4.4 West Midlands Region

4.4.1 Data sources

The following sources were used for data abstraction:

Cheshire 1983-84 Phase 1 survey

Shropshire 1978-79 Phase 1 survey

Hereford and Worcester Phase 1 surveys of pre-1974 Herefordshire (1977) and pre-1974 Worcestershire (1976-78)

Gloucestershire 1976-77 Phase 1 survey

Warwickshire 1981-82 partial Phase 1 survey

West Midlands 1985-88 Phase 1 surveys of Birmingham, Dudley, Sandwell, Walsall and Wolverhampton MDs; Coventry MD (1982-83) plus updated data for area

Staffordshire 1979 Phase 1 survey and 1992 1:10,000 colour air photos (English Nature)

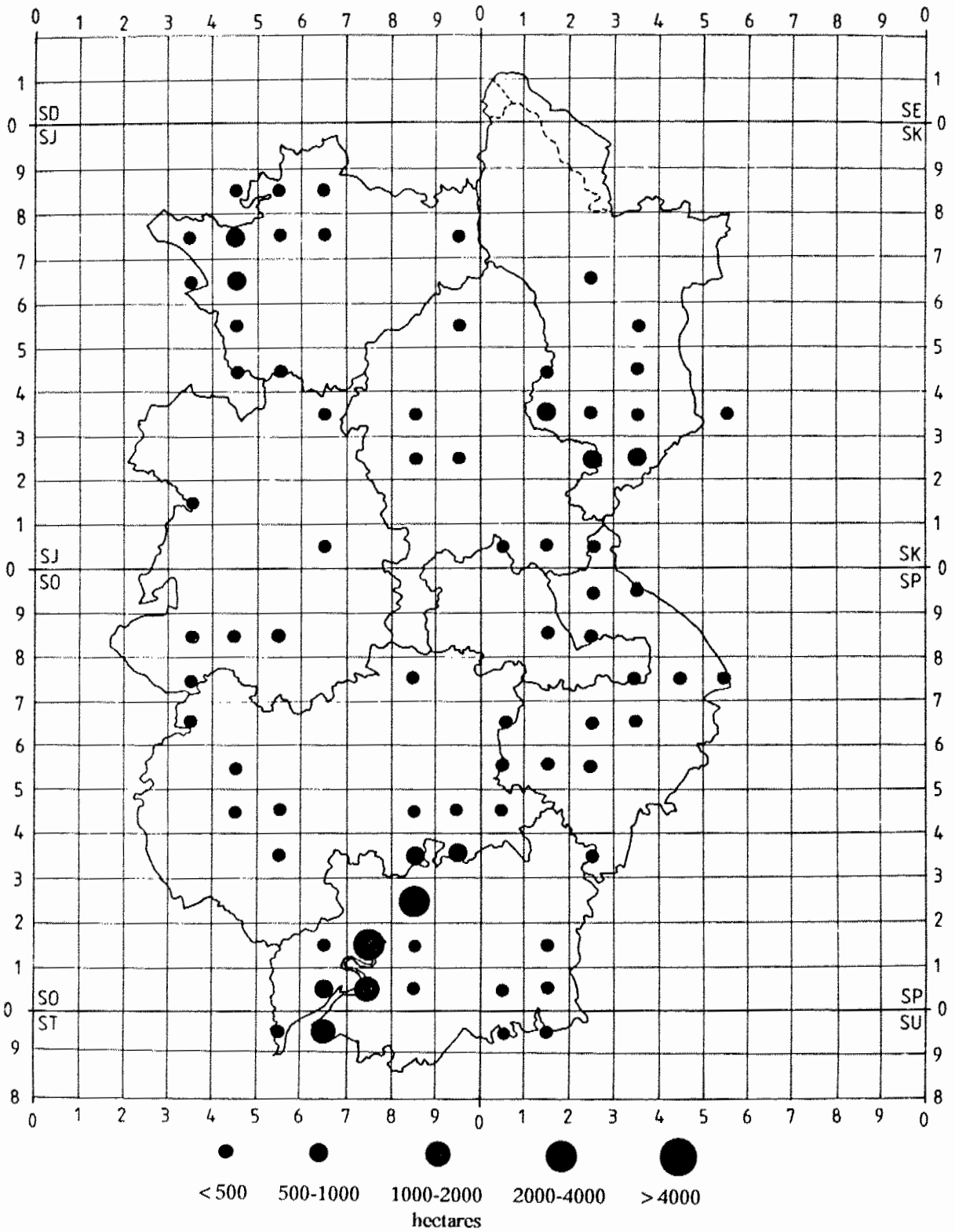
Derbyshire 1982-83 Phase 1 survey (outside Peak District National Park) and 1983-88 partial Phase 1 survey of Peak District National Park.

4.4.2 Distribution and soil relationships

A large proportion of West Midlands Region (Warwickshire, Shropshire, Hereford and Worcester) has inadequate grassland distribution data based only on the location of unimproved grassland at the time of early (late 70s) Phase 1-type surveys. Grassland distribution and quantity is thus probably much more widespread than that mapped (Figure 4.6), a fact corroborated by a doubling of 10 km square records for Staffordshire based on air photo interpretation. For counties with possible full data sets there is a widespread distribution which is strongly concentrated on the lower Severn in Gloucestershire and in more central areas in the valleys of the Trent and its major tributaries (Tame, Dove). Very large blocks are confined to the Severn but some Trent and Tame cases are also sizeable and are among the largest of river alluvium blocks in England. Associations with soil parent materials are given in Figure 4.7. Staffordshire data does not include changes introduced by air photo interpretation (see 3.2.1) and underestimated county areas (Staffordshire, Shropshire, Warwickshire, Hereford and Worcester) contrast strongly with Cheshire, Derbyshire and the dominant Gloucestershire. For a region with only a small extent of coastline there is naturally little marine alluvium and river alluvium is the major parent material. Mixed soils including both marine and river materials are extensive in Gloucestershire. Small unmapped grassland blocks were relatively common in a few areas and this is the normal form of occurrence in the area around the Birmingham - Coventry conurbation. The West Midlands Urban Wildlife Trust cited several examples of small sites of great value in an urban context: King's Hayes Farm (3.5 ha) SK055027, Peak Rise (3 ha) SO874996), Wychall Road (2.8 ha) SP034792.

4.4.3 Data evaluation and adjustment

Most surveys for this region are old and grassland loss is likely to be important. Rates of loss close to those established for Staffordshire are used for adjusting the data of other counties in this region, apart from West Midlands where more effective control might be reflected in a lower rate of loss. Underestimated improved and semi-improved grassland extent is also important for the counties cited above and in the case of Staffordshire proved to be 4.6 times as extensive as mapped unimproved types (see section 3.2.1). The value of 3.6 is used as a multiplier to provide a 'guesstimate' of total grassland area from unimproved values. The Warwickshire Phase 1 survey covered only half the county and all areas for this case need doubling.



Grid lines are spaced at 10 km intervals

Figure 4.6 Distribution of lowland wet grassland in 10 km squares of West Midlands Region.

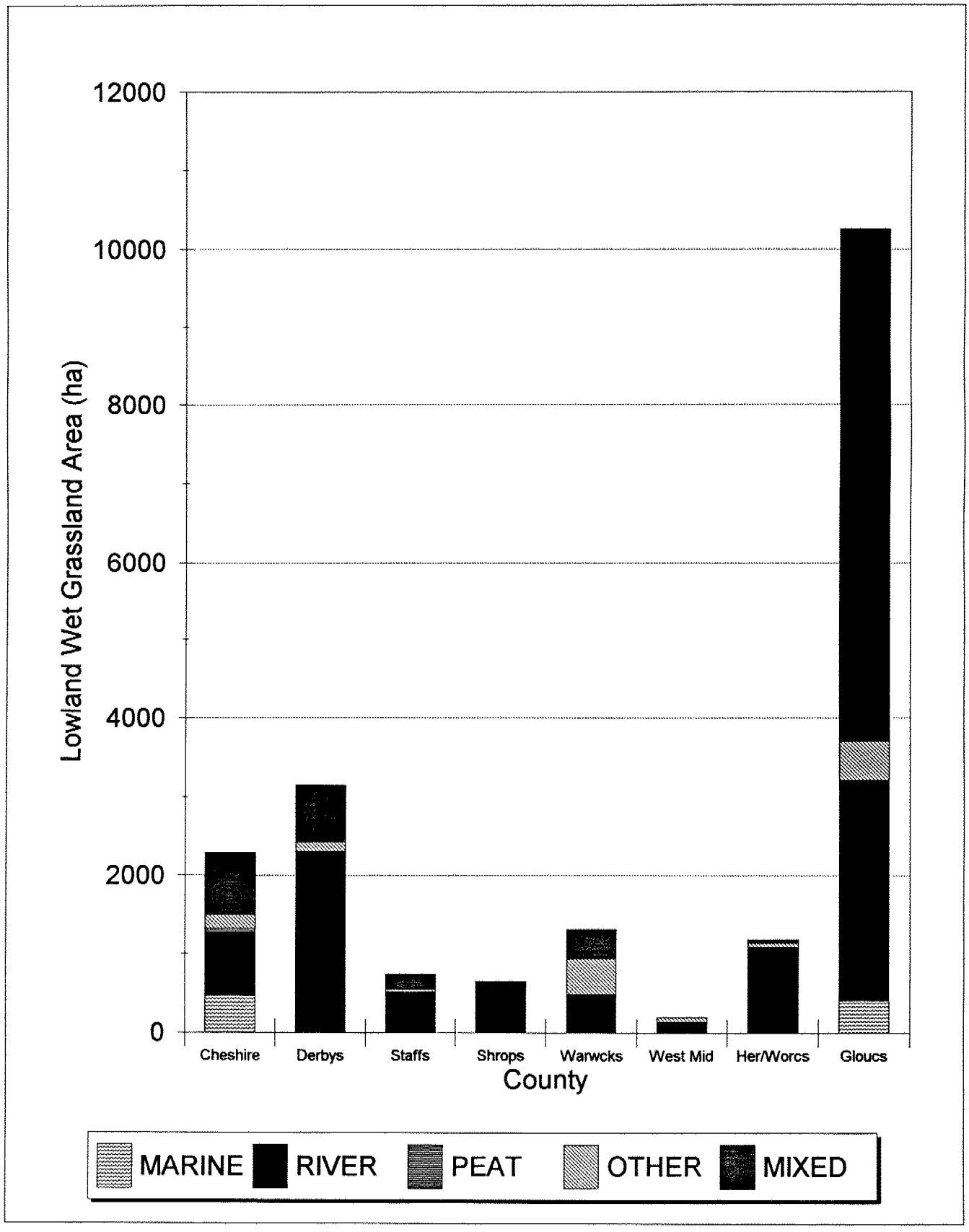


Figure 4.7 Soil parent material of lowland wet grassland in counties of West Midlands Region. Source: Table 4.1 and Annex 1.

4.4.3 continued

	Median Survey Date	Annual Loss Rate	Estimated Total Loss	Underestimated Extent (ha)
Cheshire	1984	1.5%	12%	-
Shropshire	1979	1.5%	19.5%	2354 (654 x 3.6)
Hereford/Worcester	1977	1.5%	22.5%	4255 (1182 x 3.6)
Gloucestershire	1977	1.5%	22.5%	-
Warwickshire	1982	1.5%	15%	2622 (1311 x 2)
West Midlands	1988	0.5%	2%	-
Staffordshire	1992	1.4%	0%	0%
Derbyshire	1983	1.5%	13.5%	-

Results (Table 4.2) alter total values for West Midlands considerably, especially for Hereford and Worcester. Most of the increase in the region will be for grassland upon river alluvium and figures for this soil type in Table 4.1 must be regarded as underestimates in West Midlands.

4.5 East Region

4.5.1 Data sources

The following sources were used for data abstraction:

Essex 1987-92 (ongoing) Phase 1 survey

Suffolk 1983-86 Countryside Survey

Norfolk 1988-89 Phase 2 ditch surveys (Reid *et al.* 1989), SSSI habitat maps, 1990-1991 Broads ditch vegetation map at 1:50,000 scale (author C. Doarkes) and 1988 BKS 1:10000 colour air photos (including photo-interpreted habitat map of River Wensum by Norfolk County Council) - no information available for southwestern Norfolk areas within Fenland

Hertfordshire 1985-86 partial Phase 1 survey

Bedfordshire 1987-88 Phase 1 survey

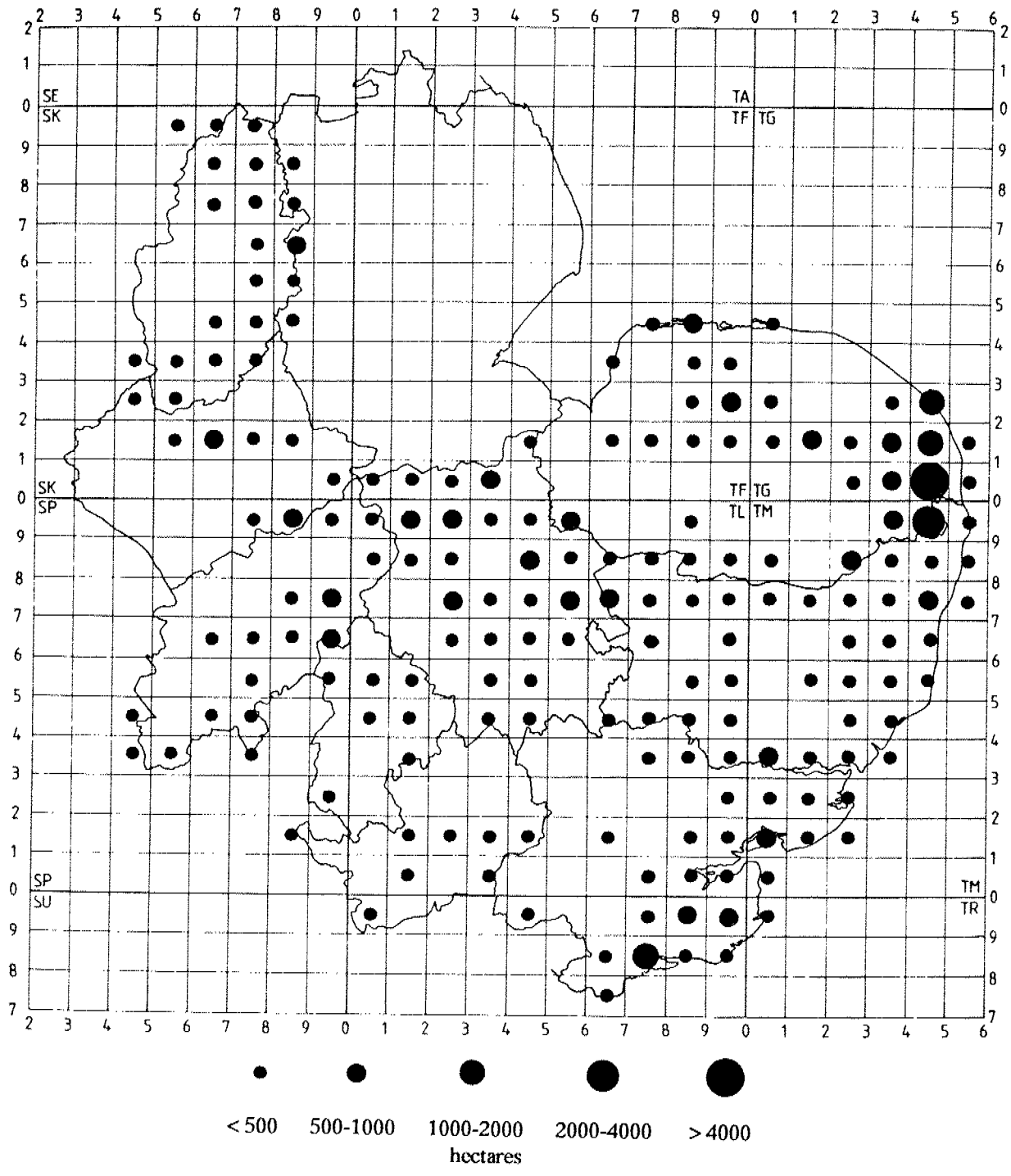
Northamptonshire 1978-80 Phase 1 survey, including Peterborough District of Cambridgeshire

Leicestershire 1979-91 Phase 1 surveys

Nottinghamshire 1986-89 Phase 1 survey

Cambridgeshire partial 1992 Phase 1 survey, 1988 land use maps based on air photos, Cambridgeshire Green Belt Strategy, 1978-80 Peterborough Soke survey

Lincolnshire - no suitable sources available at Phase 1, Phase 2 or as air photos



Grid lines are spaced at 10 km intervals

Figure 4.8 Distribution of lowland wet grassland in 10 km squares of East Region

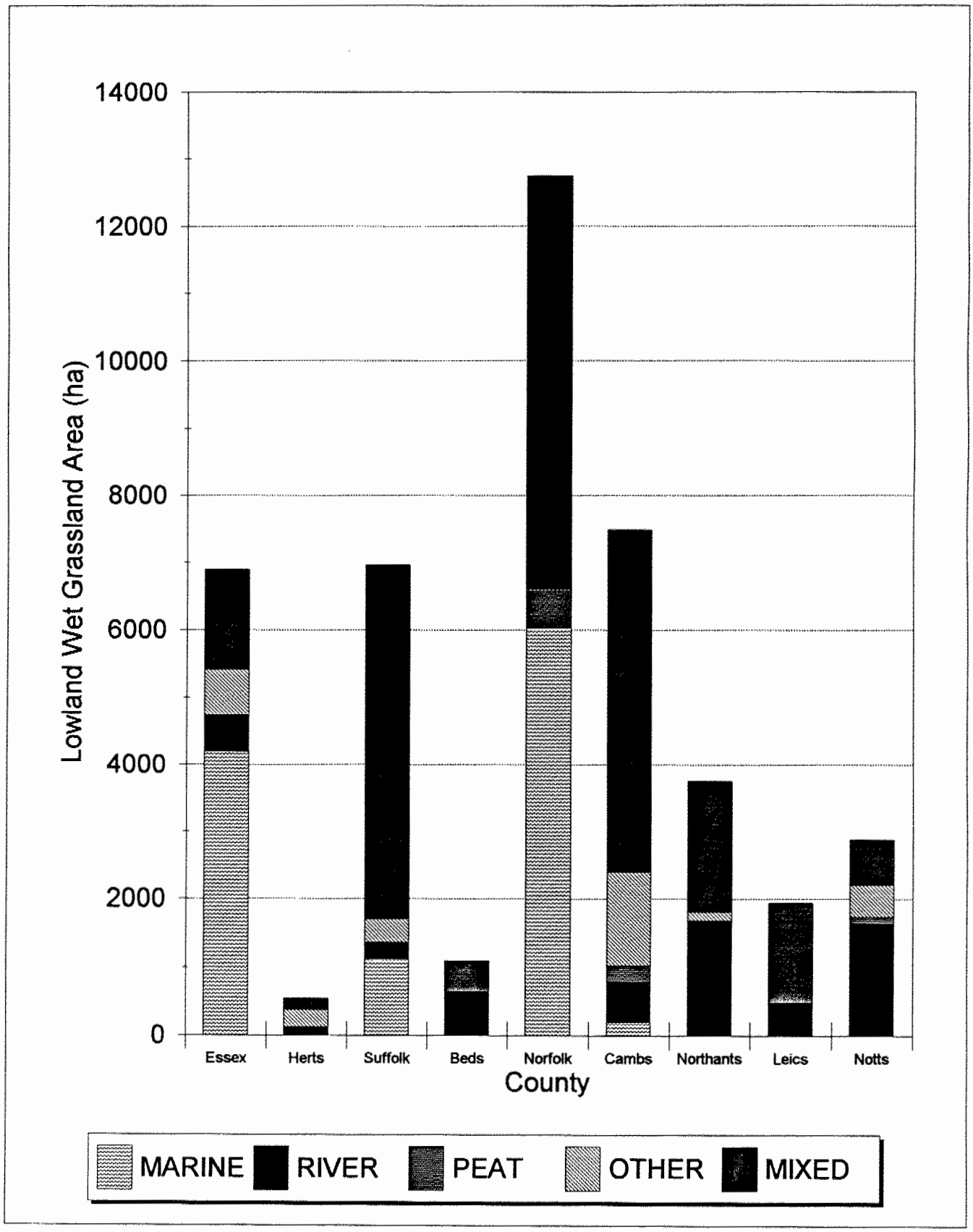


Figure 4.9 Soil parent material of lowland wet grassland in counties of East Region. Source: Table 4.1 and Annex 1.

4.5.2 Distribution and soil relationships

Lowland wet grassland is very widespread (Figure 4.8) in East Region (ignoring its absence from Lincolnshire due to lack of data) and only shows restriction in Leicestershire, Northamptonshire, Bedfordshire and Hertfordshire (in the latter it is underepresented by at least 60% due to partial survey). Large tracts are found in Broadlands (and to a lesser extent Fenland) and these are also associated with extensive transitions from marine alluvium to river alluvium and peat, recorded as large areas of grassland with mixed soils (Figure 4.9). These areas include the very large block of the Halvergate Marshes, perhaps the finest coastal grazing marsh in Britain, replete with extensive transitions to freshwater ditches. Marine alluvium is common in East Anglia, especially in Essex and Norfolk but elsewhere is only found in Cambridgeshire (and Lincolnshire too if data were available, perhaps extensively) where the bulk is made up by the distinctive Washes extending as a narrow belt inland from the Wash Estuary. Inland counties are mainly dominated by river alluvium and transitions to other river terrace types of soil. The Trent valley is the major source of river alluvium grassland but many smaller rivers are important (e.g. the Wensum in Norfolk). Peat is moderately extensive in Norfolk, less so in Cambridgeshire and Suffolk; it is also present in mixed soil groupings. Hertfordshire stands out as deficient in grassland, a result of only partial survey in South Hertfordshire. At least one large block on the border with Essex (Hunsdon Mead SSSI, TL419111) is documented (Seymour 1992) but is not mapped in the Hertfordshire survey.

4.5.3 Data evaluation and adjustment

Few counties have old surveys apart from Northamptonshire and loss adjustment is likely to be relatively small in most cases. High rates of loss probably exist in the Fenland counties (mainly West Norfolk, Cambridgeshire and Lincolnshire), following trends in Humberside, and this should be reflected in adjustments. Underestimated data apply to Hertfordshire and western sectors of Norfolk, plus all of Lincolnshire. Essex survey has yet to be completed in Uttlesford District but topography suggests that there is little or no lowland wet grassland >10 ha in extent in this area - no underestimate adjustment is needed.The following adjustments are therefore applied to East Region data:

	Median Survey Date	Annual Loss Rate	Estimated Total Loss	Underestimated Extent (ha)
Essex	1990	1.5%	3%	-
Suffolk	1984	1.5%	12%	-
Norfolk	1989	1.5%	4.5%	500 (guesstimate)
Hertfordshire	1985	1.5%	10.5%	800 (546 x 1.5)
Bedfordshire	1987	1.5%	7.5%	-
Northants	1979	1.5%	19.5%	-
Leicestershire	1991	1.5%	1.5%	-
Notts	1988	1.5%	6%	-
Cambridge	1988	4%	16%	-
Lincolnshire	-	4%?	-	7,500 (guesstimate)

4.6 South-West Region

4.6.1 Data sources

The following sources were used for data abstraction:
Avon 1987-89 Phase 1 survey
Somerset 1982 Phase 1 survey
Dorset 1982-83 Phase 1 survey
Devon 1983-84 Phase 1 survey, SSSI habitat maps
Cornwall 1983-84 Phase 1 survey

4.6.2 Distribution and soil relationships

Lowland wet grassland in Somerset dominates the resource in South-West Region (Figures 4.10 and 4.11). Very large individual blocks are present (with inliers of arable land, open water, heathland, woodland, etc.) and hence soil assemblages are made up of many types. Marine alluvium, river alluvium and peat are the common types (with peat forming *c.* 5% of all mixed area - it is not absent as inferred in Table 4.1). Marine alluvium is the dominant parent material in both Somerset and Avon, a feature which is also made unclear by the predominance of large blocks with mixed soils. The Somerset Levels contain the largest expanses by far of lowland wet grassland in Britain and equivalent grassland in Avon is also extensive on a national scale. This habitat is also widespread in Dorset but is more characteristic of river alluvium, especially in the valleys of the Frome and Stour. Such grassland becomes much rarer further west in Devon where the only large extents are in the valleys of the Axe and Exe. Only small fragments are found in Cornwall, with several small occurrences along the Devon/Cornwall boundary on the River Tamar. One block is also considered an example of Culm grassland (SW12) and suggests that a transition between these two forms of grassland is present.

4.6.3 Data evaluation and adjustment

Large parts of the Devon and Cornwall Phase 1 surveys lack information on arable, improved and semi-improved grassland, though virtually all areas of potential lowland wet grassland were marked. There was therefore no major underestimation of grassland extent in any county. Most surveys date from the early 1980s and loss adjustment is necessary. It is possible that conversion to arable land has been at a slower rate in Devon and Cornwall (due to the continued importance of pastoral farming) and this is reflected in the adjustments detailed below:

	Median Survey Date	Annual Loss Rate	Estimated Total Loss
Avon	1988	1.5%	6%
Somerset	1982	1.5%	15%
Dorset	1983	1.5%	13.5%
Devon	1984	0.5%	4%
Cornwall	1984	0.5%	4%

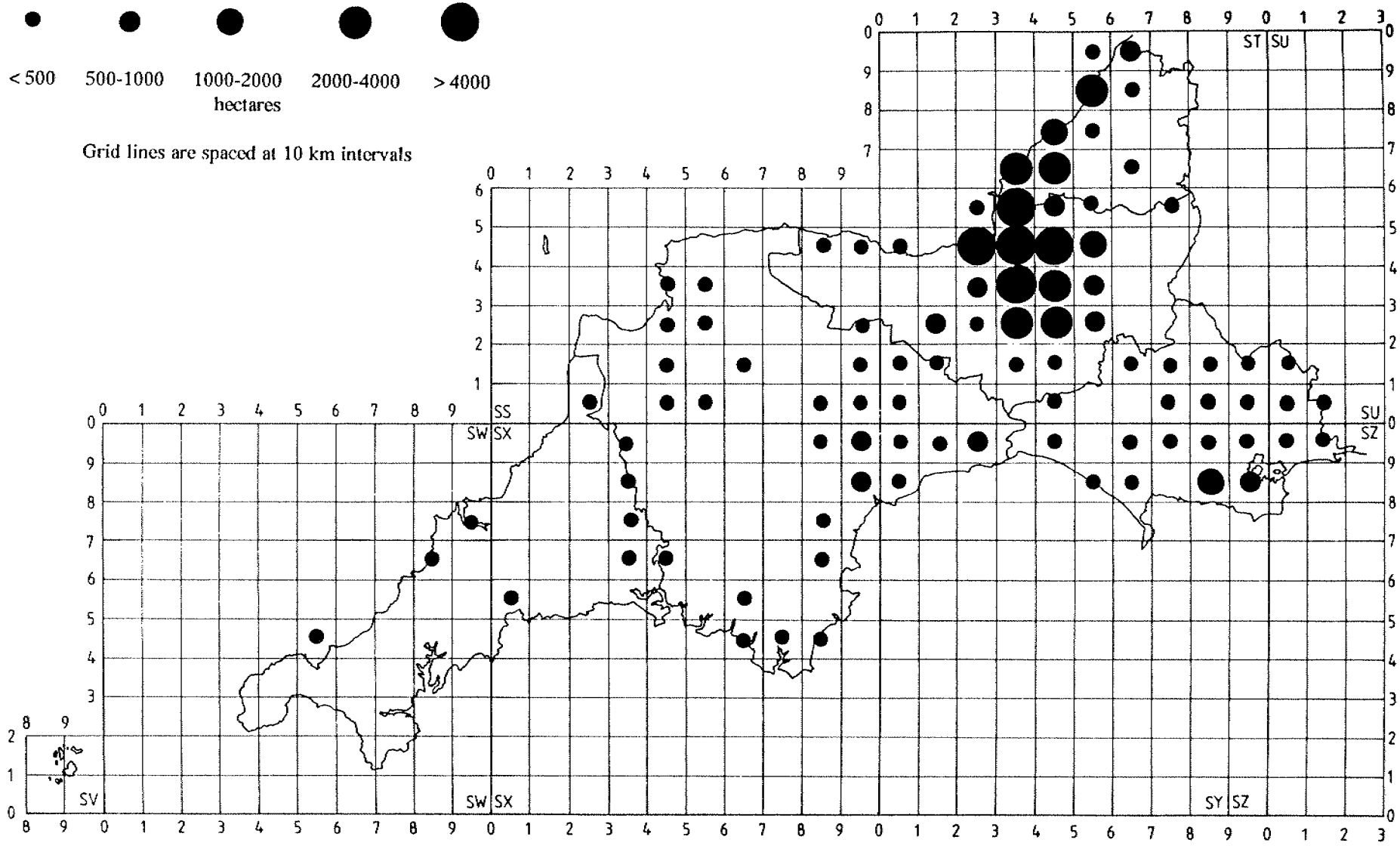


Figure 4.10 Distribution of lowland wet grassland in 10 km squares of South-West Region

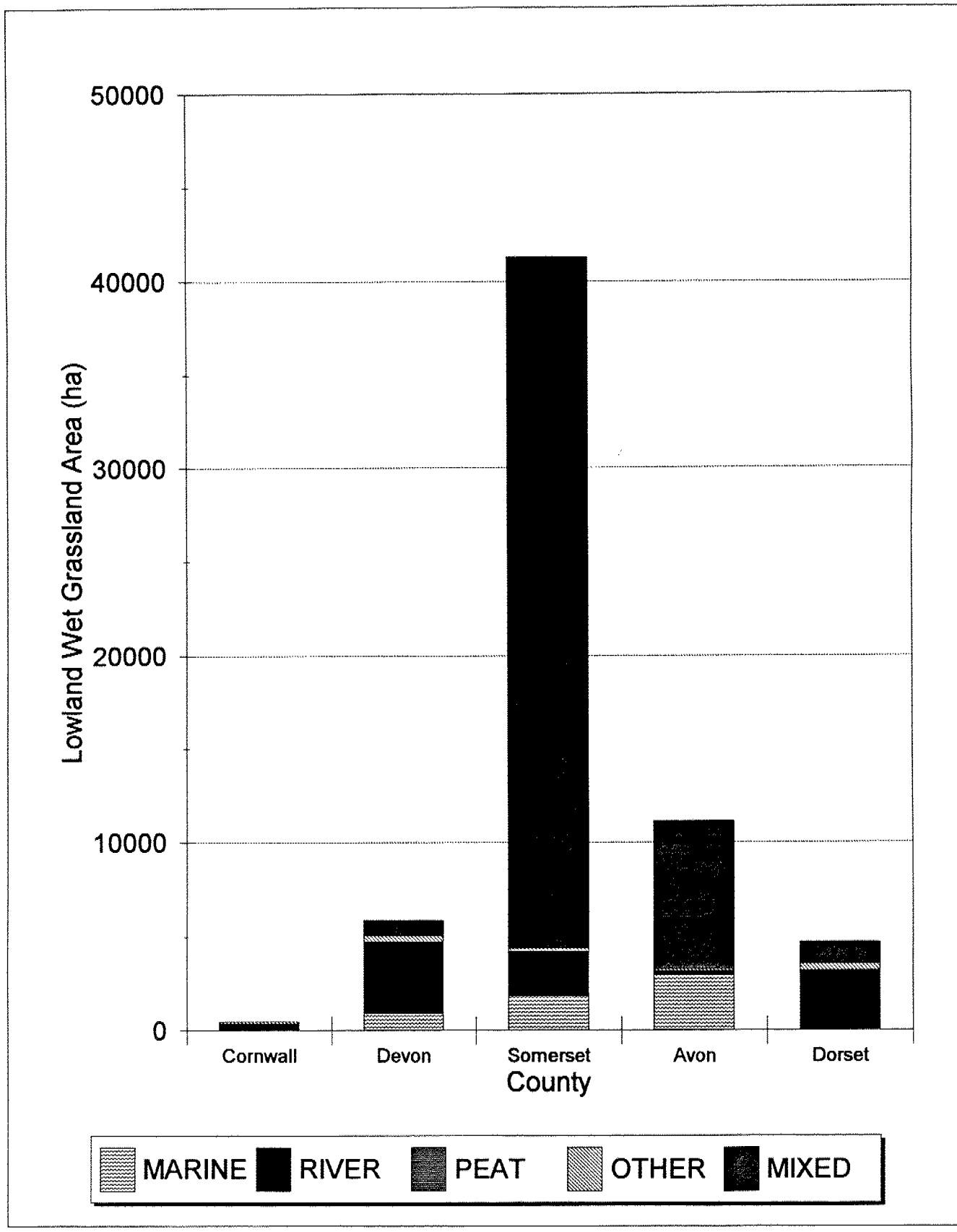


Figure 4.11 Soil parent material of lowland wet grassland in counties of South-West Region. Source: Table 4.1 and Annex 1.

4.7 South Region

4.7.1 Data sources

The following sources were used for data abstraction:

Hampshire 1990 partial Phase 1 survey of the Isle of Wight, 1991 1:10,000 colour air photos of Hampshire mainland, 1992 1:10,000 colour air photos of the Isle of Wight, SSSI habitat maps

Wiltshire 1991 1:10,000 colour air photos of southern Wiltshire, 1992 Phase 1 survey of northwest Wiltshire, SSSI habitat maps for northeast Wiltshire (Thamesdown).

Berkshire Stage 1 and Stage 2 BBONT surveys 1978-1986, SSSI habitat maps

Oxfordshire 1988-89 BBONT interpretation of 1983 colour air photos (some reservations on accuracy - Wyatt 1991), SSSI habitat maps

Buckinghamshire Stage 1 and Stage 2 BBONT surveys 1978-1986, SSSI habitat maps

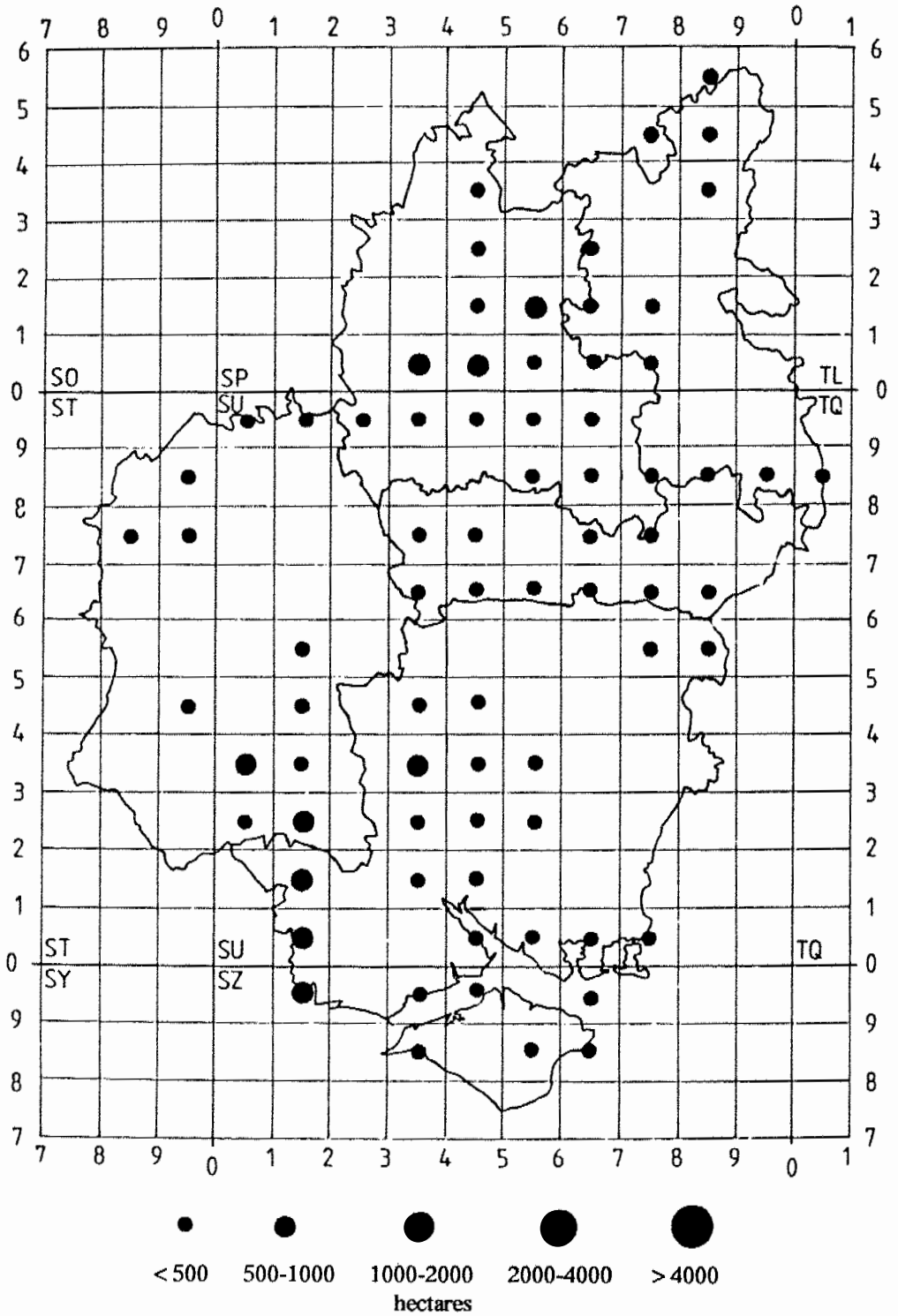
4.7.2 Distribution and soil relationships

Lowland wet grassland is widespread in South Region and is largely found on river alluvium. Hampshire is the only county with a coastline and has important quantities of coastal grazing marsh, with mixed soils common as a result of in blocks with transition to river alluvium and also in river alluvium/peat mosaics (peat extent is underestimated). The Avon, Test and Itchen valleys are shown clearly in Hampshire, with the Avon maintaining further large blocks into southern Wiltshire. Oxfordshire in particular (mainly in the Thames valley and associated tributaries) and Wiltshire are dominated by large areas of grassland on river alluvium, but both also have grassland on poorly drained clays representing wet meadows which are now very rare in Britain in an unimproved form. The extents for Berkshire and Buckinghamshire are major underestimates, the result of survey work concentrating only on prime sites and ignoring improved/semi-improved grassland.

4.7.3 Data evaluation and adjustment

Only unimproved grassland is mapped for Berkshire (1078 ha), Buckinghamshire (697 ha) and Thamesdown, Wiltshire (510 ha). These areas require an allowance for underestimation, to be based on the 3.6 multiplier derived from Staffordshire data (see section 3.2.1). Adjustment for loss over time is needed for several counties. It is difficult to state a date for Oxfordshire since the study was carried out in 1988-89 but used air photos dating from 1983. It is uncertain how much alteration to photo patterns was made as a result of field checking. There are doubts on the thoroughness of mapping (Wyatt 1991) due to a large number of errors in edge-checks and it is assumed here that information largely represents that on air photos (i.e. a date of 1983 is assumed for calculating loss). The adjustments used are as follows:

	Median Survey Date	Annual Loss Rate	Estimated Total Loss	Underestimated Extent (ha)
Hampshire	1992	-	-	-
Wiltshire	1992	-	-	1836 (Thamesdown)
Berkshire	1986	1.5%	9%	3881
Oxfordshire	1983	1.5%	13.5%	-
Bucks	1986	1.5%	9%	2509



Grid lines are spaced at 10 km intervals

Figure 4.12 Distribution of lowland wet grassland in 10 km squares of South Region.

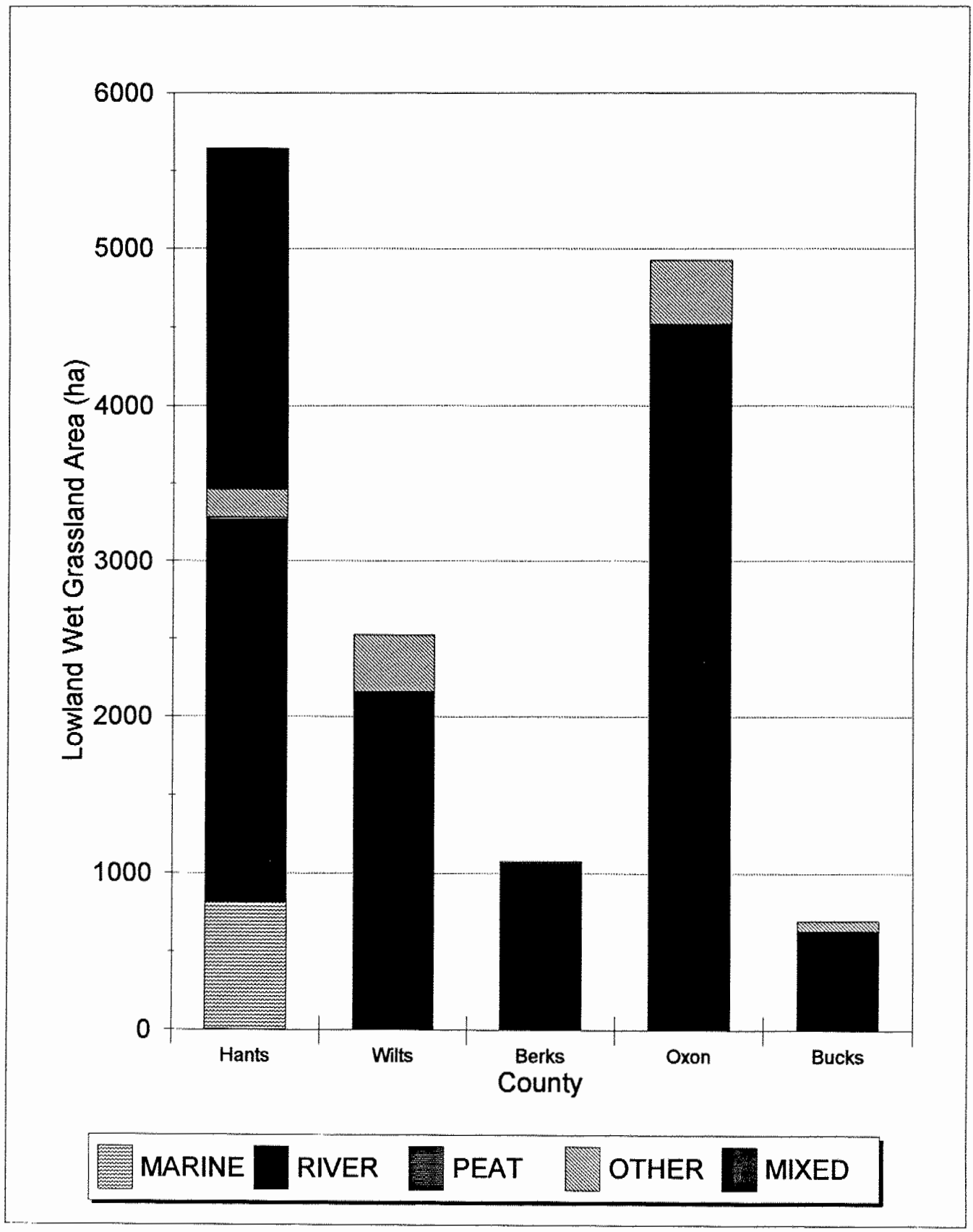


Figure 4.13 Soil parent materials of lowland wet grassland in counties of South Region. Source: Table 4.1 and Annex 1.

4.8 South-East Region

4.8.1 Data sources

The following sources were used in data abstraction:
Greater London 1985 Phase 1 survey
Surrey 1990-91 air photo interpretation by Surrey County Council
West Sussex 1981 air photo interpretation
East Susses 1989 air photo interpretation
Kent 1990-93 Phase 1 survey (ongoing, with no data for part of Romney/Walland Marsh, plus an area close to Tunbridge Wells)

4.8.2 Distribution and soil relationships

Most of the lowland wet grassland resource of South-East Region is restricted to Kent, East Sussex and West Sussex (Figures 4.14 and 4.15). Greater London has a few large remnants of coastal grazing marsh and Surrey has only one identified block (recorded from Berkshire data, not from Surrey data). Potential terrain for lowland wet grassland is very scarce in Surrey and Greater London due to residential and industrial development on restricted areas of river floodplain. Elsewhere marine alluvium is the dominant soil parent material, especially in Kent which has very large grazing marshes on its northern and southern coasts. Romney/Walland Marsh is highly fragmented and probably forms part of an arable/temporary ley rotation. The Pevensey Levels in East Sussex are also very large and contain a transition from marine to river materials. River alluvium is of restricted distribution in the region but is important in West and East Sussex where the valleys of the Cuckmere, Ouse, Adur and Arun contain much lowland wet grassland.

4.8.3 Data evaluation and adjustment

Unsurveyed areas of Kent require an allowance for underestimation of grassland area but all other counties have complete data. Adjustment for loss by conversion is required as follows:

	Median Survey Date	Annual Loss Rate	Estimated Total Loss	Underestimated Extent (ha)
Grt. London	1985	0.5%	3.5%	-
Surrey	1990	0.5%	1.0%	-
W. Sussex	1981	0.5%	5.5%	-
E. Sussex	1989	1.5%	4.5%	-
Kent	1991	1.5%	1.5%	500 ha (guesstimate)

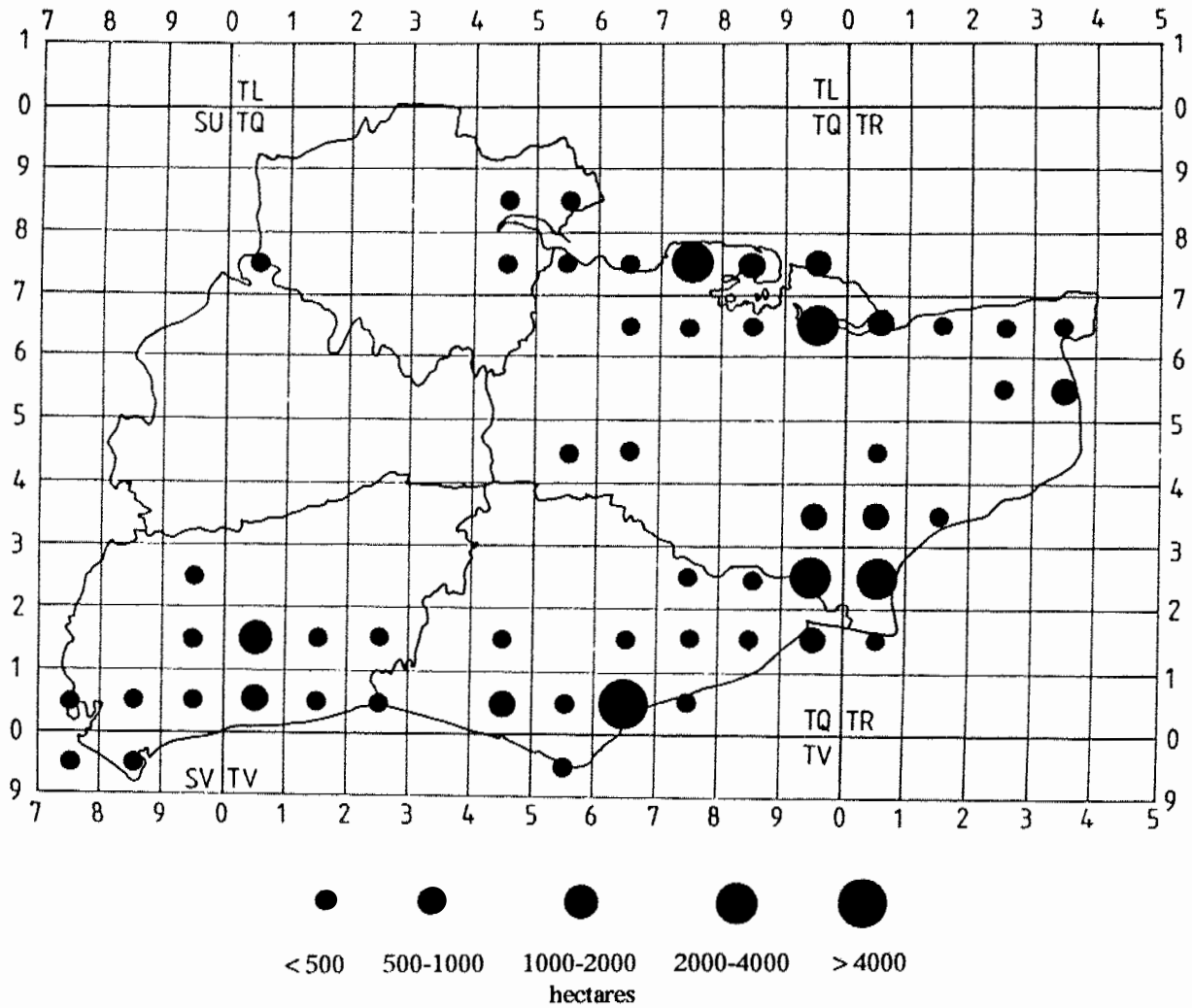


Figure 4.14 Distribution of lowland wet grassland in 10 km squares of South-East Region

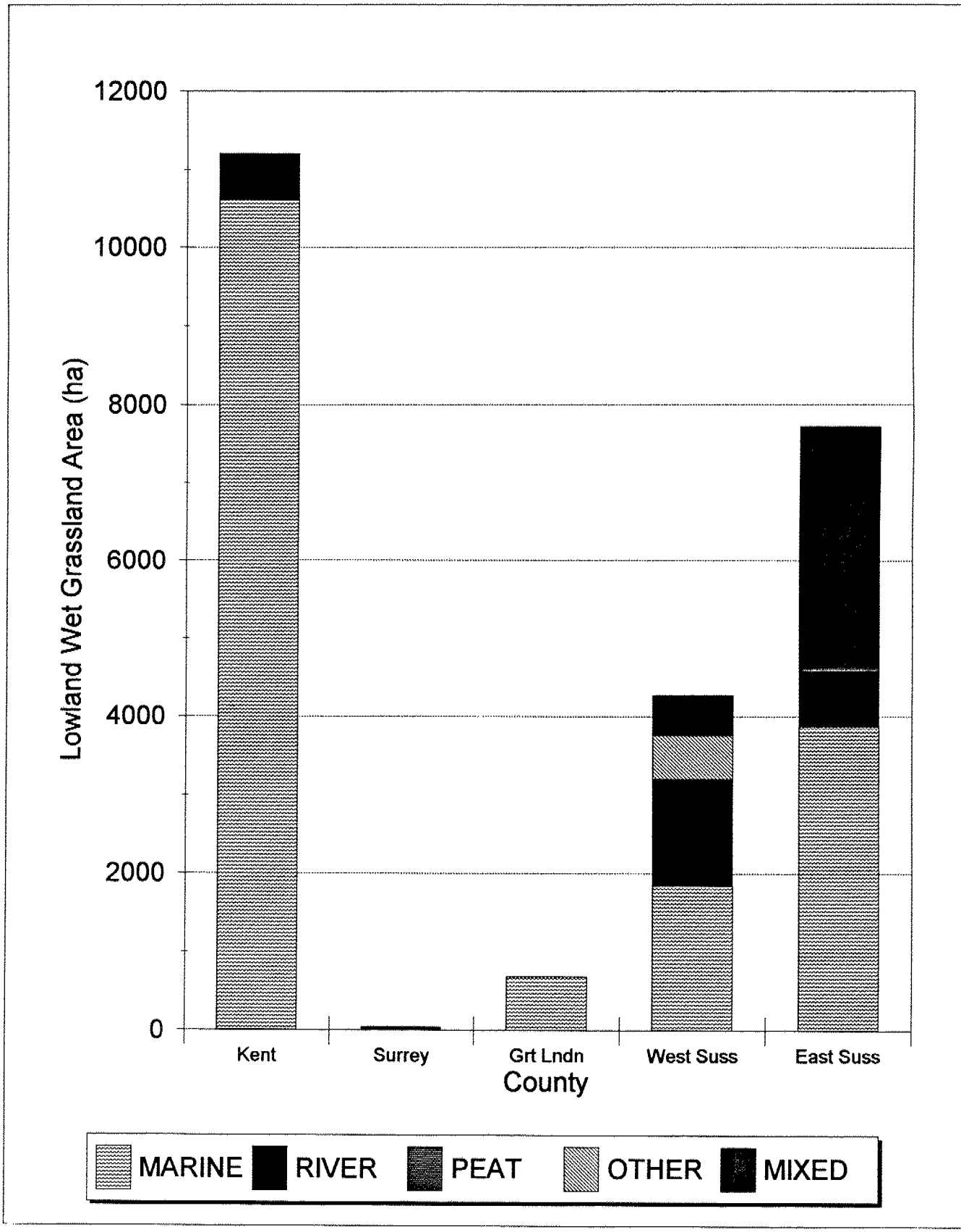


Figure 4.15 Soil parent materials of lowland wet grassland in counties of South Region. Source: Table 4.1 and Annex 1.

4.9 Overview of the lowland wet grassland resource at the national scale

4.9.1 National data and inter-regional comparison

Mapped and measured lowland wet grassland in all regions totals 216,916 ha (Table 4.1). This value takes no account of underestimated county totals due to insufficient Phase 1 coverage, nor does it adjust values for loss since survey due to conversion to other types of land cover or habitat. Adjustments made in sections 4.2 to 4.8 provide data (Table 4.2) which attempt to bring all counties and metropolitan areas in line for comparison based on extent in 1992. Underestimation outweighs grassland loss and the adjusted 1992 national total is higher and estimated as 219,410 ha. There are major differences between regions in adjusted totals (Figure 4.16). A rank order is very clear in the sequence South-West (55,750 ha), East (49136), North-West (34,439 ha), West Midlands (24,504 ha), South-East (23,667), South (21,700), and North-East (10,214 ha).

These national and regional totals are high for a habitat generally regarded as threatened and under retreat. It must be stressed that nature conservation value is poor for much of all mapped and measured grassland. Most was improved grassland and ditch density was often low, with no information on water depth - the bulk of this measured resource is therefore of low conservation interest, with deep drains and low water tables rarely producing the very wet conditions characteristic of the best examples of this habitat.

It is also important to stress that the adjusted totals are largely 'guesstimates' based on only a few detailed studies calculating rates of loss and degree of grassland underestimation. They are thus not definitive values but they are probably sufficiently accurate to allow a better comparison of regional totals than one based on raw map area data. Adjusted values demonstrate a five-fold difference in range between the largest and smallest regional totals. The pre-dominance of the South-West is largely due to very large extents of grassland in the Somerset Levels, allowing a comparatively small set of counties to overshadow much larger assemblages such as East Region.

4.9.2 Soils of lowland wet grassland at the national scale

Lowland wet grassland is developed in England upon approximately equal areas (23 - 24 % of unadjusted mapped block area) of marine and river alluvium (Figure 4.17). Several areas with underestimated grassland cover probably have river alluvium as parent material and if this extra river material area is added it is most likely to be the commonest soil type. The question of dominance is difficult to resolve clearly without a detailed breakdown of the very large extent (44% of mapped area) of mixed soils. Peat is uncommon as the sole soil of a grassland block (only 1% of area) but larger quantities are present in the mixed soils of large blocks. Other parent materials are commoner (7% area) and perhaps represent transitions to drier conditions on slightly higher ground.

The frequency distribution of block size has already been mentioned as a sampling complication (see section 3.1 and Figure 3.1) and it maintains its logarthmic pattern of size decline for all soil types (Figure 4.18). Mixed soils are the commonest in very large blocks, accounting for much of their overall 44% of all soil area. The commonest small blocks are river alluvium, suggesting that these environments are more readily fragmented than those developed on marine alluvium.

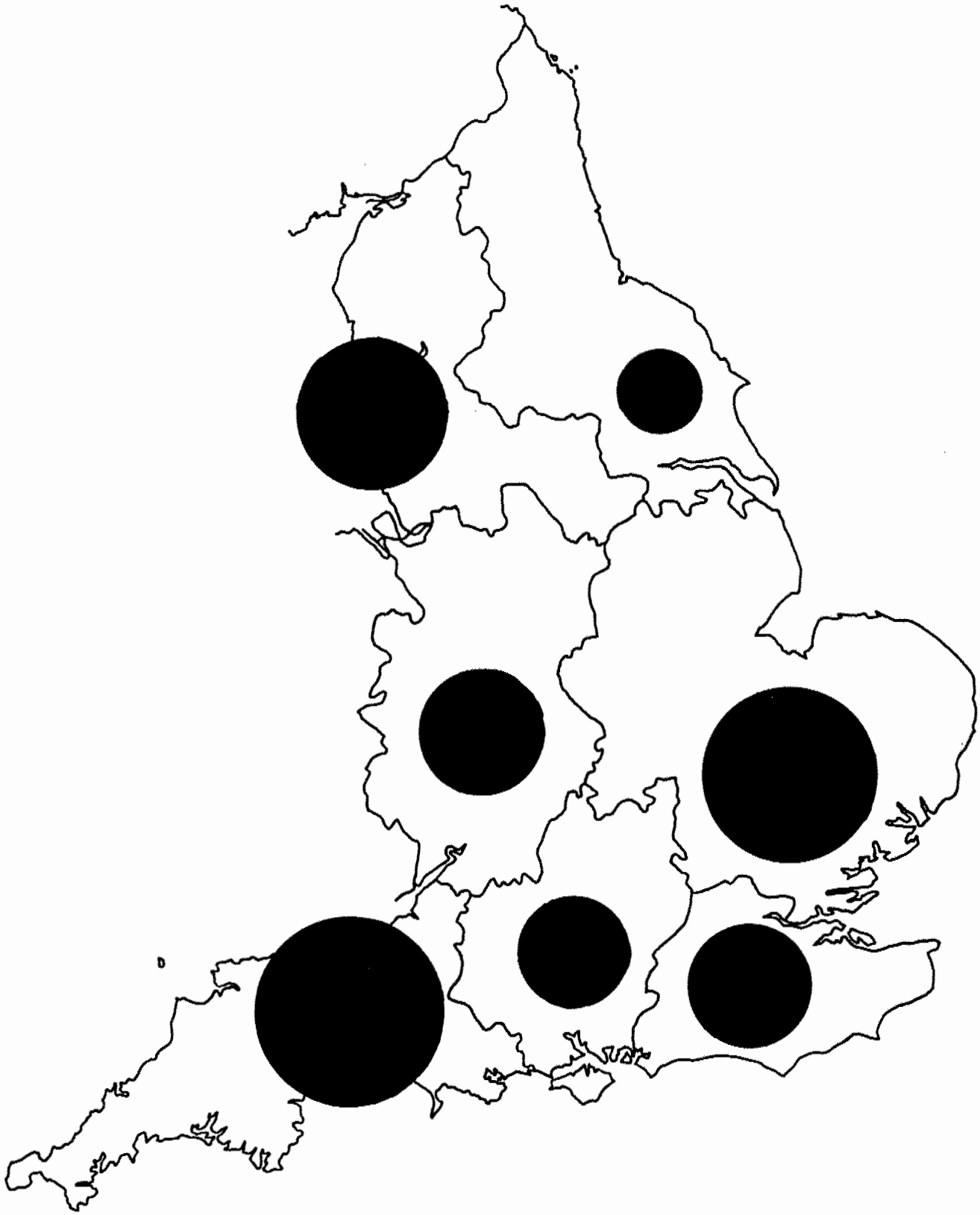


Figure 4.16 Regional differences in adjusted totals of lowland wet grassland area. Circle radius is proportional to adjusted grassland area. Data source: Table 4.2. English Nature Regions marked are those current at time of project.

There is strong regional variation in the balance between marine, river, other and mixed soil types (Figure 4.18). Marine alluvium appears commoner on the eastern coast of England, and in Cumbria. Results are a little deceptive because there is a very large extent of mixed soil in South-West Region, much of which is marine alluvium. Regions with little coastline (South, West Midlands) are obviously dominated by river alluvium.

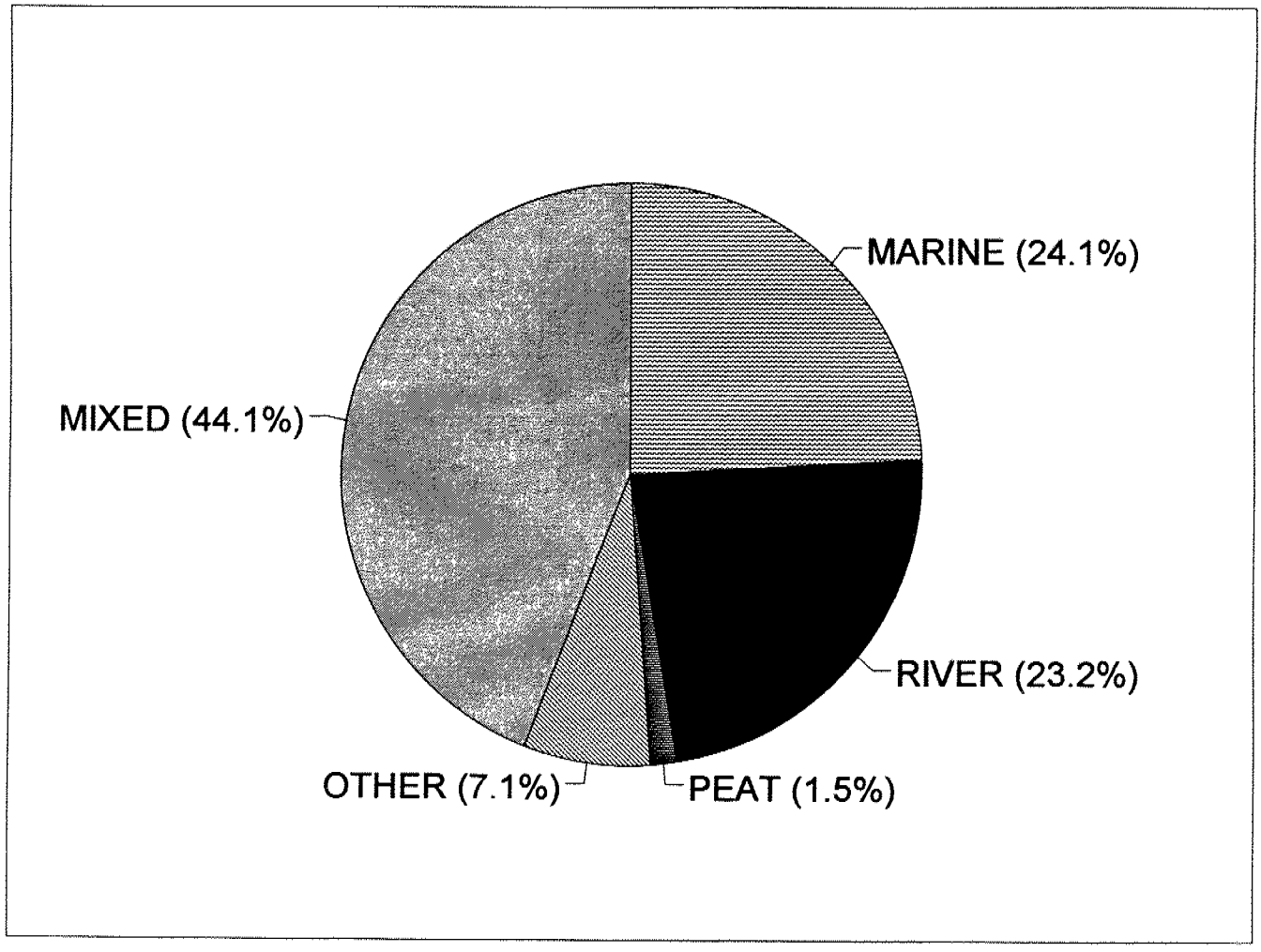


Figure 4.17 The balance between soil parent material types for all measured blocks of lowland wet grassland. Data source: Table 4.1 but including old soil totals for Staffordshire.

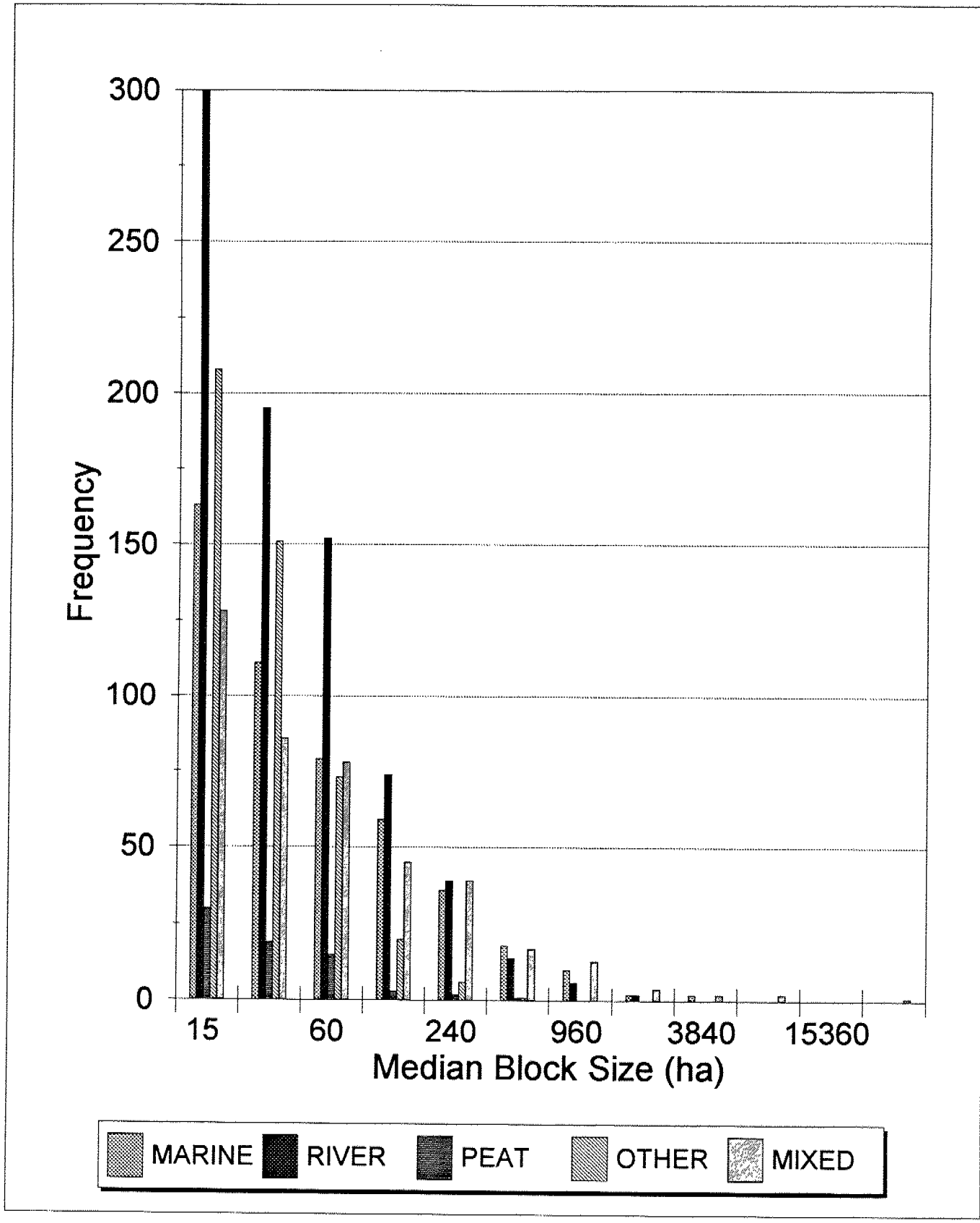


Figure 4.18 Frequency distribution of lowland wet grassland block size in relation to soil parent material type. Source: Annex 1.

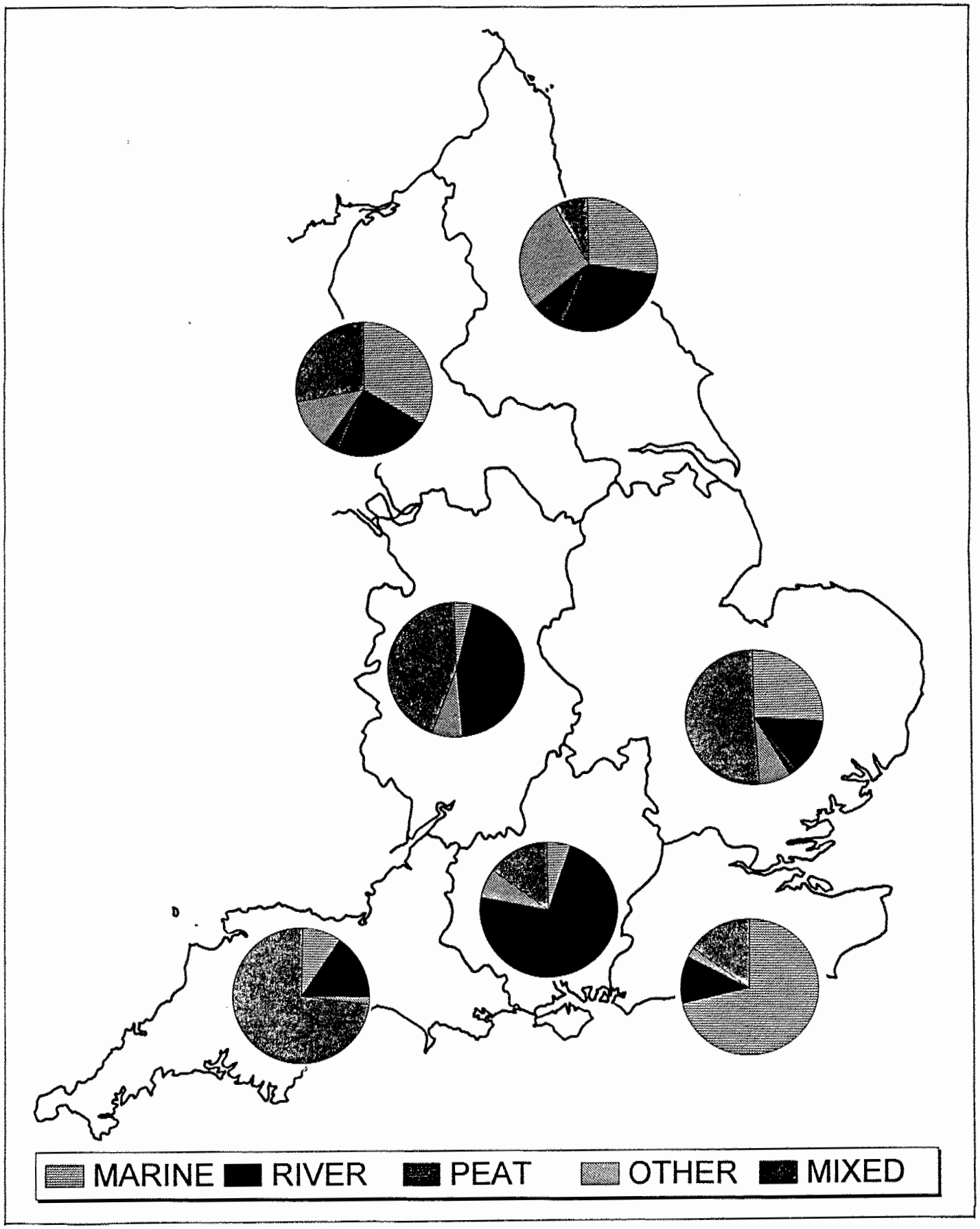


Figure 4.19 Regional differences in the balance between soil parent types under lowland wet grassland. Source: Table 4.1 (old data for Staffordshire).