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Dr S D Ward
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33 Eskdale Terrace
Newcastle upon Tyne
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Your reference

Our reference

Date April 1980

Dear Stephen

Here is the report on my work at Semer Water. I found it a fascinating place, as you can see from the report.

I have been in touch with Dr Fryer of the FBA, who has been sampling the lake for some years, and he has sent me a very long list of small Crustacea (Cladocera, Ostracoda and Copepoda) for the site. He says that Semer Water is the richest water body he has found in Yorkshire for Crustacea. This lake is the only known site in Yorkshire for several species, some of which are rare in Britain. Dr Fryer is anxious that his list is not published by anyone but himself because he is planning a review of Yorkshire Crustacea. However, he is happy for us to state that this is the best site he has encountered in Yorkshire, and says he is very keen to see it conserved.

I have also been corresponding with the British Museum over peculiar specimens of Daphnia cucullata which I took from Semer Water (see footnote on page 1 of TABLE 2), and the museum has retained specimens for their collection.

I hope you will find the report useful in your efforts to protect Semer Water.

Yours sincerely

Margaret Palmer

MARGARET PALMER
Chief Scientist's Team

Copy for D. Mugley.

SURVEY OF SEMER WATER
1979

Margaret Palmer
Chief Scientist's Team

SURVEY OF SEMER WATER, 1979

Introduction

The main aim of this survey was to collect information about the aquatic invertebrates of Semer Water but brief records of vertebrates and aquatic plants were also made.

Semer Water was visited twice during 1979, on May 9th and July 19th. The May visit followed very heavy rainfall and, the lake was unusually high, which made sampling difficult.

Methods

Sampling for invertebrates was carried out at 6 contrasting sites (see sketch map). Three of these sites were in the lake itself: one (Site 5) on the stony north-west shore; another (Site 6) in the silty reedswamp at the south-west corner; the third (Site 2) in water about ½ m. deep near the southern shore, amongst mainly submerged aquatic plants growing in sand and silt. The other sampling sites were in inflow and outflow streams at points very close to the lake itself. Site 1 was at the mouth of the main inflow stream at the South-west corner of the lake, where there was sparse vegetation over a sandy bottom; Site 3 was at the mouth of the small, rocky inlet stream at the north-east corner of the lake; Site 4 was amongst submerged and emergent plants in the outlet stream, which had a bed of sand and stones.

Littoral invertebrates were collected from the 6 sites in May and July with a standard pond net (1mm mesh) by sweeping amongst aquatic plants and by kick-sampling. Stones and plants were examined for animals clinging to them. About half an hour was spent at each sampling site making a thorough search in order to obtain as full a species list as possible.

Profundal invertebrates were not collected but plankton samples were obtained by trawling from a boat. Aquatic plants were recorded at the sampling sites and elsewhere in the lake.

Secchi disc and pH measurements were taken in May (see sketch map).

Results

The aquatic plants recorded are listed in TABLE 1.

The 67 invertebrate taxa found during the 1979 survey are listed in TABLE 2, which also indicates relative abundance. 51 taxa were found in the lake itself and 29 in the streams. The total numbers of taxa per sampling site varied from 11 to 26. During the May visit only 27 taxa were collected, but in July the total was 53.

The birds, fish and mammals seen during the survey are listed in TABLE 3.

Discussion

The aquatic plants

The macrophyte community is broadly indicative of mesotrophic conditions. The most abundant submerged macrophyte was Potamogeton pectinatus, which is local in the north of England, although very common in southern and central areas (Haslam, Sinker and Wolseley, 1975). The alien Elodea canadensis, Myriophyllum spicatum and Scirpus lacustris, (abundant along the north west shore) have similar, mainly lowland, distributions in Britain. Conversely, Carex rostrata, which is abundant at Semer Water, is common in upland regions of Britain and mainly extinct in eastern and central England (Haslam, Sinker and Wolseley, 1975).

Monostroma bullosum is a sac-like green alga about 1 cm long, which attaches itself to boulders and submerged plants by a holdfast. It was found in the northern inflow stream in May. It is not at all common in Britain, but has been found in some northern rivers including the Teviot (Holmes and Whitton, 1975).

In the Nature Conservation Review the phytoplankton is described as characteristic of nutrient rich waters, as it is dominated by Asterionella, Ceratium and Pediastrum species.

A detailed account of the woodland, marsh and reedswamp vegetation of Semer Water recorded by Mrs. E. Moore in 1978 is held in NCC files.

General distribution of invertebrates

The flooded condition of the lake during the May visit, together with seasonal variation account for the large discrepancy in numbers of species found during the two visits to Semer Water in 1979.

TABLE 2 shows that the greatest number of species was found in the reedswamp (Site 6). 8 species were found only in this part of the lake. 2 of these, Caenis horaria and Sialis lutaria, are dependent on the soft, muddy type of substrate found in the reedswamp. 15 taxa were found in the inflow and outflow streams but not in the lake proper, so it appears that the streams add to the diversity of habitat and consequently to the species richness of the system.

Past records

The previous survey by Mr Hately (1978) produced records of 24 taxa of littoral invertebrates (10 determined to species), 10 of which were not found in the 1979 survey. These are listed in TABLE 4 along with 3 planktonic species collected in 1978 and the 7 species mentioned in the Nature Conservation Review (Ratcliffe, 1977). 2 mayfly species recorded in the NCR were not found in 1979 (see below).

The Zooplankton

The plankton sample taken in May contained no truly planktonic animals, but consisted of species washed from the littoral zone by flood water. The July sample was much more satisfactory. The dominant species then were the copepods Diaptomus gracilis and Cyclops vicinus, together with the cladocerans Daphnia hyalina var. lacustris and Daphnia cucullata.

The large (about 1 cm long) cladoceran Leptodora kindti was caught in small numbers. Semer Water is the only water body in Yorkshire where this animal has been recorded (Dr Fryer, Freshwater Biological Association, pers. comm.). The August 1978 plankton sample examined by Mr Smyly also contained Diaptomus gracilis, but it was accompanied by Bosmina longirostris and the late summer species Cyclops strenuus abyssorum.

Galliford (Holmes, 1965) has noted the apparently sudden arrival of Cyclops vicinus in Malham Tarn in 1962, and has suggested that this may have reflected some change in the environment such as increasing pollution. Perhaps a similar change has occurred in recent years in Semer Water. Cyclops vicinus is common in the southern counties of England and has been recorded from Cheshire and Dundee (Scourfield and Harding, 1966). Daphnia cucullata and Bosmina longirostris are also indicative of relatively rich conditions and so are more typical of lowland than of upland water bodies. Daphnia cucullata is uncommon in Yorkshire (Dr. Fryer, pers. comm.).

The larger Crustacea (Malacostraca)

Both Gammarus pulex and Gammarus lacustris were found in Semer Water in 1979, although only Gammarus pulex is mentioned in the Nature Conservation Review. Gammarus pulex is widespread in Britain, but Gammarus lacustris is largely confined to lakes in Scotland, Wales and Northern England (Gledhill, Sutcliffe and Williams, 1976). It is rare to find both species in one lake, but this is also the case in Malham Tarn (Holmes, 1965), where Gammarus pulex is mostly confined to stony shores and Gammarus lacustris occurs in areas where there is an accumulation of organic silt. Although no detailed quantitative work was done at Semer Water in 1979, it appeared that Gammarus lacustris was more numerous than Gammarus pulex in the lake. Only Gammarus pulex was found in the streams.

A notable feature of Semer Water is the presence of the crayfish Austropotamobius pallipes which was found in large numbers beneath stones on the north-west shore. This species is known to occur as far north as Northumberland, and is said to have been introduced into the Yorkshire Dales from the south of England in the 16th century (Holmes, 1965).

The insects

The Nature Conservation Review mentions that Semer Water is notable for the large number of mayfly species it contains. 8 species were recorded in 1979, but four of these, Parleptophlebia cincta, Habrophlebia fusca, Ephemerella ignita and Baetis rhodani, were found only in the streams.

Centroplilum luteolum, Siphlonurus lacustris and Ecdyonurus dispar were present in both the streams and the lake. Only Caenis horaria appeared to be confined to the lake.

Mr Hately's survey records Centroptilum pennulatum, which was not found in 1979. The Nature Conservation Review mentions two further species, Procloeon pseudorufulum and Baetis scambus/bioculatus.

As at Semer Water, Baetis rhodani and Siphlonurus lacustris are the most abundant mayfly species in streams on Moor House National Nature Reserve (Crisp and Nelson, 1965). The samples from the Moor House streams were taken over an altitudinal range of

about 350 to 800 m, whereas Semer Water lies at approximately 250m.

13 taxa of caddis-flies were recorded in 1978 and 1979 from Semer Water. The most surprising record is that of Holocentropus stagnalis, reported by Mr Hately in 1978. This insect has been found in only a few counties, including Worcestershire (Moseley, 1939); Norfolk and Somerset (recent NCC surveys by M Palmer).

Macan (1970) has shown that the less productive lakes of the Lake District contain larger numbers and a greater species diversity of insects such as mayflies, stoneflies and caddisflies that do the more productive lakes, in which non-insect species become more prominent. About a third of the invertebrate species found in Semer Water in 1979 were mayflies, stoneflies and caddis-flies, which represents a relatively high proportion of the total fauna.

6 species of water bug were found in 1979, the most abundant being the tiny Micronecta poweri, a species typical of sandy-or-stony-bottomed lakes. The occurrence in relatively large numbers of Sigara dorsalis and Sigara falleni is typical of a calcareous lake with little organic matter in the substrate, (Macan, 1976). A single male specimen of Sigara concinna was found in the main inflow stream. This species is rather rare, especially in upland areas. Macan (1976) records that only a single specimen has been taken in the Lake District. The usual habitat of this species is lakes and rivers with sandy bottoms.

The few dragonfly and beetle species found in Semer Water are common and widespread. All 3 species of stonefly recorded from Semer Water and its streams in 1979 have been found within the tarns, pools or streams of Moor House National Nature Reserve at altitudes up to 750 m (Brown, Cragg and Crisp, 1964). Nemoura cinerea is a stonefly which is generally distributed in lowland and upland Britain and whose nymphs are found in still or slow-flowing water with abundant emergent vegetation. This was the one stonefly found in Semer Water itself; the other two species, which have a more restricted northerly and westerly distribution in Britain, (Hynes, 1977), were recorded from the inflow streams.

Parapoynx stagnata is one of the small group of moths with aquatic larvae which make cases out of plant material in a similar way to caddis-fly larvae. A single specimen was found in the main inflow stream.

The Molluscs

Six species of Gastropoda (snails) were found in 1979, to which can be added Bithynia sp. recorded by Mr Hately. The River Limpet Ancylus fluviatilis was the most abundant species, occurring attached to stones on the west shore of the lake and in the streams.

Potamopyrgus jenkinsi may be a fairly recent coloniser of the Lake. It was known only from brackish water until the turn of the century, when it began its highly successful colonisation of fresh waters. It was first recorded from Malham Tarn in 1950 and was possibly introduced accidentally by visiting students (Holmes, 1965).

According to the Nature Conservation Review, several snail species which are typical of more nutrient-rich, weedy conditions than now exist in the lake have been recorded from Quaternary deposits taken from the lake bed, but can no longer be found alive.

Comparison of the flora and fauna of Semer Water with those of Malham Tarn

Malham Tarn, which is about 20 km south of Semer Water, and about 140 m higher, has been intensively studied for over 30 years, and like Semer Water is a Grade 1 site. Semer Water has an alkalinity of 60-70 ppm $CaCO_3$, whereas that of Malham Tarn is 62-142 ppm (Ratcliffe, 1977) which puts it in the "marl" category.

The most abundant macrophyte species in Malham Tarn are Carex rostrata, Potamogeton lucens and Chara delicatula. Myriophyllum spicatum, Potamogeton berchtoldii, P. perfoliatus, P. X nitens, Fontinalis antipyretica and Elodea canadensis occur in smaller quantities (Holmes, 1965). This flora reflects the highly calcareous nature of the lake water. Although Semer Water and Malham Tarn have the majority of these species in common, the dominant species, apart from Carex rostrata, are different (see TABLE 1).

Several invertebrate species common to both lakes have already been mentioned (Cyclops vicinus, Gammarus lacustris, Gammarus pulex, Potamopyrgus jenkinsi). Although, as might be expected from a long-term study, the species recorded so far from Malham Tarn (Holmes, 1965) are more numerous than those from Semer Water, some other comparisons seem valid. Crayfish are a feature of both lakes. Other taxa in common

are the leeches Helobdella stagnalis and Glossiphonia complanata; the alderfly Sialis lutaria; the molluscs Ancylus fluviatilis, Lymnaea peregra, Planorbis albus, Planorbis crista and Pisidium spp.; the stonefly Nemoura sp.; and Chironomid midge larvae. Caddis-flies are abundant in Malham Tarn, and although little is so far known about the caddis fauna of Semer Water, the same families (Hydroptilidae, Polycentropidae, Limnephilidae, Phryganeidae, Leptoceridae) are represented in both lakes.

Mayflies are a more prominent feature of Semer Water than of Malham Tarn. The only common mayfly in Malham Tarn is Caenis horaria. Ecdyonurus dispar, Centroptilum luteolum and Cloeon dipterum are present but rare (Holmes, 1965). At least 11 species occur in Semer Water and its streams and most are present in large numbers.

The Hemiptera fauna is also more varied in Semer Water than in Malham Tarn. In both, Micronecta poweri is abundant, but Sigara dorsalis is the only species of larger corixid recorded in Malham Tarn (Holmes, 1965).

On present evidence the mollusc fauna of Malham Tarn appears to be richer than that of Semer Water. In 1978 and 1979 7 species of Gastropod and 7 species of bivalve mollusc were found in Semer Water. 14 species of Gastropod and 10 species of bivalve molluscs have been recorded from Malham Tarn (Ratcliffe, 1977). This species richness is probably largely due to the high calcium level of Malham Tarn.

The zooplankton of the two water bodies is very similar. Holmes (1965) lists Diaptomus gracilis, Daphnia hyalina, Bosmina longirostris and Cyclops vicinus as the dominant planktonic crustacea, and these four species also occur in Semer Water.

Possible effects of increased public pressure on Semer Water

Increased public pressure on Semer Water could affect its flora and fauna in several ways. These include mechanical damage of emergent, submerged and floating macrophytes by trampling and boating; increased turbidity of the water caused by disturbance of sediments by motorised craft; eutrophication resulting from pollution; disturbance of wildfowl nesting and roosting sites. The use of herbicide for the removal of plants which may be a nuisance to fishermen could also cause an increase in nutrient levels in the water when the dead vegetation decomposes.

Eutrophication could alter the character of the biota, starting with phytoplankton and other algae, and ultimately tending to increase the "lowland" element of the system at the expense of the "upland" component. Liddle, Happey-Wood and Buse (1979) in their study of 12 lakes in Snowdonia have shown correlations between characteristics of the phytoplankton and nutrient concentrations in the water. They have suggested that high levels of nitrogen in some of the lakes may be the result of increased amounts of sewage from campers, and have predicted that increased recreational activity is likely to degrade the biota of some of the smaller, more interesting lakes in their study area.

Summary

This brief survey has shown that Semer Water and its adjacent streams contain a species-rich community of invertebrates. The lake's macrophyte flora and invertebrate fauna are similar in some ways to those of Malham Tarn, but there are also marked differences, especially as regards the relative proportions of various groups of invertebrates within the two communities.

Semer Water's flora and fauna exhibit characteristics usually associated with northern/upland/fairly nutrient-poor conditions (eg the large number of mayfly species; the presence of species such as Gammarus lacustris, Leuctra hippopus, Carex rostrata, Monostroma bullosum) alongside elements more typical of southern/lowland/more nutrient-rich conditions (eg Sigara concinna; Austropotamobius pallipes; Cyclops vicinus; Elodea canadensis; Potamogeton pectinatus; Myriophyllum spicatum; Scirpus lacustris, Asterionella and other phytoplanktonic species). Some of the "lowland" species (eg Elodea canadensis, Cyclops vicinus, Potamopyrgus jenkinsi) may have arrived relatively recently as a direct result of man's activities in the area. However, the Nature Conservation Review sights evidence from the sub-fossil snail fauna of the lake sediments which suggest that the water was once more eutrophic than at present.

Increased recreational activity on and near Semer Water could degrade the semi-natural character of the lake and modify its biota.

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TABLE 1 AQUATIC PLANTS RECORDED DURING 1979 SURVEY

			Presence at sampling sites					
			1	2	3	4	5	6
Algae	Filamentous green algae	frequent			✓		✓	
	*Monostroma bullosum	occasional (N. inflow)			✓			
	Chara sp.	occasional	✓					
Bryophyta	*Calliergon (Acrocladium) cuspidatum	occasional					✓	
	*Cinclidotus fontinaloides	occasional			✓			
	*Rhytidiadelphus squarrosus	occasional			✓			
	Fontinalis antipyretica	occasional						
Angiospermae	Agrostis stolonifora	frequent						
	Alisma plantago-aquatica	occasional						✓
	Caltha palustris	frequent						
	Carex acuta	locally frequent						
	Carex nigra	locally abundant						
	Carex rostrata	locally dominant	✓	✓		✓		✓
	Carex vesicaria	locally abundant						
	Eleocharis palustris	abundant				✓		✓
	Elodea canadensis	frequent (S. inflow)	✓					
	Equisetum fluviatile	locally dominant		✓		✓	✓	✓
	Filipendula ulmaria	locally frequent						
	Galium palustre	frequent						
	Juncus acutiflorus	abundant						
	Juncus bulbosus	abundant						
	Lemna minor	rare		✓				
	Mentha aquatica	frequent						
	Myosotis scorpiodes	frequent						
	Myriophyllum spicatum	occasional						
	Nuphar lutea	locally abundant		✓				
	Phalaris arundinacea	locally frequent						✓
	Phragmites australis	locally abundant						✓
	Potamogeton berchtoldii	rare						✓
	Potamogeton crispus	occasional		✓		✓		
	Potamogeton pectinatus	locally abundant	✓	✓		✓		✓
	Potamogeton alpinus	small fragments	✓				✓	
	Ranunculus flammula	frequent						
	Scirpus lacustris	locally abundant					✓	

*Identified by Dr. N. Holmes

TABLE 2 AQUATIC INVERTEBRATES COLLECTED IN 1979 SURVEY

		Lake edges						Streams						Lake Centre	
		Site 2 (South end)		Site 5 (N.W. shore)		Site 6 (S.W. corner)		Site 1 (S.W. inflow)		Site 3 (N.E. inflow)		Site 4 (Out-flow)		Plankton sweep	
		9.5.79	19.7.79	9.7.79	19.7.79	9.5.79	19.7.79	9.5.79	19.7.79	9.5.79	19.7.79	9.5.79	19.7.79	9.5.79	19.7.79
OLIGOCHAETA (Worms)	Lumbricidae sp. non det			x											
HIRUDINEA (Leeches)	Glossiphonia complanata (L.)						xx								
	Helobdella stagnalis (L.)						x								
HYDRACARINA (Mites)	Spp. non det.							x	x						
CLADOCERA (Water fleas)	Sida crystallina (Müller)												x	x	
	Daphnia cucullata Sars. s.str.®														xxx
	Daphnia hyalina var. lacustris Sars.														xxx
	Simocephalus exspinosus (Koch)						x								
	Alona affinis Leydig		x												
	Leptodora kindti (Focke)														x
OSTRACODA	Spp. non det.						x								
COPEPODA	Diaptomus gracilis Sars.														xx
	Cyclops vicinus Uljanin														xxx
	Acanthocyclops vernalis (Fischer)													x	
	Acanthocyclops viridis (Jurine)		x				xx								
MALACOSTRACA	Gammarus lacustris Sars.		xxx		x		xx								
	Gammarus pulex (L.)		xx				x			xx					
	Austropotamobius pallipes (Lereboullet)				xx										
EPHEMEROPTERA (Mayflies)	Siphlonurus lacustris Eaton	xxx		xx		x	xx	x	x					x	
	Baetis rhodani (Pictet)							xx	x	xxx	xxx				
	Centroptilum luteolum (Müller)						x	xxx	x	xxx		x			
	Ecdyonurus dispar (Curtis)				xx	x					x	xx			
	Paraleptophlebia cincta (Retzius)										x				
	Habrophlebia fusca (Curtis)										xx				
	Ephemerella ignita (Poda)								x		x				
	Caenis horaria (L.)						x								
PLECOPTERA (Stone-flies)	Nemoura cinerea (Retzius)	x			x										
	Leuctra hippopus (Kempny)										x				

®The range of crest development includes forms that have previously been referred to the rare variety kahlbergensis Schödler recorded from Loch Gary, Scotland and Loch Erne, Ireland).

TABLE 2 (Contd.)

		Lake edges						Streams								Lake Centre	
		Site 2 (South end)		Site 5 (N.W. shore)		Site 6 (S.W. corner)		Site 1 (S.W. inflow)		Site 3 (N.W. inflow)		Site 4 (Out-flow)		Plankton sweep	
		9-5-79	19-7-79	9-5-79	19-7-79	9-5-79	19-7-79	9-5-79	19-7-79	9-5-79	19-7-79	9-5-79	19-7-79	9-5-79	19-7-79
PLECOPTERA Cont.	Isoperla grammatica (Poda)							x							
ODONATA (Dragonflies)	Ischnura elegans (Linden)				x										
HEMIPTERA (Bugs)	Velia sp. (nymph)													x	
	Micronecta poweri (Douglas & Scott)	xxx	x	xxx	x		x	x		x		x		x	
	Sigara concinna (Fieber)							x							
	Sigara dorsalis (Leach)	xx					xx								
	Sigara falleni (Fieber)	xxx	x												
	Sigara nigrolineata (Fieber)	xx													
	Sigara sp. (nymphs)						xx		x						
COLEOPTERA (Beetles)	Haliplas wehnckei Gerhardt		x												
	Haliplidae (larva)						x								
	Hydroporus palustris (L.)		xx				x								
	Dytiscidae sp. non det. (larva)													x	
	Hydraena britteni Joy													x	
	Elmis aenea (Muller)							x							
MEGALOPTERA (Alderflies)	Sialis lutaria (L.)						x								
TRICHOPTERA (Caddis-flies)	Rhyacophila dorsalis (Curtis)										x				
	Polycentropus flavomaculatus (Pictet)				x										
	Holocentropus picicornis (Stephens)				x										
	Hydroptilidae sp. non det. (larvae)										xx				
	Anabolia nervosa Curtis			x											
	Halesus radiatus/digitatus (larvae)							x		x					
	Athripsodes aterrimus (Stephens)			xx											
	Oesetis lacustris (Pictet)												x		
	Leptoceridae spp non det (larvae)						x	x	x						
LEPIDOPTERA (Moths)	Parapoynx stagnata (Donovan)							x							
DIPTERA (Flies)	Tipulidae sp. non det. (larvae)	x						x			x				

TABLE 2 (Contd.)

		Lake edges						Streams						Lake Centre	
		Site 2 (South end)		Site 5 (N.W. shore)		Site 6 (S.W. corner)		Site 1 (S.W. inflow)		Site 3 (N.W. inflow)		Site 4 (Out-flow)		Plankton sweep	
		9.5.79	19.7.79	9.5.79	19.7.79	9.5.79	19.7.79	9.5.79	19.7.79	9.5.79	19.7.79	9.5.79	19.7.79	9.5.79	19.7.79
DIPTERA Contd.	Chironomidae spp. non det. (larvae)				x	xx	x			xx	x				
GASTROPODA (Snails)	Potamopyrgus jenkinsi (Smith)				xx								xx		
	Lymnaea palustris (Müller)					x									
	Lymnaea peregra (Müller)												x		
	Planorbis (Gyraulus) albus Müller						x								
	Planorbis (Anisus) crista						x								
	Ancylus fluviatilis Müller				xx					x	x		x		
*BIVALVIA	Sphaerium corneum (L.)						x						x		
	Pisidium amnicum (Müller)												x		
	P. casertanum (Poli)												x		
	P. milium Held		x												
	P. nitidum Jenyns		x				x								
	P. personatum Malm					x									
	P. subtruncatum Malm				x		x								
No. of taxa per site		15		15		26		14		15		11		7	5

x = rare)
xx = frequent) in samples
xxx = abundant)

*Bivalve molluscs identified by Dr M. Kerney of Imperial College, London.

TABLE 3 VERTEBRATES RECORDED 9.5.79 AND 19.7.79

Fish:	Phoxinus phoxinus (L.) Minnow
	Noemacheilus barbatulus (L.) Stone Loach
Birds:	Great Crested Grebe
	Mallard
	Goosander
	Black-headed Gull
	Oyster Catcher
	Common Sandpiper
	Redshank
	Curlew
	Lapwing
	Reed Bunting
Mammals:	Water Vole

TABLE 4 INVERTEBRATE RECORDS FROM OTHER SURVEYS

Nature Conservation Review

7 species mentioned:-

Ephemeroptera	Baetis rhodani
	Baetis scambus/bioculatus
	Procloeon pseudorufulum
	Paraleptophlebia cincta
	Habrophlebia fusca
Crustacea	Gammarus pulex
	Austropotamobius pallipes

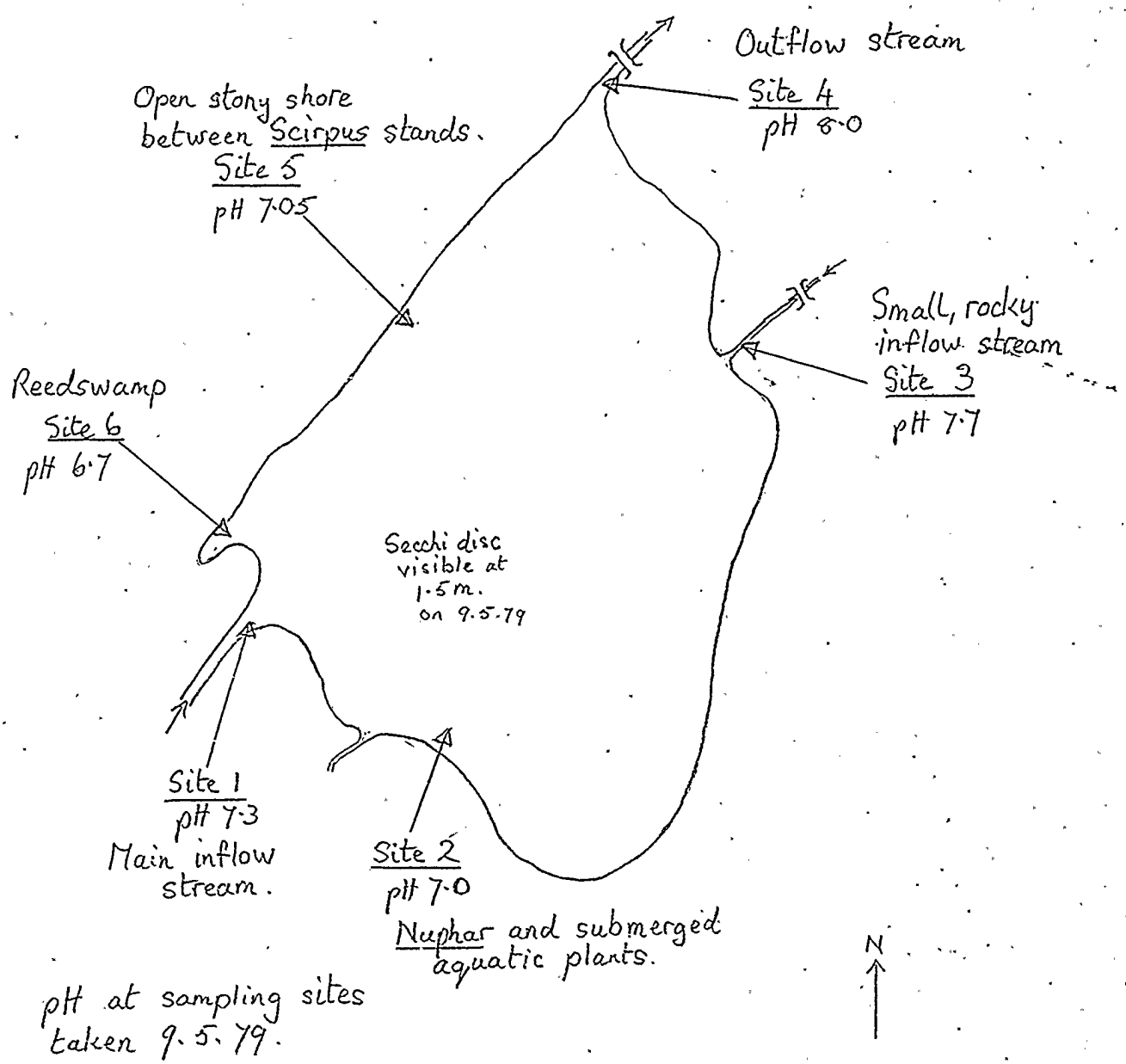
1978 Survey of Semer Water

1) Littoral invertebrates (identified by Mr Hately) not found in 1979:-

Ephemeroptera	Centroptilum pennulatum
Trichoptera	Plectronemia geniculata
	Phryganea grandis
	Holocentropus dubius
	Holocentropus stagnalis
Diptera	Thaumalea sp.
	Medetera sp.
	Chaoborus sp.
	Culicini
Mollusca	Bithynia sp.

2) Planktonic species identified by Mr W.J P Smyly:-

Diaptomus gracilis
Bosmina longirostis
Cyclops stenuus abyssorum



pH at sampling sites taken 9.5.79.

Sketch map of Semer Water to show the sites sampled for invertebrates in May and July 1979.