CONSERVATION OF A RARE SNAIL *SEGMENTINA NITIDA* SHINING RAM'S-HORN: PROBLEMS AND POSSIBLE SOLUTIONS

PAT HILL-COTTINGHAM

Abstract

A study of the life cycle and ecological requirements of *Segmentina nitida* on Catcott Moor has highlighted the problems of providing a suitable habitat for this endangered species. Suggestions are made for providing the type of late succession ditch required for its survival.

DITCH STRUCTURE, VEGETATION AND SHADING

There has been increasing awareness in more recent years of the problems associated with late succession fauna, especially the length of time involved (up to ten years), in contrast to plant succession which can pass through its stages in 2–3 years. The Nature Conservancy Council (NCC now English Nature) in its report (Newbold *et al.* 1989) on the management of drainage channels deals almost exclusively with plant species, and the management techniques recommended to maintain open water and water flow are certainly not sympathetic to late succession animal species, especially the rare snails requiring a high level of vegetation within the water body.

In Somerset, this attitude has changed in recent years, especially following the results of a survey of ditches selected for a range of management history rather than plant diversity as has happened in previous surveys (Hill-Cottingham and Smith, 1997). It was shown that longer intervals between cleaning activities of ditches results in greater faunal diversity. For example, a regularly cleaned ditch yielded just 15 target species, in contrast with an open mature ditch which had 24. It was also shown that over-shading by trees reduced the numbers of faunal species although it did have the advantage of reducing the growth of surface duckweeds and hence favouring the presence of pond skaters and other surface dwellers. Taking cognisance of the long aquatic stages in many insect life cycles, which could be 3–4 years for some Odonata and Trichoptera, intervals between ditch cleaning should be 7–8 years minimum. This would also benefit the late succession mollusc species. As a result of surveying on the Pevensey Levels, East Sussex, Hingley (1979) advocates at least 5 years but does not take into account the more demanding mollusc species such as *Anisus vorticulus* and *Segmentina nitida*. Hingley did, however, demonstrate the longer length of time required for species such as *A. vorticulus* to recolonise cleaned ditches. Killeen (1998) suggests that, because species such as *Segmentina nitida* only become abundant in late succession ditches, too regular cleaning could cause them to disappear. This could be an explanation of more fossil sites than modern ones in Somerset (Eales pers comm).

Over-shading by trees, with concomitant leaf fall, can give rise to eutrophication, especially if there is insufficient light to maintain submerged macrophytes. Boycott (1936) suggested that light levels may be important in increasing snail activity. He observed that:

> snails enjoy sunshine and are more active in it both in aquaria and in the field, and their response is so immediate that it must be to the light rather than the warmth.

S. nitida can be kept alive and breeding on a window-sill in small aquaria for months if kept

topped up with ditch water and a plentiful supply of *Lemna trisulca* Ivy-leaved Duckweed. Under such conditions, the duckweed grows and there is no intra-specific competition for food.

Costil and Clement (1996) also emphasise the importance of abundant submerged plant growth to molluscs which, as they state, provides well-oxygenated water, attachment and hiding locations, and grazing surfaces on the plants themselves or epiphytic microscopic algae.

Jackson and Howlett (1997) of the Waveney Marshes quote:

> Segmentina nitida was typically found in relatively shallow dykes with extensive emergent vegetation … and which were generally in an advanced stage of succession … .

The presence of these essential plants determines the type and frequency of ditch cleaning. Willing and Killeen (1999) advocate several strategies: never cleaning the whole ditch at any one time; cleaning ditches from one side only and then only to the centre; clearing ditches in stages with occasional stretches left untouched until the following season; and leaving occasional ditch spurs and side sections untouched for much longer periods of time than the main ditches. It seems that the way in which a ditch is treated is more important than the actual time interval between cleaning. This is borne out by the survey of ditches on an organic farm on the Avon Levels (Hill-Cottingham and Smith 1997) which not only had species which were absent from other ditches but which were also cleaned very sympathetically with no large-scale use of Hymac buckets.

As demonstrated in so many surveys, the importance of *L. trisulca* to gastropods seems paramount. Boycott (1936) pointed out the unfavourable condition produced by surface duckweeds and Hingley (1979) demonstrated the higher mean number of gastropod species in ditches containing *L. trisulca*, compared with the lower mean in ditches dominated by surface duckweeds *L. minor* and *Spirodela polyrhiza*. Certainly, previous work on Somerset ditches (Hill-Cottingham and Smith 1996; 1997) has emphasised the presence of *L. trisulca* as an indicator of faunal diversity.

CONSERVATION REQUIREMENTS ON THE CATCOTT MOOR SITE

Segmentina nitida is found in only one ditch in Somerset and is therefore especially vulnerable. It requires late succession ditches, highly vegetated with emergent stems and with little disturbance (Fig. 1; Hill-Cottingham 2004). On Catcott North Reserve (Somerset Wildlife Trust) this has been achieved by assigning different management strategies to internal and boundary ditches. The latter have to be stock-proof and kept open to allow inflow and outflow of water flushing through accumulated minerals, and therefore require regular cleaning. In addition, the growth of trees and scrub has to be kept to a minimum to allow access by machinery as well as to reduce over-shading. The suggested time interval for cleaning these boundary ditches is 3–4 years (Cousins 1997).

Fig. 1 *Segmentina* ditch showing the highly vegetated state of a late succession ditch

Although the grazing of the meadows is let out to neighbouring farmers in late summer, internal ditches do not necessarily have to be stock-proof in themselves, temporary electric fencing can be used instead. These ditches can therefore be left to vegetate up to late successional stages. However, more suitable ditches are required on the Reserve to ensure survival of *S. nitida.*

PRACTICAL OPTIONS FOR MANAGEMENT FOR CONSERVATION ON CATCOTT NORTH RESERVE

Ditches will always present a management problem with vegetation growth in the water and on the banks including willow and alder growth. Throughout a single year there is an inevitable increase in organic detritus, and succession on the Somerset Levels has a climax of alder-willow carr (Storer 1985). It is therefore all the more important that the ecology of species is known in order to tailor management to those targeted for conservation.

At present, *S. nitida* is in only one ditch, making it vulnerable to adverse environmental changes; however, it is questionable whether it is possible to mitigate against the effects of climate disruption. Meanwhile, the most practical solution is to extend its range by increasing the number of suitable interconnecting ditches.

Over the last decade the surrounding meadows have shown an increase in rush growth, mainly *Juncus subnodulosus*. A decision was taken to put in guttering (locally known as gips) across the fields either side of the north–south running *Segmentina* ditch at right angles to it, draining surface water off the meadow and discouraging rush growth.. This guttering has provided limited wet and boggy conditions throughout the year, with standing water in the winter, and would probably suit the snail's tolerance to a certain amount of drying-out whilst benefiting the fen plants in the surrounding fields. *S. nitida* has been shown to inhabit such gutters (Jackson and Howlett 1997):

> Very high numbers of *Segmentina nitida* were found in a few 'dykes' which were little more than shallow depressions running across the fields between the main dykes. These depressions … were almost completely grown over by floating grass mats which had masked any standing water.

Plans are now in hand to construct an east–west running ditch which would be allowed to vegetate without disturbance and provide a suitable habitat into which the snail can spread into two further north–south ditches. This will provide a network of four interconnecting ditches with a single inflow pipe with flap valve linking the system to a boundary ditch, enabling their isolation in the event of an adverse environmental event as well as allowing mowing machinery to move around the perimeter. Trees have now been removed from these ditches and the four ditches will be kept free of over-shading to allow light penetration for submerged macrophytes, but which will be allowed to vegetate to a late stage in succession.

In contrast, the boundary ditches, three of which lie alongside droves, are kept open to allow inflow and outflow of water on the reserve and act as wet fences. These ditches have a degree of over-shading from the high canopy trees, Aspen, Alder and willows (mainly Grey Willow) and shrubs such as Guelder Rose and Elder. The trees provide an essential habitat within the mosaic, in particular acting as protective windbreaks from the prevailing westerlies and reducing evaporation from the peat surface but also in providing shelter and feeding stations for other species, both invertebrate and vertebrate. Flocks of Long-tailed Tits are daily seen working along the tree-lined verges for food. However, if trees are removed from drove sides adjacent to the reserve ditches only, both objectives – maintenance of the tree habitat and unshaded ditches – would be achieved.

One concern is that it will take a minimum of 7–8 years for the new connecting ditch to reach late succession. Only at that stage can the final connection be made with the *Segmentina* ditch, allowing spread of the snail into the new ditch network. Meanwhile, the *Segmentina* ditch has to be maintained at its present successional stage which demands an urgent answer to the question – how much of the existing emergent vegetation can be removed without disturbing the snail population?

CONSERVATION ELSEWHERE ON THE SOMERSET MOORS

It is a widely held view that a nature reserve should not be managed solely in consideration of the benefit to a single species (Sheppard 1996). However, in the case of *S. nitida*, it has been shown that the conservation of other species of mollusc is also achieved by allowing late succession ditches to develop (Hill-Cottingham 2004).

Particular problems arise with species requiring conditions not necessarily concomitant with local farming needs. *S. nitida* is an example of this. The habitat requirements of *S. nitida*, viz. late succession ditch, presence of *L. trisulca*, highly vegetated ditch with emergents and minimum disturbance, mean that the majority of the ditches on intensively farmed land on the Somerset Levels and Moors are not suitable for transferred populations. However, in areas under English Nature (EN), Royal Society for the

Protection of Birds (RSPB) or SWT management, or where there is the more traditional and organic farming, there is far more scope for techniques based on suites of animal species and not just plants.

It seems an inevitable conclusion that dedicated sites need to be set aside for this and other late succession species and this will require collaboration between national bodies such as English Nature, the Environment Agency as well as the SWT, the Somerset Private Nature Reserves (PNR) network, farmers and other land owners especially those of County Wildlife Sites (CWS).

With any conservation or management strategy, knowledge of species and their requirements are vital and this basic knowledge is often piecemeal or even lacking altogether. It is clear that factors defining change with time are as significant as those defining distribution.

FORECASTS

The current view on nature conservation generally is that large areas should be established for nature conservation rather than small isolated pockets of reserves in Sites of Special Scientific Interest (SSSIs) or even CWSs (English Nature 1999). Large areas permit movement and spread of species, allowing for local environmental changes, and provide an increase in the availability of habitat for territorial species, as long as such habitats are available. Ditches are linear habitats and may provide wildlife corridors (Cordrey 1996). They therefore perform the same function as hedgerows in allowing the spread of species. With a total waterway length of 6902km in Somerset, including rivers and tufa streams as well as ditches, the county has a wonderful potential for aquatic wildlife. It is inevitable that collaboration between landowners with regard to the management of large areas will involve a certain amount of legislation and control if it is to succeed, and this may well involve changes in attitudes that could be difficult to achieve. However, even with willing landowners, it is doubtful whether the number of suitable ditches for spread of the species is available at present. A report on the effectiveness of ditch management on Environmentally Sensitive Areas (ESAs) (McLaren *et al*. 2002) states that on the Somerset Levels, out of a total of 760 ditches surveyed on sites ranging from 100 to 250ha on Stoke Moor, Curry Moor, North Moor, West Sedgemoor and Wet Moor, 'there were relatively few shallow, well vegetated/overgrown ditches in the case study sites'.

In addition, there are unknown factors, chief of which is global warming. We already have evidence of movement of invertebrates in response to weather changes, *Nemobius sylvestris* Wood Cricket and *Pseudomogoplistes squamiger* Scaly Cricket are two orthopterans (Anderson pers. comm.), *Aeshna mixta* Migrant Hawker is another (Hill-Cottingham and Smith 1996); all are spreading northwards and westwards. Another concern with climate change is changing patterns in rainfall, lately there has been a tendency for high levels of rainfall in late autumn followed by dry springs. This means that a high rate of evapo-transpiration results in a lowering of the water table before the summer pen level is established. Occult water is not sufficient to offset this loss. The vagaries of the weather have resulted in more floods on the Levels in recent years and the summer flood in August of 1997, alongside high temperatures, resulted in an ecological 'blip', with high levels of eutrophication, on Curry and Hay Moors that took several months to recover. However, ditch fauna was back to 'normal' by June of the following year (Hill-Cottingham and Smith 1998). In spite of this apparent recovery, it is likely that regular recurrence of such events could result in permanent damage to the wildlife.

If global climate change continues as at present, it could well be that a major area of the Somerset Levels and Moors reverts to a marine environment, in which case management of freshwater invertebrates in Somerset's ditches could become a distant dream. Until that happens; however, it is the duty of all conservationists to protect the species typical of Somerset's local wetland.

REFERENCES

Boycott, A. E., 1936. 'The habitats of freshwater Mollusca in Britain', *J Anim Ecol* 5, 116–86.

Cordrey, L. (ed.), 1996. *The biodiversity of the South-West an audit of the South-West biological resource*, RSPB and SW County Wildlife Trusts.

Costil, K., and Clement, B., 1996. 'Relationships between freshwater gastropods and plant communities reflecting various trophic levels', *Hydrobiologia* 321, 7–16.

Cousins, M., 1997. *Catcott North Reserve Management Plan 1997–2001,* Somerset Wildlife Trust.

English Nature 1999. *Natural Areas in the South West Region,* English Nature.

Hill-Cottingham, P., 2004. *The ecology of the Shining Ram's-horn Snail Segmentina nitida (Müller) 1774 on Catcott North Reserve (part of a SSSI on the Somerset Levels and Moors) to determine strategies for its conservation*, unpub PhD thesis, Open University.

_____ , and Smith, A.G., 1996. *Somerset Levels and Moors Aquatic Invertebrate Survey*, unpublished Environment Agency report.

_____ , 1997. *Avon Levels and Moors Ditch Invertebrates Survey*, unpub English Nature report.

_____ , 1998. *The effect of summer flooding on Curry and Hay Moors*, unpub English Nature report.

Hingley, M.R., 1979. 'The colonisation of newly-dredged drainage channels on the Pevensey levels (East Sussex), with special reference to gastropods', *J. Conch Lond* 29, 319–23.

Jackson, M.J., and Howlett, D,J., 1997. *Freshwater Molluscs of the River Waveney Grazing Marshes*, unpub English Nature report.

Killeen, I. J., 1998. 'Can freshwater molluscs be used as bio-indicators for ditch management?', in *Molluscan Conservation. A Strategy for the 21st Century: Abstracts, Conchological Society of Great Britain and Ireland Conference report.*

McLaren, R., Riding, A., and Lyons-Visser, H., 2002. *The Effectiveness of Ditch Management for Wildlife in the Broads and Somerset Levels and Moors ESAs*, ADAS Report to the Department for Environment Food and Rural Affairs.

Newbold, C., Honno, J., and Buckley, K., 1989. *Nature conservation and the management of drainage channels*, Nature Conservancy Council.

Sheppard, D. A., 1996. 'Managing Habitats for Single Species Conservation', in *Environmental Monitoring, surveillance and conservation using Invertebrates*, EMS Publications.

Storer, B., 1985. *The Natural History of the Somerset Levels*, Dovecote Press.

Willing, M. J., and Killeen, I. J., 1999. '*Anisus vorticulus* – a rare and threatened water snail', *British Wildlife* 10, 412–18.