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Historical review, survey and monitoring on the Lewes Levels

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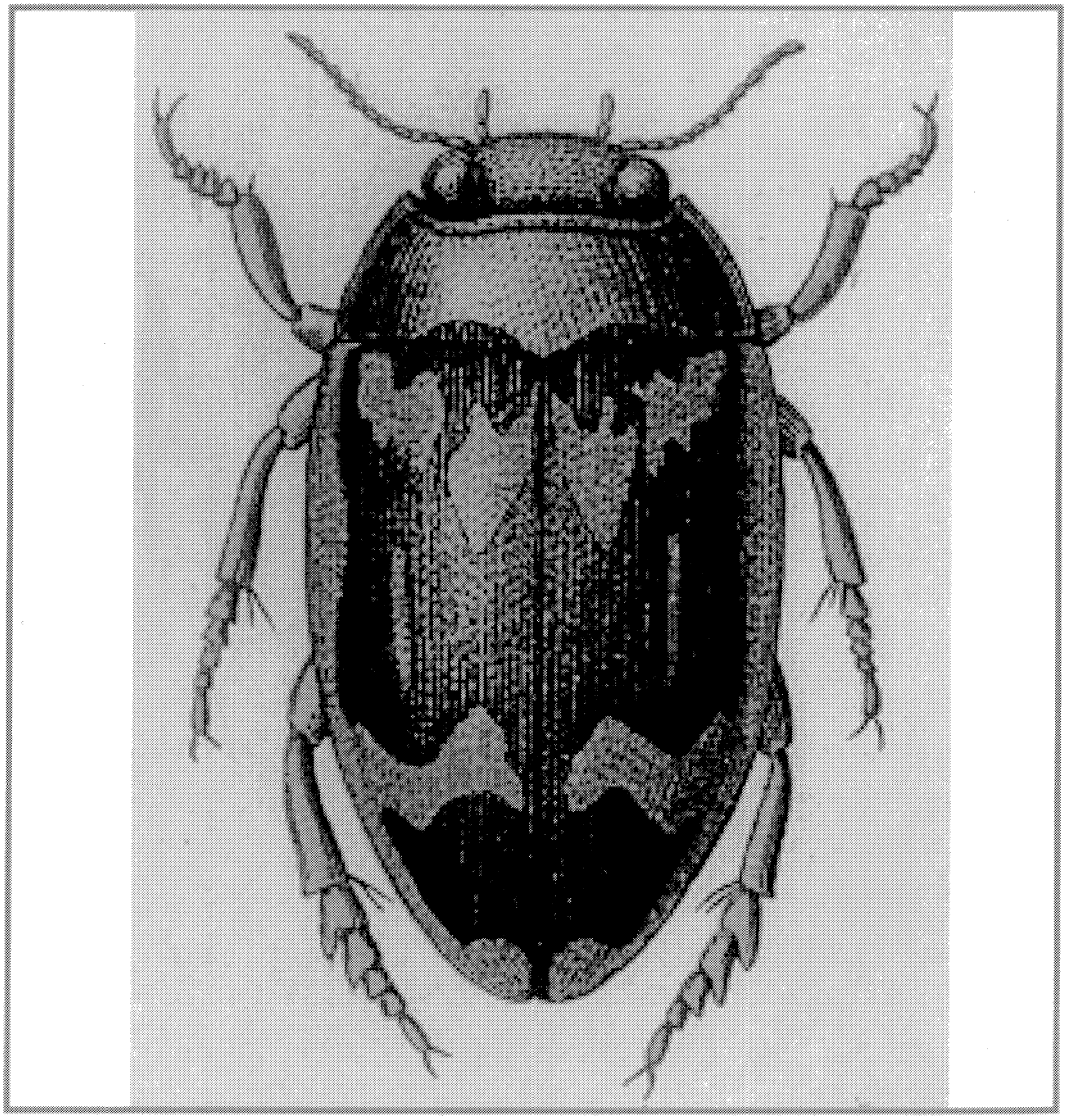

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The diving beetle *Laccophilus poecilus* (Dytiscidae): Historical review, survey and monitoring on the Lewes Levels

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Summary

Laccophilus poecilus is a small water beetle (3.5 mm long) in the family Dytiscidae. One of three British *Laccophilus* species, it has distinctly patterned elytra and is considered to be sufficiently distinct, so far as the British fauna is concerned, to confidently permit the acceptance of historical records. However, it is worth noting that four different names have been applied during the 20th century: *L. variegatus* (Germ.), *L. obsoletus* West., *L. ponticus* Sharp and *L. poecilus* Klug. A summary of the nomenclatorial history is given by Ahmed & Angus, 1998.

The species' status is currently listed as **Red Data Book 2 - Vulnerable** (RDB2). It is also a **Biodiversity Action Plan** (BAP) species (Foster, 1999a & 1999b). There are recent (post-1970) records for only the Pevensey Levels (up to 1972) and the Lewes Levels, where a small population is still present. A 1970 published record for Thorne Moor requires confirmation.

There are strong grounds for recommending that the status be upgraded to **Red Data Book 1 - Endangered** (RDB1) since just a single British population is currently known to exist, at Lewes, East Sussex.

This report aims to bring our knowledge of the species up to date and also to collate historical information, so that it is contained in one document. The results of a more general aquatic Coleoptera survey of selected ditches within the Lewes Brooks SSSI, carried out during 1998-99, is also recorded in this report.

1. Introduction

The stated objectives of this contract are as follows:

1. Survey and map the distribution of *Laccophilus poecilus* on the Lewes Brooks.
2. Recommend a method for monitoring the species.

Because this project was partly funded by the Environment Agency, additional aquatic insect survey work was requested for the main drainage sewers under their control and management. This was mainly to determine their general habitat richness, but also to assess their suitability for *L. poecilus*.

Additional information, including historical data, has also been provided. This data should prove useful if the project is continued beyond the initial assessment stage.

2. Distribution and status

2.1 Summary of records by vice counties

Distribution maps have been published by Foster (1981) and Foster (Ed.) (1999).

Records are known from five British vice counties as follows:

Vice County	Locality	Record date	Reference
South Yorkshire	Thorne Moor	c. 1907	Bayford, E. G., 1907
South Yorkshire	Thorne Moor	1954	Bunting, W., 1955;
			Foster, G. N. (Ed.)., 1999
South Yorkshire	Thorne Moor	1970	Skidmore, P. et al, 1985
East Kent	Birchington	c. 1885	Wood, T., 1885
	Pegwell Bay	pre-1887	Fowler, W. W., 1887, 1908
	Dover	pre-1887	Fowler, W. W., 1887, 1908
	Deal	pre-1887	Fowler, W. W., 1887, 1908
	Canterbury	1958	Foster G. N., 1999a & 1999b
East Sussex	Pevensey	pre-1887	Fowler, W. W., 1887
	Bulverhythe	c. 1888	Bloomfield, E. N. (Ed.), 1888
			& Bennett, 1910
	Pevensey	July1897	Esam, W. W., 1898
	Pevensey	July1896	Esam, W. W., 1897
	Pevensey	Sept.1896	Esam, W. W., 1897
	Winchelsea	1901	Esam, W. W., 1902
	Lewes	pre-1905	Fowler, 1905
	Pett	1921	Foster, G. N., 1972
	Lewes, near priory	1965	*Foster, G. N., 1972
	Pevensey Levels	1972	J. A. Owen (pers. com.)
	Lewes Levels	9.x.1976	Hodge, P. J., 1978
	Lewes Levels	20 Nov. 1976	Hodge, P. J., 1978
	Lewes Levels	13 Feb. 1977	Hodge, P. J., 1978
	Lewes Levels	6 March 1977	Hodge, P. J., 1978
	Lewes Levels	19 March 1977	Hodge, P. J., 1978
	Lewes Levels	7 Jan. 1978	Hodge, P. J., unpublished
	Lewes Levels	26 July 1983	Hodge, P. J., unpublished
	Lewes Levels	16 July 1996	Hodge, P. J., 1998
	Lewes Levels	20 Feb. 1998	Hodge, P. J., unpublished
	Lewes Levels	30 Aug. 1998	Hodge, P. J., unpublished
West Sussex	Arundel	Pre-1887	Fowler, W. W., 1887
South Hampshire	Isle of Portsea	c. 1840-1880	H. Moncreaf, (Foster, 1972)
South Hampshire	Lymington salterns	c. 1856	Foster, G. N., 1981
			& Balfour-Browne, F., 1940
		c. 1856	by Dr Power
		1904	by H. Donisthorpe

* Foster (1972) states: 'there are several records from the area just south of Lewes up until 1965'

2.2 Current status

Although there is a 1970 record of *L. poecilus* for Thorne Moor (Skidmore *et al* 1985) it is not repeated in the BAP (Foster, 1999a), and the record requires confirmation. Foster (pers.comm.) suggests the entry by Skidmore *et al* 1985 was intended to refer to Bunting's 1954 record (Bunting, 1955).

Two or three specimens were taken from the Pevensey Levels in 1972 by Prof John Owen. This record was omitted by Foster, 1999a, but an amendment is to be published shortly. Unfortunately the precise location of the capture was not recorded.

All other recent (post-1970) British records for *L. poecilus* are from the northern half of the Lewes Brooks SSSI, where a small population still survives and was last recorded there in August 1998.

There is therefore absolutely no doubt that a serious decline has taken place during the 20th century. Until about 1970 there were evidently several isolated colonies scattered over eastern England, but the Lewes site in East Sussex may now the support the only breeding population in Britain, where it is very localised and may be struggling for survival.

2.3 Summary of recent (post 1970) records from Lewes Brooks SSSI

Ten separate records exist for the species at Lewes Brooks during the period 1976 - 1998 as follows:

1.	9 Oct.1976	1 adult	Ditch 7, TQ411092
2.	20 Nov.1976	2 adults	Ditch 61a, (adjacent to Rise Farm Sewer), TQ418091
3.	13 Feb.1977	1 adult	Ditch 61a (adjacent to Rise Farm Sewer), TQ418091
4.	6 Mar.1977	1 adult	Ditch 61a (adjacent to Rise Farm Sewer), TQ418091
5.	19 Mar.1977	several adults	Ditch 61a (adjacent to Rise Farm Sewer), TQ418091
6.	7 Jan.1978	2 adults	Ditch 61a (adjacent to Rise Farm Sewer), TQ418091
7.	26 July 1983	several adults	Ditch 91a (east of Pool Bar Wall), TQ426084
8.	16 July 1996	1 adult	Ditch 5 (Celery [Kingston] Sewer), TQ407090
9.	20 Feb.1998	2 adults	Ditch 5 (Celery [Kingston] Sewer), TQ407090
10.	30 Aug.1998	1 adult	Ditch 5 (Celery [Kingston] Sewer), TQ407090

When *L. poecilus* was found between 1976-78 it was not considered a difficult species to find and most samples taken from ditches where it was known to occur near Rise Farm resulted in the discovery of at least one adult.

On 26 July 1983, after a period of several years with no records, *L. poecilus* was found again whilst assisting Dr Ian McClean (Nature Conservancy Council HQ, Peterborough) with the proposed SSSI notification site assessment. What appeared to be a strong colony was located in a large deep drain, running through arable land between Pool Bar Wall and the River Ouse, which from memory was at the southern end of Ditch 91a (TQ426084). It is not known how long this colony persisted after 1983 and, with the benefit of hindsight, this important discovery should have been followed up by regular monitoring.

Occasional very brief searches were made for *L. poecilus* during the mid-1980s to mid-1990s without any success and it was feared that the species might have died out altogether at Lewes. However, whilst assisting Dr Martin Willing with an aquatic mollusc survey of the Celery Sewer (Ditches 5, 5A, 20A & 20B) on 16 July1996 I was surprised to discover a single adult at the northern end of Ditch 5A at TQ407090. This was a very important discovery, for not only did it confirm that *L. poecilus* still occurred at Lewes, but it was some distance from any ditch where it had previously been found since 1970.

The species has since been recorded on two subsequent occasions; both in the northern half of Ditch 5A; on 20 Feb.1998 and 30 Aug.1998, within a few metres of the 1996 site, thus confirming that a small breeding population must be present.

3. Habitat requirements and biology

Shirt, D.B. (ed.), 1987 states (under the heading *Laccophilus obsoletus*):

'Habitat and ecology Freshwater and weakly saline drains in lowland fens, not exclusive to grazing fen'.

3.1 Habitat requirements at Lewes Brooks SSSI

It appears that *L. poecilus* requires ditches that are frequently cleared of aquatic vegetation and therefore have significant areas of open water. At the present time this reduces the available habitat choice at Lewes to a few ditches only. A slight flow is also thought to be important. Many previous records are from ditches that may possibly be slightly saline, since small shrimps were sometimes noted in samples where *L. poecilus* occurred. However, according to Foster (1999a) there is not a requirement for brackish water and its occurrence near the coast is likely to be either for climatic reasons or because that is where large areas of freshwater ditches occur.

All but one of the 1970s and 1980s records for *L. poecilus* at Lewes were from ditches east of Rise Farm and, because these sites are relatively close to the tidal section of the River Ouse, a close association with slightly brackish water was thought to be preferred. However, the most recent records have been from a ditch further west and here there is no saline influence, except perhaps during very rare occasions when the Lewes Brooks are affected by winter floods. Spring water from the calcareous Cockshut Stream regularly flows into the Celery Sewer, via a culvert at the northern end, and it is possible that mineral-rich water are the key to the presence of *L. poecilus* at Lewes. However, chemical analysis of the water has not yet been carried out at any of the *L. poecilus* recording sites.

The 1970s records near Rise Farm were from ditches which now have substantially lower water quality. This is thought to be partly due to the construction of the Lewes by-pass in the late 1970's and partly due to intensification of adjacent agricultural land. The by-pass work involved the diversion of the Cockshut Stream, which used to flow close to the ditches where *L. poecilus* bred. The by-pass engineering operations involved the diversion of the Cockshut to the north side of the dual carriageway and although it is still linked by a culvert to Ditch 61A the water in the ditch now supports very little aquatic life. Thus *L. poecilus* almost certainly vacated Ditch 61A within a few years of the by-pass being built.

L. poecilus is almost certainly associated with early successional stages in the ditch management cycle and it is especially worth noting that the Celery Sewer site is dredged every year, in late summer. The following notes have been made as a result of observations during recent monitoring work. Soon after dredging, in late August, Ditch 5A contains virtually no aquatic or marginal vegetation, but by November beds of *Calatriche stagnalis* are rapidly developing and by February or March the ditch surface is completely choked with this plant. During late winter Glyceria fluitans begins to grow out from the banks and this is thought to be a vital part of the ecology of *L. poecilus*.

Shallow grassy ditch margins, especially where the floating-leaved *Glyceria fluitans* grow, are where adults of *L. poecilus* generally occur, and breeding may take place in this grassy ditch-side habitat. Therefore, for successful breeding the correct management of the ditch bank profile may be important.

Since 1976, adults of *L. poecilus* have been recorded during the months of January, February, March, July, August, October and November. The fact that there are no records during the April to June period suggests that mating and egg-laying takes place during the winter months. Because aquatic sampling is most frequently carried out during early summer, it is possible that some recorders may have missed *L. poecilus* by not sampling at the correct time of year. It is thought that fresh adults emerge during July and live until the following March or April.

4. Threats

In the Red Data Book, Shirt, D. B. eds. (1987) states:

> **Threats** Change from mixed farming to arable farming. Construction of the Lewes bypass appeared to improve the status of this species in cleared dykes for a while, and indicates the importance of dyke management in sustaining this beetle.

In the BAP report, Foster (1999a) states:

> **2 Current factors causing loss or decline**
> **2.1** Water abstraction.
> **2.2** Declining water quality.
> **2.3** Conversion of grazing marsh to arable land.
> **2.4** Inappropriate ditch management.

4.1 Threats at Lewes Brooks SSSI

Although it is possible that *L. poecilus* is a naturally declining species in Britain, existing precariously at the northern limit of its geographical range, it may still not be too late to save the species if its restricted habitats can be conserved and managed correctly. However, any slight incident, natural or otherwise, such as pollution, drought and engineering works, might trigger a population crash, possibly resulting in extinction in Britain. It is therefore vitally important that the single known population is given careful protection from potentially damaging events.

Declining water quality on the Lewes Brooks might have caused the local extinction of *L. poecilus*, especially from ditches east of the road to Rise Farm. Even the isolated population discovered in 1983 between Pool Bar Wall and the River Ouse is now thought to have died out, probably due to poor water quality in Rise Farm Sewer. Further west, where *L. poecilus* may be less threatened by poor water quality, the main threat is probably infrequent ditch clearance.

Some of the likely threats are listed below:

a. Nutrient enrichment

Run-off as a result of spraying silage poses a serious threat to any *L. poecilus* colonies on the eastern portion of the Lewes Brooks SSSI. If, as seem very likely, *L. poecilus* is no longer present in this area, then it can perhaps be safely assumed that there is currently no actual threat to the existing population, since the known colony is well upstream of any fields likely to be sprayed with silage.

The ditches either side of the Rise Farm Sewer, where a breeding population of *L. poecilus* was present up to the late 1970's, appears to have declined in wildlife interest during recent years, either as a result of more intensive agriculture or run-off from the A27 Lewes by-pass. However, the reasons for any change in habitat quality have not yet been determined.

The colony of *L. poecilus* discovered in 1983, in a ditch near Pool Bar Wall, may also be affected by adverse water quality, which could arise from anywhere along the length of the Rise Farm Sewer.

b. The Cockshut Stream

During periods of high rainfall, water from the Cockshut Stream flows via culverts into ditches along the northern boundary of the Lewes Brooks, and this may have maintained suitable conditions for *L. poecilus* in the past. However, the water quality of the Cockshut stream now varies along its length. Near the source, about 200 metres west of the Celery Sewer, the water is quite unpolluted, but the stream quickly becomes heavily shaded by crack willow *Salix fragilis* and this continues for the entire length of the playing fields to the north of the stream. Although the water in the shaded section is is clear and unpolluted, the environment might not suit *L. poecilus.*

Further to the east, the water quality in the Cockshut Stream is likely to be affected by run-off from the A27 Lewes by-pass. Most of the eastern section of the Cockshut Stream follows close to one or other side of the by-pass. This immediately introduces the possibility of pollution caused by run-off from passing traffic and any water entering ditches from this part of the stream is likely to be affected in the same way.

c. Inappropriate ditch management

L. poecilus almost certainly inhabits ditches that are not excessively choked with aquatic vegetation. and it is now apparently restricted to one large drains controlled and managed by the Environment Agency. This is cleaned out regularly on an annual basis in late summer. Small ditches flowing into the main drains are cleaned out by farmers only when they become so densely choked by vegetation that they no longer function as wet fences. This infrequent form of ditch management is unlikely to suit *L. poecilus*, although the species might form temporary colonies for short periods soon after ditch clearance.

d. Improvement of agricultural land

It is a proven fact that ditches running through unimproved pasture on levels marshes support a rich and diverse invertebrate community. On the Lewes Brooks a substantial proportion of the farmland has already been converted to arable production, and any ditches running through these areas are likely to be unsuitable for *L. poecilus.*

e. Drought or excessive water abstraction

There have been several unusually dry summers during the last ten years and *L. poecilus* has survived them all. Therefore drought alone may not be a threat in its own right. The Cockshut stream should be maintained at a relatively high level so that water can flow into the Celery Sewer during the winter months.

f. Artificial lowering of water levels

The level of ditch water on the Lewes Brooks is, with a few isolated exceptions, controlled by the Environment Agency. This is accomplished at the point where the Celery Sewer flows into the River Ouse near Rodmell. In winter the level is lower level than during the summer, thus reducing the risk of flooding.

The Cochshut Stream is a seasonal calcareous winterbourne stream which passes the northern end of the Celery Sewer about 100 metres east of its source. The two water courses are at different levels, the Cockshut being between one and two metres higher than the Celery Sewer. Throughout the winter months, when the Cockshut Stream is at its peak flow, calcareous spring water flows over a board, into the Celery Sewer, Ditch 5, via a short culvert. This could be very important for *L. poecilus*, indeed it might be one of the main reasons why the colony is breeding in this ditch.

g. Engineering work

No new engineering work is anticipated within the Lewes Brooks SSSI, and this is merely a record of work that was carried out 20 years ago.

When the new Lewes by-pass was constructed during the late 1970's there was a considerable amount of disruption to the nearby ditches. In particular, the course of the Cockshut stream was altered and it is thought that the flow in one or more ditches may have been reversed.

Because *L. poecilus* prefers recently cleaned out ditches it is quite possible that its populations increased for a while, shortly after the by-pass engineering work was completed. However, this statement is purely speculative and there are no monitoring statistics to back up the suggestion.

h. Collection of specimens by entomologists

The retention of a few voucher specimens, caught by hand netting, is not considered to be a significant threat. Indeed, the value of the records resulting from by such activities far outweigh the loss of a tiny proportion of the population and far more are likely to be eaten by other predators.

However, the trapping of water beetles, even for scientific purposes, should be considered as a potentially damaging activity and should be avoided, at least near to the single known colony of *L. poecilus*.

Regular disturbance of the ditch margins should be considered as a threat and it is recommended that monitoring is carried out no more frequently than once every two months.

5. The 1998/99 survey

In this survey, samples were taken from all known locations where *L. poecilus* has occurred since 1975. Samples were also taken from various locations throughout the SSSI, north of Rodmell, in order to provide general aquatic invertebrate data for the Environment Agency's records. Sample sites were selected at intervals along the lengths of Celery, Kingston and North End Sewers.

5.1 Methods

All ditches on the Lewes Brooks, inside the 5 metre contour line, were numbered prior to SSSI notification by Hicklin (1986) and this numbering system has been adopted, with a few exceptions, for this report. Some IDB ditches were only given vague numbers by Hicklin (1986) and a different number has been applied to all sections by adding a suffix letter to the original ditch number.

It was decided not to attempt any form of trapping for *L. poecilus* in case large numbers of the beetle were caught, which could have had a disastrous impact on the small and vulnerable population. There are also many other rare water beetles present and it would be undesirable to kill these in large numbers.

It was therefore decided to rely on traditional sampling methods, using a water net, accepting that this was not likely to be as efficient at finding any species with a very low population density.

Every effort was made to give each site equal attention, but in practice the richest sites took longer to survey than those containing few insects. Approximately 30 minutes was spent sampling and sorting samples, the aim being to catch a high percentage of the species present.

Where possible, the net was worked vigorously through submerged aquatic vegetation or patches of *Glyceria fluitans* floating at ditch margins. Ditches with sheer or very steep-sided bank profiles were avoided if at all possible. Samples were sorted in the field on a large polythene sheet.

5.2 Sample Site descriptions

Sample Site 1: Ditch 5, Celery Sewer (Kingston Sewer on EA map), TQ407090, sampled on 20 Feb. 1998, 20 Mar.1998, 30 Aug.1998, 15 Oct.1998, 9 Nov.1998, 18 Feb.1999, 15 Mar.1999 and 30 Apr.1999.

The northernmost end of a deep main drain, 4 m wide, with a varied aquatic flora. The central channel is dominated by common water starwort *Callatriche stagnalis* and a large patch of mare's-tail *Hippuris vulgaris* occurs near the northern culvert. Floating sweet grass *Glyceria fluitans* is common along both banks. The western bank profile is very steep but the eastern bank has a narrow shelf which is shallowly flooded when the ditch level high. Weed cutting is carried out annually in late summer, but the submerged vegetation recovers very quickly. There is a culvert to the Cockshut Stream, which has a water level one to two metres higher. This

allows calcareous spring water to flow from the north during the winter period, when the Cockshut is at peak flow.

Sample Site 2: Ditch 5A, Celery Sewer (Kingston Sewer on EA map), TQ408088, sampled on 15 Oct.1998.

The short second section of the Celery Sewer. The margin contained emergent aquatic grasses *Glyceria* sp. and branched bur-reed *Sparganium erectum.*

Sample Site 3: Ditch 20, Celery Sewer (Kingston Sewer on EA map), TQ408088, sampled on 15Oct.1998.

The northern end of the third section of the Celery Sewer described above. The sample was taken from a dense growth of water-cress *Nasturtium officinale*, with emergent grasses along the margin.

Sample Site 4: Ditch 20B, Celery Sewer (Kingston Sewer on EA map), TQ411083, sampled on 15Oct.1998.

This point marks the southern limit of the Lewes Brooks SSSI grazing marsh on the eastern side of Celery Sewer (on the western side there are another three fields of permanent pasture). This sample, at the junction of Ditch 31A, was from a margin choked with watercress *Nasturtium officinale*, duckweed *Lemna* sp. and grasses.

Sample Site 5: Ditch 50, North End Sewer, TQ416082, sampled on 6 Nov.1998.

The northern bank of a 5m wide, 1/2m deep main drain containing some rigid hornwort *Ceratophyllum demersum* with rushes *Juncus* sp., reed sweet-grass *Glyceria maxima* and other grasses growing along the margin.

Sample Site 6: Ditch 50G, Celery Sewer, TQ427072, Sampled on 19Oct.1998.

The western bank of a deep main drain with very little aquatic vegetation in the centre of the channel. Marginal emergent vegetation was dominated by reed sweet-grass *Glyceria maxima* with some common reed *Phragmites australis*. On the opposite bank there was a dense growth of *P. australis.*

Sample Site 7: Ditch 50I, Celery Sewer, TQ443070, Sampled on 19Oct.1998.

The western bank of a main drain, with very little aquatic vegetation in the deep central channel. Marginal emergent vegetation was dominated by reed sweet-grass *Glyceria maxima*, with some rigid hornwort *Ceratophyllum demersum.*

Sample Site 8: Ditch 115, TQ426068, Sampled on 19Oct.1998

A grassy ditch 4 m wide and 1/2 m deep.

Sample Site 9: Ditch 109A, TQ434072, sampled on 16Oct.1998

A large ditch, densely choked with tall emergent wetland vegetation.

Sample Site 10: Ditch 91A, Pool Bar Wall, TQ425085, sampled on 16Oct.1998

The northern end of deep main drain that is linked to the drain that flows into the River Ouse from Rise Farm and North End Sewers. However, the main flow of water appears to miss this ditch and the water quality there appears to be relatively high. The sample was taken at the extreme northern end, where thick emergent vegetation occurred, dominated by reed sweet-grass *Glyceria maxima.*

L. poecilus was found at the southern end of this ditch in July 1983.

Sample Site 11: Ditch 56, TQ423085, sampled on 16Oct.1998.

A shallow cattle drinking bay containing clumps of pond weed, water speedwell *Veronica* sp., duckweed *Lemna* sp., branched bur-reed *Sparganium erectum* and various grasses.

The Nationally Scarce Category A (Na) *Haliplus mucronatus* has previously been recorded from this site in the past.

Sample Site 12: Ditch 64A, TQ418091, sampled on 15Oct.1998.

A ditch that flows into Rise farm Sewer. The chosen sample site was choked with water-cress *Nasturtium officinale.*

Sample Site 13: Ditch 62, Rise Farm Sewer, TQ418091, sampled on 15Oct.1998.

A 5m wide main drain containing mainly open water, with reed sweet-grass *Glyceria maxima* growing along the banks.

Sample Site 14: Ditch 61A, TQ416092, sampled on 15Oct.1998.

A spur running north off the Rise Farm Sewer, similar in dimension and character to the main sewer itself (Sample Site 14, Ditch 62), but with very little aquatic or marginal vegetation.

This is where many of the 1970's records for *L. poecilus* originated.

Sample Site 15: Ditch 12, TQ411090, sampled on 16 Oct.1998 & 18 Oct.1998.

A very richly vegetated ditch, from which a sample was taken from many spots throughout its length. The central channel was relatively narrow, but with several good areas of open water.

Sample Site 16: Ditch 4, TQ406091, sampled on 15 Oct.1998

A grassy ditch, one field to the east of the northernmost section of the Celery Sewer. There is a culvert at the northern end, running into the Cockshut Stream. This is one of the few ditches on the Lewes Brooks that is not affected by winter lowering of water levels, in fact the water actually rises during periods of high rainfall. The water is crystal clear and may either be spring-fed or periodically topped up via a culvert from the Cockshut Stream.

5.3 Summary of 1998 survey results

The 1998 survey achieved the following results:

- Three specimens of *L. poecilus* were found in Ditch 5, the northernmost section of the Celery Sewer (Kingston Sewer on EA map), TQ407090: two on 20 Feb.1998 and one 30 Aug.1998.

- The two occasions when *L. poecilus* was found during the period of monitoring in 1998-99 coincided with the two highest species diversities recorded for Ditch 5.

- Celery Sewer (Kingston Sewer on EA map) is cleared out annually by the Environment Agency, using a weed cutter, during late summer. This rather severe management evidently suits *L. poecilus*.

- The population of *L. poecilus* appears to be very small and was only found in the northern half of Ditch 5.

- The presence of *L. poecilus* near Pool Bar Wall, where it occurred in 1983, was not confirmed during the present survey.

- Most ditches adjacent to the Celery Sewer (Kingston Sewer on EA map), contain clean unpolluted water but may be too choked with vegetation for *L. poecilus*.

- Spring-fed ditches also occur near Rodmell but *L. poecilus* has never been recorded from that area.

- Aquatic samples from the main drains, ie. Rise Farm Sewer, North End Sewer and the southern section of the Celery Sewer, did not reveal a spectacular fauna. The aquatic Coleoptera community, although reasonably diverse, was represented by only a few specimens of each species. There are several possible reasons for this, such as the steep or vertical-sided ditch bank profiles, the lack of shallow weed-choked margins, the sparse submerged aquatic vegetation and the likely presence of predatory fish. It was also very difficult to find suitably safe places to take samples without falling in, the southern part of the Celery Sewer being particularly dangerous.

6. Conservation and management

Shirt, D. B. (Ed.), 1987 states:

> 'Conservation — One of the older sites, Thorne Waste, is an NNR, and another old site, Pevensey Levels, is partly an SSSI. The northern end of the Lewes Levels is not at present notified as an SSSI'.

6.1 Conservation at Lewes Brooks SSSI

The *L. poecilus* colony appears to be in the northernmost 60 metres of Ditch 5. Here the eastern bank has a 1/2 metre wide shelf which narrows towards the southern end of the ditch. This is shallowly flooded during early summer, but is left dry when the water is low. The shelf may be slumping due to constant trampling by grazing animals. This stepped ditch profile, illustrated in Figure 1, is thought to be important.

The western bank of Ditch 5 is very steep-sided throughout its 130 metre length, except for a shallow inlet about halfway along. It is thought that the difference between the two banks is caused by weed-cutting methods, the weed bucket scooping across the ditch width, with the excavator standing on the western bank. Weed and surplus ditch debris are deposited on the west bank.

Figure 1 Bank profile of Ditch 5 approximately 50 m from northern culvert

6.2 Management

Current management of Ditch 5 should be continued as it in past years, with annual weed cutting in late summer. At a site meeting on 6 Apr.1999 with representatives of English Nature and the Environment Agency present, it was suggested that *L. poecilus* should be encouraged to spread by creating a larger area of suitable habitat. Without disturbing Ditch 5 the options are somewhat limited but clearing Ditch 19 is likely to give *L. poecilus* the best chance to colonise new territory, since there is a direct connection to it, through a short culvert. The farmer has been approached and he is happy for the work to be carried out, possibly as early as August 1999.

Other suggestions were discussed during the meeting. These included improving the bank profile along the western side of Ditch 5 and creating a better shelf along the eastern bank.

Both operations would create quite a lot of disturbance and it might be better to attempt the establishment of a second breeding centre for *L. poecilus* first.

Other ditches that might benefit from partial clearance are Ditch 7 (where *L. poecilus* has been found in the past) and Ditch 12, both of which are physically connected to Ditch 5, even if by rather an indirect route.. It should be noted that the northern end of Ditch 7 contains some water-soldier *Stratiotes aloides* and this may or may not be native to the Lewes Brooks. There is a large colony of water-soldier in Ditch 40.

7. Monitoring

Because the Lewes Brooks SSSI currently supports the only known population of *L. poecilus* it is vitally important that as much information as possible is collected and analysed before the species dies out in Britain.

Regular monitoring of the *L. poecilus* site was carried out during the period of the survey. Ditch 5, the northernmost section of Celery Sewer (Kingston Sewer on EA map), was sampled for water beetles, on a somewhat irregular basis, between 20 February 1998 and 30 April 1999 and a total of eight samples were taken.

Because the known population of *L. poecilus* at Lewes appears to be very small, and restricted to one section of one ditch, it must be considered as critically endangered. It is therefore vitally important that some monitoring is carried out. Future monitoring and research will obviously be dependant upon available time, expertise and funding, but even in the absence of sufficient funding, volunteer effort should be considered as a practical proposition.

A suitable monitoring strategy for the Lewes Brooks should, if possible, include:

- Regular fixed point photography of the likely breeding area in Ditch 5.
- Netting at regular intervals, especially in the periods July to November and February to March.
- Recording the variation in water level of Ditch 5, the Cockshut Stream. and rate of flow from the Cockshut Stream into Ditch 5.
- Occasional monitoring of Ditch 91A, near Pool Bar Wall, where *L. poecilus* occurred in July 1983.
- Occasional monitoring in Ditches 7, 12, 61, 61A, 62 and 62A near Rise Farm.
- Annual water quality checks should also be considered. This could possibly be carried out by the Environment Agency.

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Appendix 1. Aquatic insects recorded from *L. poecilus* site

Table 1. Aquatic Coleoptera from northern section of Celery Sewer (Ditch 5: TQ407090)

Species	SQS	Date (1998)					Date (1999)			National Status
		20/02	20/03	30/08	15/10	9/11	18/02	15/03	30/04	
DRYOPIDAE (Water beetles)										
Dryops luridus	1	+								Common
DYTISCIDAE (Water beetles)										
Agabus bipustulatus	1			+	+	+		+		Common
Agabus didymus	4					+	+			Local
Agabus paludosus	1							+		
Agabus sturmii	1	+								Common
Coelambus impressopunctatus	2			+						Local
Copelatus haemorrhoidalis	2	+	+					+	+	Local
Dytiscus marginalis	1			+						Common
Dytiscus semisulcatus	2							+		
Graptodytes pictus	2	+			+			+		Local
Hydaticus seminiger	4	+	+	+		+			+	**Nb**
Hydroporus angustatus	1	+		+				+		Common
Hydroporus erythrocephalus	1	+		+		+		+		Common
Hydroporus palustris	1	+	+	+	+	+	+	+	+	Common
Hydroporus pubescens	1	+								Common
Hygrotus inaequalis	1	+		+				+		Common
Hyphydrus ovatus	1	+	+		+	+		+	+	Common
Ilybius ater	2			+						Local
Ilybius quadriguttatus	4								+	Local
Laccophilus minutus	1			+	+	+				Common
Laccophilus poecilus	32	2		1						**RDB 2 - Vulnerable**
Porhydrus lineatus	2	+		+	+	+				Local
Rhantus suturalis	2	+		+	+					**Nb**
Suphrodytes dorsalis	2	+								Local
HALIPLIDAE (Water beetles)										
Haliplus immaculatus	2	+	+					+		Local
Haliplus lineatocollis	1	+	+	+	+	+		+		Common
Haliplus ruficollis	1	+	+	+	+	+	+	+	+	Common
Peltodytes caesus	4					+				**Nb**
HYDRAENIDAE (Water beetles)										
Hydraena riparia	1	+				+		+		Common
Limnebius nitidus	4							+		**Nb**
Ochthebius minimus	1	+			+	+		+		Common
Ochthebius nanus	4					+				**Nb**
HYDROPHILIDAE (Water beetles)										
Anacaena bipustulata	4	+		+	+	+		+		**Nb**
Anacaena limbata	1	+	+	+	+	+	+	+	+	Common
Berosus affinis	4	+								**Nb**
Coelostoma orbiculare	2			+					+	Local
Cymbiodyta marginella	2	+								Local
Enochrus coarctatus	2	+	+	+					+	Local
Enochrus testaceus	2	+	+	+				+	+	Local
Helochares lividus	2	+	+	+		+		+	+	**Nb**
Helophorus brevipalpis	1		+	+				+		Common
Helophorus grandis	1		+					+	+	Common
Helophorus minutus	1	+	+	+	+				+	Common
Helophorus nanus	4	+								**Nb**
Hydrobius fuscipes	1		+	+					+	Common
Hydrophilus piceus	8	+	+	+						**RDB 3 - Rare**
Laccobius bipunctatus	1	+	+		+			+		Common
Limnoxenus niger	8	+	+	+		+		+	+	**Nb**
HYGROBIIDAE (Water beetles)										
Hygrobia hermanni	2	+						+		Local
NOTERIDAE (Water beetles)										
Noterus clavicornis	2	+	+	+	+	+		+	+	Common
Total Points (WET) (Total = 138)		103	42	87	22	44	7	47	35	
No. of species recorded (Total = 50)		34	19	27	15	19	4	26	16	
Species Quality Score (SQS) (Total = 2.8)		3.0	2.2	3.2	1.4	2.3	1.75	1.8	2.2	

Appendix 2. Aquatic insects recorded during the 1998 ditch survey

Table 2 - Aquatic Coleoptera (Water beetles)

National Status	Species	SQS	Sample site number															
			1 Ditch 5	2 Ditch 5A	3 Ditch 20	4 Ditch 20B	5 Ditch 50	6 Ditch 50G	7 Ditch 50I	8 Ditch 115	9 Ditch 109A	10 Ditch 91A	11 Ditch 56	12 Ditch 64A	13 Ditch 62	14 Ditch 61A	15 Ditch 12	16 Ditch 4
	DRYOPIDAE (Water beetles)																	
	Dryops luridus	1	1	+														
	DYTISCIDAE (Water beetles)																	
	Agabus bipustulatus	1	0						+	+	+	+		+			+	+
	Agabus didymus	4	0						+									
	Agabus nebulosus	1								+							+	
	Agabus paludosus	1	0															
	Agabus sturmii	1	0					+	+		+		+	+		+		
	Coelambus impressopunctatus	2	0							+								
	Colymbetes fuscus	1							+	+			+					
	Copelatus haemorrhoidalis	2	0						+		+							+
	Dytiscus marginalis	1	0			+											+	+
	Dytiscus semisulcatus	2	0															+
	Graptodytes pictus	2	0		+				+			+						
Nb	*Hydaticus seminiger*	4	0	+							+		+	+	+	+	+	+
	Hydroporus angustatus	1	0											+				+
	Hydroporus erythrocephalus	1	0														+	
	Hydroporus palustris	1	0	+	+		+	+	+	+		+	+	+	+		+	
	Hydroporus planus	1								+	+			+				
	Hydroporus pubescens	1	0							+								
	Hydroporus tessellatus	1												+				
	Hygrotus inaequalis	1	0		+	+	+		+		+	+			+		+	+
	Hyphydrus ovatus	1	0		+		+		+		+	+	+		+	+	+	+
	Ilybius ater	2	0															
	Ilybius fuliginosus	1							+									
	Ilybius quadriguttatus	4		+							+							

National Status	Species	SQS	Sample site number															
			1 Ditch 5	2 Ditch 5A	3 Ditch 20	4 Ditch 20B	5 Ditch 50	6 Ditch 50G	7 Ditch 50I	8 Ditch 115	9 Ditch 109A	10 Ditch 91A	11 Ditch 56	12 Ditch 64A	13 Ditch 62	14 Ditch 61A	15 Ditch 12	16 Ditch 4
	Laccophilus hyalinus	2										+						
	Laccophilus minutus	1	0	+			+		+	+		+	+	+	+			
RDB2	*Laccophilus poecilus*	32	0															
	Porhydrus lineatus	2	0	+	+										+		+	+
Nb	*Rhantus suturalis*	2	0		+	+			+	+		+						+
	Suphrodytes dorsalis	2	0															
	HALIPLIDAE (Water beetles)																	
	Haliplus immaculatus	2	0	+			+											
	Haliplus lineatocollis	1	0		+			+	+	+	+							
	Haliplus ruficollis	1	0	+	+		+		+			+	+				+	+
Nb	*Peltodytes caesus*	4	0															
	HYDRAENIDAE (Water beetles)																	
	Hydraena riparia	1	1															
	Limnebius nitidus	4	0															
	Ochthebius minimus	1	0											+				+
Nb	*Ochthebius nanus*	4	0															
	HYDROPHILIDAE (Water beetles)																	
Nb	*Anacaena bipustulata*	4	0						+									
	Anacaena limbata	1	0		+			+	+			+	+	+		+		
Nb	*Berosus affinis*	4	0			+	+			+		+	+				+	+
	Coelostoma orbiculare	2	0															+
	Cymbiodyta marginella	2	0										+				+	
	Enochrus coarctatus	2	0														+	+
Nb	*Enochrus melanocephalus*	4										+						
	Enochrus testaceus	2	0								+	+						
Nb	*Helochares lividus*	2	0															+
	Helophorus aequalis	1								+								
	Helophorus brevipalpis	1	0		+					+								+
	Helophorus grandis	1	0		+					+		+						+
	Helophorus minutus	1	0															+
Nb	*Helophorus nanus*	4	0															

National Status	Species	SQS	Sample site number															
			1 Ditch 5	2 Ditch 5A	3 Ditch 20	4 Ditch 20B	5 Ditch 50	6 Ditch 50G	7 Ditch 50I	8 Ditch 115	9 Ditch 109A	10 Ditch 91A	11 Ditch 56	12 Ditch 64A	13 Ditch 62	14 Ditch 61A	15 Ditch 12	16 Ditch 4
	Hydrobius fuscipes	1	0							+				+				+
RDB3	*Hydrophilus piceus*	8	0	+		+											+	
	Laccobius biguttatus	2										+						
	Laccobius bipunctatus	1	0										+				+	+
Nb	*Limnoxenus niger*	8	0		+							+		+			+	+
	HYGROBIIDAE (Water beetles)																	
	Hygrobia hermanni	2	0															
	NOTERIDAE (Water beetles)																	
	Noterus clavicornis	2	0	+	+	+	+		+		+	+	+			+	+	
TOTAL POINTS SCORED (WET)		**(Site total = 154)**	**135**	**26**	**24**	**18**	**13**	**4**	**27**	**20**	**20**	**35**	**20**	**22**	**10**	**9**	**41**	**41**
TOTAL NO. OF SPECIES (NOS)		**(Site total = 60)**	**49**	**10**	**13**	**6**	**8**	**4**	**17**	**15**	**11**	**17**	**12**	**12**	**6**	**5**	**17**	**22**
SPECIES QUALITY SCORE (SQS)		**(Site total = 2.6)**	**2.9**	**2.6**	**1.8**	**3.0**	**1.6**	**1.0**	**1.6**	**1.3**	**1.8**	**2.1**	**1.7**	**1.8**	**1.7**	**1.8**	**2.4**	**1.9**
RDB + NAT. SCARCE SPECIES		**(Site total = 13)**	**12**	**2**	**2**	**3**	**1**	**0**	**2**	**1**	**1**	**4**	**2**	**2**	**1**	**1**	**4**	**5**

Site 1 Ditch 5, Celery (Kingston) Sewer 1 (TQ407090), 1998-99
Site 2 Ditch 5A, Celery (Kingston) Sewer 2 (TQ408088), 15Oct.98
Site 3 Ditch 20, Celery (Kingston) Sewer 3 (TQ408088), 15Oct.98
Site 4 Ditch 20B, Celery (Kingston) Sewer 4 (TQ411083), 15Oct.98
Site 5 Ditch 50, North End Sewer 1 (TQ416082), 6 Nov.98
Site 6 Ditch 50G, Celery Sewer 5 (TQ427072), 19Oct.98
Site 7 Ditch 50I, Celery Sewer 6 (TQ443070), 19Oct.98
Site 8 Ditch 115, (TQ426068), 19Oct.98
Site 9 Ditch109A, (TQ434072), 16Oct.98
Site 10 Ditch 91A, Pool Bar Wall (TQ425085), 16Oct.98
Site 11 Ditch 56, (TQ423085), 16Oct.98
Site 12 Ditch 64A, (TQ418091), 15Oct.98
Site 13 Ditch 62, Rise Farm Sewer (TQ418091), 15Oct.98
Site 14 Ditch 61A, (TQ416092), 15Oct.98
Site 15 Ditch 12, (TQ411090), 18Oct.98 (*Dytiscus marginalis* 16Oct.98)
Site 16 Ditch 4, (TQ406089), 15Oct.98

Appendix 3. Habitat Quality Assessment using water beetles

Foster and Eyre (1992) outline the methods currently used for the classification and ranking of water beetle communities. Species lists are classified into assemblage types and then used to rank sites by applying a point scoring system. The number of points awarded to each species of water beetle are listed by Foster and Eyre (1987, unpublished).

Sites are ranked using the following hierarchy of factors:

- The number of **Red Data Book (RDB)** species.
- The **Species Quality Score (SQS)** for the site. This is defined as the mean score per species, scores for each species having been awarded according to their rarity. Scores range from **1** for the commonest species to **32** for the rarest.

In the event of a tie on **SQS**:

- The number of **Nationally Scarce** species present.

In the event of a tie on **Nb**:

- The total **Number of Species** present **(NOS)**.

The **Aggregate of Points** for the species present in a site **(WET)**, i.e., the sum of the scores awarded to each species, gives a good measure of habitat quality. A score of more than **100** generally indicates a top site.

The **Aggregate of Points (WET)** may also be calculated as follows:

$$\mathbf{WET = SQS \times NOS}$$

The **Species Quality Score (SQS)** for a site may be calculated as follows:

$$\mathbf{SQS = \frac{WET}{NOS}}$$

A **SQS** of **2·0** or higher usually indicates a good site as do high species numbers and the presence of **Red Data Book** or **Nationally Scarce** species.

The system may be of limited use for sites where very few species are recorded since the results can easily be distorted by the chance presence of one or more rare species.

Appendix 4. Literature references to *L. poecilus*

Laccophilus poecilus has been known from Britain since early Victorian times, the first record possibly being by H. Moncreaf around 1840 (Foster, 1981). Some quotations from published works on British Coleoptera are given below. Unfortunately the localities for old published records are often vague, making it impossible to determine exact locations.

Stephens, J.F. 1839

No reference is made to *L. poecilus* in this publication.

Hamlet Clark 1855

L. Poecilus was recorded (as *L. variegatus*) in the *Zoologist.*

Newman, E. 1860

A note appeared in the *Zoologist* on its occurrence in the south of England, based on specimens received from Hamlet Clark.

Crotch, G.R. 1863

This is the first mention of *L. poecilus* (as *L. variegatus*) in a catalogue of British Coleoptera.

Cox, H.E. 1874

Although Cox may have underestimated the rarity of *L. poecilus* in England, his statement (under the name *L. variegatus*, Germ.) of 'Not uncommon' may merely indicate just how serious a decline has taken place over the past 125 years.

Wood, T. 1885

The first Kent record was included in a long list of Coleoptera from East Kent. An extract from the note is given below:

> '*Coleoptera in Thanet.*— Besides those *Coleoptera* which I have already recorded from this neighbourhood, I have met, during the present year, with several species of greater or less rarity, of which the following seem worthy of notice :— ..... *Laccophilus variegatus*, Birchington, sparingly; ..... —Theodore Wood, Freeman Lodge, S. Peter's, Kent: *November 5th*, 1885.'

Fowler, W.W. 1887

Fowler (1887) states (under the name *L. variegatus*, Germ.):

> 'Local; apparently confined to the south-eastern parts of England;, Dover, Pevensey, Deal, Pegwell Bay, Arundel &c.; it is a rare species on the Continent, and does not extend further north than the south of England'.

Bloomfield, E.N. (Ed.) 1888

This gives a record by E. Saunders for Bulverhythe near Hastings, East Sussex and the same record is repeated by Bennett (1910). According to Foster (1972), this is the first recorded occurrence in the vice county.

Esam, W.W. 1897

An extract from a note in which *L. poecilus* was recorded (as *L. variegatus*) is given below:

> 'Coleoptera in the Hastings district.— The following are among the most noteworthy *Coleoptera* taken in the Hastings district during a fairly successful season ..... In the Eastbourne district, a few *Cryptocephalus bilineatus,* and one *Aphanisticus pusillus* occurred in an old chalk quarry, and from ditches I got a number of *Scirtes orbicularis*, about thirty *Laccophilus variegatus*, and one *Bagous nodulosus*, with a good many *Donacia dentata* and *bidens*, in July, and in September four *L. variegatus* and nine *Hydrophilus piceus* ..... —W. W. Esam, Eagle House, St. Leonard's: *November 13th*, 1896.'

Esam, W.W. 1898

An extract from a note in which *L. poecilus* is recorded (as *L. variegatus*) is given below:

> 'Captures of Coleoptera, &c., during the past season in the vicinity of Hastings.— ..... In July *Rhinoncus inconspectus* was fairly abundant on *Polygonum persicaria*, with one or two *Hypera pollux* at Pevensey, where also a few *Laccophilus variegatus* occurred ..... — W. W. Esam, Eagle House, St. Leonard's: *December 3rd*, 1897.'

Esam, W.W. 1902

An extract from a note in which *L. poecilus* is recorded (as *L. variegatus*) is given below:

> 'Coleoptera in the neighbourhood of Hastings— ..... while among some miscellaneous *Hydropori* in one of my boxes I found, this summer, a single specimen of *H. marginatus*, labelled "Winchelsea, June, '96." On reference to my note-book I find it must have been taken about June 18th, but as I visited a good many ditches in search of *Coccidula scutellata*, which I used to take in a water net, I do not know the exact locality. The one visit I was able to make this year in search of it was fruitless, as far as the object of my search was concerned, but resulted in my turning up *Laccophilus variegatus* again. I had previously taken this only at Pevensey. ..... —W. W. Esam, Eagle House, St. Leonard's: *December 9th*, 1901.'

Fowler, W.W. 1905

The Sussex VCH List entry for *L. poecilus* (as *L. variegatus*) states: 'Bulverithe, [= Bulverhythe] Lewes, Pevensey'.

Bayford, E.G. 1907

L. poecilus was recorded in 1907 (as *L. variegatus*) in a list of Coleoptera which formed part of 'The Natural History of Thorne Waste'.

Fowler, W.W. 1908

The Kent VCH List entry for *L. poecilus* (as *L. variegatus*) states: 'Extremely local; Pegwell Bay, Deal, Dover'.

Bennett, W.H. 1910

The entry for *L. poecilus* (as *L. variegatus* Germ.) in 'The Coleoptera of the Hastings district' states: 'Rare; taken at Bulverhythe by the late Edward Saunders.'

Joy, N.H. 1932

The brief entry accurately describes the known distribution as: 'Eng. S., E.; vl.' [England, South & East, very local].

Balfour-Browne, F. 1940

L. poecilus is recorded (as *L. variegatus*) from: South West Yorks, E. Kent, E. Sussex, W. Sussex and S. Hants. For E. Kent, 'near Deal' is given as the locality. The New Forest records are all considered by Balfour-Browne to be from Lymington Salterns. However, Foster (1981) has questioned the validity of all South Hampshire records apart from those by H. Moncreaf from the Isle of Portsea.

Bunting, W. 1955

Bunting published the following note:

> '*Water Beetles at Thorne, Yorkshire.* —The following records of water beetles captured at Thorne, Yorkshire (vice-county 63) have been confirmed by Prof. F. Balfour-Browne and are additional to the list previously published (*antea*, p. 142): *Noterus sparsus* Marsh., *Laccophilus variegatus* Germ., *Hydroporus incognitus* Sharp, *H. nigrita* F., *H. longulus* Muls., *Rhantus exsoletus* Forst. *Enochrus quadripunctatus* Herbst and *E. coarctatus* Gredl. The record of *L. variegatus* confirms that of E. G. Bayford who recorded this species from Thorne in 1907 (*cf.* Balfour-Browne, 1940, *British Water Beetles*, 1: 181), and this, I believe, is the only previous northern record. *H. longulus* was taken in a peat pool on Thorne Moors. —Wm. Bunting, c/o 72 Kirton Lane, Thorne, via Doncaster: *November 10th* 1954.'

Foster, G.N. 1972

The following passage is copied from Foster's paper (the numbers on the bottom line are TQ grid references, those in italics indicating pre-1930 records):

> '*L. variegatus* Germar. First recorded at Bulverithe (Bloomfield, 1888) by E. Saunders (Bennett, 1910), there have been no further records from that area, but Esam (1897; 1898; 1902) found it on the Pevensey Levels and at Winchelsea. Although it was often recorded from Pevensey thereafter, it has not been found there since 1938. Tottenham recorded it at Pett in 1921, but, here again, there are no later records. Fowler, 1905 gave the first record for Lewes, and there are several records from the area just south of Lewes up until 1965, when I found five specimens in a ditch on the gault by the priory. It has never been found in the Rye-Camber area.
> *81*, *91*, 40, 60, *70*.'

Hodge, P.J. 1978

The following note includes some recent Lewes records:

> 'TWO RARE WATER BEETLES ON THE LEWES LEVELS, EAST SUSSEX
>
> *Laccophilus variegatus* used to be found in several localities in East Sussex, there being records for Bulverhythe, Winchelsea and Pett; but there are no recent records for any of these areas. Fowler (1905) recorded it from Lewes, where it has been found periodically up to the present time. The site occupied by this species at Lewes is just south of the town, between the Priory and Rise Farm. Since 1975, the area has been disturbed by construction work on a new bypass, and there was a time when I had fears for the future of *Laccophilus variegatus* in this area. However, I need have had no doubts as to its continued occurrence, indeed it seems to be flourishing in several adjacent dykes. A complete list of my captures is as follows:- 9th October 1976 (one), 20th November 1976, (two), 13th February 1977 (one), 6th March (one), 19th March 1977 (several). On the last occasion, I could probably have taken more than a dozen specimens in the grassy margin of a short stretch of a dyke. The fact that all my records are for the winter and early spring only illustrates the time of year when I have collected aquatic Coleoptera most in the Lewes district. Very few expeditions to this part of the Lewes Levels since 1975 have failed to reveal at least one example of the species.
>
> [A short paragraph on *Hydrovatus clypealis* is not relevant to this report and has been omitted.]
>
> 8, Harvard Road, Ringmer, Lewes, East Sussex BN8 5HJ. Received 28th November 1977'

Foster, G.N. 1981

The following text is written opposite the distribution map:

> '*Laccophilus variegatus*
>
> There are modern records for the Lewes Levels, for Canterbury and for southern Yorkshire. It is very odd that Balfour-Browne (1940, p. 181) mentioned "several" records for South Hants "from 1856, when Power took the species, to 1904, when Donisthorpe recorded it" because I cannot locate any such records in his files. The only Hampshire record is for the Isle of Portsea in H. Moncreaf's manuscript list for 1840-1880, lent to Balfour-Browne in 1911. Girling (1976) has detected many fragments of *L. variegatus* in post-glacial deposits in the Abbot's Way, Somerset (+), well outside the modern range of the species.'

Skidmore, P., Limbert, M. & Eversham, B.C. 1985

The entry on page 132 reads:

> '*L. variegatus* (Germ.) S3 1970'
> where: S = national rarity with southern distributional range.
> 3 = estuarine.
> 1970 = the year of the most recent record.

Shirt, D.B. (Ed.) 1987

The entry in the Insect Red data Book reads:

> **'Distribution** In south-east England and the lHumber valley, with modern records only for the Lewes Levels, East Sussex. Small isolated populations. For map see Foster (1981).
>
> **Status** There are old records for south-east Yorkshire, east Kent, East and West Sussex and south Hampshire. There are few substantiated modern records. The beetle was rediscovered on Thorne Waste (South Yorkshire) in the 1950s. There is a single record from Canterbury (Kent) in 1958, and a single record for the Pevensey Levels (East Sussex) in 1972. The only site with a number of modern records is the northern end of the Lewes Levels'.

Friday, L.E. 1988

In the section entitled 'Species checklist, distribution & habitat notes' (pp. 147-151) the entry for *L. poecilus* (as *L. obsoletus* Westhoff) reads '[ne] coastal ponds and weedy ditches'. [This implies that it is a rare species, found in the two distribution zones 'Northern England' and 'South-eastern England, including East Anglia'. The distribution code letters appear to have been incorrectly interpreted by Duff (1993) - see below.]

Duff, A.G. 1993

A brief summary of British and county status, with three sub-fossil records for Somerset, are given as follows:

> 'Resident, sub-fossil records only and probably extinct [in Somerset]. Fairly widespread in N & E. Britain, in lakes and ponds.
>
> ST44: Meare Hth, Bronze Age (MAG); Shapwick Hth, †Neolithic (MAG); Westhay Level, †Neolithic (MAG)'

[The national distribution quoted by Duff is clearly incorrect and is evidently due to a misinterpretation of the distribution symbols used by Friday (1988) - see above.]

Hodge, P.J. 1998

A published note in the report of exhibits at the annual British Entomological and Natural History Society (BENHS) exhibition on 2nd November 1996 includes *L. poecilus* (as *L. ponticus*) and reads as follows:

> 'Hodge, P. J.—Nineteen species of Coleoptera, including one which has not previously been recorded in Britain. *Laccophilus ponticus* Westhoff (Dytiscidae, Lewes Brooks, East Sussex, TQ4009, 16.vii.1996, one male in the Celery Sewer; ..... '

Appendix 5. Records from Lewes since 1975

L. poecilus at Lewes Brooks SSSI from 1976 to 1998: extracts from P. J. Hodge diaries

I made my first water beetle studies in May 1976 and I first visited the Lewes Brooks to collect water beetles in October 1976. It is therefore somewhat surprising to note that, as a novice, I found my first specimen of *L. poecilus* on my second visit to the site, on 9 Oct.1976, (the first visit was on 3 Oct. 1976, when I worked the Cockshut stream, not the ditches on the grazing marshes).

Having located *L. poecilus* so casually, it is thought unlikely I that the species was restricted to just one small area, and it may even have been fairly widespread within the current SSSI boundary. Alas, it is now too late to record its former range at Lewes, but because I never found it at Southease, two miles away, it is likely that, even in the 1970's, its distribution was confined to the northern half of the Lewes Brooks.

Unfortunately, records of the precise ditch locations where *L. poecilus* was found in 1976/77 were not made and therefore the grid references given below are based on memory. However, all relevant information on my personal searches for aquatic Coleoptera within the northern half of the Lewes Brooks SSSI have been extracted from my diaries and this is reproduced below. The most recent (1996 onwards) entries relate to occasions when I have found *L. poecilus*, but the results for all recent visits are recorded in Appendices 1 and 2.

1. 9 Oct.1976. Seven species of water beetles recorded, including at least one specimen of *L. poecilus* (as *L. variegatus*) from 'Southover Marshes, Lewes, fishing in dyke'. The site is thought to have been Ditch 7 (TQ411092).

   [A mysterious record for *Hydrochus elongatus* (agg.), has crept into the Lewes Brooks records (Hicklin, 1986). It is thought to have been found on 9 Oct.1976, but for some obscure reason, there is no specimen in my collection, neither did I make a diary entry for that species, although I do vaguely remember finding a specimen, probably in Ditch 7. Certainly the record must have still been fresh in my mind when I passed the record to NCC in 1983 for the proposed SSSI notification. This is still the only record for any *Hydrochus* species in the lower Ouse valley, south of Lewes].

2. 20 Nov.1976. My dairy heading reads 'Lewes, near Rise Farm, in dykes' and seven species of water beetles, including two *L. poecilus*, were recorded. The location was almost certainly Ditch 61a, the ditch that connects Rise Farm Sewer to the Cockshut Stream. In 1976, before engineering work on the Lewes bypass has commenced, this ditch was much longer. The northern half now consists of a culvert, running beneath the by-pass. This ditch was not numbered by Hicklin (1986), in fact it is not marked on his map as a watercourse so I have allocated a new number (Ditch 61a) for this ditch, which still holds a substantial amount of water.

3. 29 Jan.1977. Six species of water beetles (but no *L. poecilus*) recorded from 'Southover Levels, Lewes'.

4. 13 Feb.1977. Eight species of water beetles were recorded, including at least one specimen of *L. poecilus*, from 'Lewes, near The Rise'. The location is thought to be either Ditch 61a or Ditch 61 (Rise Farm Sewer).

5. 6 March 1977. Ten species of water beetles were recorded, including at one specimen of *L. poecilus*, from 'a dyke near Rise Farm'. This is also thought to be either Ditch 61a or Ditch 61 (Rise Farm Sewer).

6. 19 March 1977. Fourteen species of water beetles were recorded, including several specimens of *L. poecilus*, from 'Lewes, Southover, in dyke'. This is also thought to be either Ditch 61a or Ditch 61 (Rise Farm Sewer).

7. 9 Oct.1977. Seven species of water beetles (but no *L. poecilus*) were recorded from 'Lewes, Southover, in dykes near the Rise'.

6. Jan.1978. Twelve species of water beetles, including two *L. poecilus*, were recorded from 'Lewes marshes, Southover, in dyke'. This is also thought to be either Ditch 61a or Ditch 61 (Rise Farm Sewer).

7. 26 July 1983. Four species of water beetles, including several *L. poecilus* and the Nationally Scarce Category A (Na) *Hydrovatus clypealis*, were recorded in a sample from Ditch 92, east of Pool Bar Wall during an assessment for the proposed SSSI notification with Dr Ian McClean.

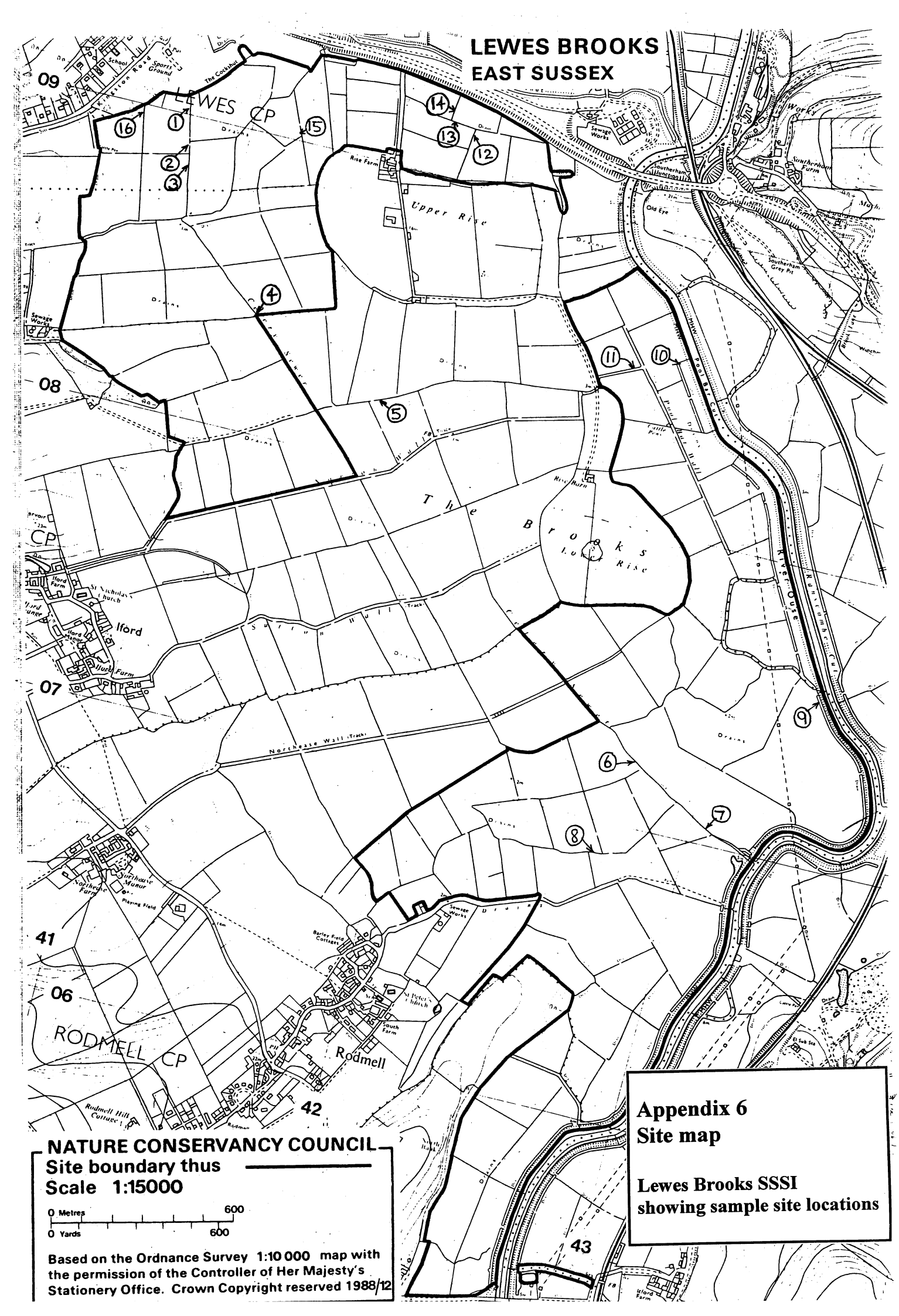
8. 16 July 1996. Three species of water beetles, including one specimen of *L. poecilus*, were recorded from Ditch 5 Celery Sewer, in a small sample taken whilst helping Dr Martin Willing with an aquatic mollusc survey.

8. 20 Feb.1998. 34 species of water beetles, including two specimens of *L. poecilus*, were recorded from Ditch 5 Celery Sewer.

10. 30 Aug.1998. 27 species of water beetles, including one specimen of *L. poecilus*, were recorded from Ditch 5 Celery Sewer.

Appendix 6.
Site map

Lewes Brooks SSSI
showing sample site locations



NATURE CONSERVANCY COUNCIL

Site boundary thus ——

Scale 1:15000

0 Metres 600

0 Yards 600

Appendix 6
Site map

Lewes Brooks SSSI showing sample site locations