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LAND DRAINAGE SURVEY III
Maps of Ireland showing the general distribution of drainage problems and of drainage schemes

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ABSTRACT

Two maps, based on an analysis of the results of a 4-year drainage survey, have been prepared.

The Drainage Problem map shows the drainage problem most frequently found in the regions indicated.

For the production of the Size of Scheme map, the data were analysed on a county basis and regions incorporating 'large,' 'medium' and 'small' schemes are delineated.

INTRODUCTION

A 4-year countrywide land drainage survey was carried out in Ireland from July 1964 to June 1968. It was designed to collect information on land in need of drainage and was based on an examination of those schemes under construction during the period indicated. Full details have been reported of the methods used to collect and process the data and of analyses already undertaken (1, 2).

As a result of further analyses, maps showing the general distribution of a) drainage problems and b) drainage schemes on the basis of size of scheme have been prepared. The analysis of survey data and its subsequent use in the production of these maps are described and discussed in this paper.

PROCEDURE

The general procedure of data collection and analysis has been described (2). For the production of the maps referred to in this paper the categories analysed were a) County, b) Area, c) Drainage Problem and d) Ordnance Survey (O.S.) Sheet Number. Categories a), b), c) were used to provide the information for the Drainage Problem map. An analysis based on categories a), b), d) provided the information for

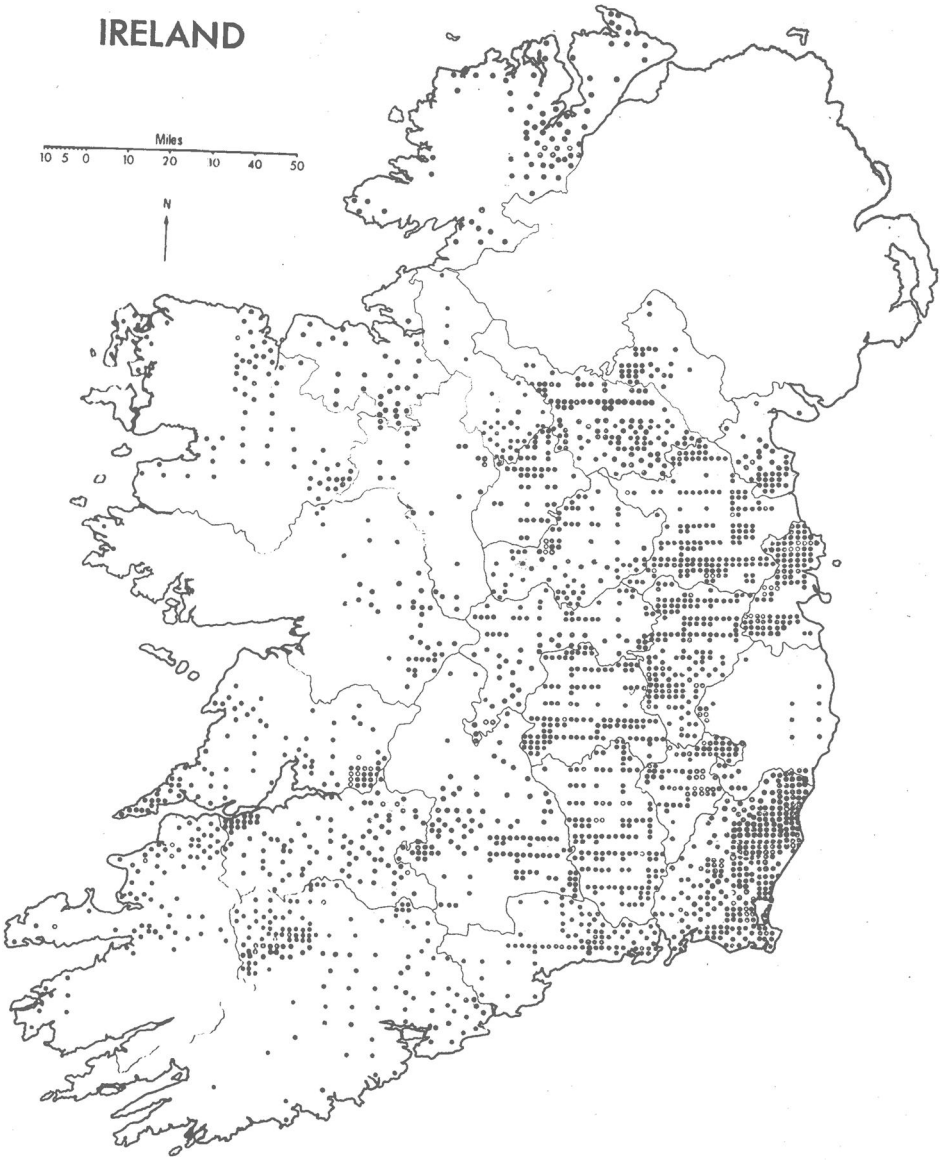

Fig. 1: Survey data of drainage problems plotted on an O.S. sheet background map
(For interpretation, see text)

the breakdown of drainage schemes in the different counties on a size of scheme basis. For this information, a general map showing the distribution of 'large,' 'medium' and 'small' schemes was prepared. The basis for this breakdown on size of scheme is discussed later.

Drainage Problem map

In analysing the survey data, a two-way table with acreage accumulated of drainage problem versus O.S. sheet number was prepared for each county. For practical purposes the resulting figures of acreage were broken down into 50-acre blocks, *e.g.* 0–24 acres was omitted, 25-74 acres = 1 block, 75–124 acres = 2 blocks, etc. In a number of cases, the acreages of contiguous O.S. sheets were combined in order to get the closest possible approximation between the actual acreage and the number of 50-acre blocks. In this manner the plotting was much more accurate than ± 24 acres, being of the order of ± 8 acres.

A tracing with the county boundaries drawn was then placed over a map of Ireland on which the O.S. sheets for each county were set out and numbered. Circles one-tenth of an inch in diameter were drawn on the tracing to represent the 50-acre blocks of each drainage problem occurring on the various O.S. sheets. These circles were later coloured differently to represent the different drainage problems. The result was a series of different coloured circles from which it was possible to sketch in boundaries. Fig. 1 shows a reproduction of this 'circle' map at a much reduced scale. All the circles on this map appear black, but in the original map nine colours were used to cater for the nine drainage problems categorised.

Having sketched in the boundaries of different drainage problems the resultant map of each county was sent to the local Land Project District Officer for his observations and comments. In the majority of cases, their observations indicated that the map accurately portrayed the conditions pertaining or they suggested some minor alterations to the boundaries which could be accommodated without conflicting with the plotted survey results. In a few cases the District Officers' suggestions could not be accommodated without conflict with the survey data. In those cases, the original survey data submitted were re-examined in conjunction with the District Officer; particular schemes were revisited and the boundaries were then fixed on the basis of the results of the new investigation.

Having decided on the location of the boundaries a full-colour map to a scale of 1:575,000 (1 inch to 9 miles) was produced. A simplified version of this map at a reduced scale is shown in Fig. 2.

Size of Scheme map

In this case a two-way frequency table of county versus acreage was produced by a digital computer. The acreages chosen were unit values from 1 to 15, a 5-acre range from 16 to 20, ranges of 10 acres (21 to 30 etc.) from 20 to 100 acres and ranges of 100 acres (101 to 200 etc.) from 100 to 500 acres.

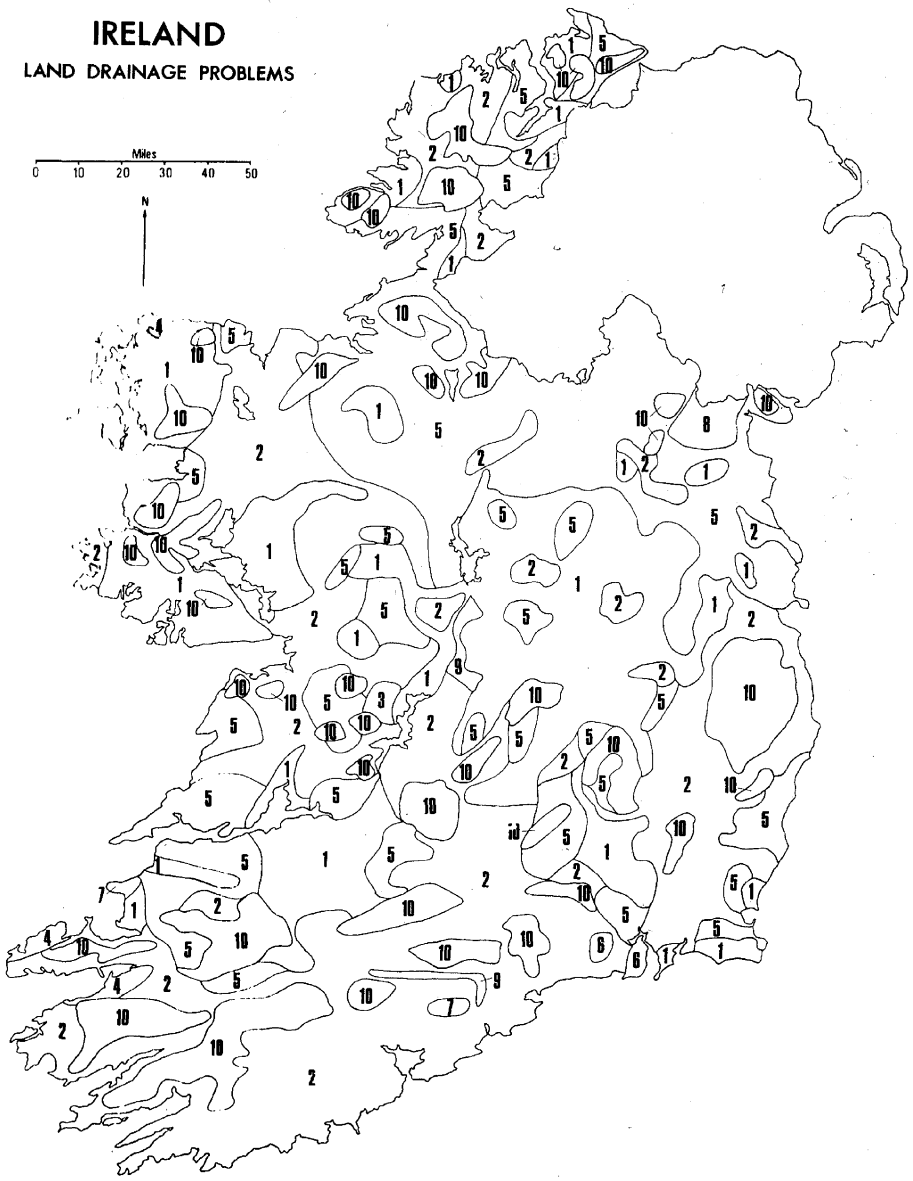

Fig. 2: Reduced and simplified diagrammatic representation of the Land Drainage Problem map

These figures were analysed to produce a table showing the percentage of schemes in each county equal to or smaller than a number of selected acreages (Table 1). This table has been laid out with the county having the greatest percentage of the larger schemes on top and the county with the greatest percentage of the low-acreage schemes at the bottom.

There are no dramatic changes between adjacent counties in the table. However, the overall difference between the top and bottom of the table is quite large. In an attempt to map these results, Table 1 was split three ways into what can be termed 'large,' 'medium' and 'small' schemes. The region designated 'large' includes the top eight counties of Table 1. In those counties, the percentage occurrence of large schemes is greater and that of small schemes less than in any of the remaining counties. The

LEGEND FOR FIG. 2

*Drainage problem**	*No.*	*Description*
Water table	*1*	*The level of the free-water surface (phreatic surface) is so high that drains must be installed to lower it*
Seepage outburst and spring	*2*	*Outburst of underground water (artesian) over a wide area near the bottom of a slope (seepage outburst) or at a particular point (spring)*
Cemented layer	*3*	*A layer of bonded subsoil resulting in an impervious layer at a relatively shallow depth*
Iron pan	*4*	*A thin high-iron layer forming an impervious pan*
Impervious subsoil	*5*	*The subsoil has such low permeability that the rate of water flow through it is restricted considerably*
Impervious topsoil	*6*	*The topsoil is so impervious that it inhibits the rate of water flow through the surface. This can sometimes occur over a permeable subsoil*
Impervious layer	*7*	*A soil layer which is not cemented but which prevents the passage of water because of its low permeability*
Natural hollows	*8*	*Large depressions that require deep cuts to provide drainage*
Flooding	*9*	*Land that is often covered by water due to its low-level position beside river, stream or sea*
Not classified	*10*	*Land above 600 ft O.D.*

* Map indicates the drainage problem most frequently found in the regions shown. Areas unaffected by drainage problems occur in all regions

TABLE 1: Occurrence of schemes, of the area indicated or smaller, in each county (expressed as percentages of total)

County	Area (acres)												
	1	2	4	6	8	10	12	15	20	30	40	50	100
Westmeath	0	2	10	16	21	33	41	48	61	81	88	92	99
Dublin	2	9	18	26	37	47	53	60	66	77	87	94	99
Kildare	3	10	21	31	38	44	50	61	72	87	91	93	100
Meath	2	7	20	33	44	49	56	64	71	82	87	90	98
Offaly	1	6	17	35	45	57	63	73	84	94	97	99	100
Wexford	3	9	23	38	48	57	64	72	81	89	94	96	99
Laois	4	14	28	38	47	56	61	70	78	87	94	96	100
Waterford	3	8	24	38	49	62	68	74	82	92	96	97	99
Wicklow	5	15	35	49	59	65	72	78	84	95	97	98	100
Tipperary	7	16	37	53	62	69	74	81	87	94	97	98	100
Cork	8	21	37	52	61	69	76	84	90	96	98	99	100
Louth	7	20	38	51	64	70	75	81	91	97	98	99	100
Carlow	11	22	42	56	68	76	82	87	93	97	98	99	100
Limerick	7	21	49	66	76	83	87	91	95	98	99	100	100
Kilkenny	13	31	55	68	75	81	85	89	93	97	98	99	100
Kerry	19	39	63	76	83	87	91	94	97	99	99	100	100
Clare	11	32	65	81	87	90	93	95	97	99	100	100	100
Cavan	12	35	64	80	89	92	95	97	98	99	100	100	100
Galway	23	45	67	78	84	89	91	93	97	99	100	100	100
Roscommon	12	37	66	82	90	93	96	98	99	100	100	100	100
Monaghan	18	40	67	80	87	92	97	98	99	100	100	100	100
Longford	26	55	78	88	93	96	98	99	99	100	100	100	100
Mayo	26	57	83	91	95	97	97	98	100	100	100	100	100
Leitrim	36	69	90	96	98	99	100	100	100	100	100	100	100
Donegal	47	73	90	95	97	98	99	100	100	100	100	100	100
Sligo	45	82	96	98	98	99	100	100	100	100	100	100	100
All counties	18	38	59	70	77	82	85	89	93	96	98	99	100

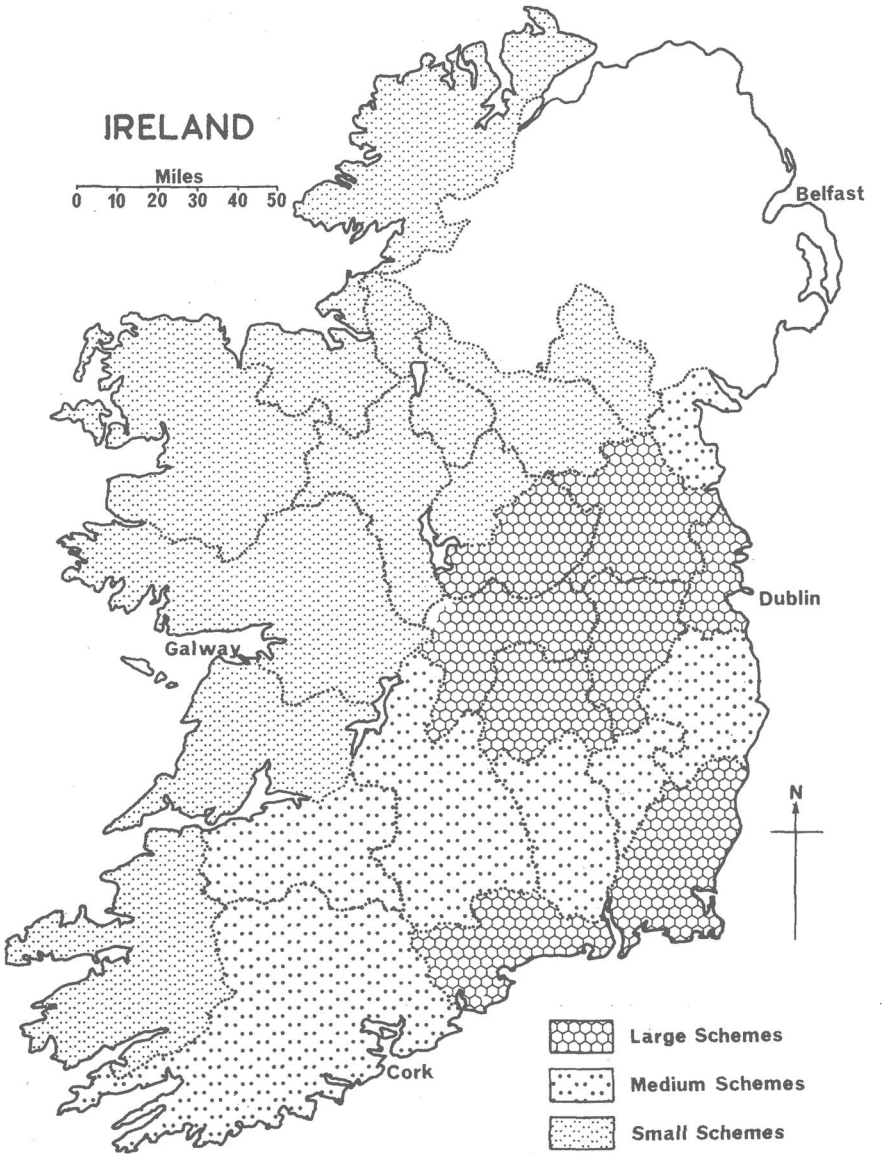

Fig. 3: Map showing a three-way breakdown (on a county basis) of drainage schemes of different size

region designated 'small' includes the bottom 11 counties where the percentage occurrence of small schemes is much greater than for any county in the 'large' and 'medium' categories. The 'medium' category includes the seven counties covering the range between 'large' and 'small.' The resulting map is shown in Fig. 3.

DISCUSSION

Fig. 2 shows the generalised break-down of drainage problems. On the scales of mapping adopted—9 miles to 1 inch on the full-colour map and approx. 40 miles to 1 inch on the map produced here— it was obviously not possible to delineate minor occurrences of all problems. However, the map does represent in broad outline the regions where particular drainage problems are the most likely to occur. It must be emphasised that large regions of the country have free-draining soils and are not affected by any drainage problem. As stated on the map legend, therefore, the regions mapped show the drainage problem most frequently found in the areas delineated.

Fig. 3 shows the distribution of 'large,' 'medium' and 'small' drainage schemes throughout the country. The breakdown is probably somewhat arbitrary but does indicate those counties where the larger-acreage scheme is more likely to occur. From Fig. 3 and Table 1, Table 2 has been compiled. This table indicates the broad differences between the three categories chosen and, while there could be some discussion on the placing of some counties fringing on the 'medium' category, there is obviously a large difference in the size of drainage scheme normally occurring in the 'large' and 'small' regions.

TABLE 2: Number of schemes of the acreages indicated in the three categories (expressed as a percentage of the total number of schemes)

	Area (acres)		
Category	1–4	1–8	1–12
'Large'	10–28	21–49	41–68
'Medium'	35–55	59–75	72–87
'Small'	63–96	83–98	91–100

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