

# DISTRIBUTION, DATES OF ORIGIN AND ACREAGE OF *SPARTINA TOWNSENDII* (*s.l.*) MARSHES IN GREAT BRITAIN

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## INTRODUCTION

*Spartina townsendii* (*s.l.*) has spread to occupy large areas of intertidal mudflats around the shores of the British Isles during the past one hundred years. Although the grass is capable of covering suitable mudflats rapidly by a combination of seeding and vegetative growth, its initial introduction by man into new sites has hastened its rate of spread and widened its distribution.

The origin of *Spartina townsendii* (*s.l.*), its nomenclature and previous estimates of total acreage have been described by Hubbard (1965b).

A recent estimate of 30,000 acres (12,140 ha) of *Spartina townsendii* (*s.l.*) in the British Isles was prepared by Goodman, Braybrooks and Lambert (1959) using aerial photographs and personal records. The paper described the topography of the major *Spartina* marshlands in Great Britain and it included a distribution map of *Spartina* marshlands in the British Isles. The present estimate has been divided into acreages limited by topographical features. It is hoped that publication in this form will act as a basis for further study and improved estimates. The present estimate was confined to Great Britain due to the difficulty of obtaining precise information from Ireland. It was carried out as part of a world survey of *Spartina* resources (Ranwell, 1967).

## METHOD OF ESTIMATION

Areas were estimated visually from a grid superimposed over panchromatic aerial photographs. The grid was divided into rectangles representing 2 acres at a scale of 6 inches to one mile. Areas were corrected by scaling an aerial photograph from each flight against distances obtained from the one inch Ordnance Survey Maps.

Subjective estimates from documentary evidence (see Hubbard 1965a) or competent observers are given where no more reliable data was available.

In certain cases the aerial photographic cover was found to be either incomplete, of poor quality or out-dated by rapid spread of the grass. It was difficult to estimate areas of *Spartina* where the grass was found to be mixed with other species or consisted of scattered tussocks or clumps.

## RESULTS

It is estimated that there are 29,742 acres (12,044 ha) of *Spartina townsendii* (*s.l.*) in Great Britain. 8258 acres (3443 ha) occur along the south coast, where the

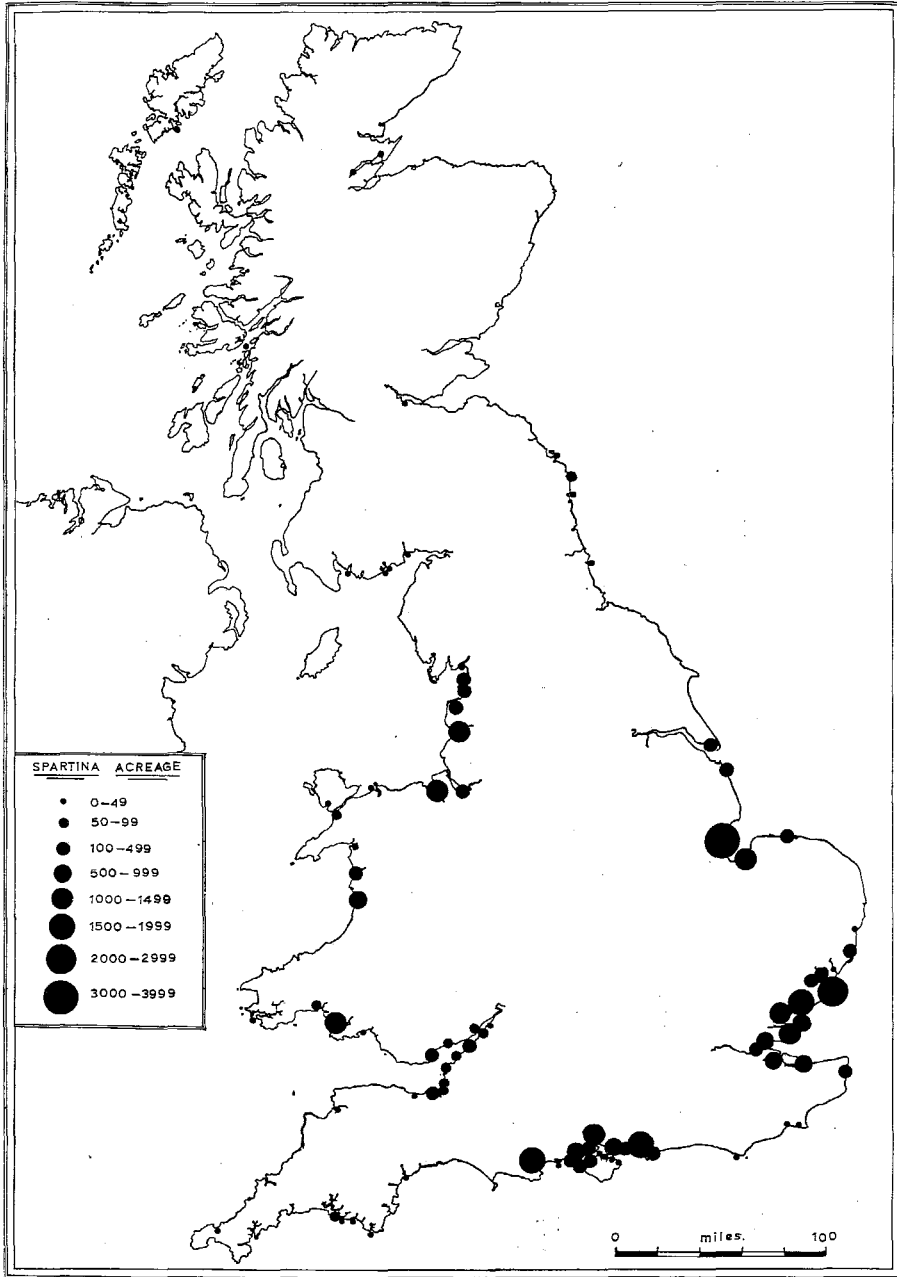


FIGURE 1. *Spartina townsendii* (s.l.) Marshes in Great Britain.

*Spartina* marshlands have mostly reached maturity and degeneration is widespread. There are 5716 acres (2313 ha) of *Spartina* along the west coast to a northern limit in the Isle of Harris. Approximately 80% of the acreage on the west coast is found within the Severn Estuary, Burry Inlet, River Dee, River Dovey and River Ribble. *Spartina* marshlands total 15,768 (6381 ha) along the east coast and reach a northern limit in the Cromarty Forth. Approximately 80% of the acreage on the east coast is restricted to the Wash and the Essex shoreline. (Figure 1.)

The name *Spartina townsendii* (s.l.) has been used throughout this paper to include *Spartina* × *townsendii* ( $2n = 62$ ) and *Spartina* × ( $2n = 120+$ ). (see Hubbard 1965b). *Spartina* × *townsendii* is only found in quantity below Hythe, in Southampton Water. Elsewhere it is limited to small patches within the marsh or as a narrow fringe near the landward limit of *Spartina* ×. There are probably not more than 50 acres (20 ha) of *Spartina* × *townsendii* in Great Britain at present. Acreage of *Spartina townsendii* (s.l.) arranged under localities, dates of introduction to each locality and the source of the present estimate, are given in table 1.

TABLE 1. DISTRIBUTION, DATES OF ORIGIN AND AREAS OF *SPARTINA TOWNSENDII* (s.l.) MARSH IN GREAT BRITAIN

SOUTH COAST

LOCALITY	DATE OF ORIGIN		ESTIMATE OF AREA		
	Natural spread	Planting	Acreage	Hectares	Date and Source
CORNWALL					
Tamar, Tavy & Lynher Estuaries		1939	94	38	1948-51 (Pethick 1965)
DEVON					
Exe Estuary		1935	15	6	1960 (Aerial photographs)
Salcombe Estuary	1954		1	0.4	1958 (S. Bryce in litt.)
Erme Estuary			5	2	1956 (P. A. Caldwell in litt.)
Yealm Estuary	1955		1	0.4	1955 (P. A. Caldwell in litt.)
DORSET					
Poole Harbour	1890		1,717	694	1952 (Hubbard 1965b)
HAMPSHIRE					
Christchurch Harbour	1913		38	15	1959-63 (Aerial photographs)
Southampton Water	1870		1,180	477	1963 (Aerial photographs)
Beaulieu Estuary		1898	449	182	1963 (Aerial photographs)
Lymington Estuary	1893		871	351	1959 (Aerial photographs)
Keyhaven	1895		369	147	1959-62 (Aerial photographs)
Portsmouth Harbour	1900		651	263	1963 (Aerial photographs)
Langstone Harbour	1900		477	193	1965 (Aerial photographs)
HAMPSHIRE/SUSSEX					
Chichester Harbour	1896		1,779	715	1963 (Aerial photographs)

LOCALITY	DATE OF ORIGIN		ESTIMATE OF AREA		
	Natural spread	Planting	Acreage	Hectares	Date and Source
<b>ISLE OF WIGHT</b>					
Yar Estuary	1893		141	56	1962 (Aerial photographs)
Newtown Estuary	1893	1933	157	63	1962 (Aerial photographs)
Medina Estuary	1895		11	4	1962 (Aerial photographs)
King's Quay			8	3	1963 (Aerial photographs)
Wooton Creek			9	4	1962-63 (Aerial photographs)
Brading Harbour	1923	1928	20	8	1966 (Estimate)
<b>SUSSEX</b>					
Pagham Harbour	1919		248	100	1963 (Aerial photographs)
Cuckmere Estuary			5	2	1966 (Estimate)
Rother Estuary	1922	1942/47	5	2	1966 (F. N. Midmer in litt.)
<b>KENT</b>					
Dungeness		1930	1	0.4	1966 (Estimate)
<b>EAST COAST</b>					
<b>KENT</b>					
Pegwell Bay	1934		100	40	1966 (Estimate)
The Swale		1927	560	228	1953-63 (Aerial photographs)
Medway Estuary		1920/32/36	689	278	1950/55/61 (Aerial photographs)
Thames Estuary			261	108	1961 (Aerial photographs)
<b>ESSEX</b>					
Canvey Island		1926/27/29	739	298	1961 (Aerial photographs)
Crouch, Roach Estuaries & Mappin Sand		1927/29/33/63	1,311	530	1955 (Aerial photographs)
Dengie Marshes		1927	650	263	1955 (Aerial photographs + estimate to 1966)
Blackwater Estuary		1924-29	1,164	469	1946-63 (Aerial photographs)
Mersea Island		1927-41	838	335	1963 (Aerial photographs)
Colne Estuary		1924/31/37/50	767	316	1955-63 (Aerial photographs)
Brightlingsea			300	121	1963 (Aerial photographs)
Hamford Water		1927/29/33	2,289	1129	1956 (Aerial photographs)
<b>SUFFOLK/ESSEX</b>					
Stour Estuary		1923/27/29	370	149	1946-53 (Aerial photographs)
<b>SUFFOLK</b>					
Orwell Estuary			142	58	1946-63 (Aerial photographs)
Deben Estuary			5	2	(Estimate)
Ore & Alde Estuaries		1934	122	49	1953 (Aerial photographs)
Blyth Estuary			1	0.4	(Estimate)
<b>NORFOLK</b>					
North Norfolk Coast		1907/11/27/30/31	200	81	1966 (Estimate)
<b>LINCOLNSHIRE/NORFOLK</b>					
Wash (Norfolk)		1910/33/57	1,366	540	1966 (Aerial photographs 1958 + J. Morley in litt.)

LOCALITY	DATE OF ORIGIN		ESTIMATE OF AREA		
	Natural spread	Planting	Acreage	Hectares	Date and Source
Wash (Lincolnshire)	1927/30/36/ 44/56		3,400	1,374	1958 (Aerial photographs 1958 + J. Morley in litt.)
LINCOLNSHIRE Saltfleet			200	81	1962 (Aerial photographs)
YORKSHIRE/LINCOLNSHIRE Humber Estuary	1936/48/52/ 54		200	81	(Estimate)
NORTHUMBERLAND Aln Estuary	1930		1	0.4	(Estimate)
Budle Bay			85	34	1963 (Aerial photographs)
Fenham Flats	1929		5	2	(Estimate)
WEST LOTHIAN Firth of Forth	1914/18		1	0.4	(Estimate)
CROMARTY Cromarty Firth	1946		1	0.4	(Estimate)
WEST COAST					
CORNWALL Hayle Estuary	1958		1	0.4	1966 (Estimate)
DEVON Torrige & Taw Estuaries	1934		30	12	1966 (Estimate)
SOMERSET Lilstock Harbour	1966		1	0.4	1966 (J. Morley in litt.)
Bridgwater Bay	1929		263	106	1963 (Aerial photographs)
Burnham			100	40	1966 (Estimate)
Berrow	1918		58	23	1942 (Boley 1942)
Sand Bay	1936		48	19	1963 (Aerial photographs)
Clevedon	1919		96	38	1963 (Aerial photographs)
GLOUCESTER Avonmouth	1930		157	63	1963 (Aerial photographs)
Aust	1935		73	29	1955 (F. W. Rowbotham in litt.)
Berkeley	1921/34		13	5	1955 (F. W. Rowbotham in litt.)
Beachley	1932/49		80	32	1955 (F. W. Rowbotham in litt.)
MONMOUTH Usk Estuary	1932		63	25	1962 (Aerial photographs)
GLAMORGAN Cardiff			127	51	1962 (Aerial photographs)
Swansea Bay			1	0.4	1965 (Estimate)
Burry Estuary	1931		1,000	405	1965 (Estimate)

LOCALITY	DATE OF ORIGIN		ESTIMATE OF AREA		
	Natural spread	Planting	Acreage	Hectares	Date and Source
CARMARTHEN Taf Estuary		1932	50	20	1966 (Estimate)
PEMBROKE Milford Haven			25	10	1952 (Aerial photographs)
CARDIGAN/MERIONETH Dovey Estuary		1920	(400-)600	(162-)243	1965 (E. H. Chater in litt.)
MERIONETH Mawddack Estuary Traeth Bach		1929	264 1	108 0.4	1962 (Aerial photographs) 1966 (Estimate)
CAERNARVON Foryd Bay Conway Estuary		1934 1946	90 1	36 0.4	1966 (Estimate) 1966 (Estimate)
ANGLESEY Malltraeth Bay			5	2	1965 (D. S. Ranwell in litt.)
FLINT/CHESHIRE Dee Estuary	(?)1945	1925	1,000	405	1966 (J. Morley in litt.)
CHESHIRE/LANCASHIRE Mersey Estuary		1929	100	40	1966 (J. Morley in litt.)
LANCASHIRE Ribble Estuary Wyre Estuary Keer Estuary Kent Estuary Lune Estuary		1932 1942	1,000 250 100 10 100	405 101 40 4 40	1966 (J. Morley in litt.) 1966 (J. Morley in litt.) 1966 (J. Morley in litt.) 1966 (J. Morley in litt.) 1966 (J. Morley in litt.)
KIRKCUDBRIGHT Gillfoot Bay		1958	1	0.4	1958 (H. Milne-Redhead in litt.)
Rough Firth		1951	1	0.4	1958 (H. Milne-Redhead in litt.)
Auchencairn Bay Fleet Bay		1947 1946	10 1	4 0.4	1956 (K. W. Braid in litt.) 1960 (W. J. McCulloch in litt.)
ARGYLL Firth of Lorne		1929/34	5	2	1959 (J. Bryce in litt.)
HEBRIDES Isle of Harris		1934/35	1	0.4	1954 (J. Rose in litt.)

## ACKNOWLEDGEMENTS

We wish to thank Mr R. Fenton and the staff of the Maps Section of the Nature Conservancy; the staff of the Air Photographic Library in the Ministry of

Housing and Local Government; Dr D. S. Ranwell (Nature Conservancy); Mr E. Chater (University College of Wales, Aberystwyth); Mr J. V. Morley (Warden of Bridgwater Bay National Nature Reserve); Dr P. J. Goodman (Welsh Plant Breeding Station, Aberystwyth) and many others.

REFERENCES

- BOLEY, G. M. (1942). The Vegetation of Berrow, North Somerset. I. The Salt Marsh Community. *Proc. Bristol Nat. Soc.*, **9**, 427-433.
- GOODMAN, P. J., BRAYBROOKS, E. M. & LAMBERT, J. M. (1959). Investigations into 'Die-back' in *Spartina townsendii* agg. I. The present status of *Spartina townsendii* in Britain. *J. Ecol.*, **47**, 651-677.
- HUBBARD, J. C. E. (1965a). A bibliography of *Spartina townsendii* (*sensu lato*) H. & J. Groves, European *Spartina alterniflora*. Lois and British *Spartina maritima*. (Curt.) Fernald. *Nature Conservancy typescript*, 1-22.
- HUBBARD, J. C. E. (1965b) *Spartina* marshes in Southern England. VI. Pattern of invasion in Poole Harbour. *J. Ecol.*, **53**, 799-813.
- PETHICK, J. (1965). Salt marsh surfaces in the Tamar Estuary, *B.A. Thesis*, St. John's College, Cambridge.
- RANWELL, D. S. (1967). World Resources of *Spartina townsendii* (*sensu lato*) and economic use of *Spartina* marshland. *J. Appl. Ecol.*, **4**, 239-256.

