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The Occurrence of DSP toxicity in Ireland

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Abstract

The geographical and temporal variations in the occurrence of DSP in Ireland are presented and the implications of the resulting closures on aquaculture operations and fisheries are discussed. Prior to 1992 DSP toxicity had been confined to the southwest and south coasts but in 1992 a protracted occurrence of DSP was recorded in Killary Harbour on the west coast.

Introduction

The symptoms of diarrhetic shellfish poisoning (DSP) were described in the Netherlands in 1961 (Kat, 1985). Through the seventies and into the eighties several more outbreaks were recorded. By the early eighties DSP had been recorded in a number of European countries including Spain (Fraga, 1987), Sweden (Underdal *et al*, 1985), France (Marcaillou-Le Baut *et al*, 1985) and Ireland (Dunne *et al*, 1984).

DSP causes vomiting, abdominal pain and diarrhea. The symptoms usually clear within two days and there are no fatalities recorded. In European waters the causative agents are dinoflagellates of the genus *Dinophysis*. Cell counts as low as 200 cells per litre have caused toxicity in shellfish (Lassus *et al*, 1985). Under EC directive 91/492/EEC shellfish for human consumption are required to be free of DSP toxins as determined by bioassay.

Ireland has operated a DSP monitoring programme involving both phytoplankton monitoring and toxin monitoring since 1984. Since its inception there have been no cases of Diarrhetic Shellfish Poisoning reported. Under this programme the Fisheries Research Centre is responsible for monitoring and reporting results to both the Department of Health, who are responsible for regulating domestic consumption of shellfish, and the Fish Quality Officers of the Department of Marine, who certify all exports. This paper describes the results of that

monitoring programme to date and discusses the impact of the resulting closures on the shellfish industry.

Methods

Phytoplankton samples were taken using a 1 litre Ruttner sampling bottle which was then subsampled. All samples were preserved in lugols iodine for later identification and enumeration using settling chambers and an inverted microscope.

DSP toxicity was determined using the rat bioassay after Kat (1983). Confirmatory HPLC analyses were carried out to determine the precise nature of the toxins (Nixon and Taaffe, 1993).

Results

DSP toxicity in Ireland has resulted in the closure of shellfish aquaculture areas since 1984 (Table. 1). From 1987 to the present these closures have been an annual occurrence, with some areas being closed almost continuously for periods of up to six months. The main effects of these closures have been limited to an area of the southwest coast. This area centred on Bantry Bay (Fig. 1) is a series of southwest facing rias with an active upwelling system and associated fronts (Raine *et al*, 1990). The onset of toxicity is typically in June within a matter of weeks of the appearance of *Dinophysis* spp. in the water (Jackson and Silke, 1993) and continues until at least September. Toxicity has persisted until the end of November in some areas and regularly persists into the month of October.

Details of the extent and duration of closures for the three years 1990-1992 are given in Figure 2. In general the main closures have been in Kenmare, Bantry, Dunmanus and Roaringwater Bays. There have also been limited closures at sites on the south coast including Cork Harbour. There was also a protracted closure of Killary Harbour, Co. Galway in 1992. This is the first time DSP has been detected on the west coast.

Toxicity results to date in 1993 include closures in the southwest and Killary Harbour. Killary was closed due to DSP toxicity on 21/7/1993 and remains closed at the time of going to press.

Discussion

Since 1987 protracted closures of shellfish growing areas have occurred in the southwest with a resultant impact on the aquaculture operations in the area. The almost certainty of summer closures has forced local growers to

concentrate on Autumn/Winter markets, giving them a very narrow window of opportunity to sell their crops. When toxicity persists into the autumn a portion of the crop may be lost to autumn storms. Irish cultured mussels are grown in rope culture, with the ropes suspended either from rafts or longlines. The storms cause slippage of the mussels on the heavily laden culture ropes and in severe cases the majority of the crop on a longline can be lost. While it is difficult to quantify in economic terms the impact of DSP on mussel culture in the southwest it is certain that it does have a negative impact and in some years this impact can be significant.

The occurrence of toxicity in the Killary Harbour area for two consecutive years is of some concern as it may presage the spread of the DSP problem to the west coast with the associated problems for shellfish aquaculture in this region. Shellfish aquaculture in the west includes important native oyster (*Ostrea edulis*) growing areas as well as oyster, clam and scallop aquaculture operations.

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Year	Max. Toxicity	Duration of Closures
1984		August - October
1985	0	-
1986	0	-
1987	3 - 4	August - December
1988	4	June - November
1989	3 - 4	June - Septmeber
1990	4	July - November
1991	4	June - November
1992	4	June - September
1993	3	June -

Table 1 Incidence of DSP in Ireland

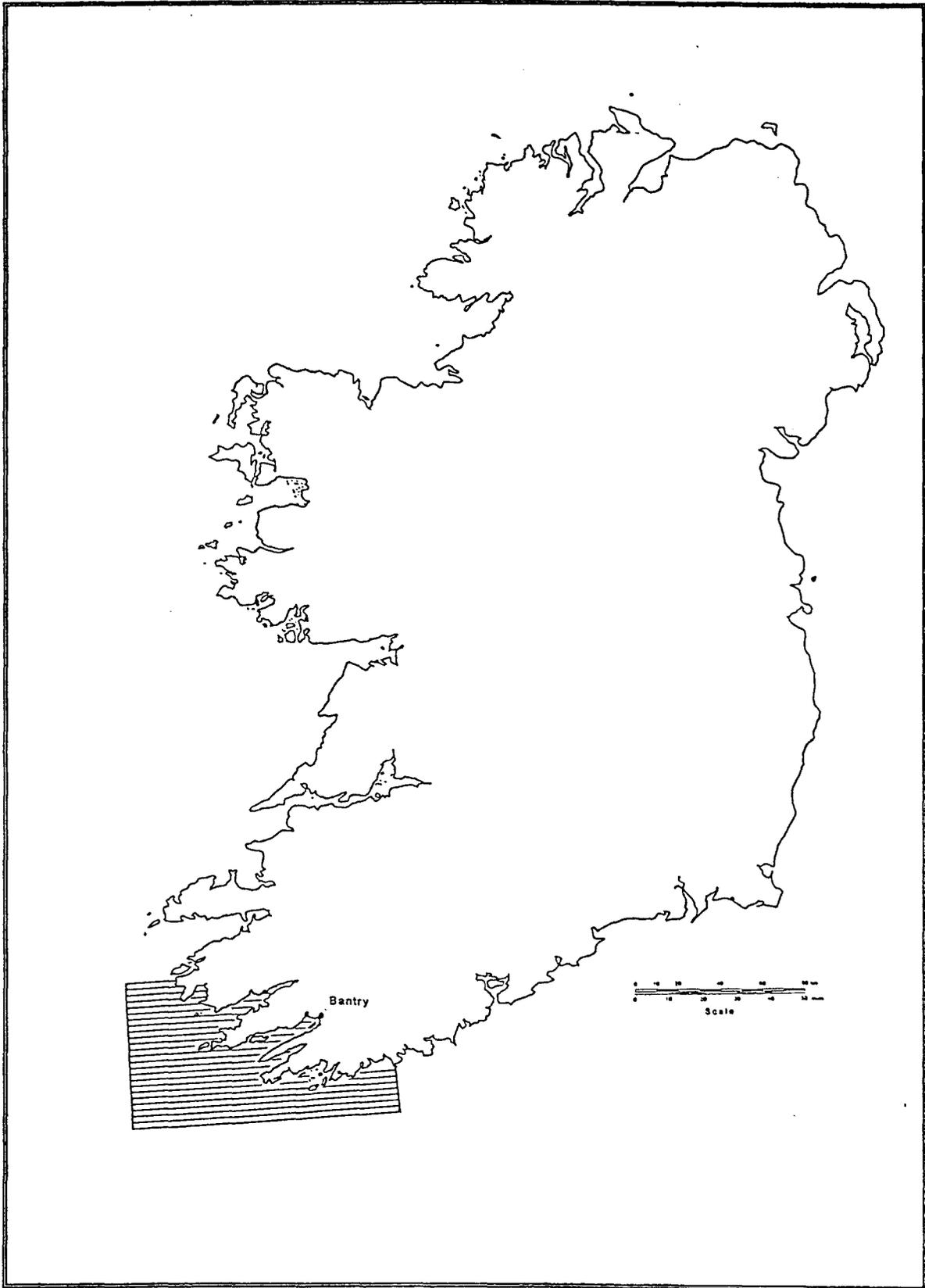


Figure 1. Area of major annual DSP Closures

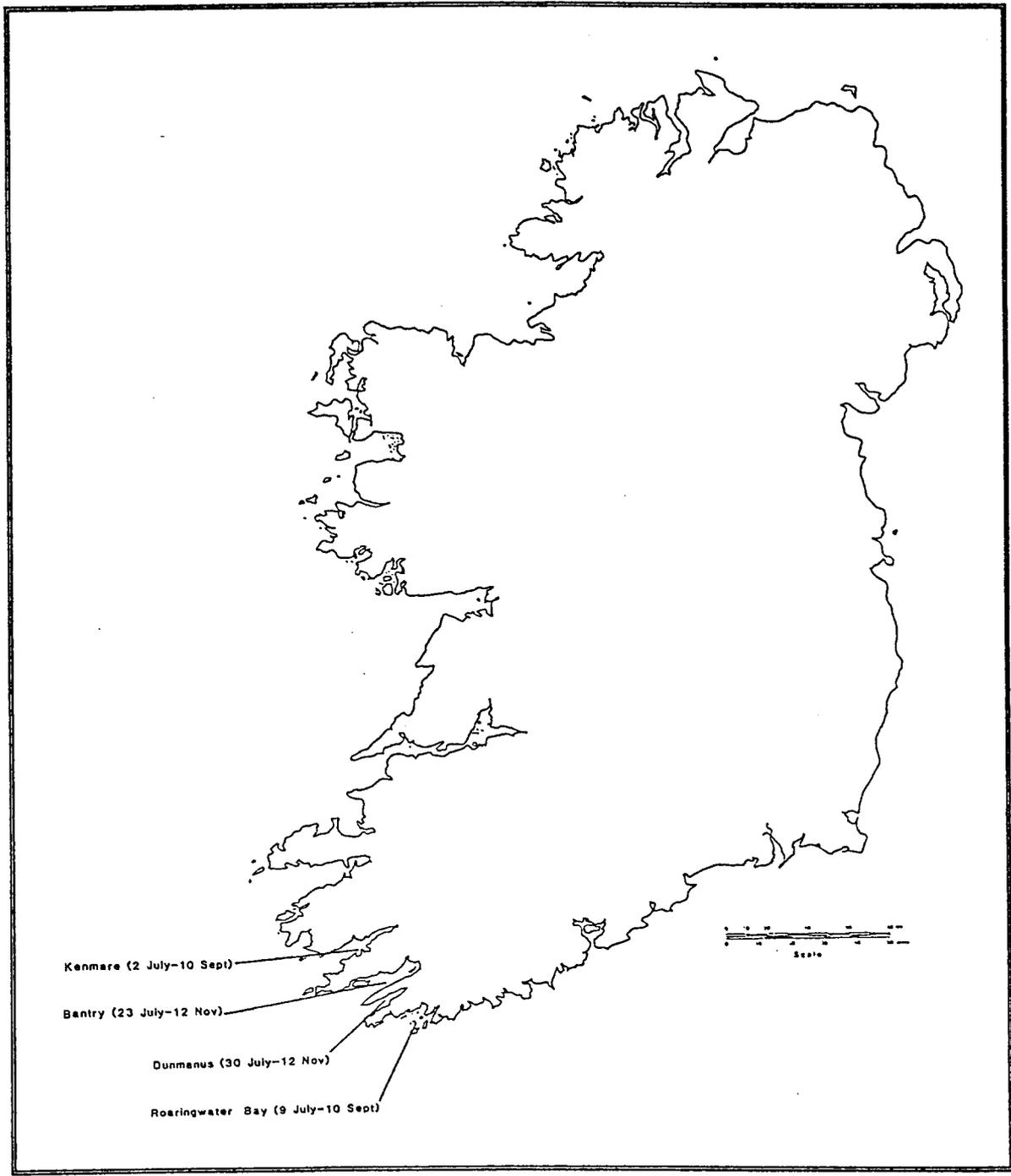


Figure 2a. Location of DSP Closures 1990

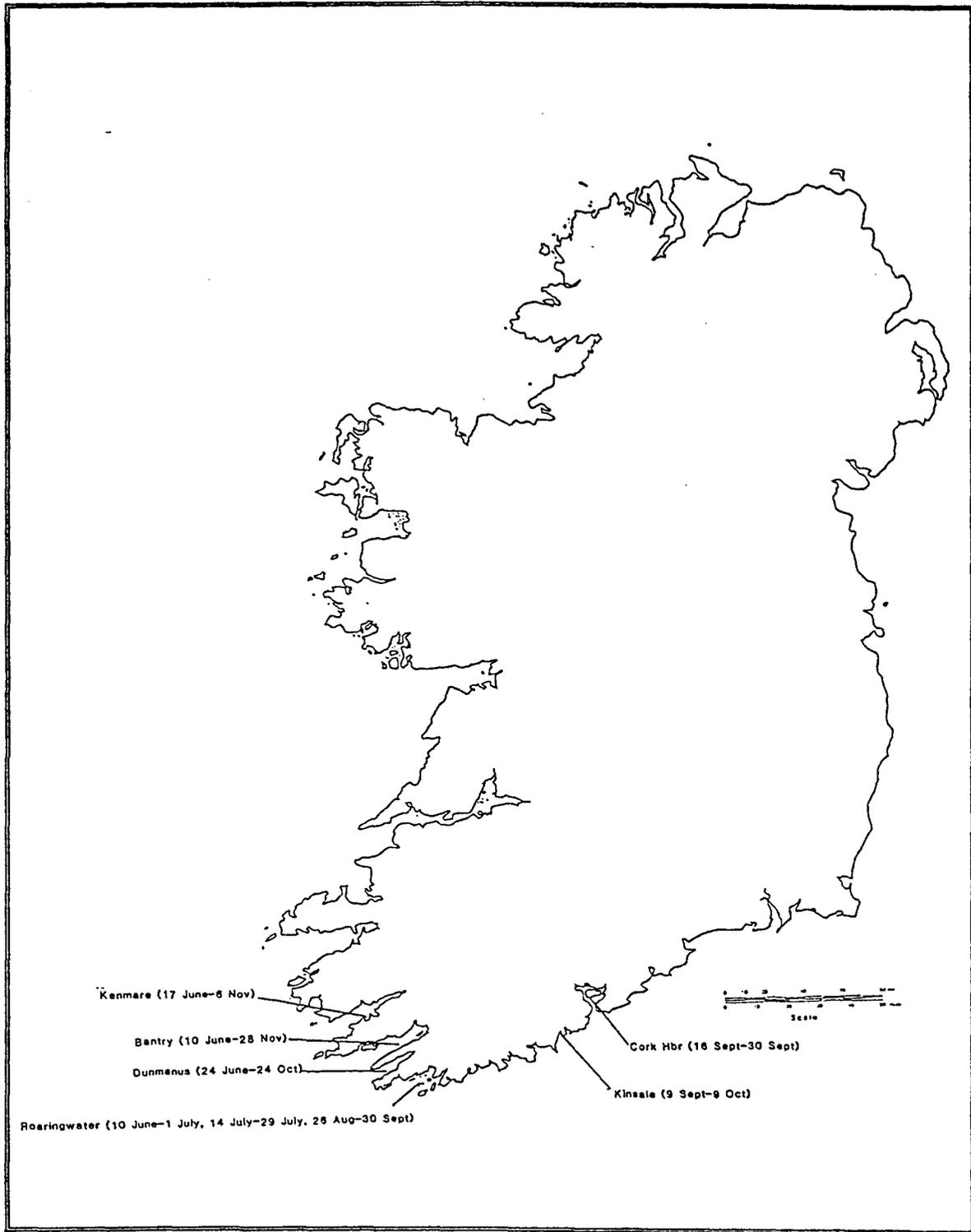


Figure 2b. Location of DSP Closures 1991

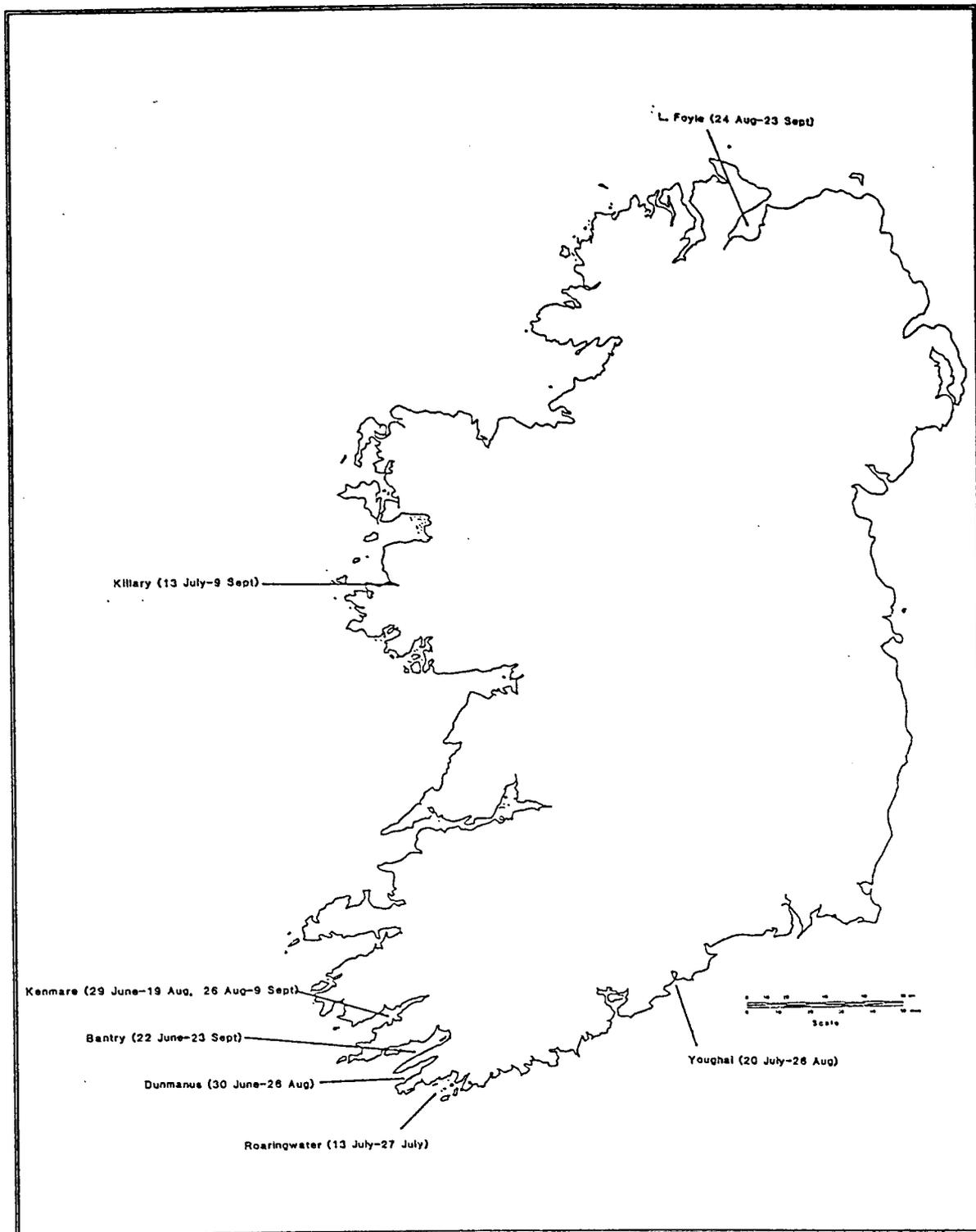


Figure 2c. Location of DSP Closures 1992