

THE NATTERJACK TOAD IN SCOTLAND

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The renowned Sir Joseph Banks, the 18/19th Century botanist, who was President of the Royal Society for 41 years, stated that he was told by his Mother that “the toad is actually a harmless animal; and to whose manner of life man is certainly under some obligation as its food is chiefly those insects which devour our crops and annoy him in various ways.”

The inoffensive and beneficial habits of toads, due to the huge numbers of pest species they consume, is a significant plus for their conservation.

SUMMARY

The Scots Solway Natterjack populations are shown to be highly important in UK numerical terms. With *implementation* of existing protective legislation (absent from inland sites until now – resulting in the loss of all previously recorded inland sites) and scientific management, the population in this discrete area can equal the recent numerical estimates of numbers for ALL the English sites. Hence its future managed conservation is vital in UK Natterjack terms. Five, previously unrecorded, inland sites are described.

INTRODUCTION

This paper describes work which I carried out on the Natterjack (*Bufo calamita*) on the Scots Solway in Spring/early Summer 1998. The study is continuing but since the conservation implications of the findings and of work in progress are far-reaching it was decided to publish this account now. This work deals with what anyone could accomplish in their local area in *part of a single season* and forms section 2 of the present paper. It underlines the crucial importance for the Society of having people *active* in the field in their local area. These people will often require support, and indeed members have said to me that they needed access to information on topics that they did not know about. I would hope that a revamped and reactivated *Conservation Committee (BHSCC)* would provide this support nationally.

I was hampered by the Natterjack occurring on the opposite side of the country from where I live in East Perthshire, necessitating a car journey of some two and a half to three hours each way to reach the habitat, and the obvious need to stay away from home overnight when carrying out field work. Operating at this distance adds to the ‘costs’ of the work. If you are able to select a study site within normal commuting distance of your own home there are obviously great advantages.

There was interest in the former Nature Conservancy in the Natterjack in Scotland over a long timespan. I remember contacting the Warden at Caerlaverock about a visit prior to leaving for Australia in 1962. The then Warden, M.J. Boyd, wrote an internal document (1972) dealing with distribution and breeding. Although it dealt primarily with the area known as Caerlaverock National Nature Reserve it included the western one third of

Priestside in the area of known breeding sites. All the sites described were coastal. The known habitat of the Natterjack in Scotland extends from Southerness (Gillfoot Bay) in Kirkcudbright in the west, eastwards through Caerlaverock, Priestside with the Powfoot at its eastern end, to Royal Ordnance only a small distance further east.

The Species Action Programme (undated, but issued at the recorders' meeting on 29th April 1998) refers to the four Scots colonies listed above. With the exception of that at Royal Ordnance – a rare heathland site (one of only three remaining Natterjack heathland sites in Britain) – all are merse-related.

The SAP goes on to state:

“It is unlikely that there are any other populations remaining to be discovered in Scotland.”

This does not agree with the findings of my limited work during 1998 in the course of which I discovered **five new colonies**. All of these were on inland, agricultural sites – the very type of site reported to have been destroyed in the publications referred to in section 4 – hence highly threatened.

The SAP states that the [then] four known colonies on the Scots Solway “are estimated to account for between 11 and 23% of the total UK population of 15,000 animals” (Banks *et al.* 1994). The population targets set out in the SAP are unrealistic – as must be the case in the absence of any population studies. For instance the **target** is 700 adults for the whole of Priestside, a linear length of 6km of merse. This year I started a population study on a 240m length of Powfoot Bay at the eastern end of this strip of merse. This strip alone, reported not to be the richest for Natterjacks in this part of Priestside, has a 1998 population estimate of 529 adults based on mark-recapture data from my individually recognisable population (Bustard, in prepn.). Of course this 6km length of merse is not uniform, but for illustrative purposes, if a similar population density was found to occur *on average*, or could be built up, along Priestside, then the **adult natterjack** population of Priestside would be 13,225 toads! This is a comparable figure to that of Banks *et al.* (1994) of 15,000 for the whole of the U.K. including Scotland, and is only slightly smaller than the U.K. estimate of 15,000-20,000 given by Beebee and Denton (1996). While no data exist to even guesstimate the size of the Priestside population at the present time, I have no doubt, that with fairly minimal management, such a population if not present, is achievable. This figure does not take into account the populations that occur at Southerness, where the potential for recovery is enormous, Caerlaverock (a very important population) or Royal Ordnance, a site of potentially very great significance. Nor does it take into account the recently discovered inland breeding populations. Their significance – if they can be properly protected – is to extend the Natterjack in substantial numbers much further inland than the merse-related populations are likely to reach in the course of normal foraging activities, hence opening up large new habitat areas for colonisation. The *potential* for the solway meta-populations is enormous provided the legal protection afforded the species is actually implemented by the statutory authority.

Properly managed, therefore, the Scots Solway can sustain populations greatly in excess of Banks *et al.*'s (1994) and Beebee and Denton's (1996) total UK population estimates. Clearly, therefore, this is a site of *national* importance, the highlighting of which is the key conservation contribution of this paper.

MY INVOLVEMENT

John Buckley is due credit for my involvement in Natterjack Toads. He saw that Frank Bowles and I were invited to the Scottish Heritage Natterjack Toad Recorders' Meeting held at Dumfries on 29th April 1998. I said to him well in advance that if I was to play a useful role at the meeting I needed to see the situation in the field beforehand. John, it turned out, had planned a monitoring visit around the meeting so Frank and I were able to spend three days in his company during which we visited virtually all the known Scots Natterjack habitat with John as guide/instructor.

The SAP for the Natterjack was presented at the 29th April meeting. In the discussion of this and what needed to be done for Natterjack Toad conservation in Scotland, it became apparent that there was an urgent need for hard data and hence an important role for my professional skills as a population ecologist. I agreed, at the meeting, to become involved in census work if permits could be granted to enable me to start work more or less immediately to make full use of the 1998 breeding season then already underway. The SNH Area Officer, Chris Miles, played a key role here, and I was issued with a permit within days.

I chose as my study area a very fragile population, in the sense that its habitat was very restricted and highly threatened by human activities. This is at Powfoot (Queensberry Bay) on the merse between Annan and Cummertrees. We had visited that area with John Buckley both by day and in late evening after the northern darkness had fallen. As it happened the count we made on 28th April, the evening before the meeting, of 139 toads, including three pairs in amplexus, was the largest count I have made this season (Bustard 1998, a). This may reflect the way breeding has unfolded this year due to subsequent cold and/or dry periods, but on some evenings may have been a result of my inability, due to the time taken to record toads individually, to cover the whole breeding area in the time available. The toads do not emerge from cover until late dusk and then only spend some two hours at the breeding pools before returning to their homesites. I do not know if this short period is normal or reflected rapidly falling temperatures after nightfall.

I had hoped to be able to mark toads for subsequent recapture to enable population size to be estimated. I do not believe in toe clipping amphibians nor using plastic waist bands on anurans. Nor do I like the idea of inserting transponders which represent to toads the equivalent of inserting a sizeable battery pack into a human. Both these activities have a 'cost' in ecological terms. A cost which is unknown especially in relation to possible changes in behaviour over the shorter term when most recaptures need to be made during population size estimations. While I was investigating possible methods which I approved of, Bill Wales, BHS Chairman, suggested that I affix small markers with biological glue. So that they would be water resistant I decided to use 1mm circles punched out from waxed milk cartons.

The use of this technique on Natterjacks in my study area was not approved by SNH. This has resulted in my doing a trial run using the nearest toad then available – *Bufo pardalis*. The results of these trials will be published in due course. It also necessitated my developing a visual identification method that could be used to identify toads *individually* to enable the 1998 work programme to proceed. I discussed visual recognition features with Trevor Beebe who thought that throat patterns of females would allow individual recognition of small numbers – perhaps up to 25 females – but that the method would not work on males due to the dark reddish-brown colour of the throat in breeding males.

I started by looking at the dorsal yellow stripe and decided that by using that in combination with the throat markings it should be possible to identify every toad individually. This technique will be published elsewhere. It comprises a quick *diagnostic drawing* of BOTH the stripe and the throat pattern. Blanks, the original kindly provided by John Buckley, are run off in advance so that the stripe can be placed in relation to the eyes, parotids, etc and the throat markings in relation to the lower jaw. The key thing is that this method has worked 100% at Powfoot in 1998 on a marked population estimated at 529 adult toads.

The two techniques – affixing dots and drawing the stripe/throat – are not mutually exclusive. The dot technique involves minimum disturbance to the toad, compared to the other commonly used techniques mentioned above, as the biological glue dries instantly. The dot is short-lived – being lost at the next moult – but a large number of toads could be marked in an evening and the population resampled the next night. The toads do not need to be touched at recapture – one merely records the number of marked and unmarked toads and hence arrives at a population estimate for the number of male toads at that breeding pond *at that particular time*. A further advantage of this technique is that it can be quickly ‘exported’ to other toad workers in the area and requires no special skills. It is also most inexpensive.

The drawing technique, on the other hand, is a **permanent** record and of an **individual toad**. These are big plus points. The disadvantage is that some skill in drawing and a good eye to be able to confidently and quickly record the diagnostic features are necessary, so the technique is not so readily exportable to other workers. Furthermore, since it is clearly impracticable to carry books of drawings into the field at night (especially on the treacherous Scottish *merse*), the toads have to be redrawn at each further sighting and the numerous drawings that accumulate subsequently compared in order to detect matches.

Individual recognition has many advantages, of course, in that it allows one to work on topics such as survival and movement of individual toads. So I am glad that I have tested the technique and found that it works effectively on the Natterjack.

In the course of the work at Powfoot described above, in ‘spare time’, I have talked extensively to local people and followed up reported breeding ponds. In the course of searching for one such pond two other important areas being used by breeding populations of Natterjacks have been discovered. Indeed, I have recorded a total of five new breeding populations. These have been reported regularly in the *Natter Jack*. A portion of the breeding pool of the first of these is shown in Plate 3. Since the whole field has been ploughed up, no terrestrial habitat remained for the toads, making them extremely vulnerable to predation. This photograph was taken on 13th May 1998, long after the breeding season had commenced. As I pointed out at the time (Bustard, 1998b), “Such treatment of a site is a recipe for population extinction – which is, of course, precisely why such sites are meant to be fully protected”.

Frank and I listened to this population calling after dark on both the evenings of 12th and 13th May, and by the volume of sound on both evenings, It was clear that we were dealing with an important population. To quote from Bustard (1998b) “Ploughing the field had attracted large numbers of herring gulls, lesser black-backed gulls and crows, all voracious feeders and serious potential predators of the toads”. These birds are all able to disembowel the toads thus avoiding problems with the toxic skin. This site still held water in late Summer.



Plate 1: The narrow habitat strip at Powfoot with traditional cottages behind the dune bank



Plate 2: Two small breeding pools (on opposite sides of the plate) on Powfoot merse



Plate 3: A very threatened inland breeding site on arable land near Cummetress showing ploughing into the pool and absence of any terrestrial habitat



Plate 4: Debris lifted to show natterjack in sealed chamber (Southernness). The toads close the entrance when 'at home'

The second site is a roughly circular, man-made, stock pond (Bustard 1998c) located in a field currently under grass at Cummertrees village at an elevation of 15m. I wrote, "Frank Bowles and I heard substantial Natterjack calling at this site after nightfall on two nights in mid-May. Furthermore, several local residents confirmed that they regularly heard the toads calling after they went to bed this is clearly a well-established breeding pond well known to the local people but one that has never been recorded. This pond requires management. It is too deep, and is a permanent pond extensively used by Common Toads judging by the numbers of all age classes seen in the vicinity. However, successful Natterjack breeding appears to have occurred in 1997, as during a joint search with me, John Buckley discovered a 1997 toad in a sandy area adjacent to this pond in July 1998 (Bustard, in press, a). By the time this paper appears management of sites 1 and 2 will have been discussed in a tripartite meeting between BHS (represented by Frank and myself), SNH, and the tenant farmer.

The third new site and potentially the most exciting (Bustard, 1998d), is a large water-meadow covering about one-third of the depth of a sizeable field and approximately two-thirds of its breadth (this in mid-May 1998). Large numbers of toads were calling both from the main water area, and also from 'satellite' pools across the breadth of the field at the time we discovered the site in mid-May. Unfortunately, the next day we found a sluice mechanism to drain the field into an adjoining ditch. Despite this drainage, the site appears to have produced many metamorphs in 1997 (Bustard, 1998e; in press, b). If drainage can be stopped this water meadow could become a key breeding site in the local **meta-population**. Details of two further sites are given in Bustard (in press, c; in press, d).

These discoveries have perhaps been the aspect of this year's work which has most fired conservation interest, in that these five breeding areas are all away from the merse – up to distances of 1200m and elevations of 15m. The generally accepted view appears to have been that the toads were tied to the merse and the sand (bank) immediately behind the merse.

Discovery of these inland populations is of great conservation significance as the merse is in retreat at the present time due to massive erosion. Indeed its depth has been halved in less than half the lifetime of local farmers. The fact that breeding is also taking place away from the merse provides safeguards in the event that the remaining merse is progressively lost. It also provides key continuity of populations. The area in which I directed most searching effort over the 1998 breeding season was around Cummertrees. Inland breeding ponds are about 350m apart varying from about this distance to 1200m inland from the merse. Their distribution means that they all constitute at least potentially inter-breeding populations. Decimation of habitat in southern England has resulted in the fragmentation of many Natterjack populations and it is isolated mini-populations which are most liable to extinction. Hence this discovery of these contiguous breeding or meta-populations on arable land, when taken together with the known populations on the merse, is a very significant discovery in Natterjack conservation ecology *on a UK-wide basis*. It is not that inland breeding sites are a-typical (Bustard 1998f; Buckley 1998) but that most such sites have long gone and it had been assumed that they were confined to the dune/saltmarsh (merse) habitat.

Conservation action has to try to ensure that these contiguous populations including newly discovered inland populations on arable land are protected as it is the combination of these and merse sites that will provide the best long-term future for the Natterjack.

Actions that the *Society* can take in order to try to achieve this ideal goal are considered in section 5.



Plate 5: Detail of a merse breeding pool at Powfoot. The shallow pools are typically 10-15cm deep and usually measure only 2-3m x 1-2m



Plate 6: Eleven of eighteen 1997 juveniles located under one stone at Moss-side farm, an *excellent* site on Priestside merse

KEY SITES

Key sites include Caerlaverock, under excellent protection as a National Nature Reserve/Wetland & Wildfowl Trust Reserve; Southerness to the extreme west of the *recorded* distribution where the population needs every help it can get (see 5 below); the merse along Priestside to Powfoot; and the Royal Ordnance heathland site. This site last came on the market several years ago and had we known that SWT (Scottish Wildlife Trust) was not to purchase it we would have purchased this key site for all time.

The other sites are the five that I discovered this year in the Cummertrees area, described above. It is also most probable that further inland sites remain to be discovered. The 1998 searches concentrated in a single area. A new – *workable* – mechanism will have to be put in place to properly protect sites on agricultural land (see 5 below).

LOSS OF ALL PREVIOUSLY-KNOWN BREEDING SITES ON ARABLE LAND

When I started my work in May 1998 all recorded sites were on the coastal salt marsh (known locally as merse). All subsequent inland sites that came to my notice as I did a literature search were describing their loss. These are set out in summary form below. They make distressing reading in that all inland sites on arable land were lost. Bridson (1976) provides early information on the progressive loss of breeding sites on farmland close to Caerlaverock due to incompatible agricultural activities. The *BHSCC* Report, combined 1989 and 1990 (Anon, 1991) states:

“In the latter county (Dumfriesshire) two important saltmarsh breeding ponds were drained although negotiations are underway with the owners to provide replacement ponds. Another group of pools in a sandy field at Powillimont were completely destroyed when the owner *ploughed and reseeded the site* (my italics). Damage to another pool by a farmer was reported to the NCC in August 1990” [I have corrected misspellings],

It should be noted that all these pond losses occurred in this small area in the timespan of the *BHSCC* 1989 and 1990 report.

Vin Fleming, a senior Scottish Natural Heritage staff member, formerly stationed in SW Scotland, has taken a keen interest in Natterjacks and their conservation. It is greatly disturbing, therefore, that he wrote in our *Herpetological Journal* (Fleming *et al.*, (1996) of, ‘*continuing loss and attrition of breeding ponds*’ and

‘*Of greatest concern, perhaps, is that these losses have continued, and indeed accelerated, into the present decade, despite legal protection given to the Natterjacks, and elements of their habitat, since 1975.*’

This paper, above all others, indicates that all is very far from well with Natterjack conservation as it has been practiced on the small Solway area where this toad still exists in Scotland. It is obvious that there has been long-term failure by the statutory authority charged with implementing the legal protection afforded to the Natterjack by Parliament.

In the SAP for the Natterjack Scottish Natural Heritage, writing about Southerness Natterjacks – the most threatened colony on the Scots Solway – stated:

“Numbers have continued to decline with the loss in 1989 of unprotected breeding pools at Powillimont.”

It is very hard to understand how these key breeding pools at the extreme western part of the range could have been “unprotected”. I have written “key” as the terrestrial habitat at Southernness (Gilfoot Bay) has virtually all been lost to a gigantic caravan city complete with all amenities on site. John Buckley has – as always – been most helpful in rediscovering with me the two Powillimont ponds. In our opinion these could easily be reinstated. Equally significant is that John showed me three other ponds at Southernness all of which could also be reinstated. Two are just outside the caravan site, and the third is in the ‘village green’ area, where the caravan site could have a unique breeding site and give themselves very positive conservation publicity. Southernness is a considerable distance from my centre of activities, and ‘servicing’ this from Perthshire I do not think it possible that I can do this site justice. Accordingly I have advertised in the *Scottish Herpetologist* (the *BHS* Scottish Group publication) for people interested in adopting this site. If such people do not come forward then this would be an excellent area for our sister organisation *Herpetological Conservation Trust (HCT)* to carry out complementary work to what I have been doing to the east. We badly need these five ponds reinstated and this whole small area managed on a regular basis for the toads. Priority should be given to the Powillimont ponds.

SNH have advised me that the Natterjack enjoys all legal protection necessary for its conservation. In view of this, the failure to use this legislation effectively is extremely disturbing. The loss of these five ponds at what is the most threatened Scots population is dreadful. This is a subject which I will be discussing with Vin Fleming and his staff in Edinburgh on behalf of the Society in early September.

WHAT THE *BHS* CAN DO

- 1) Highlight the problems.
- 2) Carry out population studies to show the significance of key threatened populations (e.g. Powfoot) and provide hard data on abundance.
- 3) Enter into management agreements with landowners.
- 4) Try to have key sites reinstated (this would often be easy with minor work due to the nature of Natterjack breeding sites).
- 5) Lease land to fully protect threatened inland sites.
- 6) Buy land – by the time you read this paper the *Society* will hold an option to purchase a farm in Dumfriesshire which has the potential to double the total Scottish Natterjack population of 2250 adults set out in the SAP.

All five of these activities are being strenuously pursued at present.

The *BHS* has suffered in Scotland, as elsewhere, by not being active over most of Britain. This is a situation that I am working to improve.

The failure of the *Conservation Committee* to live up to its *national* remit gives cause for concern. There is much more work to be done that ALL the existing conservation groupings can cope with. The situation described in this paper amply confirms this, and more importantly underlines the need for **local involvement on a continuing basis**. It is totally inadequate for even an outstanding field worker such as John Buckley to make occasional visits to such a site. *There has to be local people involved in a continuing dialogue to achieve and maintain conservation objectives.*

FUNDING FOR THIS WORK

The *BHS* has a land fund which is divided into two – money which may be spent to acquire reserves, and money invested, the income from which may be used for paying annual leases for land. Unfortunately, the land fund, once very active, appears to have lost impetus. When I raised the question of land purchase I was told that it was most unlikely that land would be available to purchase. In my short time working in SW Scotland I have found that land is fairly readily available. The need, therefore, is to raise the funds to acquire it. **There is no substitute for land ownership.**

The late Sir Peter Scott of Slimbridge Wildfowl Trust (and its other more recent derivatives) was extremely helpful to me when I was a youngster and he impressed on me then the importance in a country such as ours of **actual land ownership or achieving the same effect by very long leases**. One has to be persistent, patient and persuasive but if one is, a tremendous amount can be done for conservation. Substantial land ownership also raises one's profile enormously which is exactly what the *BHS* needs right now – nationwide.

If even a part of these plans are successfully brought to fruition – and I am hopeful, as I write in late August, that they ALL will be – then the NATTERJACK, from being a neglected member of the Scots fauna, can become a significant conservation icon and the implications of the work will have a large UK-wide effect. Opportunities for the *BHS* to benefit from this are as enormous as they are obvious.

ACKNOWLEDGEMENTS

The Scots Natterjacks owe a debt of gratitude to those who helped me in the field. John Buckley not only took both Frank and I round the then known sites but dealt with all my many subsequent queries and his dedication to their conservation is inspiring. We have spent two visits to the Scots Solway together. Frank Bowles has likewise made two visits with me helping me at Powfoot and he was with me when several of the new inland sites were discovered. It has also fallen to Frank, as Conservation Officer of the Scots Group, of *BHS* to carry out the follow-up to try to ensure their conservation. At this he is excellent – and most tenacious. Colin Glendinning, whom I recently recruited as a new *BHS* member, kindly helped me at Powfoot one week-end, and Gwen Soutar – whom I have yet to recruit to the *Society* – helped on two occasions both at Powfoot and on night-time road searches. The work could not have been undertaken without the support of Chris Miles, the SNH area officer for Dumfriesshire, who got a licence issued to me in days to enable me to immediately commence the population work at Powfoot. I thank them all.

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