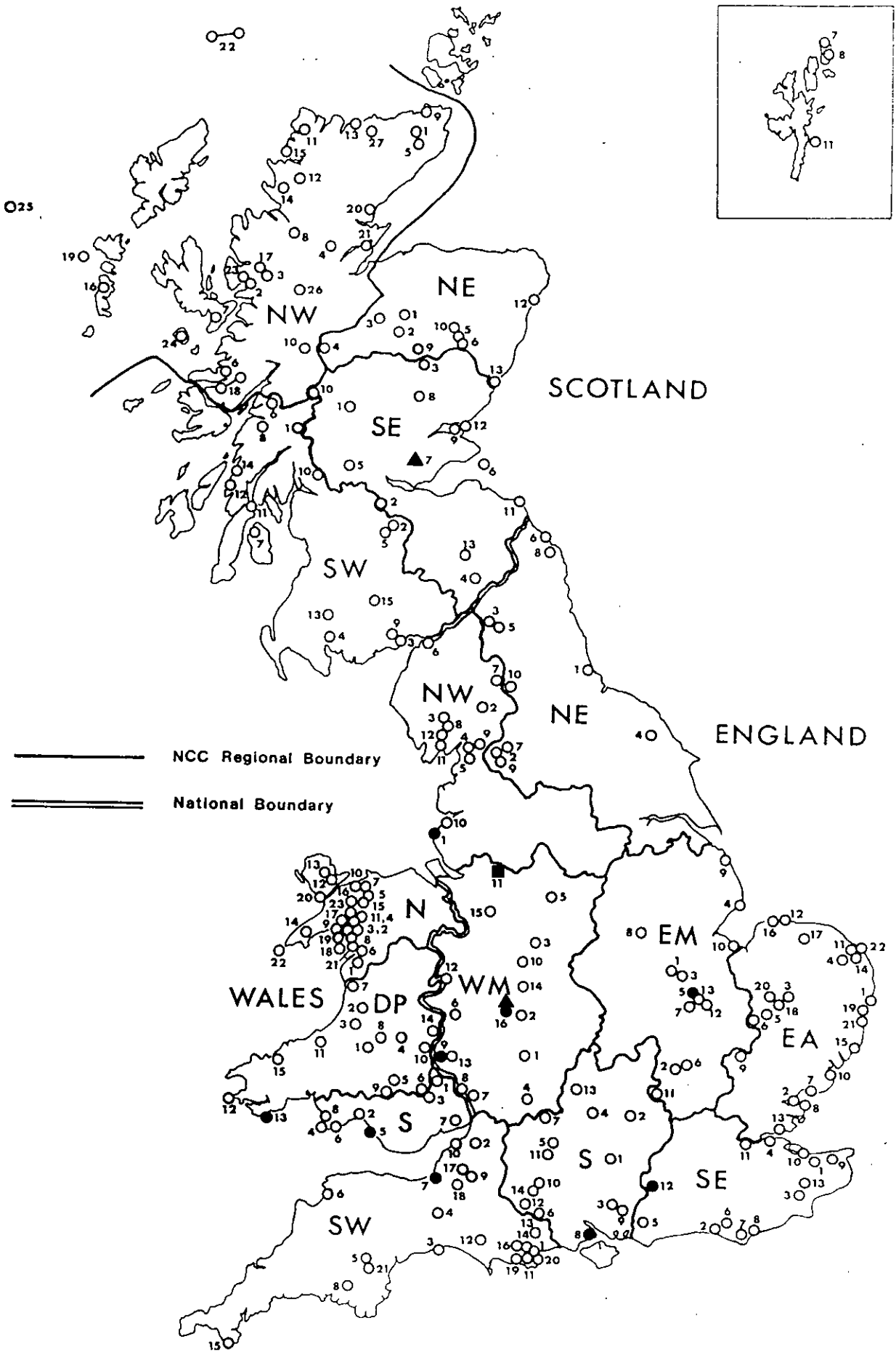
- 18 Morfa Dyffryn
- 19 Morfa Harlech
- 20 Newborough Warren
- 21 Rhinog
- 22 Yns Enlli-Bardsey
- 23 Y Wyddfa-Snowdon

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- 4 Cors y Llyn
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- 9 Ogof Ffynnon-Ddu
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**Figure IIIh The distribution of freshwater fish in NNRs**

GUDGEON - ●  
 GUDGEON + BARBEL - ■

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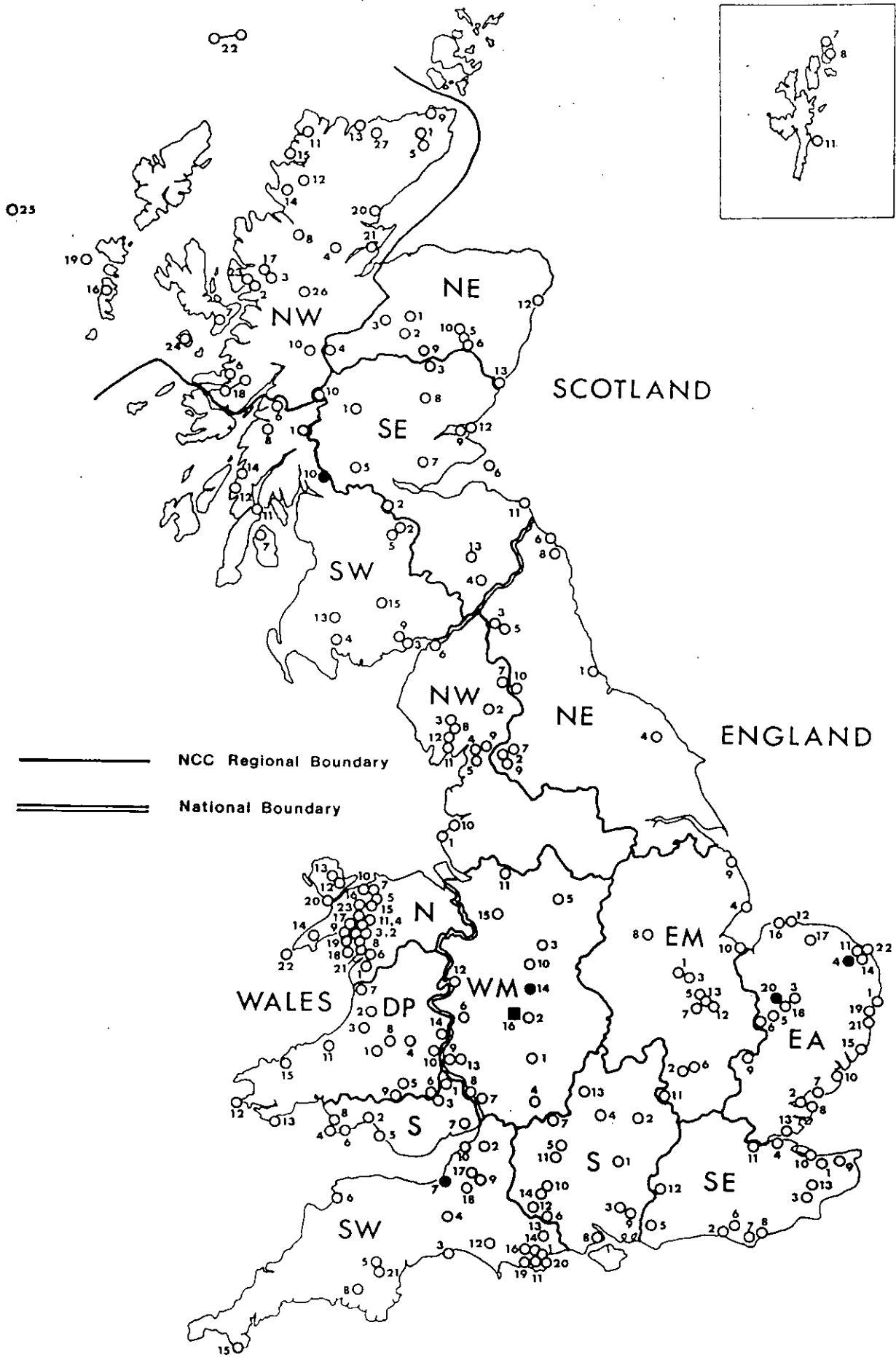
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**SW**

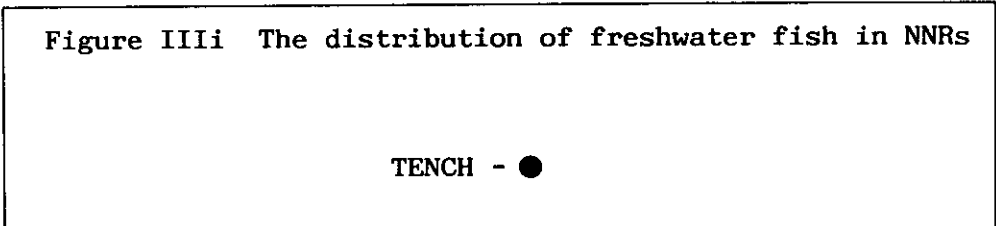
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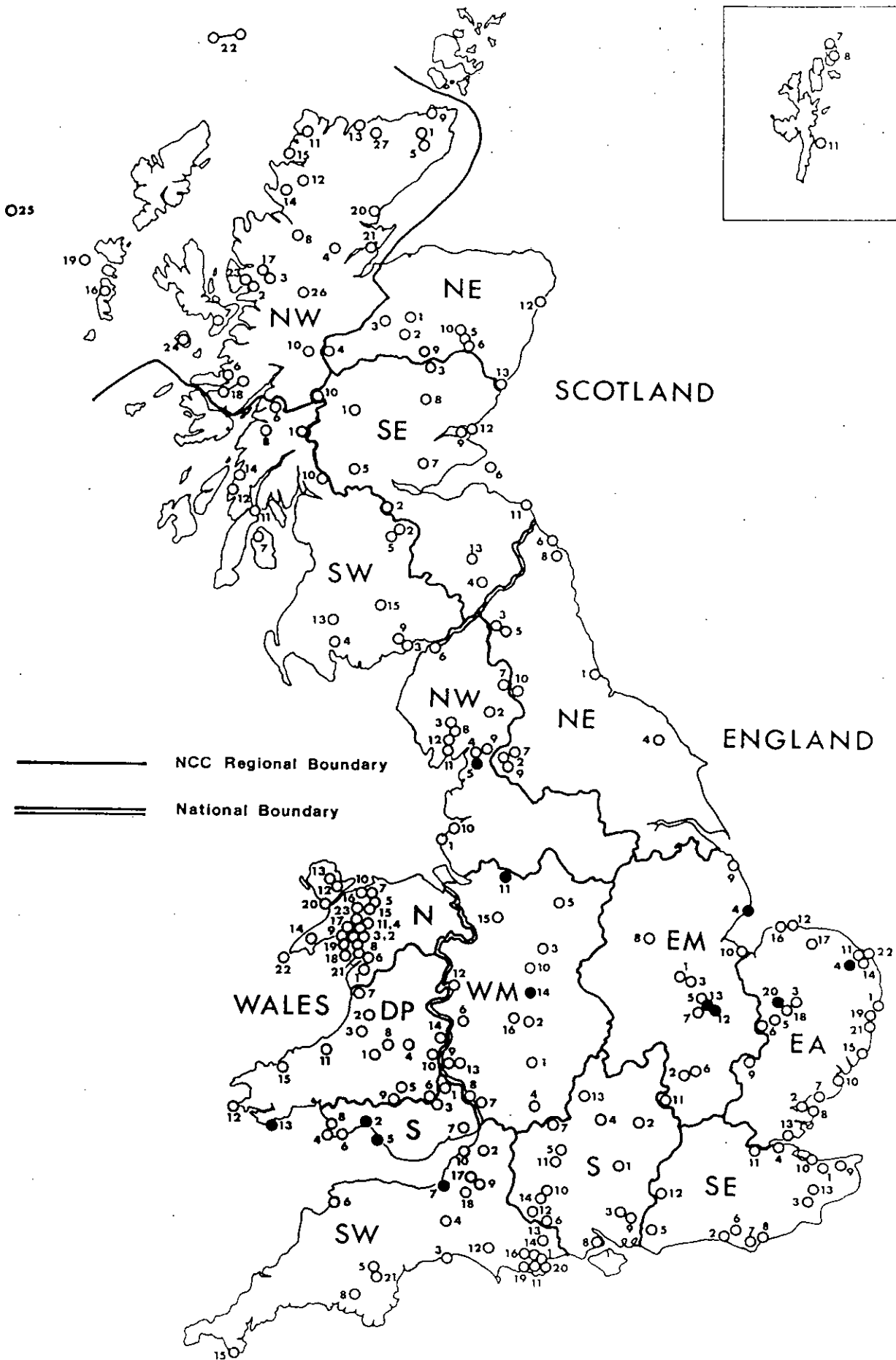
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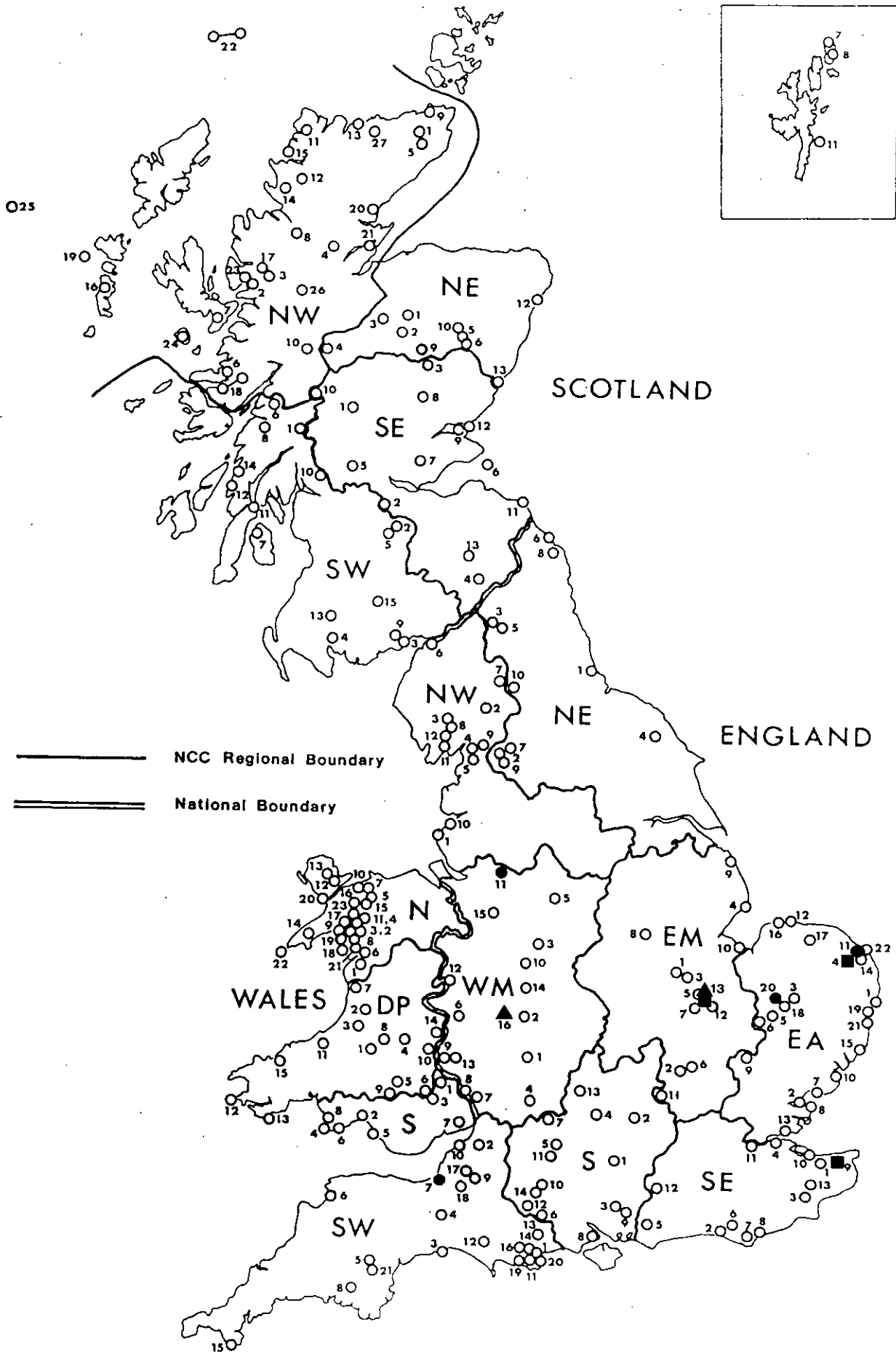
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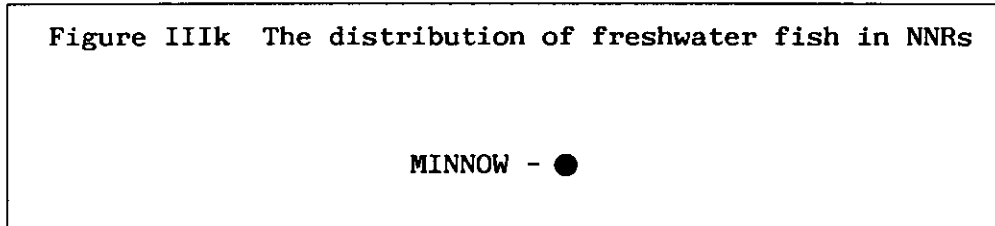
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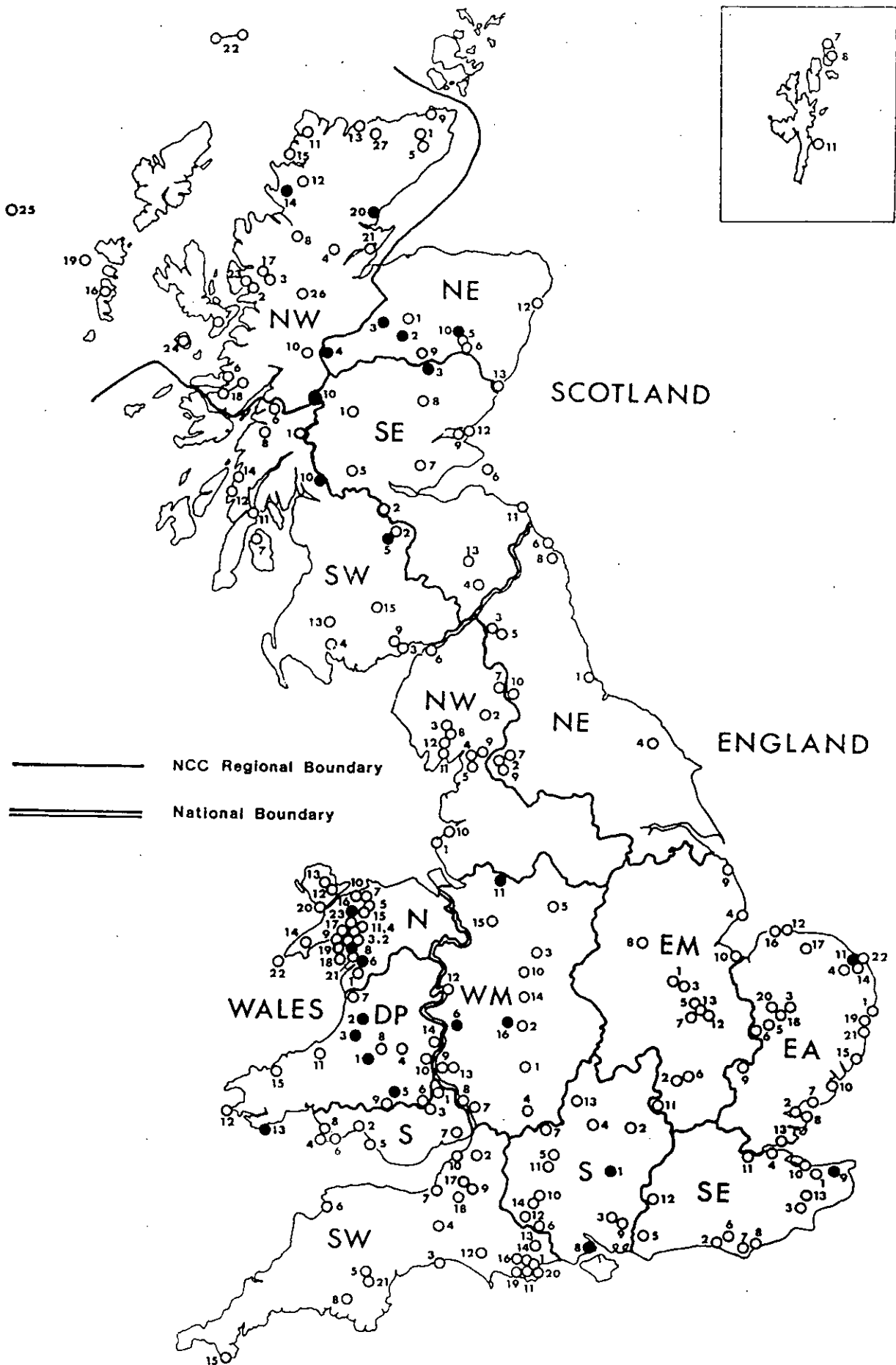
- 18 Morfa Dyffryn
- 19 Morfa Harlech
- 20 Newborough Warren
- 21 Rhinog
- 22 Yns Enlli-Bardsey
- 23 Y Wyddfa-Snowdon

**DP**

- 1 Allt Rhyd y Groes
- 2 Coed Rheidol
- 3 Cors Caron
- 4 Cors y Llyn
- 5 Craig Cerrig Gleisaid
- 6 Craig y Cilau
- 7 Dyfi
- 8 Nant Irfon
- 9 Ogof Ffynnon-Ddu
- 10 Rhos Goch
- 11 Rhos Llaur Cwrt
- 12 Skomer
- 13 Stackpole
- 14 Stanner Rocks
- 15 Ty Canol

**S**

- 1 Coed y Cerrig
- 2 Crymlyn Bog
- 3 Cwm Clydach
- 4 Gower Coast
- 5 Kenfig
- 6 Oxwich
- 7 Penhow Woodlands
- 8 Whiteford

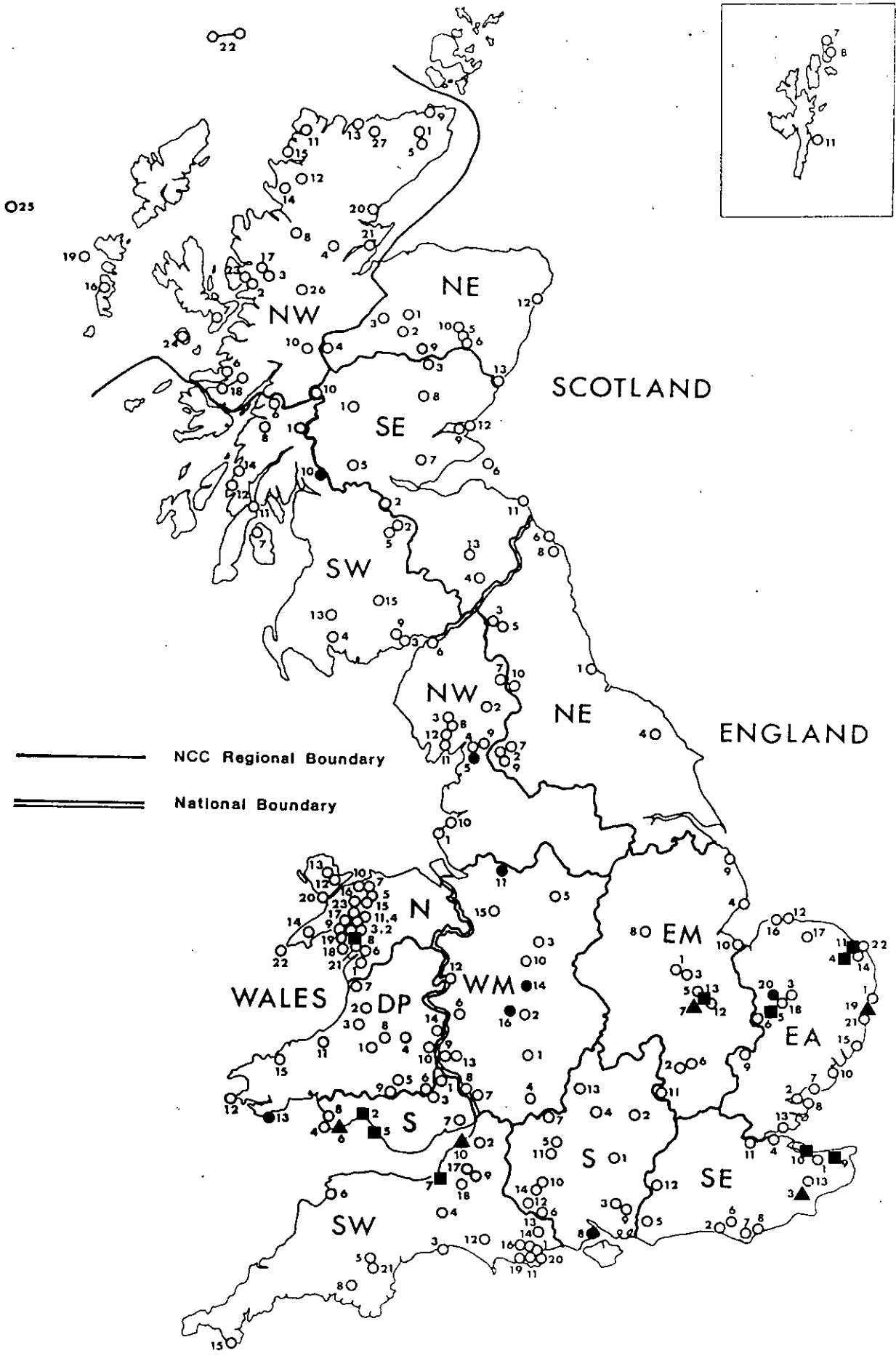


Index to NNR Numbers on Figure

<b>Scotland</b>	<b>England</b>		
<b>NW</b>	<b>NW</b>		
1 Achanarras Quarry	1 Ainsdale Sand Dunes	8 Dengie	10 The Swale
2 Alt nan Carnan	2 Asby Scar	9 Hales Wood	11 Swanscombe Skull Site
3 Reinn Eighe	3 Blielham Bog	10 Hamford Water	12 Thursley
4 Ben Wyvis	4 Clawthorpe Fell	11 Hickling Broad	13 Wye
5 Blar Nam Faoileag	5 Gait Barrows	12 Holkham	
6 Claish Moss	6 Glasson Moss	13 Leigh	<b>Wales</b>
7 Coille Thogabhaig	7 Moor House	14 Ludham Marshes	<b>N</b>
8 Corrieshalloch	8 North Fen	15 Orfordness-Havergate	1 Cadair Idris
9 Dunnet Links	9 Park Wood	16 Scolt Head Island	2 Ceunant Llennyrch
10 Glen Roy	10 Ribble Marshes	17 Swanton Novers Wood	3 Coed Camlyn
11 Gualin	11 Roundsea Woods	18 Thetford Heath	4 Coed Cymerau
12 Inchadampf	12 Rusland Moss	19 Walberswick	5 Coed Dolgarrog
13 Invernaver		20 Weeting Heath	6 Coed Ganllwyd
14 Inverpolly	<b>NE</b>	21 Westleton Heath	7 Coed Gorswen
15 L.A.Mhuilinn Wood	1 Castle Eden Dene	22 Winterton Dunes	8 Coed y Rhygen
16 L.Druidibeg	2 Colt Park Wood		9 Coed Tremadoc
17 L.Maree Islands	3 Coom Rig Moss	<b>SW</b>	10 Coedydd Aber
18 L.Sunart Woodlands	4 Forge Valley Woods	1 Arne	11 Coedydd Maentwrog
19 Monach Isles	5 Grain Heads Moss	2 Avon Gorge	12 Cors Bodeilio
20 Mound Alderwoods	6 Lindisfarne	3 Axmouth - etc	13 Cors Erddreiniog
21 Nigg & Udale Bays	7 Ling Gill	4 Barrington Hill	14 Cors Geirch
22 N.Rona & Sula Sgeir	8 Newham Bog	5 Bovey Valley	15 Cwm Glas Crafant
23 Rassel Ashwood	9 Scar Close	6 Braunton Barrow	16 Cwm Idwal
24 Rhum	10 Upper Teesdale	7 Bridgewater Bay	17 Hafod Garregog
25 St Kilda			
26 Strathfarrar			
27 Strathy Bog			
<b>NE</b>			
1 Abernethy Forest			
2 Cairngorms			
3 Craigellachie			
4 Creag Meagaidh			
5 Dinnet Oakwood			
6 Glen Tanar			
7 Hermaness			
8 Keen of Hamar			
9 Morrone Birkwood			
10 Muir of Dinnet			
11 Noss			
12 St Cyrus			
13 Sands of Forvie			
<b>SW</b>	<b>WM</b>		
1 Ben Lui	1 Bredon Hill	8 Dendles Wood	18 Morfa Dyffryn
2 Braehead Moss	2 Chaddesley Moss	9 Ebbor Gorge	19 Morfa Harlech
3 Caerlaverock	3 Chartley Moss	10 Gordano Valley	20 Newborough Warren
4 Cairnsmore of Fleet	4 Cotswold Commons	11 Hartland Moor	21 Rhinog
5 Clyde Valley Woodlands	5 Derbyshire Dales	12 Hog Cliff	22 Yns Enlli-Bardsey
6 Glasdrum	6 Downton Gorge	13 Holt Heath	23 Y Wyddfa-Snowdon
7 Glen Diomhan	7 Highbury Wood	14 Holton Heath	
8 Glen Nant	8 Lady Park Wood	15 The Lizard	<b>DP</b>
9 Kirkconnel Flow	9 Moccas Park	16 Morden Bog	1 Allt Rhyd y Groes
10 L.Lomond	10 Motte Meadows	17 Rodney Stoke	2 Coed Rheidol
11 Mealdarroch	11 Rostherne Mere	18 Shapwick Heath	3 Cors Caron
12 Moine Mhor	12 Stiperstones	19 Stoborough Heath	4 Cors y Llyn
13 Silver Flowe	13 The Flits	20 Studland Heath	5 Craig Cerrig Gleisaid
14 Taynish	14 Wrens Nest	21 Yarner Wood	6 Craig y Cilau
15 Tynron Juniper Wood	15 Wynbury Moss		7 Dyfi
	16 Wyre Forest	<b>S</b>	8 Nant Irfon
		1 Ashford Hill	9 Ogor Ffynnon-Ddu
		2 Aston Rowant	10 Rhos Goch
	<b>EM</b>	3 Beacon Hill	11 Rhos Llawr Cwrt
	1 Barnack Hills & Holes	4 Cothill	12 Skomer
	2 Barton Hills	5 Fyfield Down	13 Stackpole
	3 Castor Hanglands	6 Martin Down	14 Stanner Rocks
	4 Gibraltar Point	7 N. Meadow Cricklade	15 Ty Canol
	5 Holme Fen	8 N. Solent	
	6 Knocking Hoe	9 Old Winchester Hill	<b>S</b>
	7 Monks Wood	10 Parsonage Down	1 Coed y Cerrig
	8 Muston Meadows	11 Pewsey Down	2 Crymlyn Bog
	9 Saltfleetby etc.	12 Prescombe Down	3 Cwm Clydach
	10 The Wash	13 Wychwood	4 Gower Coast
	11 Tring Reservoirs	14 Wylie Down	5 Kenfig
	12 Upwood Meadows		6 Oxwich
	13 Woodwalton Fen	<b>SE</b>	7 Penhow Woodlands
		1 Blean Woods	8 Whiteford
	<b>EA</b>	2 Castle Hill, Lewes	
	1 Benacre	3 Ham Street Woods	
	2 Blackwater Estuary	4 High Halstow	
	3 Brettenham Heath	5 Kingley Vale	
	4 Bure Marshes	6 Lewes Downs	
	5 Cavenham Heath	7 Lullington Heath	
	6 Chippenham Fen	8 Pevensey Levels	
	7 Colne Estuary	9 Stodmarsh	

Figure IIII The distribution of freshwater fish in NNRs

ROACH - ●  
 RUDD - ▲  
 ROACH + RUDD - ■



**Index to NNR Numbers on Figure**

- Scotland**
- NW**
- 1 Achanarras Quarry
  - 2 Alt nan Carnan
  - 3 Reinn Eighe
  - 4 Ben Wyvis
  - 5 Blar Nam Faoileag
  - 6 Claish Moss
  - 7 Coille Thogabhaig
  - 8 Corrieshalloch
  - 9 Dunnet Links
  - 10 Glen Roy
  - 11 Gualin
  - 12 Inchnadamph
  - 13 Invernaver
  - 14 Inverpoll
  - 15 L.A.Mhuilinn Wood
  - 16 L.Druidibeg
  - 17 L.Maree Islands
  - 18 L.Sunart Woodlands
  - 19 Monach Isles
  - 20 Mound Alderwoods
  - 21 Nigg & Udale Bays
  - 22 N.Rona & Sula Sgeir
  - 23 Rassal Ashwood
  - 24 Rhum
  - 25 St Kilda
  - 26 Strathfarrar
  - 27 Strathy Bog
- NE**
- 1 Abernethy Forest
  - 2 Cairngorms
  - 3 Craigellachie
  - 4 Creag Meagaidh
  - 5 Dinnet Oakwood
  - 6 Glen Tanar
  - 7 Hermaness
  - 8 Keen of Hamar
  - 9 Morrone Birkwood
  - 10 Muir of Dinnet
  - 11 Noss
  - 12 St Cyrus
  - 13 Sands of Forvie
- SW**
- 1 Ben Lui
  - 2 Braehead Moss
  - 3 Caerlaverock
  - 4 Cairnsmore of Fleet
  - 5 Clyde Valley Woodlands
  - 6 Glasdrum
  - 7 Glen Diomhan
  - 8 Glen Nant
  - 9 Kirkconnel Flow
  - 10 L.Lomond
  - 11 Mealdarroch
  - 12 Moine Mhor
  - 13 Silver Flowe
  - 14 Taynish
  - 15 Tynron Juniper Wood
- SE**
- 1 Ben Lawers
  - 2 Blawhorn Moss
  - 3 Caenlochan
  - 4 Cragbank Wood
  - 5 Flanders Moss
  - 6 Isle of May
  - 7 L.Leven
  - 8 Milton Wood
  - 9 Morton Lochs
  - 10 Rannoch Moor
  - 11 St Abbs Head
  - 12 Tentsmuir Point
  - 13 Whitlaw Mosses

- England**
- NW**
- 1 Ainsdale Sand Dunes
  - 2 Asby Scar
  - 3 Blelham Bog
  - 4 Clawthorpe Fell
  - 5 Gait Barrows
  - 6 Glasson Moss
  - 7 Moor House
  - 8 North Fen
  - 9 Park Wood
  - 10 Ribble Marshes
  - 11 Roundsea Woods
  - 12 Rusland Moss
- NE**
- 1 Castle Eden Dene
  - 2 Colt Park Wood
  - 3 Coom Rig Moss
  - 4 Forge Valley Woods
  - 5 Grain Heads Moss
  - 6 Lindisfarne
  - 7 Ling Gill
  - 8 Newham Bog
  - 9 Scar Close
  - 10 Upper Teesdale
- SW**
- 1 Arne
  - 2 Avon Gorge
  - 3 Axmouth - etc
  - 4 Barrington Hill
  - 5 Bovey Valley
  - 6 Braunton Barrow
  - 7 Bridgewater Bay
- WM**
- 1 Bredon Hill
  - 2 Chaddesley Moss
  - 3 Chartley Moss
  - 4 Cotswold Commons
  - 5 Derbyshire Dales
  - 6 Downton Gorge
  - 7 Highbury Wood
  - 8 Lady Park Wood
  - 9 Moccas Park
  - 10 Motte Meadows
  - 11 Rotherne Mere
  - 12 Stiperstones
  - 13 The Flits
  - 14 Wrens Nest
  - 15 Wynbury Moss
  - 16 Wyre Forest
- EM**
- 1 Barnack Hills & Holes
  - 2 Barton Hills
  - 3 Castor Hanglands
  - 4 Gibraltar Point
  - 5 Holme Fen
  - 6 Knocking Hoe
  - 7 Monks Wood
  - 8 Muston Meadows
  - 9 Saltfleetby etc.
  - 10 The Wash
  - 11 Tring Reservoirs
  - 12 Upwood Meadows
  - 13 Woodwalton Fen
- EA**
- 1 Benacre
  - 2 Blackwater Estuary
  - 3 Brettenham Heath
  - 4 Bure Marshes
  - 5 Cavenham Heath
  - 6 Chippenham Fen
  - 7 Colne Estuary
- Dengie**
- 8 Dengie
  - 9 Hales Wood
  - 10 Hamford Water
  - 11 Hickling Broad
  - 12 Holkham
  - 13 Leigh
  - 14 Ludham Marshes
  - 15 Orfordness-Havergate
  - 16 Scolt Head Island
  - 17 Swanton Novers Wood
  - 18 Thetford Heath
  - 19 Waiberswick
  - 20 Weeting Heath
  - 21 Westleton Heath
  - 22 Winterton Dunes

- 10 The Swale
- 11 Swanscombe Skull Site
- 12 Thursley
- 13 Wye

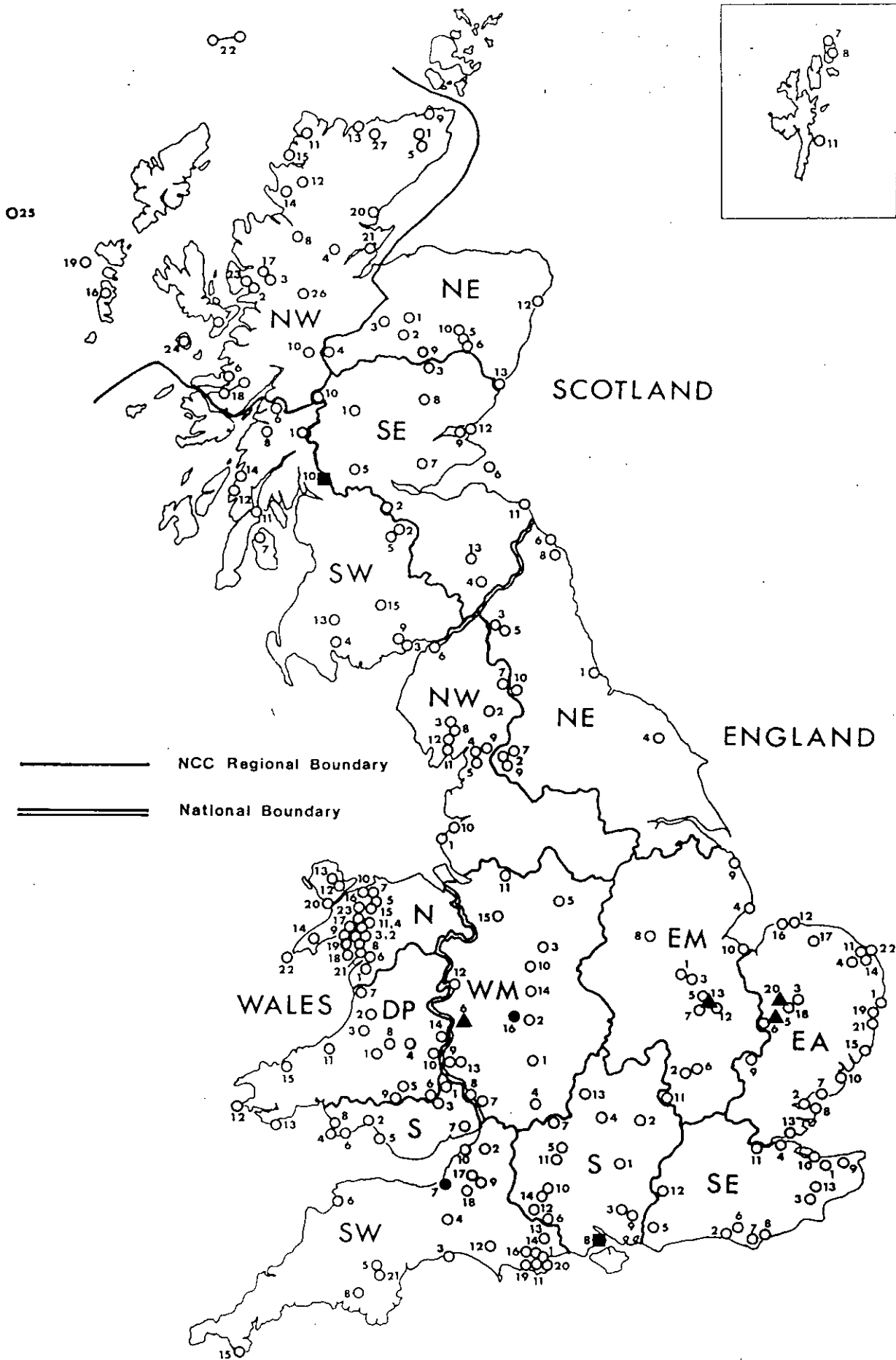
- Wales**
- N**
- 1 Cadair Idris
  - 2 Ceunant Llennyrch
  - 3 Coed Camlyn
  - 4 Coed Cymerau
  - 5 Coed Dolgarrog
  - 6 Coed Ganllwyd
  - 7 Coed Gorswen
  - 8 Coed y Rhygen
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  - 12 Cors Bodeilio
  - 13 Cors Erddreiniog
  - 14 Cors Geirch
  - 15 Cwm Glas Crafant
  - 16 Cwm Idwal
  - 17 Hafod Garregog

**Figure III m The distribution of freshwater fish in NNRs**

CHUB - ●  
 DACE - ▲  
 CHUB + DACE - ■

- DP**
- 1 Allt Rhyd y Groes
  - 2 Coed Rheidol
  - 3 Cors Caron
  - 4 Cors y Llyn
  - 5 Craig Cerrig Gleisaid
  - 6 Craig y Cilau
  - 7 Dyfi
  - 8 Nant Irfon
  - 9 Ogof Ffynnon-Ddu
  - 10 Rhos Goch
  - 11 Rhos Llaur Cwrt
  - 12 Skomer
  - 13 Stackpole
  - 14 Stanner Rocks
  - 15 Ty Canol
- S**
- 1 Coed y Cerrig
  - 2 Crymlyn Bog
  - 3 Cwm Clydach
  - 4 Gower Coast
  - 5 Kenfig
  - 6 Oxwich
  - 7 Penhow Woodlands
  - 8 Whiteford

- S**
- 1 Ashford Hill
  - 2 Aston Rowant
  - 3 Beacon Hill
  - 4 Cothill
  - 5 Fyfield Down
  - 6 Martin Down
  - 7 N. Meadow Cricklade
  - 8 N. Solent
  - 9 Old Winchester Hill
  - 10 Parsonage Down
  - 11 Pewsey Down
  - 12 Prescombe Down
  - 13 Wychwood
  - 14 Wylie Down
- SE**
- 1 Blean Woods
  - 2 Castle Hill, Lewes
  - 3 Ham Street Woods
  - 4 High Halstow
  - 5 Kingley Vale
  - 6 Lewes Downs
  - 7 Lullington Heath
  - 8 Pevensey Levels
  - 9 Stodmarsh



**Index to NNR Numbers on Figure**

**Scotland**

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- 1 Achanarras Quarry
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  - 24 Rhum
  - 25 St Kilda
  - 26 Strathfarrar
  - 27 Strathy Bog

**NE**

- 1 Abernethy Forest
- 2 Cairngorms
- 3 Craigellachie
- 4 Creag Meagaidh
- 5 Dinnet Oakwood
- 6 Glen Tanar
- 7 Hermaness
- 8 Keen of Hamar
- 9 Morrone Birkwood
- 10 Muir of Dinnet
- 11 Noss
- 12 St Cyrus
- 13 Sands of Forvie

**SW**

- 1 Ben Lui
- 2 Braehead Moss
- 3 Caerlaverock
- 4 Cairnmore of Fleet
- 5 Clyde Valley Woodlands
- 6 Glasdrum
- 7 Glen Diomhan
- 8 Glen Nant
- 9 Kirkconnel Flow
- 10 L.Lomond
- 11 Mealdarroch
- 12 Moine Mhor
- 13 Silver Flowe
- 14 Tainish
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- 2 Blawhorn Moss
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- 7 L.Leven
- 8 Milton Wood
- 9 Morton Lochs
- 10 Rannoch Moor
- 11 St Abbs Head
- 12 Tentsmuir Point
- 13 Whitlaw Mosses

**England**

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  - 3 Blelham Bog
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  - 5 Gait Barrows
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  - 7 Moor House
  - 8 North Fen
  - 9 Park Wood
  - 10 Ribble Marshes
  - 11 Roundsea Woods
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- 1 Castle Eden Dene
- 2 Colt Park Wood
- 3 Coom Rig Moss
- 4 Forge Valley Woods
- 5 Grain Heads Moss
- 6 Lindisfarne
- 7 Ling Gill
- 8 Newham Bog
- 9 Scar Close
- 10 Upper Teesdale

**WM**

- 1 Bredon Hill
- 2 Chaddesley Moss
- 3 Chartley Moss
- 4 Cotswold Commons
- 5 Derbyshire Dales
- 6 Downton Gorge
- 7 Highbury Wood
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- 18 Thetford Heath
- 19 Walberswick
- 20 Weeting Heath
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- 22 Winterton Dunes

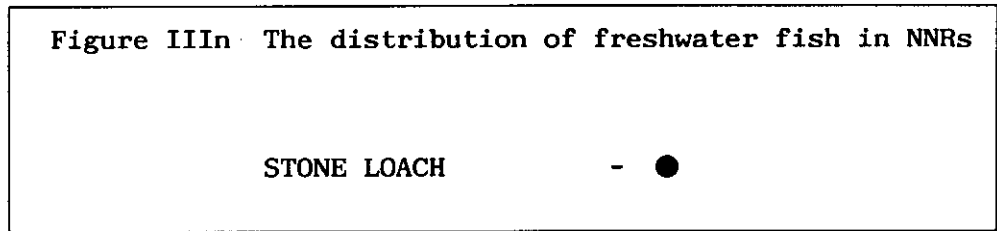
**SW**

- 1 Arne
- 2 Avon Gorge
- 3 Axmouth - etc
- 4 Barrington Hill
- 5 Bovey Valley
- 6 Braunton Barrow
- 7 Bridgewater Bay

- 10 The Swale
- 11 Swanscombe Skull Site
- 12 Thursley
- 13 Wye

**Wales**

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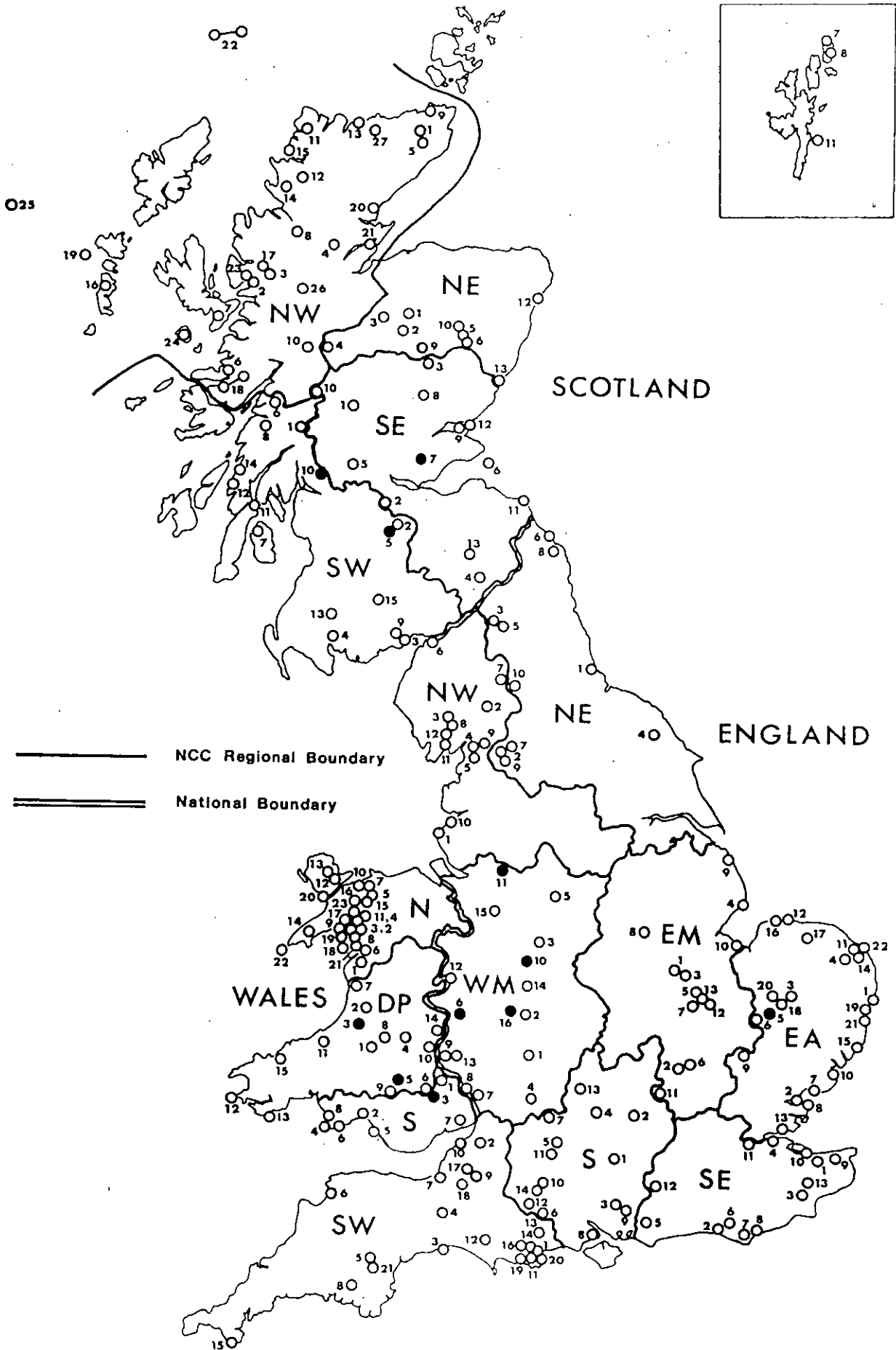
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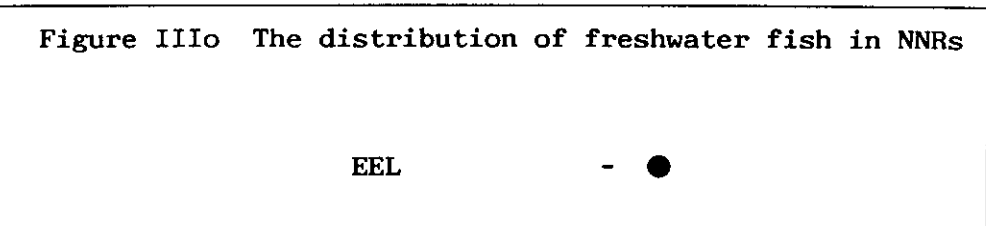
SW

- 1 Arne  
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 6 Martin Down  
 7 N. Meadow Cricklade  
 8 N. Solent  
 9 Old Winchester Hill  
 10 Parsonage Down  
 11 Pewsey Down  
 12 Prescombe Down  
 13 Wychwood  
 14 Wylie Down

SE

- 1 Blean Woods  
 2 Castle Hill, Lewes  
 3 Ham Street Woods  
 4 High Halstow  
 5 Kingley Vale  
 6 Lewes Downs  
 7 Lullington Heath  
 8 Pevensey Levels  
 9 Stodmarsh

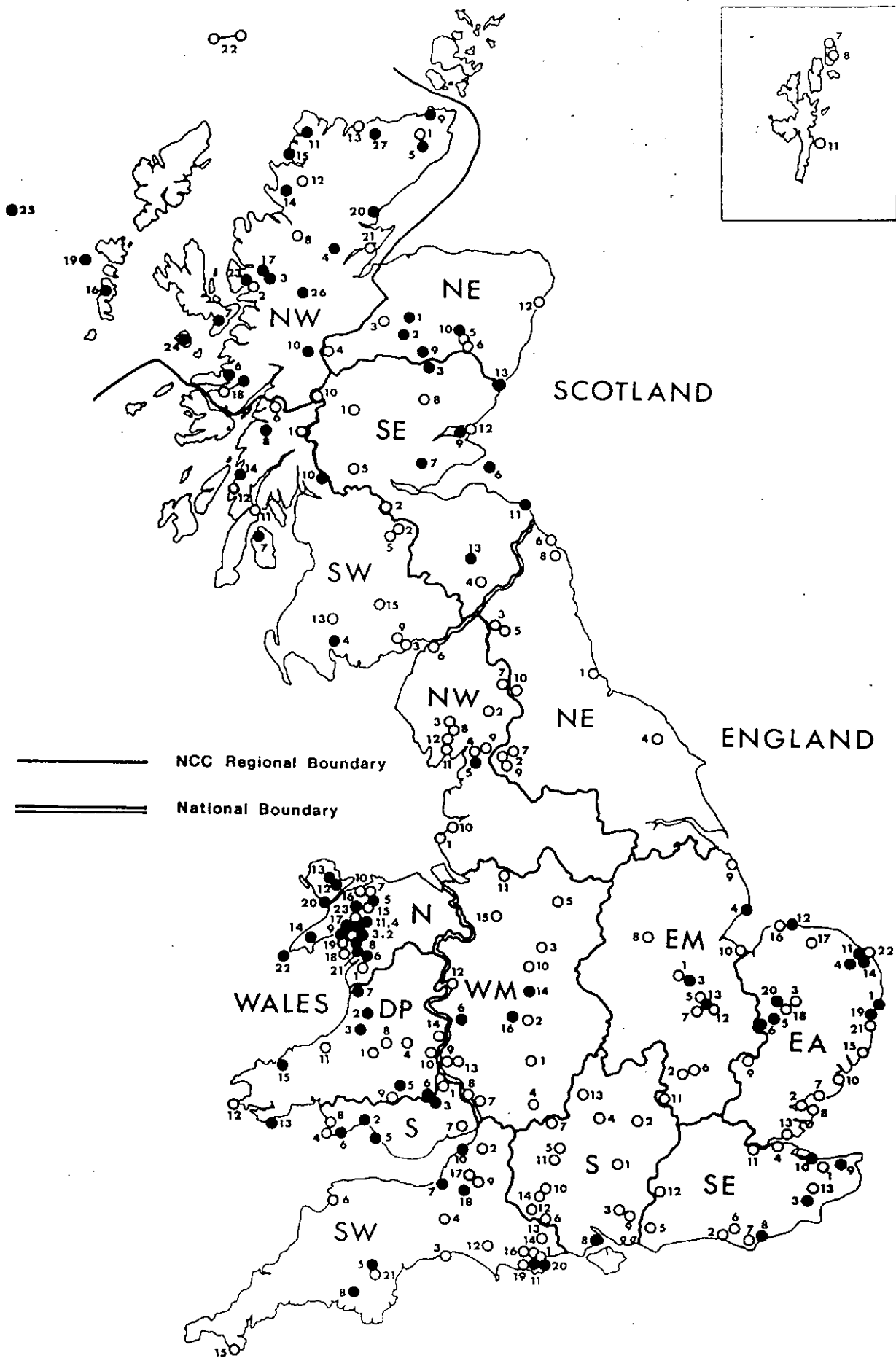
- 18 Morfa Dyffryn  
 19 Morfa Harlech  
 20 Newborough Warren  
 21 Rhinog  
 22 Yns Enlli-Bardsey  
 23 Y Wyddfa-Snowdon

DP

- 1 Allt Rhyd y Groes  
 2 Coed Rheidol  
 3 Cors Caron  
 4 Cors y Llyn  
 5 Craig Cerrig Gleisaid  
 6 Craig y Cilau  
 7 Dyfi  
 8 Nant Irfon  
 9 Ogor Ffynnon-Ddu  
 10 Rhos Goch  
 11 Rhos Llaur Cwrt  
 12 Skomer  
 13 Stackpole  
 14 Stanner Rocks  
 15 Ty Canol

S

- 1 Coed y Cerrig  
 2 Crymlyn Bog  
 3 Cwm Clydach  
 4 Gower Coast  
 5 Kenfig  
 6 Oxwich  
 7 Penhow Woodlands  
 8 Whiteford

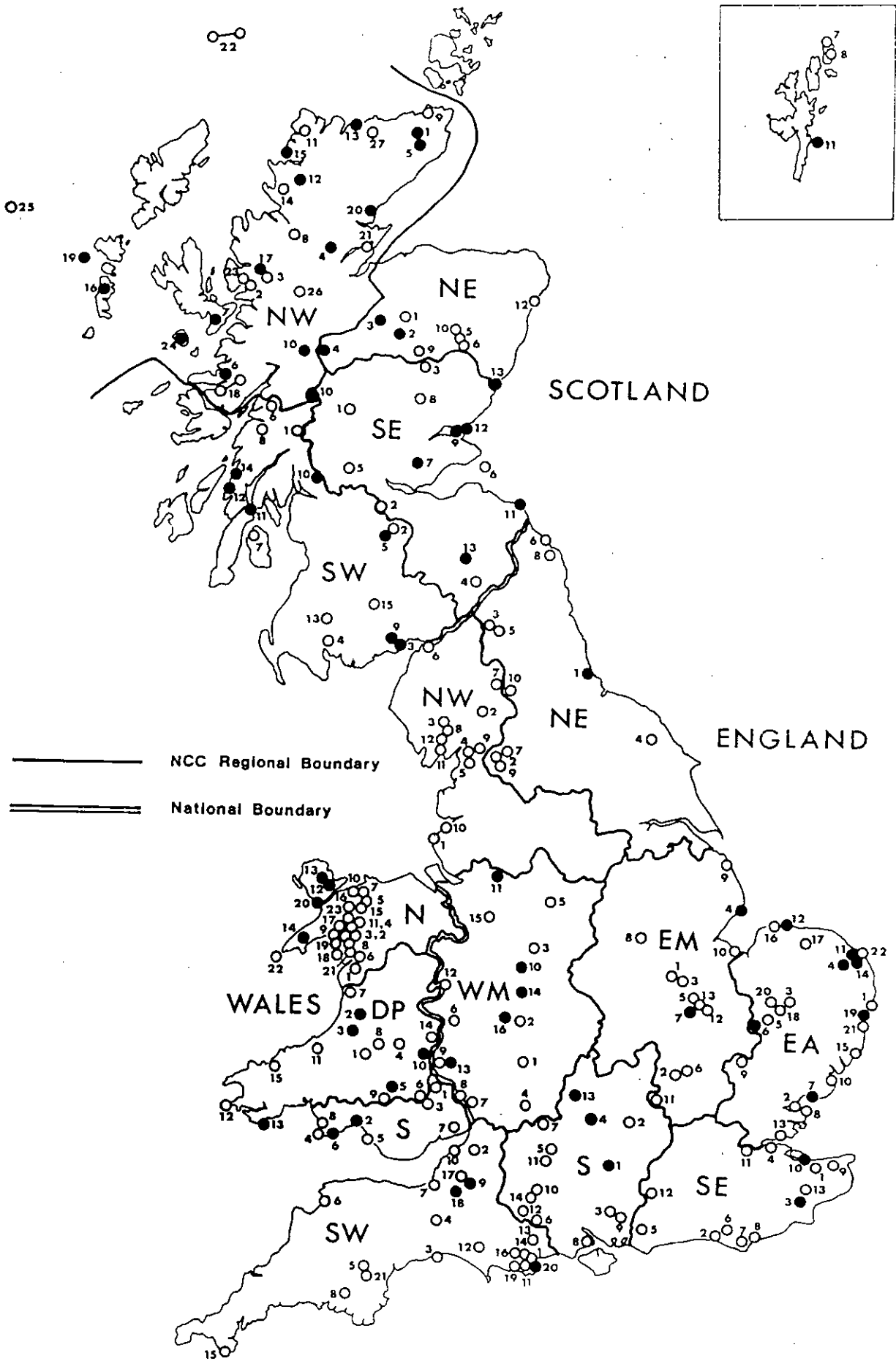


Index to NNR Numbers on Figure

<b>Scotland</b>	<b>England</b>		
<b>NW</b>	<b>NW</b>		
1 Achanarras Quarry	1 Ainsdale Sand Dunes	8 Dengie	10 The Swale
2 Alt nan Carnan	2 Asby Scar	9 Hales Wood	11 Swanscombe Skull Site
3 Reinn Eighe	3 Blelham Bog	10 Hamford Water	12 Thursley
4 Ben Wyvis	4 Clawthorpe Fell	11 Hickling Broad	13 Wye
5 Blar Nam Faoileag	5 Gait Barrows	12 Holkham	
6 Claish Moss	6 Glasson Moss	13 Leigh	<b>Wales</b>
7 Coille Thogabhaig	7 Moor House	14 Ludham Marshes	<b>N</b>
8 Corrieshalloch	8 North Fen	15 Orfordness-Havergate	1 Cadair Idris
9 Dunnet Links	9 Park Wood	16 Scolt Head Island	2 Ceunant Llennyrrch
10 Glen Roy	10 Ribble Marshes	17 Swanton Novers Wood	3 Coed Camlyn
11 Gualin	11 Roundsea Woods	18 Thetford Heath	4 Coed Cymerau
12 Inchnadamph	12 Rusland Moss	19 Walberswick	5 Coed Dolgarrog
13 Invernaver		20 Weeting Heath	6 Coed Ganllwyd
14 Inverpolly	<b>NE</b>	21 Westleton Heath	7 Coed Gorswen
15 L.A.Mhuilinn Wood	1 Castle Eden Dene	22 Winterton Dunes	8 Coed y Rhygen
16 L.Druidibeg	2 Colt Park Wood		9 Coed Tremadoc
17 L.Maree Islands	3 Coom Rig Moss	<b>SW</b>	10 Coedydd Aber
18 L.Sunart Woodlands	4 Forge Valley Woods	1 Arne	11 Coedydd Maentwrog
19 Monach Isles	5 Grain Heads Moss	2 Avon Gorge	12 Cors Bodeilio
20 Mound Alderwoods	6 Lindisfarne	3 Axmouth - etc	13 Cors Erddreiniog
21 Nigg & Udale Bays	7 Ling Gill	4 Barrington Hill	14 Cors Geirch
22 N.Rona & Sula Sgeir	8 Newham Bog	5 Bovey Valley	15 Cwm Glas Crafant
23 Rassal Ashwood	9 Scar Close	6 Braunton Barrow	16 Cwm Idwal
24 Rhum	10 Upper Teesdale	7 Bridgewater Bay	17 Hafod Garregog
25 St Kilda			
26 Strathfarrar			
27 Strathy Bog			
<b>NE</b>			
1 Abernethy Forest			
2 Cairngorms			
3 Craigellachie			
4 Creag Meagaidh			
5 Dinnet Oakwood			
6 Glen Tanar			
7 Hermaness			
8 Keen of Hamar			
9 Morrone Birkwood			
10 Muir of Dinnet			
11 Noss			
12 St Cyrus			
13 Sands of Forvie			
<b>SW</b>			
1 Ben Lui			
2 Braehead Moss			
3 Caerlaverock			
4 Cairnmore of Fleet			
5 Clyde Valley Woodlands			
6 Glasdrum			
7 Glen Diomhan			
8 Glen Nant			
9 Kirkconnel Flow			
10 L.Lomond			
11 Mealdarroch			
12 Moine Mhor			
13 Silver Flowe			
14 Taynish			
15 Tynron Juniper Wood			
<b>SE</b>			
1 Ben Lawers			
2 Blawhorn Moss			
3 Caenlochan			
4 Cragbank Wood			
5 Flanders Moss			
6 Isle of May			
7 L.Leven			
8 Milton Wood			
9 Morton Lochs			
10 Rannoch Moor			
11 St Abbs Head			
12 Tentsmuir Point			
13 Whitlaw Mosses			
	<b>WM</b>		
	1 Bredon Hill	8 Dendles Wood	18 Morfa Dyffryn
	2 Chaddesley Moss	9 Ebbor Gorge	19 Morfa Harlech
	3 Chartley Moss	10 Gordano Valley	20 Newborough Warren
	4 Cotswold Commons	11 Hartland Moor	21 Rhinog
	5 Derbyshire Dales	12 Hog Cliff	22 Yns Enlli-Bardsey
	6 Downton Gorge	13 Holt Heath	23 Y Wyddfa-Snowdon
	7 Highbury Wood	14 Holton Heath	
	8 Lady Park Wood	15 The Lizard	<b>DP</b>
	9 Moccas Park	16 Morden Bog	1 Allt Rhyd y Groes
	10 Motte Meadows	17 Rodney Stoke	2 Coed Rheidol
	11 Rostherne Mere	18 Shapwick Heath	3 Cors Caron
	12 Stiperstones	19 Stoborough Heath	4 Cors y Llyn
	13 The Flits	20 Studland Heath	5 Craig Cerrig Gleisaid
	14 Wrens Nest	21 Yarner Wood	6 Craig y Cilau
	15 Wynbury Moss		7 Dyfi
	16 Wyre Forest	<b>S</b>	8 Nant Irfon
		1 Ashford Hill	9 Ogor Ffynnon-Ddu
		2 Aston Rowant	10 Rhos Goch
		3 Beacon Hill	11 Rhos Llaur Cwrt
		4 Cothill	12 Skomer
		5 Fyfield Down	13 Stackpole
		6 Martin Down	14 Stanner Rocks
		7 N. Meadow Cricklade	15 Ty Canol
		8 N. Solent	
		9 Old Winchester Hill	<b>S</b>
		10 Parsonage Down	1 Coed y Cerrig
		11 Pewsey Down	2 Crymlyn Bog
		12 Prescombe Down	3 Cwm Clydach
		13 Wychwood	4 Gower Coast
		14 Wylie Down	5 Kenfig
		<b>SE</b>	6 Oxwich
		1 Blean Woods	7 Penhow Woodlands
		2 Castle Hill, Lewes	8 Whiteford
		3 Ham Street Woods	
		4 High Halstow	
		5 Kingley Vale	
		6 Lewes Downs	
		7 Lullington Heath	
		8 Pevensey Levels	
		9 Stodmarsh	
	<b>EA</b>		
	1 Benacre		
	2 Blackwater Estuary		
	3 Brettenham Heath		
	4 Bure Marshes		
	5 Cavenham Heath		
	6 Chippenham Fen		
	7 Colne Estuary		

Figure IIIp The distribution of freshwater fish in NNRs

3 SPINED STICKLEBACK - ●



**Index to NNR Numbers on Figure**

- Scotland**  
**NW**  
 1 Achanarras Quarry  
 2 Alt nan Carnan  
 3 Reinn Eighe  
 4 Ben Wyvis  
 5 Blar Nam Faoileag  
 6 Claish Moss  
 7 Coille Thogabhaig  
 8 Corrieshalloch  
 9 Dunnet Links  
 10 Glen Roy  
 11 Gualin  
 12 Inchnadamph  
 13 Invernaver  
 14 Inverpolly  
 15 L.A.Mhullinn Wood  
 16 L.Druidibeg  
 17 L.Maree Islands  
 18 L.Sunart Woodlands  
 19 Monach Isles  
 20 Mound Alderwoods  
 21 Nigg & Udale Bays  
 22 N.Rona & Sula Sgeir  
 23 Rassal Ashwood  
 24 Rhum  
 25 St Kilda  
 26 Strathfarrar  
 27 Strathy Bog

- NE**  
 1 Abernethy Forest  
 2 Cairngorms  
 3 Craigellachie  
 4 Creag Meagaidh  
 5 Dinnet Oakwood  
 6 Glen Tanar  
 7 Hermaness  
 8 Keen of Hamar  
 9 Morrone Birkwood  
 10 Muir of Dinnet  
 11 Noss  
 12 St Cyrus  
 13 Sands of Forvie

- SW**  
 1 Ben Lui  
 2 Braehead Moss  
 3 Caerlaverock  
 4 Cairnsmore of Fleet  
 5 Clyde Valley Woodlands  
 6 Glasdrum  
 7 Glen Diomhan  
 8 Glen Nant  
 9 Kirkconnel Flow  
 10 L.Lomond  
 11 Mealdarroch  
 12 Moine Mhor  
 13 Silver Flowe  
 14 Tainish  
 15 Tynron Juniper Wood

- SE**  
 1 Ben Lawers  
 2 Blawhorn Moss  
 3 Caenlochan  
 4 Cragbank Wood  
 5 Flanders Moss  
 6 Isle of May  
 7 L.Leven  
 8 Milton Wood  
 9 Morton Lochs  
 10 Rannoch Moor  
 11 St Abbs Head  
 12 Tentsmuir Point  
 13 Whitlaw Mosses

- England**  
**NW**  
 1 Ainsdale Sand Dunes  
 2 Asby Scar  
 3 Blelham Bog  
 4 Clawthorpe Fell  
 5 Gait Barrows  
 6 Glasson Moss  
 7 Moor House  
 8 North Fen  
 9 Park Wood  
 10 Ribble Marshes  
 11 Roundsea Woods  
 12 Rusland Moss

- NE**  
 1 Castle Eden Dene  
 2 Colt Park Wood  
 3 Coom Rig Moss  
 4 Forge Valley Woods  
 5 Grain Heads Moss  
 6 Lindisfarne  
 7 Ling Gill  
 8 Newham Bog  
 9 Scar Close  
 10 Upper Teesdale

- WM**  
 1 Bredon Hill  
 2 Chaddesley Moss  
 3 Chartley Moss  
 4 Cotswold Commons  
 5 Derbyshire Dales  
 6 Downton Gorge  
 7 Highbury Wood  
 8 Lady Park Wood  
 9 Moccas Park  
 10 Motte Meadows  
 11 Rostherne Mere  
 12 Stiperstones  
 13 The Flits  
 14 Wrens Nest  
 15 Wynbury Moss  
 16 Wyre Forest

- EM**  
 1 Barnack Hills & Holes  
 2 Barton Hills  
 3 Castor Hanglands  
 4 Gibraltar Point  
 5 Holme Fen  
 6 Knocking Hoe  
 7 Monks Wood  
 8 Muston Meadows  
 9 Saltfleetby etc.  
 10 The Wash  
 11 Tring Reservoirs  
 12 Upwood Meadows  
 13 Woodwalton Fen

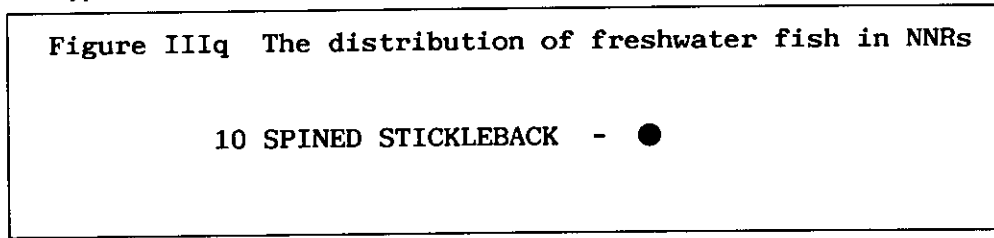
- EA**  
 1 Benacre  
 2 Blackwater Estuary  
 3 Brettenham Heath  
 4 Bure Marshes  
 5 Cavenham Heath  
 6 Chippenham Fen  
 7 Colne Estuary

- 8 Dengie  
 9 Hales Wood  
 10 Hamford Water  
 11 Hickling Broad  
 12 Holkham  
 13 Leigh  
 14 Ludham Marshes  
 15 Orfordness-Havergate  
 16 Scolt Head Island  
 17 Swanton Novers Wood  
 18 Thetford Heath  
 19 Walberswick  
 20 Weeting Heath  
 21 Westleton Heath  
 22 Winterton Dunes

- SW**  
 1 Arne  
 2 Avon Gorge  
 3 Axmouth - etc  
 4 Barrington Hill  
 5 Bovey Valley  
 6 Braunton Barrow  
 7 Bridgewater Bay

- 10 The Swale  
 11 Swanscombe Skull Site  
 12 Thursley  
 13 Wye

- Wales**  
**N**  
 1 Cadair Idris  
 2 Ceunant Llennyrch  
 3 Coed Camlyn  
 4 Coed Cymerau  
 5 Coed Dolgarrog  
 6 Coed Ganllwyd  
 7 Coed Gorswen  
 8 Coed y Rhygen  
 9 Coed Tremadoc  
 10 Coedydd Aber  
 11 Coedydd Maentwrog  
 12 Cors Bodeilio  
 13 Cors Erddreiniog  
 14 Cors Geirch  
 15 Cwm Glas Crafant  
 16 Cwm Idwal  
 17 Hafod Garregog



- 8 Dendles Wood  
 9 Ebbor Gorge  
 10 Gordano Valley  
 11 Hartland Moor  
 12 Hog Cliff  
 13 Holt Heath  
 14 Holton Heath  
 15 The Lizard  
 16 Morden Bog  
 17 Rodney Stoke  
 18 Shapwick Heath  
 19 Stoborough Heath  
 20 Studland Heath  
 21 Yarner Wood

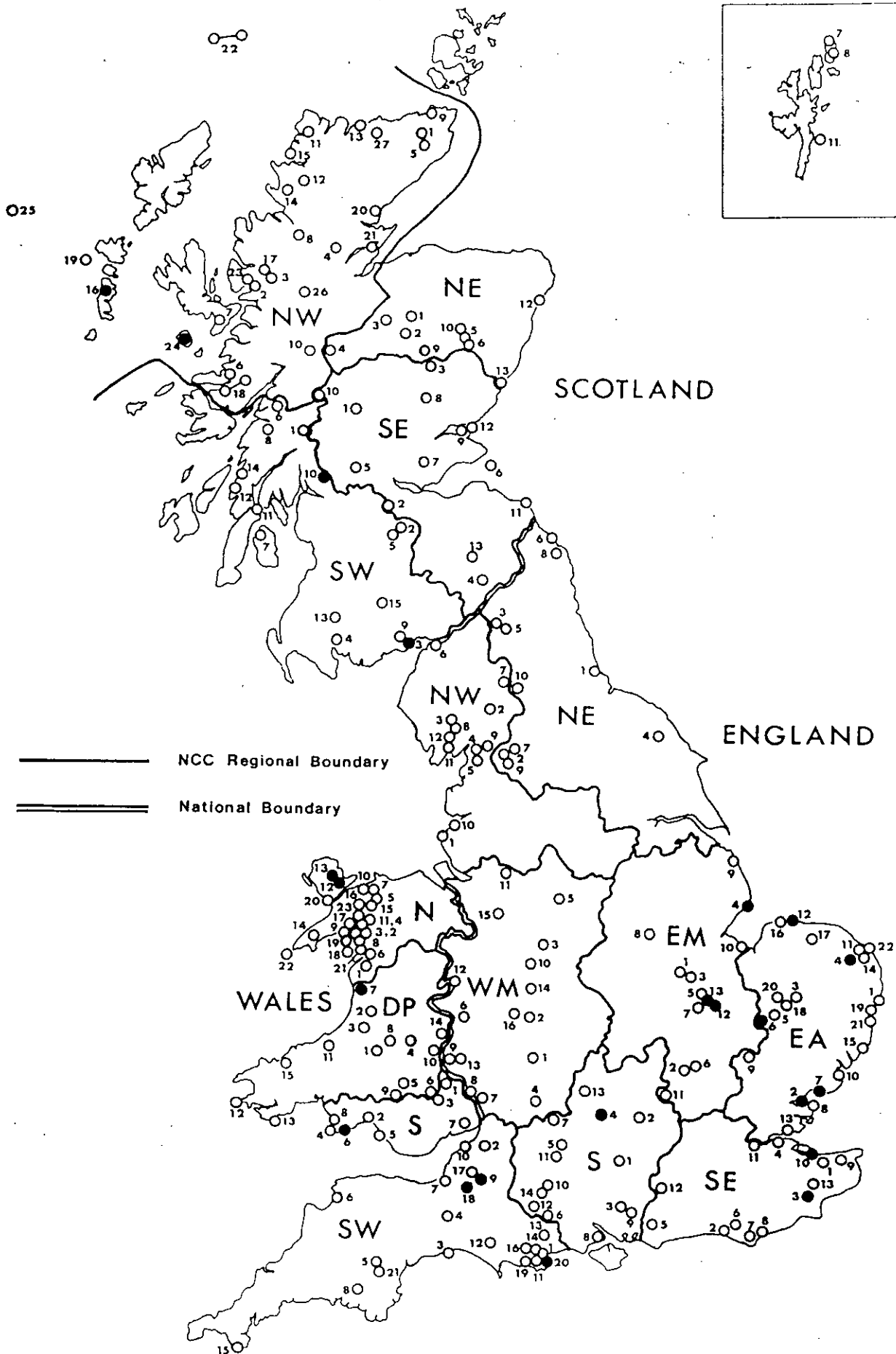
- S**  
 1 Ashford Hill  
 2 Aston Rowant  
 3 Beacon Hill  
 4 Cothill  
 5 Fyfield Down  
 6 Martin Down  
 7 N. Meadow Cricklade  
 8 N. Solent  
 9 Old Winchester Hill  
 10 Parsonage Down  
 11 Pewsey Down  
 12 Prescombe Down  
 13 Wychwood  
 14 Wylie Down

- SE**  
 1 Blean Woods  
 2 Castle Hill, Lewes  
 3 Ham Street Woods  
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- 18 Morfa Dyffryn  
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 11 Rhos Llawr Cwrt  
 12 Skomer  
 13 Stackpole  
 14 Stanner Rocks  
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**Scotland**

- NW**
- 1 Achanarras Quarry
  - 2 Alt nan Carnan
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  - 4 Ben Wyvis
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  - 22 N.Rona & Sula Sgeir
  - 23 Rassal Ashwood
  - 24 Rhum
  - 25 St Kilda
  - 26 Strathfarrar
  - 27 Strathy Bog

**NE**

- 1 Abernethy Forest
- 2 Cairngorms
- 3 Craigellachie
- 4 Creag Meagaidh
- 5 Dinnet Oakwood
- 6 Glen Tanar
- 7 Hermaness
- 8 Keen of Hamar
- 9 Morrone Birkwood
- 10 Muir of Dinnet
- 11 Noss
- 12 St Cyrus
- 13 Sands of Forvie

**SW**

- 1 Ben Lui
- 2 Braehead Moss
- 3 Caerlaverock
- 4 Cairnmore of Fleet
- 5 Clyde Valley Woodlands
- 6 Glasdrum
- 7 Glen Diomhan
- 8 Glen Nant
- 9 Kirkconnel Flow
- 10 L.Lomond
- 11 Mealdarroch
- 12 Moine Mhor
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- 14 Taynish
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- 6 Isle of May
- 7 L.Leven
- 8 Milton Wood
- 9 Morton Lochs
- 10 Rannoch Moor
- 11 St Abbs Head
- 12 Tentsmuir Point
- 13 Whitlaw Mosses

**England**

**NW**

- 1 Ainsdale Sand Dunes
- 2 Asby Scar
- 3 Blelham Bog
- 4 Clawthorpe Fell
- 5 Gait Barrows
- 6 Glasson Moss
- 7 Moor House
- 8 North Fen
- 9 Park Wood
- 10 Ribble Marshes
- 11 Roundsea Woods
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- 1 Castle Eden Dene
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- 3 Coom Rig Moss
- 4 Forge Valley Woods
- 5 Grain Heads Moss
- 6 Lindisfarne
- 7 Ling Gill
- 8 Newham Bog
- 9 Scar Close
- 10 Upper Teesdale

- 8 Dengie
- 9 Hales Wood
- 10 Hamford Water
- 11 Hickling Broad
- 12 Holkham
- 13 Leigh
- 14 Ludham Marshes
- 15 Orfordness-Havergate
- 16 Scolt Head Island
- 17 Swanton Novers Wood
- 18 Thetford Heath
- 19 Walberswick
- 20 Weeting Heath
- 21 Westleton Heath
- 22 Winterton Dunes

**SW**

- 1 Arne
- 2 Avon Gorge
- 3 Axmouth - etc
- 4 Barrington Hill
- 5 Bovey Valley
- 6 Braunton Barrow
- 7 Bridgewater Bay

- 10 The Swale
- 11 Swanscombe Skull Site
- 12 Thursley
- 13 Wye

**Wales**

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- 1 Cadair Idris
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- 15 Cwm Glas Crafant
- 16 Cwm Idwal
- 17 Hafod Garregog

Figure IIIr The distribution of freshwater fish in NNRs

- PERCH - ●  
 PERCH + RUFFE - ■  
 PIKEPERCH - ▲

**WM**

- 1 Bredon Hill
- 2 Chaddesley Moss
- 3 Chartley Moss
- 4 Cotswold Commons
- 5 Derbyshire Dales
- 6 Downton Gorge
- 7 Highbury Wood
- 8 Lady Park Wood
- 9 Moccas Park
- 10 Motte Meadows
- 11 Rostherne Mere
- 12 Stiperstones
- 13 The Flits
- 14 Wrens Nest
- 15 Wynbury Moss
- 16 Wyre Forest

**EM**

- 1 Barnack Hills & Holes
- 2 Barton Hills
- 3 Castor Hanglands
- 4 Gibraltar Point
- 5 Holme Fen
- 6 Knocking Hoe
- 7 Monks Wood
- 8 Muston Meadows
- 9 Salfleetby etc.
- 10 The Wash
- 11 Tring Reservoirs
- 12 Upwood Meadows
- 13 Woodwalton Fen

**EA**

- 1 Benacre
- 2 Blackwater Estuary
- 3 Brettenham Heath
- 4 Bure Marshes
- 5 Cavenham Heath
- 6 Chippenham Fen
- 7 Colne Estuary

- 8 Dendles Wood
- 9 Ebbor Gorge
- 10 Gordano Valley
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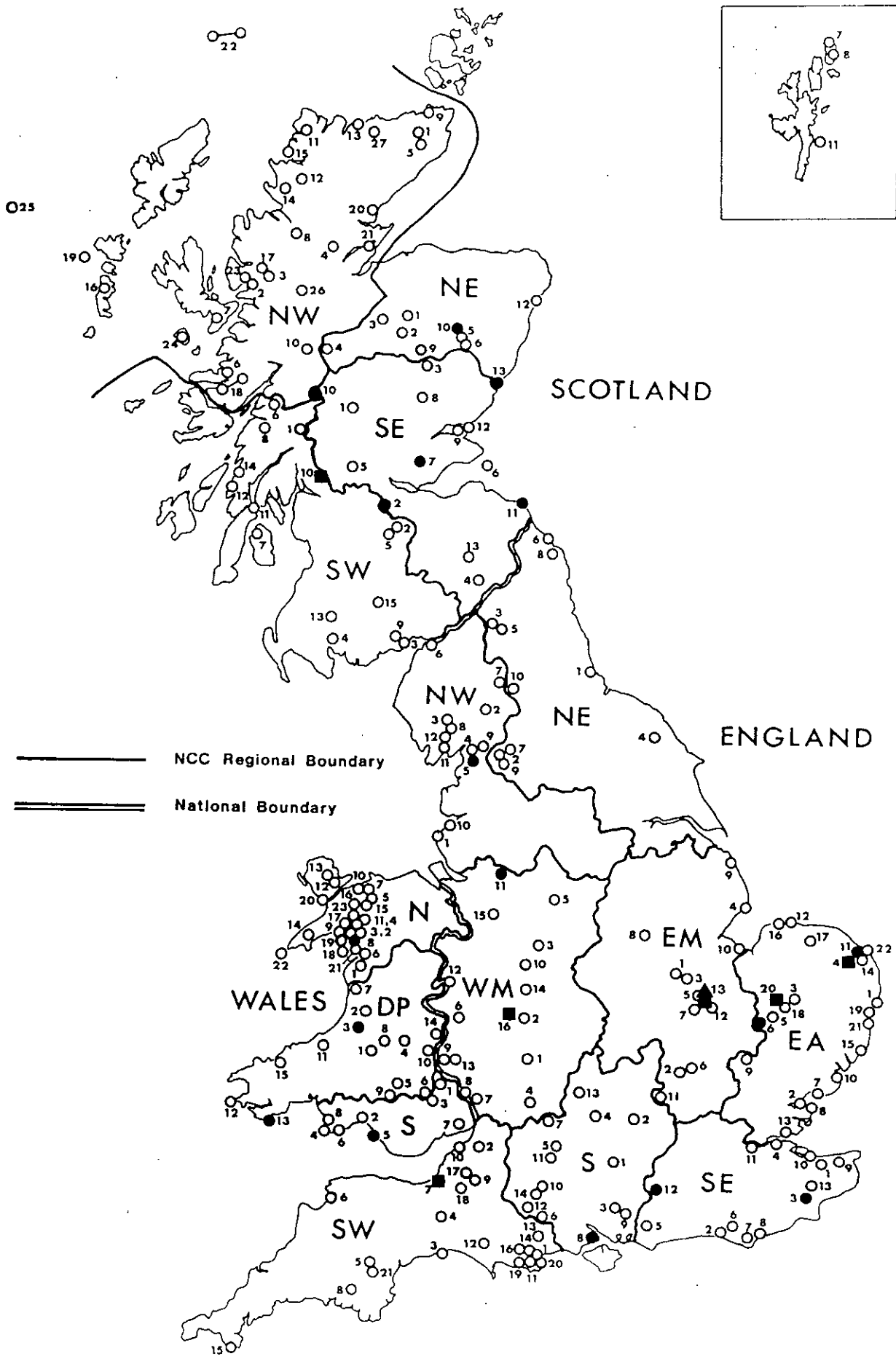
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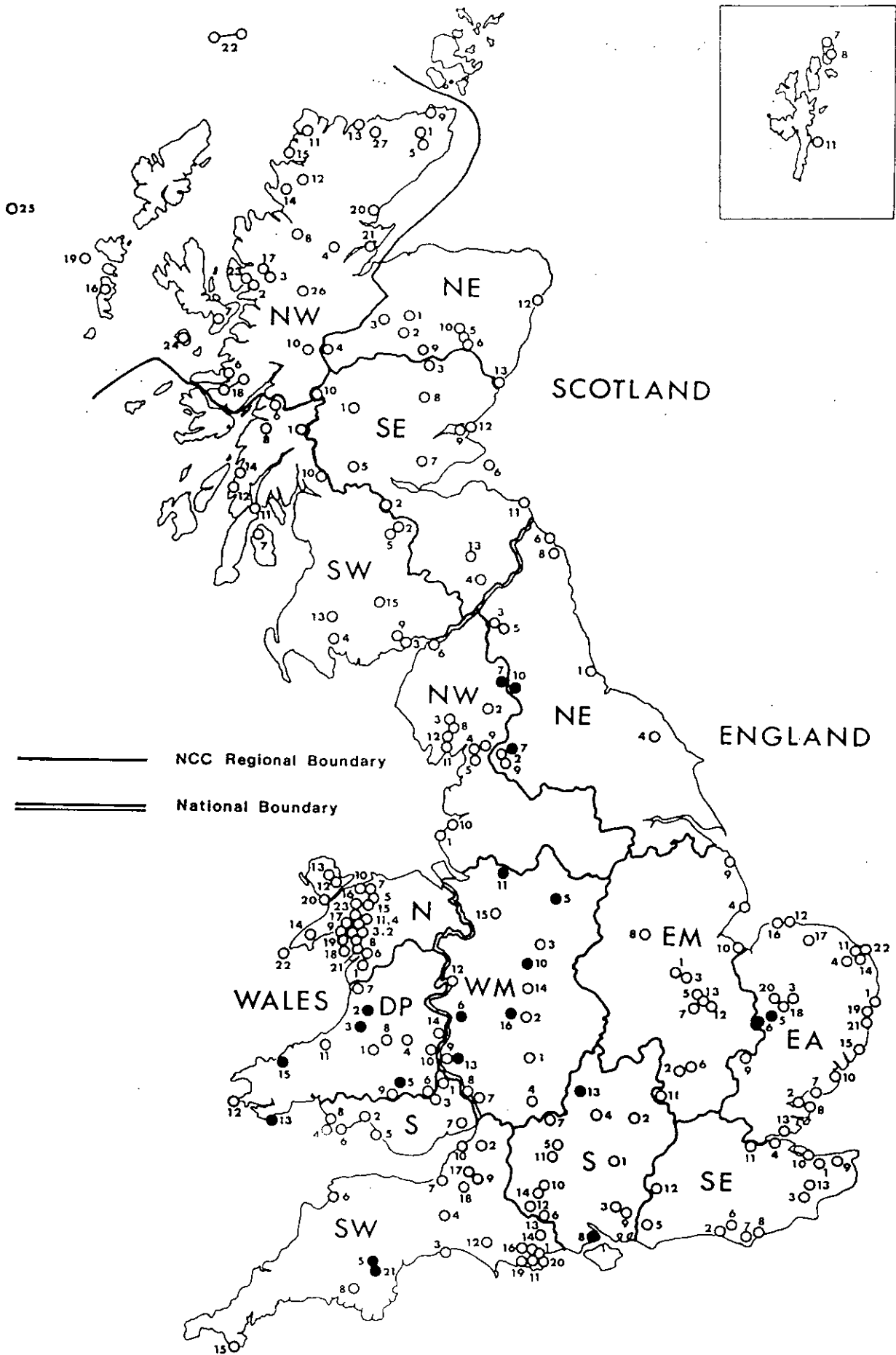
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 13 Cors Erddreiniog  
 14 Cors Geirch  
 15 Cwm Glas Crafant  
 16 Cwm Idwal  
 17 Hafod Garregog

**Figure III t The distribution of freshwater fish in NNRs**

MULLET - ●  
 MULLET + SEA BASS - ■

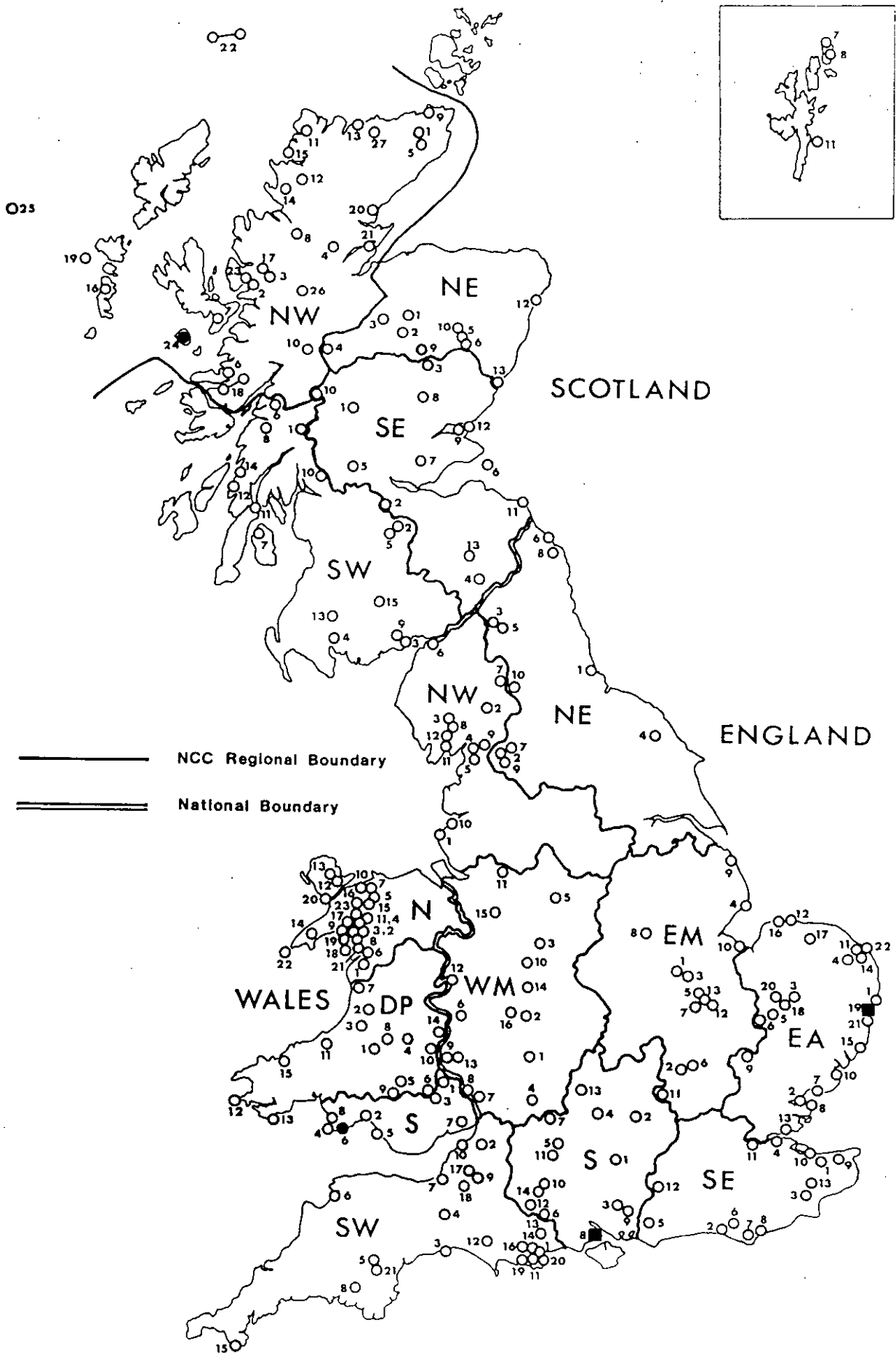
- 8 Dendles Wood  
 9 Ebbor Gorge  
 10 Gordano Valley  
 11 Hartland Moor  
 12 Hog Cliff  
 13 Holt Heath  
 14 Holton Heath  
 15 The Lizard  
 16 Morden Bog  
 17 Rodney Stoke  
 18 Shapwick Heath  
 19 Stoborough Heath  
 20 Studland Heath  
 21 Yarner Wood

- S**  
 1 Ashford Hill  
 2 Aston Rowant  
 3 Beacon Hill  
 4 Cothill  
 5 Fyfield Down  
 6 Martin Down  
 7 N. Meadow Cricklade  
 8 N. Solent  
 9 Old Winchester Hill  
 10 Parsonage Down  
 11 Pewsey Down  
 12 Prescombe Down  
 13 Wychwood  
 14 Wylie Down

- SE**  
 1 Blean Woods  
 2 Castle Hill, Lewes  
 3 Ham Street Woods  
 4 High Halstow  
 5 Kingley Vale  
 6 Lewes Downs  
 7 Lullington Heath  
 8 Pevensy Levels  
 9 Stodmarsh

- DP**  
 1 Allt Rhyd y Groes  
 2 Coed Rheidol  
 3 Cors Caron  
 4 Cors y Llyn  
 5 Craig Cerrig Gleisaid  
 6 Craig y Cilau  
 7 Dyfi  
 8 Nant Irfon  
 9 Ogor Ffynnon-Ddu  
 10 Rhos Goch  
 11 Rhos Llawr Cwrt  
 12 Skomer  
 13 Stackpole  
 14 Stanner Rocks  
 15 Ty Canol

- S**  
 1 Coed y Cerrig  
 2 Crymlyn Bog  
 3 Cwm Clydach  
 4 Gower Coast  
 5 Kenfig  
 6 Oxwich  
 7 Penhow Woodlands  
 8 Whiteford



**Index to NNR Numbers on Figure**

**Scotland**

- NW**
- 1 Achanarras Quarry
  - 2 Alt nan Carnan
  - 3 Reinn Eighe
  - 4 Ben Wyvis
  - 5 Blar Nam Faoileag
  - 6 Claish Moss
  - 7 Coille Thogabhaig
  - 8 Corrieshalloch
  - 9 Dunnet Links
  - 10 Glen Roy
  - 11 Gualin
  - 12 Inchnadamph
  - 13 Invernaver
  - 14 Inverpolly
  - 15 L.A.Mhuilinn Wood
  - 16 L.Druidibeg
  - 17 L.Maree Islands
  - 18 L.Sunart Woodlands
  - 19 Monach Isles
  - 20 Mound Alderwoods
  - 21 Nigg & Udale Bays
  - 22 N.Rona & Sula Sgeir
  - 23 Rassal Ashwood
  - 24 Rhum
  - 25 St Kilda
  - 26 Strathfarrar
  - 27 Strathy Bog

**NE**

- 1 Abernethy Forest
- 2 Cairngorms
- 3 Craigellachie
- 4 Creag Meagaidh
- 5 Dinnet Oakwood
- 6 Glen Tanar
- 7 Hermaness
- 8 Keen of Hamar
- 9 Morrone Birkwood
- 10 Muir of Dinnet
- 11 Noss
- 12 St Cyrus
- 13 Sands of Forvie

**SW**

- 1 Ben Lui
- 2 Braehead Moss
- 3 Caerlaverock
- 4 Cairnsmore of Fleet
- 5 Clyde Valley Woodlands
- 6 Glasdrum
- 7 Glen Diomhan
- 8 Glen Nant
- 9 Kirkconnel Flow
- 10 L.Lomond
- 11 Mealdarroch
- 12 Moine Mhor
- 13 Silver Flowe
- 14 Tainish
- 15 Tynron Juniper Wood

**SE**

- 1 Ben Lawers
- 2 Blawhorn Moss
- 3 Caenlochan
- 4 Cragbank Wood
- 5 Flanders Moss
- 6 Isle of May
- 7 L.Leven
- 8 Milton Wood
- 9 Morton Lochs
- 10 Rannoch Moor
- 11 St Abbs Head
- 12 Tentsmuir Point
- 13 Whitlaw Mosses

**England**

**NW**

- 1 Ainsdale Sand Dunes
- 2 Asby Scar
- 3 Blelham Bog
- 4 Clawthorpe Fell
- 5 Gait Barrows
- 6 Glasson Moss
- 7 Moor House
- 8 North Fen
- 9 Park Wood
- 10 Ribble Marshes
- 11 Roundsea Woods
- 12 Rusland Moss

**NE**

- 1 Castle Eden Dene
- 2 Colt Park Wood
- 3 Coom Rig Moss
- 4 Forge Valley Woods
- 5 Grain Heads Moss
- 6 Lindisfarne
- 7 Ling Gill
- 8 Newham Bog
- 9 Scar Close
- 10 Upper Teesdale

- 8 Dengie
- 9 Hales Wood
- 10 Hamford Water
- 11 Hickling Broad
- 12 Holkham
- 13 Leigh
- 14 Ludham Marshes
- 15 Orfordness-Havergate
- 16 Scolt Head Island
- 17 Swanton Novers Wood
- 18 Thetford Heath
- 19 Walberswick
- 20 Weeting Heath
- 21 Westleton Heath
- 22 Winterton Dunes

**SW**

- 1 Arne
- 2 Avon Gorge
- 3 Axmouth - etc
- 4 Barrington Hill
- 5 Bovey Valley
- 6 Branton Barrow
- 7 Bridgewater Bay

- 10 The Swale
- 11 Swanscombe Skull Site
- 12 Thursley
- 13 Wye

**Wales**

**N**

- 1 Cadair Idris
- 2 Ceunant Llennyrch
- 3 Coed Camlyn
- 4 Coed Cymerau
- 5 Coed Dolgarrog
- 6 Coed Ganllwyd
- 7 Coed Gorswen
- 8 Coed y Rhygen
- 9 Coed Tremadoc
- 10 Coedydd Aber
- 11 Coedydd Maentwrog
- 12 Cors Bodeilio
- 13 Cors Erddreiniog
- 14 Cors Geirch
- 15 Cwm Glas Crafant
- 16 Cwm Idwal
- 17 Hafod Garregog

**Figure IIIu The distribution of freshwater fish in NNRs**

FLOUNDER - ●  
COMMON GOBY - ▲  
FLOUNDER + COMMON GOBY - ■

**WM**

- 1 Bredon Hill
- 2 Chaddesley Moss
- 3 Chartley Moss
- 4 Cotswold Commons
- 5 Derbyshire Dales
- 6 Downton Gorge
- 7 Highbury Wood
- 8 Lady Park Wood
- 9 Moccas Park
- 10 Mottey Meadows
- 11 Rostherne Mere
- 12 Stiperstones
- 13 The Flits
- 14 Wrens Nest
- 15 Wynbury Moss
- 16 Wyre Forest

**EM**

- 1 Barnack Hills & Holes
- 2 Barton Hills
- 3 Castor Hanglands
- 4 Gibraltar Point
- 5 Holme Fen
- 6 Knocking Hoe
- 7 Monks Wood
- 8 Muston Meadows
- 9 Saltfleetby etc.
- 10 The Wash
- 11 Tring Reservoirs
- 12 Upwood Meadows
- 13 Woodwalton Fen

**EA**

- 1 Benacre
- 2 Blackwater Estuary
- 3 Brettenham Heath
- 4 Bure Marshes
- 5 Cavenham Heath
- 6 Chippenham Fen
- 7 Colne Estuary

- 8 Dendles Wood
- 9 Ebbor Gorge
- 10 Gordano Valley
- 11 Hartland Moor
- 12 Hog Cliff
- 13 Holt Heath
- 14 Holton Heath
- 15 The Lizard
- 16 Morden Bog
- 17 Rodney Stoke
- 18 Shapwick Heath
- 19 Stoborough Heath
- 20 Studland Heath
- 21 Yarner Wood

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- 2 Castle Hill, Lewes
- 3 Ham Street Woods
- 4 High Halstow
- 5 Kingley Vale
- 6 Lewes Downs
- 7 Lullington Heath
- 8 Pevensy Levels
- 9 Stodmarsh

- 18 Morfa Dyffryn
- 19 Morfa Harlech
- 20 Newborough Warren
- 21 Rhinog
- 22 Yns Enlli-Bardsey
- 23 Y Wyddfa-Snowdon

**DP**

- 1 Allt Rhyd y Groes
- 2 Coed Rheidol
- 3 Cors Caron
- 4 Cors y Llyn
- 5 Craig Cerrig Gleisaid
- 6 Craig y Cilau
- 7 Dyfi
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