

The conservation status of *Lythrum hyssopifolia* L. in the British Isles

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ABSTRACT

Seven geographically distinct populations of *Lythrum hyssopifolia* L. (Lythraceae) currently exist in the British Isles, with the total population in mainland Britain recently numbering in the region of 600,000–700,000 individuals. Over 90% of this total occurs around a single lake in Gloucestershire. This site has only recently been colonized, and it seems the seed originated either from migratory waterfowl (Anatidae) from continental Europe or from corn fed to wintering birds. The distribution of the species does not seem to have altered significantly in the British Isles during the present century. At present, the conservation status of six of the populations seems favourable, although measures are proposed at three of these in order to improve the situation. The only population in immediate danger is in Oxfordshire, where habitat management to halt succession is urgently required if flowering plants are to continue to survive.

KEYWORDS: Exposed-mud, Lythraceae, habitat management, migratory birds, dispersal, winter flooding, protected areas.

INTRODUCTION

Grass-poly, *Lythrum hyssopifolia* L. (Lythraceae), is a characteristic component of the "exposed-mud" flora, and occurs on the northern limit of its European range in Britain (Webb 1968; Fitter 1978). The exposed-mud environment is created by winter flooding that subsides in the spring to reveal exposed-mud for the summer period, and is subsequently reflooded in the autumn. Typically, exposed-mud species germinate after the water-levels fall in the spring and complete their life-cycle by the autumn. The majority are therophytes, whilst others, potentially perennial and invariably hemicryptophytes, usually adopt the therophytic strategy when growing in this environment. The species exhibit, in varying degrees, significant specialization for the colonization of exposed-mud, and because they are adapted to such an ephemeral environment, they are intolerant of long-term competition (Salisbury 1968, 1970).

The exposed-mud habitat was once a common element of the British countryside but it has disappeared rapidly this century, mainly as a result of land drainage/fill operations, and lack of appropriate management resulting in succession (Salisbury 1970; Palmer & Newbold 1983). At present, ten native vascular plant species characteristic of this habitat are nationally rare, while a further five are scarce (see Table 1). Thus, the exposed-mud flora is clearly of special conservation concern. *L. hyssopifolia* is one of the rarest of these species and until recently was thought to be confined to just two sites in the British Isles, located in Cambridgeshire and Jersey (Preston & Whitehouse 1986). Owing to its rarity it is listed in the *British red data book* (Perring & Farrell 1983), and since 1988 it has been listed in Schedule 8 of *The wildlife & countryside act, 1981*, making it a criminal offence intentionally to pick, uproot or destroy plants of this species (HMSO 1981, 1988).

The aims of this paper are to: (i) review the current status of *L. hyssopifolia* in the British Isles, (ii) describe any action that has been taken to conserve current populations, and (iii) provide recommendations for future action.

Nomenclature of vascular plants follows Kent (1992) and abbreviations of herbaria follows Kent & Allen (1984).

TABLE 1. NATIONALLY RARE AND SCARCE NATIVE VASCULAR PLANT SPECIES CHARACTERISTIC OF THE EXPOSED-MUD FLORA IN THE BRITISH ISLES (AFTER SALISBURY 1970; STACE 1991; STEWART *ET AL.* 1994)

Rare species (≤ 15 10-km squares)	Scarce species (16–100 10-km squares)
<i>Corrigiola litoralis</i>	<i>Cicendia filiformis</i>
<i>Cyperus fuscus</i>	<i>Elatine hexandra</i>
<i>Damasonium alisma</i>	<i>Elatine hydropiper</i>
<i>Eleocharis parvula</i>	<i>Illecebrum verticillatum</i>
<i>Juncus pygmaeus</i>	<i>Limosella aquatica</i>
<i>Limosella australis</i>	
<i>Lythrum hyssopifolia</i>	
<i>Pulicaria vulgaris</i>	
<i>Ranunculus ophioglossifolius</i>	
<i>Rorippa islandica</i>	

METHODS

Botanists and conservationists local to all of the current *L. hyssopifolia* sites in the British Isles were contacted and questioned regarding the current status and conservation of the species, and site visits were made to three areas during 1993; in Cambridgeshire (five sub-populations), Gloucestershire (three sub-populations) and Oxfordshire. Censuses were conducted by counting individual plants, but if this was not feasible owing to the abundance of the species (i.e. at one sub-population in Gloucestershire and one in Cambridgeshire), figures were estimated by measuring the area occupied by a population, counting the number of individual plants in a sample of ten random quadrats (0.25 m^2) and multiplying the total count from these quadrats to correspond with the total area occupied by the species.

RESULTS

In 1993, *Lythrum hyssopifolia* was known to occur within seven 10-km squares in the British Isles¹, all of which were located in the south. The following account provides details of the status and conservation of the species within each of these areas, from west to east (see Fig. 1):

Area A (GR WV/6.5, v.c. S, Jersey). 0–10 m a.s.l. The species was rediscovered at Grouville Marsh (Jersey) in 1993 (F. Le Sueur in litt. 1995), following the records of 1839 and 1894 (Le Sueur 1984). The plant was found growing on muddy, open ground, that was created following the clearance of an area of *Salix* scrub. By the following year (1994), other marsh vegetation had colonized the area and *L. hyssopifolia* was excluded. However, during the same year it was found in another area of the marsh where there was more recent clearance of *Salix* scrub. Plants have not been counted at the marsh, but there was certainly in excess of 100 individuals in both 1993 and 1994. The area of the marsh where the plant has been recorded is owned and managed by the National Trust for Jersey (F. Le Sueur in litt. 1995).

Area B (GR WV/7.5, v.c. S, Jersey). 10–20 m a.s.l. In St Catherine's Bay (Jersey), the species is established on disturbed and seasonally flooded ground within an area that was previously quarried for granite. It was first recorded here in 1841 by W. W. Newbould, before quarrying activity began in 1847. At present, "a reasonable" population occurs here, although numbers fluctuate greatly from year to year. The area receives some conservation protection, but re-landscaping and succession are potential threats to parts of the population (Le Sueur 1984; F. Le Sueur in litt. 1993, 1995).

Area C (GR SO/7.0, v.c. 34, W. Gloucs.). 5 m a.s.l. Three sub-populations are established at The

¹ In 1989, *L. hyssopifolia* was recorded from a site close to Rosslare Harbour in Co. Wexford (v.c. H12) where it was probably alien (R. FitzGerald, pers. comm. 1995).

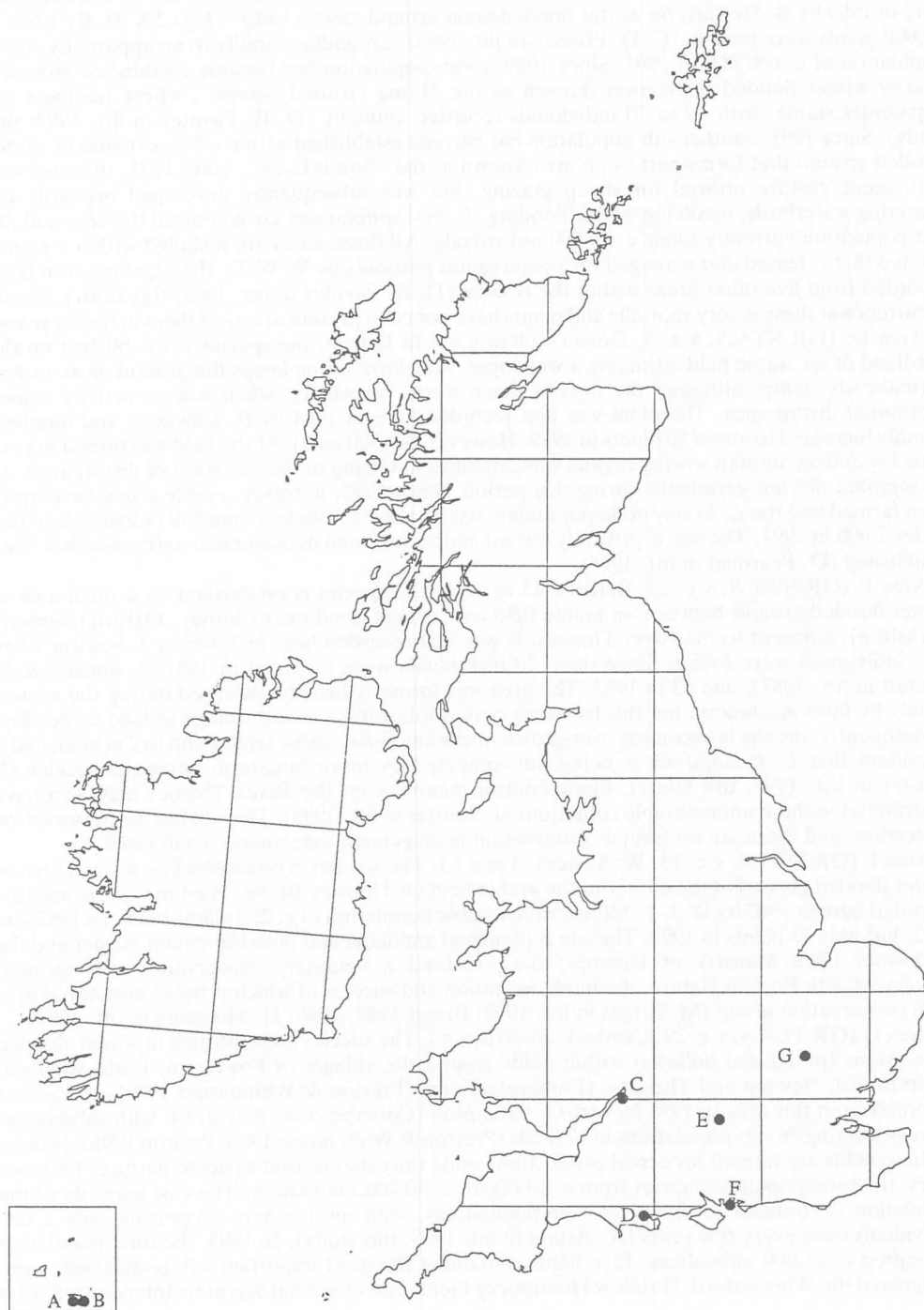


FIGURE 1. Current 10-km square distribution of *Lythrum hyssopifolia* in the British Isles (see text for details of each site, A–G).

Wildfowl & Wetlands Trust (W.W.T.) Slimbridge Reserve, Gloucestershire. It was first recorded here in 1985 by B. Stewart, on winter flooded areas around "Swan Lake" (Figs 2 & 3). By 1988, c. 30,000 plants were present (C. D. Preston in litt. 1993), expanding rapidly to an apparently stable population of c. 600,000 in 1993. Since 1989, a sub-population has become established around a nearby winter flooded depression, known as the "Long Ground Scrape", where numbers are apparently stable, with 10 to 70 individuals recorded annually (D. B. Paynter in litt. 1993; this study). Since 1991, another sub-population has become established within a 5 ha expanse of winter flooded ground that forms part of an area known as the "South Lake". Until 1991, this area was permanent pasture utilized for sheep grazing, but was subsequently developed primarily for wintering waterbirds, involving winter flooding. *L. hyssopifolia* quickly colonized the area and the sub-population currently totals c. 10,000 individuals. All three areas are included within a nature reserve that is leased and managed for conservation purposes by W.W.T. The plant has also been recorded from five other areas within the reserve (D. B. Paynter in litt. 1993; this study), but its occurrence at these is very sporadic and plants have not been present at any of them in recent years.

Area D. (GR SY/9.9, v.c. 9, Dorset). 60 m a.s.l. In Dorset, the species is established on the headland of an arable field adjoining a wet copse. A nearby spring keeps the ground more-or-less permanently damp, although the area is much wetter in winter, when tractor activity causes substantial disturbance. The plant was first recorded here in 1984 by B. Edwards, and numbers steadily increased to about 50 plants in 1989. However, in 1990 and 1991 the field was turned over to grass ley and an autumn sowing regime was established. Owing to the cessation of disturbance, *L. hyssopifolia* did not germinate during this period. Since 1992, however, arable crops have again been farmed and the *L. hyssopifolia* population has increased from less than 500 individuals to just under 2,000 in 1994. The site is privately owned and an informal management agreement has been established (D. Pearman in litt. 1995).

Area E (GR SU/6.8, v.c. 22, Berks.). 45 m a.s.l. The species is established on a small area of winter flooded ground between an arable field and a small pond near Cholsey, Oxford (formerly Berkshire), adjacent to the River Thames. It was first recorded here in 1986² by J. Souster when four individuals were found. Since then, 20 individuals were recorded in 1987 (J. Souster & S. Everett in litt. 1987), and 13 in 1993. The area was formerly heavily disturbed during the winter, mainly by farm machinery, but this has since ceased following a recent change in land ownership. Consequently, the site is becoming over-grown, including *Salix caprea* saplings up to 2 m high, and it is evident that *L. hyssopifolia* is being out-competed by more long-term perennial species (J. Souster in litt. 1993; this study). Flood-control measures on the River Thames may also have contributed to these unfavourable conditions (J. Souster in litt. 1995). The site has no conservation protection, and there are no formal conservation management agreements established.

Area F (GR SU/7.0, v.c. 13, W. Sussex). 3 m a.s.l. The species is established on a small area of winter flooded ground in the corner of the arable field on Thorney Island, West Sussex. It was first recorded here in 1987 by D. J. P. Miller, with a stable population of c. 250 plants between 1987 and 1992, but only 33 plants in 1993. The site is ploughed annually, and both the tenant farmer and the landowner (The Ministry of Defence) have entered a voluntary conservation management agreement with English Nature, the implementation and success of which is being monitored by a local conservation group (M. Briggs in litt. 1993; Briggs 1988, 1990; H. Matcham in litt. 1993).

Area G (GR TL/4.4, v.c. 29, Cambs.). 20–30 m a.s.l. The species is established in winter-flooded depressions (periglacial hollows) within fields around the villages of Fowlmere, Little Shelford, Whittlesford, Newton and Thriplow (Cambridgeshire) (Preston & Whitehouse 1986). It was first recorded from this area in 1958 by Mrs G. Crompton (Coombe *et al.* 1959 a, b), with subsequent surveys locating 36 sub-populations in 17 fields (Preston & Whitehouse 1986; Preston 1995). Sixteen of these fields are farmed for cereal production, while the other is used as horse pasture. Between years, the total population varies from c. 10,000 to c. 50,000 individuals. The vast majority of the population is confined to about five sub-populations, with most others supporting only a few individuals once every few years (A. Arbon in litt. 1995; this study). In 1993, the total population numbered c. 15,000 individuals. Five fields containing the most important sub-populations were designated the Whittlesford-Thriplow Hummocky Fields Site of Special Scientific Interest (S.S.S.I.)

² Herbarium material in OXF, RNG, CGE, E and BM collected from "Cholsey" in 1835 could have originated from this site.



FIGURE 2. Prime winter conditions for *Lythrum hyssopifolia* around Swan Lake, Gloucestershire (January 1994).



FIGURE 3. *Lythrum hyssopifolia* growing at the centre of the area depicted in Figure 2 (August 1994).

by English Nature in 1987 (Preston 1989), thus providing these sites with special legal protection and a formal conservation management agreement.

DISCUSSION

STATUS AND DISTRIBUTION

The current geographical distribution of *L. hyssopifolia* is comparable to that earlier this century, being confined to the southern lowlands of the British Isles (cf. Preston & Whitehouse 1986). The size of the total population within Great Britain has never been estimated, and this is still not possible due to a lack of census data from Jersey. However, data from this study suggest that the total population in mainland Great Britain has been in the region of 600,000–700,000 individuals in recent years, with over 90% of this total around Swan Lake in Gloucestershire. This estimate should be treated with caution, however, as exposed-mud species can be conspicuously variable in their abundance between years (Salisbury 1970). This is clearly apparent with regard to *L. hyssopifolia* in Cambridgeshire, where the species' abundance is largely dependent on the rainfall of the previous autumn/winter (Preston & Whitehouse 1986; Coombe 1990). Similar variations in abundance are apparent in Jersey (F. Le Sueur in litt. 1993, 1995). However, following the initial colonization process at Swan Lake and the Long Ground Scrape in Gloucestershire, numbers between years seem to have become relatively stable. Presumably, this is due to the relatively consistent degree of disturbance and winter flooding between years; these factors are much more variable in Cambridgeshire (Preston & Whitehouse 1986; Preston 1989; Coombe 1990), and presumably also in St Catherine's Bay (Jersey). The sub-population at South Lake in Gloucestershire has increased following recent colonization, whilst the small populations in Sussex and Oxfordshire seem to have been relatively stable, although a decline is predicted in Oxfordshire due to the cessation of winter disturbance.

ORIGIN OF THE GLOUCESTERSHIRE POPULATION

Considering the significant contribution of the Gloucestershire *L. hyssopifolia* population to the national status of this species it seems pertinent to discuss its possible origin. Prior to the discovery of the Swan Lake population in 1985, the plant was previously unrecorded from Gloucestershire, the closest record being of an alien occurrence "in the Bristol area" in 1932 (Riddelsdell et al. 1948), at least 30 km to the south of Swan Lake. Seed was probably transported to Swan Lake in the early 1980s either by its adhesion to migratory waterfowl or its ingestion and subsequent excretion by the birds (cf. Salisbury 1970), or by corn fed to wintering waterfowl. At the time of the discovery of the plant around Swan Lake (1985), the only other known localities supporting the species in the British Isles were in Cambridgeshire, Dorset and Jersey (St Catherine's Bay), while in continental Europe it is widespread south of c. 52°N (Fitter 1978; Webb 1968). Many migratory waterfowl from continental Europe visit Swan Lake during the winter, the principal species being Bewick's Swan (*Cygnus colombianus bewickii*) (c. 200 individuals), Mallard (*Anas platyrhynchos*) (c. 250 individuals), Pintail (*Anas acuta*) (c. 60 individuals), Pochard (*Aythya ferina*) (c. 1,300 individuals) and Tufted Duck (*Aythya fuligula*) (c. 600 individuals) (D. B. Paynter, pers. comm. 1994). Of these, the most likely vectors of *L. hyssopifolia* seeds would be Mallard, Pochard and Tufted Duck, since many of these birds migrate to Great Britain from the continental range of *L. hyssopifolia* (cf. Webb 1968; Fitter 1978; Owen et al. 1986).

Considering *L. hyssopifolia* frequently occurs in cornfields, it is also possible that seed was transported to Swan Lake with the corn fed to wintering waterfowl. Most of this corn originates from the West Midlands of England, from where the only records of *L. hyssopifolia* pre-date 1950 (Preston & Whitehouse 1986). However, on (very few) occasions "sweepings" of split corn have been collected from Sharpness Docks (Gloucestershire), where seed is exported and imported from a diversity of sources. Although *L. hyssopifolia* has never been recorded from the docks, it remains possible that this is the source of the seeds. Unfortunately, it seems impossible to prove conclusively whether commercial grain or migratory waterfowl are responsible for the establishment of *L. hyssopifolia* in Gloucestershire.

CONSERVATION REQUIREMENTS

The most important factor governing the persistence of *Lythrum hyssopifolia* at a site is the

continuation of regular winter disturbance. Under natural conditions, this is provided by fluctuating water-levels, but under more artificial conditions it can be complemented by disturbance from ploughing, livestock or machinery. Considering this, the future of the species seems favourable in Gloucestershire, Sussex, the main sites in Cambridgeshire and at St Catherine's Bay (Jersey). If *Salix* clearance is continued on a rotational basis at Grouville Marsh (Jersey), then the species survival here would also seem favourable. In St Catherine's Bay, there is no immediate threat to the species, but more stringent protection measures are necessary to remove the potential threat of re-landscaping, and habitat management may be necessary if succession becomes a problem. The very small population at Cholsey (Oxfordshire) is especially threatened by succession, and it seems the species can no longer survive there without the presence of mechanical disturbance during the winter. At a site located within a horse pasture near Newton (Cambridgeshire), the best area for the species has been fenced off. Ironically, this has caused a decline in numbers, since more long-term perennial species are beginning to dominate the area following the cessation of disturbance from the activity of horses. This area needs to be re-opened to grazing and a sympathetic stocking regime developed.

Formal management plans have been produced and are being implemented for the benefit of the species in Sussex and at the main sites in Cambridgeshire, while more informal plans are being implemented in Dorset, Gloucestershire and Jersey. As yet, however, there are no such agreements concerning the Oxfordshire population, which clearly needs remedy.

All sites supporting the species in Gloucestershire, the main sites in Cambridgeshire and at Grouville Marsh (Jersey), have been afforded formal conservation protection, while the site at St Catherine's Bay (Jersey) is partially protected. Of the three unprotected sites (in Dorset, Sussex and Oxfordshire), probably only the Oxfordshire site could immediately benefit from such protection.

The following measures are proposed to sustain the current status of the species in the British Isles:

Area A, Grouville Marsh (Jersey).

- i. Rotational *Salix* clearance on an annual basis.

Area B, St Catherine's Bay (Jersey).

- i. Better site protection.
- ii. Habitat management may be necessary if succession becomes a problem.

Area C, Wildfowl & Wetlands Trust Slimbridge Reserve (Gloucestershire).

- i. No additional measures are currently required.

Area D, Poole (Dorset).

- i. No additional measures are currently required.

Area E, Cholsey (Oxfordshire).

- i. Re-establishment of mechanical disturbance during winter.
- ii. Production and implementation of management agreement.
- iii. Evaluation of the need for site protection following action (ii).

Area F, Thorney Island (Sussex).

- i. No additional measures are currently required.

Area G, Fields around Fowlmere, Whittlesford, Newton and Thriplow (Cambridgeshire).

- i. Re-assessment of management implemented at the horse pasture site near Newton.

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