TWO ASPECTS OF SAMPLING

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1. DETERMINING DIVERSITY OF MOLLUSCA IN FRESHWATER DITCHES

INTRODUCTION

Sampling was carried out on a single ditch on West Sedgemoor (RSPB) in September 1998 in order to determine the frequency of sampling necessary to produce representative data of mollusca populations in a single ditch. This was a preliminary survey prior to determining the extent of the populations of *Valvata macrostoma* Mörch Wide-mouthed Valve Snail on West Sedgemoor. An Action Plan has been written for this species as part of the Taunton Deane Biodiversity Action Plan (BAP) for Local Agenda 21. This species has been found in ditches within an area of approximately 2 x 1km, mainly on land owned by the RSPB, and appropriate methodology had to be established in order to assess the distribution and size of the populations within this area, the ecology of the life cycle, as well as historic treatment of the ditches, in order to determine strategies for its conservation.

SAMPLING METHOD IN A TEST DITCH

Nineteen three-second samples were taken using a heavy duty net at sites of 10m interval along the 180m ditch. The numbers of *V. macrostoma* and other mollusc species were recorded before being returned to the site. The total numbers of each species taken at each sampling site are given in Table 1.

	Distance along ditch (m)																			
	0	6	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	f
Anisus vortex	26	3	8	0	13	5	4	0	5	8	3	0	10	10	17	5	10	12	11	17
Bathyomphalus contortus	45	100	280	76	74	93	68	47	70	53	53	110	136	92	143	15	22	46	7	19
Bithynia leachii	5	46	34	15	4	10	3	7	8	1	33	21	37	4	19	8	1	5	3	19
Bithynia tentaculata	62	56	151	148	20	58	41	50	52	44	35	127	209	59	37	48	26	39	38	19
Gyraulus albus	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Gyraulus crista	1	2	2	0	0	3	0	0	0	0	2	2	0	4	0	0	1	0	0	8
Hippeutis complanatus	20	19	28	27	2	17	3	5	19	4	16	44	47	14	3	3	2	1	0	18
Lymnaea palustris	10	6	5	7	4	6	4	3	1	6	4	9	15	4	6	6	10	7	5	19
Lymnaea peregra	5	2	18	11	5	1	5	0	4	0	0	1	1	1	1	2	2	3	1	16
Lymnaea stagnalis	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Lymnaea truncatula	5	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2
Musculium lacustre	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	0	0	0	2
Physa fontinalis	1	2	1	2	0	0	0	0	4	0	1	2	2	7	3	1	0	2	3	13
Pisidium milium	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Planorbis planorbis	24	2	11	14	10	14	8	12	12	6	2	12	11	1	20	12	43	29	38	19
Sphaerium corneum	2	0	10	44	0	0	6	8	2	0	3	2	5	0	15	3	13	5	0	13
Valvata cristata	19	22	29	8	1	15	3	3	0	0	5	89	6	15	3	2	0	0	1	15
Valvata macrostoma	169	225	581	745	58	656	258	300	138	24	285	196	431	70	26	11	6	3	11	19

Table 1 Total numbers of molluscs found at each sample site

Discussion

These results show not only the fact that *V. macrostoma* can exist in numbers exceeding the totals of all the other species put together, which is astonishing for a rare species, but most species show localisation in their distribution. Even with *V. macrostoma*, numbers varied from 3 to 745 within the range of 19 sampling sites; just these two figures would produce a large discrepancy in an estimate of abundance if only one of these samples had been used! These results therefore raise questions about the standard method for sampling as described by Anderson *et al.* (1991) in terms of the number and siting of samples along a ditch. The described method states 'at least three samples from as many microhabitats as possible in a 50m length of ditch'. I consider this to be inadequate since results can appear to differ depending on how many and where samples are taken (Table 2). For example, at 10m intervals, 18 species of mollusc were recorded but the frequency with which these occurred varied widely, six species being found in every sample but three in one sample only (Fig. 1). A closer look at the data shows that two of the species are present only in the first sample (0m) where 16 of the total 18 species are present. At no other site was the total as high as this, the number varying from 8 to 16, the mean number of species being twelve.

Table 2 Summary of numbers of species showing maximum and minimum frequency with samples taken at different intervals

	Sample interval (m)			
	10	20	30	60
Number of species with maximum frequency	6	7	6	9
Number of species with minimum frequency	3	4	4	4
Number of species 'not recorded'	0	0	2	2

If there are longer lengths of ditch between samples (Fig. 2), discrepancies arise, not only in terms of which species are deemed to be present but also their frequencies. The longer the sampling interval, the more frequent species can appear to be and this will affect general conclusions about how common (usually given in terms of 'abundance') such species are. Other species will appear to be 'absent', the better term being 'not recorded'.

A single ditch sample should therefore comprise dips taken at a maximum of 20m intervals, but preferably 10m, along the entire length of a ditch, assembled together. It is planned to take such samples from as many ditches as possible on West Sedgemoor and determine the mean numbers per unit length of ditch in order to map populations over the Moor and highlight a) possible breeding sites, and hence the number of colonies, and b) ditches containing the most significant populations to target for conservation. DNA analysis could be used to determine relationships between existing populations and postulate possible historical distribution. In addition, a study of the correlation between the history and pattern of ditch cleaning and present-day distribution should help to formulate a conservation strategy.

2. REPETITIVE SAMPLING OF AQUATIC MOLLUSCA

Introduction

Too often survey work involves taking away preserved samples for analysis. In the case of rare species this can have serious effects on the population and, if repeated samples are required, another method has to be used to conserve the population.

In the monthly sampling of a Somerset ditch for the rare *Segmentina nitida* Müller Shining Ram's-horn, I have had to use a method that enabled me to analyse distribution along the ditch

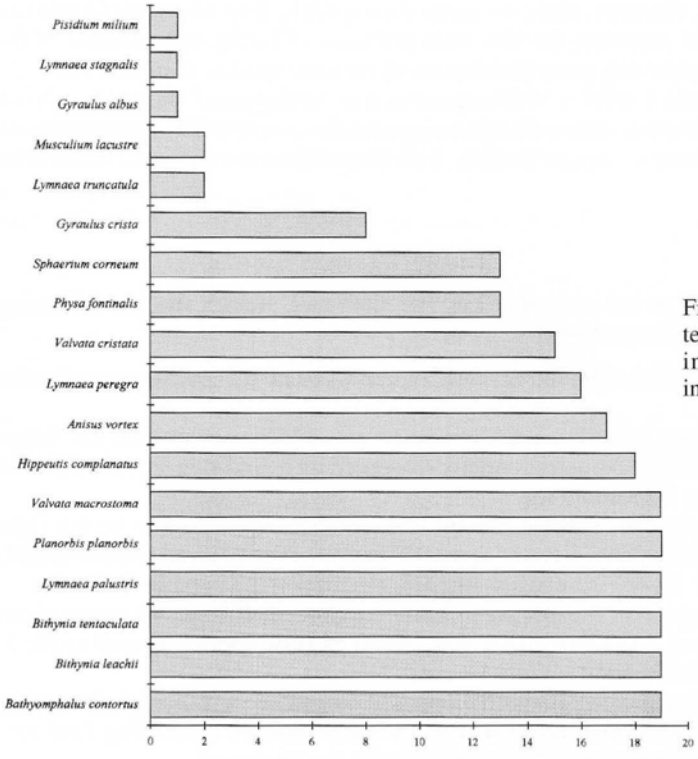

Fig. 1 Frequency of species (in terms of nos of samples) found in samples taken at *c.* 10m intervals

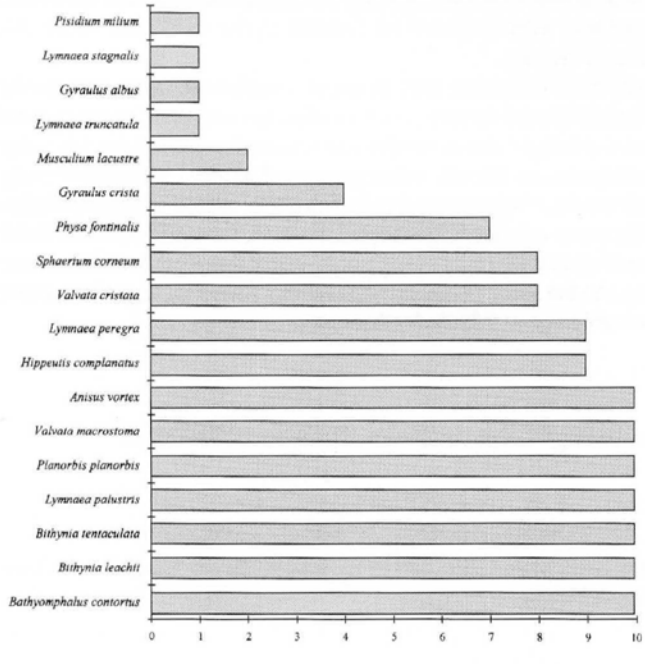

Fig. 2 Frequency of species found in samples taken at 20m intervals

as well as changes over time. Because of this, the method accepted by English Nature (Anderson *et al.* 1991) was modified to overcome the two main problems of firstly, conservation of the species, and secondly, the often very local distribution of mollusc species along a ditch.

S. nitida is a Red Data Book 1 species which classifies it as 'endangered'. In addition it is a Priority Species in the Biodiversity Action Plan list of species for conservation. Apart from one ditch in Somerset, it is confined to sites in Norfolk, Suffolk and Kent so every care needs to be taken in its conservation.

Sampling Method

Sampling sites were laid out at 5m intervals along the ditch and, at each site, the following method was used in sorting and recording:

- a three-second dip was taken with the net over an approximate 0.5 x 0.5m area of water near the bank
- the collected material was put into a large tray 510 x 365 x 35mm, examined, and larger molluscs other than *S. nitida* extracted, counted, recorded on a field data sheet and placed in a bucket for return to the sample site
- water from the same site was poured into the tray (2 litres was found to be the right amount), the plant material agitated, teased apart and washed, then removed into the bucket; molluscs (other than *S. nitida*) were again counted, recorded and placed in the bucket
- finally, water containing bits of floating plant debris was poured off from one corner of the tray leaving a precipitate containing many other small mollusc species as well as the *S. nitida* which sticks to the bottom
- this remaining material containing all the *S. nitida* was poured into a 250ml specimen tube with sufficient water and *Lemna trisulca*, Ivy-leaved Duckweed (providing food and oxygen) to keep the specimens alive for examination in the laboratory
- all other material in the bucket was returned to the site of collection

In the laboratory all specimens of *S. nitida* were counted and the maximum diameter measured and recorded. Other species of mollusc were counted and added to the field data sheet. All specimens were then returned alive to the site.

It is important, if animals are to be kept alive, that only as many samples are taken that can be examined on the same day. I therefore restricted sampling to the mornings, material was measured in the afternoon and evening, placed in a refrigerator overnight and returned to the site the following morning when further samples were taken. As a result of using this technique, I was able to carry out 13 monthly samples of *S. nitida* from the 26 sites along the ditch without depleting the population at all. In the case of *S. nitida*, and the other species of gastropod mollusc, recognition in the field, even of juveniles, is easy and the species is tolerant of being out of water for short periods of time to enable measurements to be taken. At the same time, any dead shells found were collected and an estimate made of the most vulnerable age at which death occurs.

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REFERENCE

Anderson, M., Duff, A.G., Hill-Cottingham, M.P., 1991. *Survey of Aquatic Invertebrates on the Avon Levels and Moors*, unpub report, English Nature.