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JNCC Report

No. 75

Statutory suspension of wildfowling in severe weather:
Review of past winter weather and actions

J. M. Stroud

Report to the
Joint Nature Conservation Committee

Further copies of this report can be obtained from:

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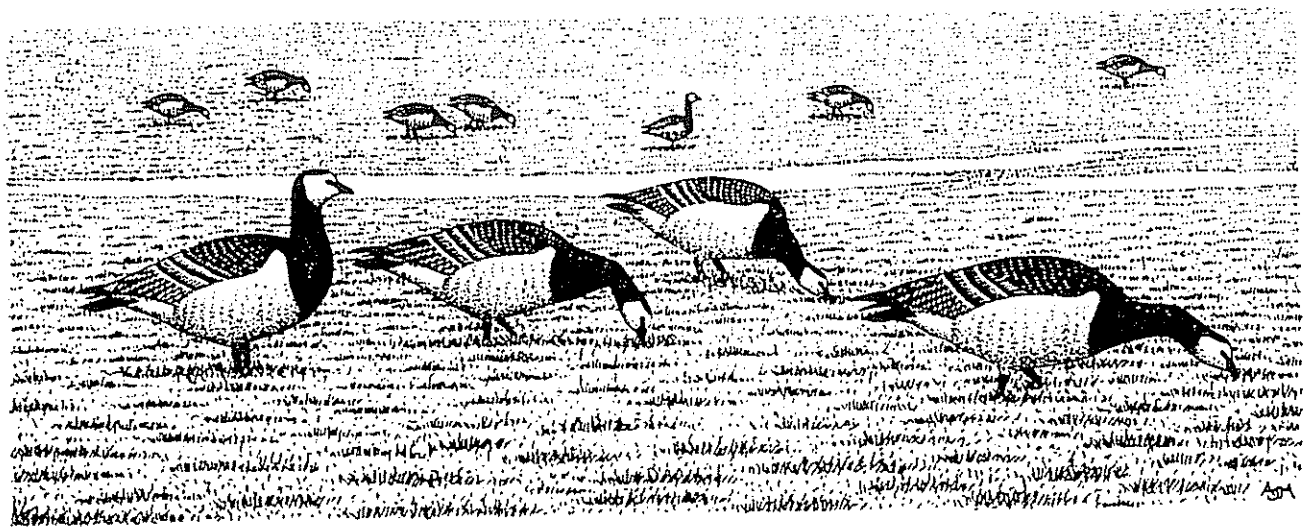
Statutory suspension of wildfowling in severe weather: Review of past winter weather and actions.

1. Introduction

Birds have evolved different strategies for coping with the effects of winter. Some avoid it completely by migrating in the autumn whilst those remaining in colder climates show behavioural and physiological adaptations. Even so, very cold weather can cause heavy mortality and many species of waterfowl move into milder areas during such periods. Others, notably waders such as Curlew and Redshank, tend not to move and so risk high mortality.

Maintaining body temperature and finding food are the major problems faced by birds in severe weather. It is important therefore that they are not unduly disturbed by human activities at these times. With this in mind Section 7 of the 1967 Protection of Birds Act allowed for the Secretary of State to ban shooting of Schedule 3 birds because of severe weather. This provision has been kept under Section 2(6) of the Wildlife and Countryside Act 1981.

The open shooting season starts on 1 September and ends on 1 February, inland, for Coot, Moorhen, Golden Plover, Common Snipe and Woodcock and ends on the foreshore on 20th February for ducks and geese.



2. Background to setting up criteria for monitoring severe weather

In January 1979 a ban on wildfowling was imposed as a result of a prolonged period of severe weather. There was considerable disagreement over calling this ban due to 'lack of universally accepted criteria and procedures'. As a result a Working Group was set up in the UK at the Waterfowl Liaison Committee meeting on 8 February 1979, chaired by the Nature Conservancy Council (NCC), to devise such criteria for future use. Representatives from the following organisations were involved:

Wildfowlers Association of Great Britain and Ireland (WAGBI): now the British Association for Shooting and Conservation (BASC)
Royal Society for the Protection of Birds (RSPB)
Wildfowl Trust (WT): now Wildfowl and Wetlands Trust (WWT)
British Trust for Ornithology (BTO)
Game Conservancy (GC)
Department of the Environment (DoE)
Nature Conservancy Council (NCC)

Biological data were considered in devising the search for criteria e.g. changes in weights and numbers of birds found dead or shot but as this information is not obtainable at short notice, nor from a wide range of localities, it was agreed that meteorological data, based on the state of the ground, could form a more workable base (Batten & Swift 1982) (Appendix 1). The state of the ground is recorded at 9am at many meteorological stations and-up until 1982 ground codes 1 - 9 were used where 3 - 9 included various combinations of ice and snow cover. It was suggested that thirteen stations at coastal, or near coastal, sites were selected (Figure 1, Table 1) for monitoring these conditions of ice and snow cover. If more than half of the stations recorded ground state 3-9 it could be considered a day of 'severe weather', marked on Meteorological Office forms with an 'X', and counting towards a possible suspension.

From these proposals the following criteria were proposed and accepted:

A period of Restraint:
After 7 days of continuous freezing, or 10 days when freezing occurred, interspersed with one or two day thaws. (The thaws are not counted in the total period of severe weather.) A thaw of three days or more is sufficient to end the cold-weather ban countdown. The term 'restraint' is undefined.

A Full Ban:
After 14 days of continuous freezing or after 14 days when freezing occurred, interspersed with one or two day thaws. (The thaws are not counted in the total period of severe weather.)

The recommendation as to when to lift a ban or restraint would have to be agreed by the parties involved, depending on the severity of the conditions, with an emphasis on flexibility at this early stage.

To test these proposed criteria Meteorological Office data from 1959-1979 were analysed by the group. They indicated that a wildfowling ban would have been called on only three occasions - 1961-62, 1962-63 and 1978-79. Periods of voluntary restraint would have operated in 13 out of the 20 years examined (Batten & Swift 1982). As a result there was broad agreement over these criteria which were subsequently accepted by the Secretary of State for the Environment. Details of implementation and areas of responsibility were then discussed.

Areas of responsibility:

1) NCC established a contract with Meteorological Office. Weekly reports of ground state were sent to NCC (now JNCC) between 20 December - 20 February unless required earlier. Should half or more of the thirteen stations record ground state 3-9 on five successive days OR on five

days punctuated by up to two days with less than half the stations recording the required ground state then DAILY reports would be sent by phone/fax. On instruction, the Meteorological Office would send NCC (JNCC) five-day forecasts of frost, ground state, wind and likelihood of snow, DAILY at 10am. JNCC will then liaise with DoE concerning future actions.

2) Publicity: DoE will then liaise with the Central Office of Information and with WAGBI (now BASC). WAGBI/BASC would then produce a report for circulation to other organisations who would then suggest how they could best help with publicity. Forty-eight hours notice was given between a ban being called and its implementation. If a ban was called on a Friday then a 13 day period of severe weather rather than 14 was the trigger for action. If the 14th day fell on a Sunday a ban would not be called until the Monday i.e. the 15th day. These arrangements were made to facilitate good communications.

Ministers asked for the criteria to be reviewed at the end of any year in which a restraint was called for or a ban imposed.

As disturbance of waterfowl in severe weather is not only caused by shooting but also by birdwatchers the RSPB drew up a code of conduct for restraint for birdwatchers and the BTO agreed to suspend cannon-netting activities during such conditions.

Table 1. Meteorological Stations monitoring the State of Ground for NCC/JNCC.

The thirteen stations selected in 1980

	Period in which station used for monitoring.
Dyce	1980/81 to 1991/92
Leuchars	1980/81 to 1984/85
Abbotsinch	1980/81 to 1984/85
Carlisle	1980/81 to 1989/90
Tynemouth	1980/81 to 1991/92
Binbrook	1980/81 to 1984/85
Gorleston	1980/81 then Hemsby from 1981/82 to 1991/92
Manston	1980/81 to 1984/85 then again from 1986/87 to 1991/92
Hurn	1980/81 to 1991/92
Mount Batten	1980/81 to 1991/92
Blackpool	1980/81 to 1984/85
Rhoose	1980/81 to 1991/92
Aberporth	1980/81 to 1984/85

Table 2. Summary of winter conditions and actions relating to implmentation of shooting bans; 1978/1979 to 1991/1992.

Winter	Conditions	Voluntary restraint	Shooting ban	Notes
1978/1979	December relatively mild. A total of 24 days in January with > half all stations recording ground states 3-9, and very cold. 11 days in February with > half all stations recording ground states 3-9.	Northumberland and Durham volunt. restraint 7-20 February. Rest of country 16-20 February. Scotland voluntary restraint called for in Solway Firth	England & Wales 26 January - 7 February Scotland 30 January - 14 February and then extended to 20 February in Fife, Grampian, Highland, Tayside and Central	Pre-working group
1979/80	Relatively mild winter			
1980/81	Relatively mild winter			
1981/82	Very severe winter	Voluntary restraint from 15 December. In Scotland restraint	England & Wales 22 December - 5 January Scotland 23 December - 5 January Scotland 11-24 January England & Wales 13-22 January	Revoked on 22 January 1982
1982/83	Very mild in January. Cold period in February.	No voluntary restraint as close to end of shooting season		
1983/84	Cold spell in mid-January			
1984/85	Very severe in January and again in mid February	Voluntary restraint assumed pre-ban	England & Wales 16-30 January Scotland 18-31 January	Many waders died
1985/86	Very cold end to December and first week of January. February - severe from 5th until the end of the season.	No records of restraint on file		
1986/87	Very cold mid January and again at end of February	Voluntary restraint from 13 January	England & Wales 21-26 January Scotland 21-26 January	Order revoked as conditions mild from 14th day of frost
1987/88	Very mild winter			
1988/89	Very mild winter			
1989/90	No data available to this review			
1990/91	Very cold February	Voluntary restraint from 14 February until the end of the season		Many waders died on the Wash. Many Wash Wildfowling Clubs implemented voluntary bans
1991/92	Cold snap at end of January			

FIGURE 1. The 13 Meteorological stations initially selected for monitoring ground state 1980/81 to 1984/85

3. Winter weather, restraints, bans, meetings and their outcomes 1980/81 - 1991/2

An outline of winter weather, shooting restraints and bans is given in Table 2 for quick reference.

3.1 Winter 1981/82:

The first opportunity for testing the agreed criteria came in December 1981. Sudden, severe snow storms in the south of England on 8 December rapidly spread to the rest of the country and the Meteorological Office contract was brought forward from the 20th to 6 December. By 12 December, there had been five days of continuous freezing and bad weather led to communication problems between all the parties involved. NCC kept BASC, WT, RSPB, and DoE informed of the situation and on the 15th BASC issued a press release and informed its members that bags should be limited and shooting confined to certain times to give birds the maximum time for feeding. Sanctuary areas were also established. RSPB contacted their reserve wardens and NCC sent a minute to the Country HQs for circulation to regional staff as soon as possible. Wardens of National Nature Reserves (NNR) with wildfowling interests were also advised via the regions. A list of coastal NNRs is given (Table 3) for reference.

After a further seven days of continuous freezing a statutory ban came into force at 0001 hours on 22 December in England and Wales and 0001 hours on 23 December in Scotland. The ban continued until 5 January, after an agreed 8 day recovery period from the first day of thaw on 29 December. Severe weather continued in Scotland and the ban was reintroduced there on 8 January, coming into force on 11 January. Provision for voluntary restraint and local bans had been made in the intervening period.

The state of the ground value 3-9 was again recorded from seven or more stations from 6 January and a statutory ban was again recommended. This came into force at 0001 hours on 13 January and was lifted at midnight on 22 January in England and Wales and midnight 24 January in Scotland. The winter continued mild and no further action was necessary.

Meetings to review the criteria after the bans of 1981/2

In accordance with the Minister's request the criteria were reviewed by representatives of the Working Group. Meetings were held on 18 January, 21 April and 19 July 1982 after which the finalised conclusions and recommendations were sent to the Minister. A copy of this paper is appended (Appendix 2). Key changes only, resulting from meetings of the NCC Working Group, are as follows:

1) Waders should not be treated separately from wildfowl, and Woodcock should not be treated separately from wildfowl when considering the introduction of a period of restraint or a total ban. This arose from a point raised by the British Field Sports Society (BFSS) who joined the group at the second meeting. They had pointed out that Woodcock, being birds of woodland are not affected to the same extent as coastal waders.

2) Capercaillie should not be included in any future cold weather bans.

3) It was recommended that an Order should be made after 13 days of frost, confirmed at 9am on that day. Publication and publicity would follow with the Order commencing at 9am on 15th day. A minimum period of seven days when less than half of the Meteorological Stations record state of ground 3-9 should be allowed before the ban is lifted.

4) The Group recommended that NCC should inform BASC, BFSS, BTO, DoE, Scottish Home and Health Department (SHHD), Welsh Office (WO), RSPB, WT and Game Conservancy of state of ground EACH DAY when restraint or ban called for.

5) More research into movements of birds, body weight changes and behaviour particularly relating to disturbance in mild, normal and cold winters was recommended.

6) The Group concluded that more effective publicity was required and the arrangements needed further examination.

Effects of the severe 1981/2 winter on waterfowl

The BTO carried out a contract for NCC to study the effects as shown by ringing recoveries. Mortality increased significantly in some species notably Redshank, Oystercatcher, Pochard, Heron, Shag and a number of passerine species (in litt.).

The Wader Study Group set up a new project to monitor the effects of severe weather on waders (Davidson & Clark 1982) (Appendix 3i). By counting and collecting tideline corpses and catching waders the aim was to examine the seasonal and geographical distribution of mortality, body condition (fat and protein reserves) of corpses and sub-lethal effects.

A summary of reported mortality of waders around Britain (Clark 1982) showed marked differences between estuaries. Mortality was highest in Scotland, particularly in Oystercatcher and Redshank. Several south- and west-coast estuaries were apparently unaffected (Appendix 3ii).

Changes in Meteorological Office recording codes

In 1982 the Meteorological Office introduced new codes for use in ground state monitoring. Instead of a scale of 0-9 they are replaced by a series of 'E' numbers (Table 4). Codes E4, E5 and E 0-9 are all recorded on ground state reports as indicating freezing or snow conditions.

Table 3. Coastal National Nature Reserves in Britain

* denotes a wardened NNR

England

Ainsdale Sand Dunes, Merseyside *
Arne, Dorset
Axmouth - Lyme Regis Undercliffs, Devon
Blackwater Estuary, Essex *
Braunton Burrows, Devon *
Bridgewater Bay, Somerset *
Colne Estuary, Essex *
Hamford Water, Essex *
High Halstow, Kent
Holkham, Norfolk *
Leigh, Essex *
Lindisfarne, Northumberland *
The Lizard, Cornwall *
North Solent, Hampshire *
Orfordness - Halvergate, Suffolk *
Ribble Marshes, Lancs & Merseyside *
Saltfleetby - Theddlethorpe Dunes, Lincs *
Scolt Head Island, Norfolk *
The Swale, Kent *
Walberswick, Suffolk *

Winterton Dunes, Norfolk

Scotland

Caerlaverock, Dumfries & Galloway *
Haaf Gruney, Shetland Isles *
Hermaness, Shetland Isles
Isle of May, Fife *
Monach Isles, Western Isles
Morton Lochs, Fife *
Nigg & Udale Bays, Highland
North Rona & Sula Sgeir, Western Isles
Noss, Shetland Isles *
Rhum, Highland *
St. Abbs Head, Borders *
St. Cyrus, Grampian *
St. Kilda, Western Isles
Sands of Forvie & Ythan Estuary, Grampian *
Tentsmuir Point, Fife *
Loch Druidibeg, Western Isles *

Wales

Dyfi, Dyfed *
Gower Coast, Glamorgan *
Newborough Warren Ynys Llanddwyn, Gwynedd *
Oxwich, W. Glamorgan *
Skomer, Dyfed *
Stanner Rocks, Powys *
Whiteford, W. Glamorgan *

3.2 Winter 1982/83:

December and January were both very mild and although there was a period of very cold weather in mid-February. This was very close to the end of the foreshore shooting season and thus did not lead to any action.

DoE put out a Press Release announcing the new criteria used in calling for a voluntary restraint or a shooting ban. The files indicate that BASC were still unhappy about the effectiveness of the publicity of the 1981/2 ban and DoE agreed to inform the *Times, Telegraph, Daily Mail* and the *Sun* newspapers and to use the medium of BBC Radio 4 public service announcements.

BASC agreed to inform all its affiliated wildfowling and game shooting clubs, joint councils and shoot syndicates by telephone should a period of restraint or a ban be required. Also, they agreed to commence a 24 hour telephone service and issue press announcements in both the local and national media.

Following the recommendations of the Working Group meetings in 1982 a draft bibliography of movements of migratory species during severe weather was drawn up in conjunction with IWRB (Appendix 4).

Exemptions for cannon-netting restraint in severe weather was agreed for ringing groups participating in the WSG Project on the Effects of Severe Weather on waders. The Groups exempted were SCAN

TABLE 4.

METEROLOGICAL OFFICE CODES USED IN GROUND STATE REPORTS

These are the new Met Office codes brought in in 1982 and replaces the old code of 0-9.

E = Ground without snow or measurable ice cover

E_4 = surface of ground frozen

E_5 = glaze

E^1 = Ground with snow or measurable ice cover

E^1_0 = Ground predominantly covered with ice

E^1_1, E^1_2 = Compact or wet snow not completely covering the ground

E^1_3 = Even layer of compact or wet snow completely covering the ground

E^1_4 = Uneven layer of compact or wet snow completely covering the ground

E^1_5, E^1_6 = Loose, dry snow not completely covering the ground

E^1_7 = Even layer of loose dry snow completely covering the ground

E^1_8 = Uneven layer of loose dry snow completely covering the ground

E^1_9 = Snow covering the ground completely with deep drifts

E_4, E_5 and E^1_{0-9} are all shown as "x" on Ground State Reports.

February 1985

Ringing Group (North Wales), Tay Ringing Group, Celtic Wader Research Group, Dr. RW Furness (Glasgow University) and FL Symonds (NCC and Highland Ringing Group). These exemptions have to be applied for annually through WSG to NCC.

3.3 Winter 1983/4:

After four severe days in early December the weather continued relatively mild until 15 January, from when 10 days of freezing conditions punctuated by three frost free days were recorded. Additional ground state reports were requested from two more Scottish stations (Machrihanish, - later replaced by Prestwick as it monitored seven days a week,- and Inverness) as the weather was milder this winter in Scotland, particularly in the East and Central belt. Voluntary restraint was called for at a Great Britain level and although advance notice of a possible shooting ban from the 28th and starting on the 30th was given, conditions ameliorated after the tenth day and no ban was called.

3.4 Winter 1984/5:

This winter was one of the coldest on record, not only in Britain but in many parts of Europe and Africa. Severe weather at more than half of the stations began on 2 January and continued until the 24th, with only one day when less than half of the stations reached the required ground state code. The south, east and midlands of England were the worst affected but severe frosts and snowfalls were quite widespread.

Five-day forecasts were requested from the Meteorological Office from 8 January.

A shooting ban in England and Wales was called by the Secretary of State on 14 January to come into operation at 9am on the 16th and ending immediately before midnight on the 29th. In Scotland the ban was called by the Scottish Secretary on 18 January to be lifted on the 31st.

The weather was again severe 8-20 February and additional data was requested from the Meteorological Office up until 25 February, as a result of a request from BASC to see what would have happened if the season had not ended on the 20th. In such an event a ban would have been unlikely. There were twelve days of continuous freezing and then the weather ameliorated.

Information and comments on the ban from within NCC

Following the shooting ban comments were sent from wardens and other regional staff on the weather conditions, movements and mortality of birds, publicity of bans and reaction of wildfowling and other groups in their areas.

The weather in Scotland had not been as severe as in parts of England and NCC officers had received several complaints that as birds were in good condition there should be regional bans or a separate system of implementation in Scotland. Whilst there was considerable sympathy for this idea many officers, particularly those in SW Scotland, felt that if a ban had been only imposed in England and Wales an influx of wildfowlers from south of the border would soon have arrived to shoot the unusually large numbers of Pinkfeet on the Solway. They felt that if birds had moved to milder areas to avoid the worst of the weather then they should remain undisturbed. Generally, however, wildfowlers had accepted the need for the ban although they were disappointed at having such a short season. There was press coverage of meetings of wildfowlers and BASC where they pressed for the idea of regional bans. Certainly, in parts of Scotland the cold spell in February was far more severe than in January when the ban was imposed.

Effects of severe weather on waterfowl

Information from NCC regional staff suggested some movements and some increased mortality of birds, especially Redshank. BTO ringing recovery data (in litt.) for 23 species showed that some Lapwing had moved out of Britain and were being recovered in France and Iberia. Redshank, Heron, Sparrowhawk, Kestrel and Oystercatchers all showed increased mortality as did Pied Wagtail, Wren, Robin, Song Thrush and Great Tit.

The IWRB wrote to NCC emphasising the need for collection of information at an international level on the effects of severe weather on wintering waterfowl and the basis for measures taken to conserve them in such conditions. A request for information was sent out to IWRB delegates and NCC, from whom a request for funds was also lodged.

The steps taken by other west European countries during the severe weather in early 1985 following an IWRB initiative are as follows (From BASC document of 30 May 1985).

Denmark:	Dabbling duck shooting stopped 6 January with shooting of seaduck to cease if conditions did not improve.
Norway:	No action as shooting season finished at the end of December.
Sweden:	No action as shooting season finished at the end of December.
West Germany:	Shooting season ended 11 January.
Netherlands:	Wildfowl and gamebird shooting stopped 11 January.
France:	Wildfowling stopped on 9 January for a minimum of 10 days. (France has a system of suspension based on the British one).
Belgium:	Here shooting seemed to have stopped.
Italy:	Suspension in northern regions (no specific dates given in BASC document).
Ireland:	Voluntary suspension in Northern Ireland and in Republic shooting ended 18 January.

In a preliminary unpublished analysis of National Wildfowl Count Scheme returns, the Wildfowl Trust indicated that during the first week in January when most of NW Europe was gripped by extreme weather conditions there was no significant influx of wildfowl that most species were slow and reluctant to move south and west. Two species, Teal and Shoveler, tended to move out of Britain and in late January there was an influx of more Wigeon, Smew and other sawbills and increased numbers of Bewick's Swans. During the return of cold weather from 8 February, movements were more as anticipated with Bewick's Swans and European Whitefronts moving into Britain. By this time the Wigeon had moved on again.

The Wader Study Group Project of the Effects of Severe Weather on Waders, set up after the severe winter of 1982/83, showed that during a mild winter the peak mortality of waders occurs in February. Although the peak mortality in 1984/5 winter was in February a higher proportion of mortality occurred in January and February (Davidson & Clark 1985) (Appendix 5). Similarly, in France there was a significantly different pattern in that winter. This was particularly true in north France and in east and south-east England. Those birds that died had exhausted their fat reserves, with the exceptions of Dunlin and Turnstone. It seemed that Dunlin were unable to mobilise their fat reserves fast enough to meet their energy requirements. From catching waders it was found that by the severe weather in February most waders had recovered their lost condition from the January spell. Redshank had a higher body mass than expected and although they suffered a high mortality it appears that the survivors had compensated for loss of condition.

Local movements of waders, particularly of Oystercatcher and Black-tailed Godwit, took place on the Suffolk/Essex coast and there was an influx into east coast estuaries, probably from the continent. As mentioned earlier Lapwing moved out of Britain to warmer areas.

Discussions and meetings following 1984/5 shooting ban

Sir Hector Munro asked a question in Parliament on 7 February (Commons Hansard, 7 February 1985, column 636-637) requesting the Secretary of State for Scotland to list the meteorological stations, their height above sea level in feet and their daily temperatures in degrees Fahrenheit for the 14 days before the cold weather shooting ban was put into force in January and for the seven subsequent days. These the Secretary of State for Scotland, Mr. Younger, listed in reply.

Meeting of the NCC Working Group 14 June 1985:

A meeting was held by the Working Group to review cold weather shooting bans at DoE, Marsham Street on 14 June 1985. Representatives from WT, SHHD, BASC, NCC, Durham University, DoE, BFSS, BTO, RSPB, Game Conservancy attended, chaired by Prof. GV Matthews (WT).

BASC had prepared a detailed paper 'Severe Weather Suspensions of Wildfowling - with special reference to January 1985'. BASC felt that much improvement was needed in publicity and asked for an increased number and distribution of Meteorological Stations to monitor coastal conditions. They called for changes in the criteria used in decision-making with statutory suspensions applied separately to Scotland based on recommendations of Regional advisory groups. Britain would be subdivided into severe weather regions each with its own advisory group.

The details of this paper formed the basis of the meeting. The agreed summary of recommendations is appended (Appendix 6), with major changes as follows:

1) It was agreed to increase the number of Meteorological Stations used for monitoring and a meeting was arranged between NCC, BASC chaired by Prof. Matthews to discuss this.

2) Regional subdivision of Britain was not agreed but when a statutory suspension was imposed NCC would have recommendations from their regional staff available, if necessary, to assist in decision making.

3) Statutory suspensions could be applied separately in England/Wales and Scotland with regional advice to be taken into account in deciding the extent of voluntary suspensions only. Statutory suspensions were to run for a maximum of 14 days but re-examined after a maximum of seven days.

4) Agreed wording of press releases or advertisements should be prepared well in advance and sent to wider range of national and regional newspapers. A quicker system in England and Wales was needed for the Home Office to inform police forces. The Meteorological Office were to be approached about having a ban announced on weather forecasts and British Telecom were approached about recorded announcements.

5) Shooting organisations, in particular the Game Conservancy were asked to investigate separate treatment of Woodcock.

3.5 Winter 1985/6:

Twenty-three meteorological stations around Britain were agreed for state of ground monitoring (Figure 2). When twelve or more stations record freezing conditions for five successive days NCC should be alerted.

The twenty-three stations and their subsequent changes up to 1991/2 winter are given in Table 5. Only Dyce, Tynemouth, Hemsby, Manston, Hurn and Rhoose remained constant from 1980/81.

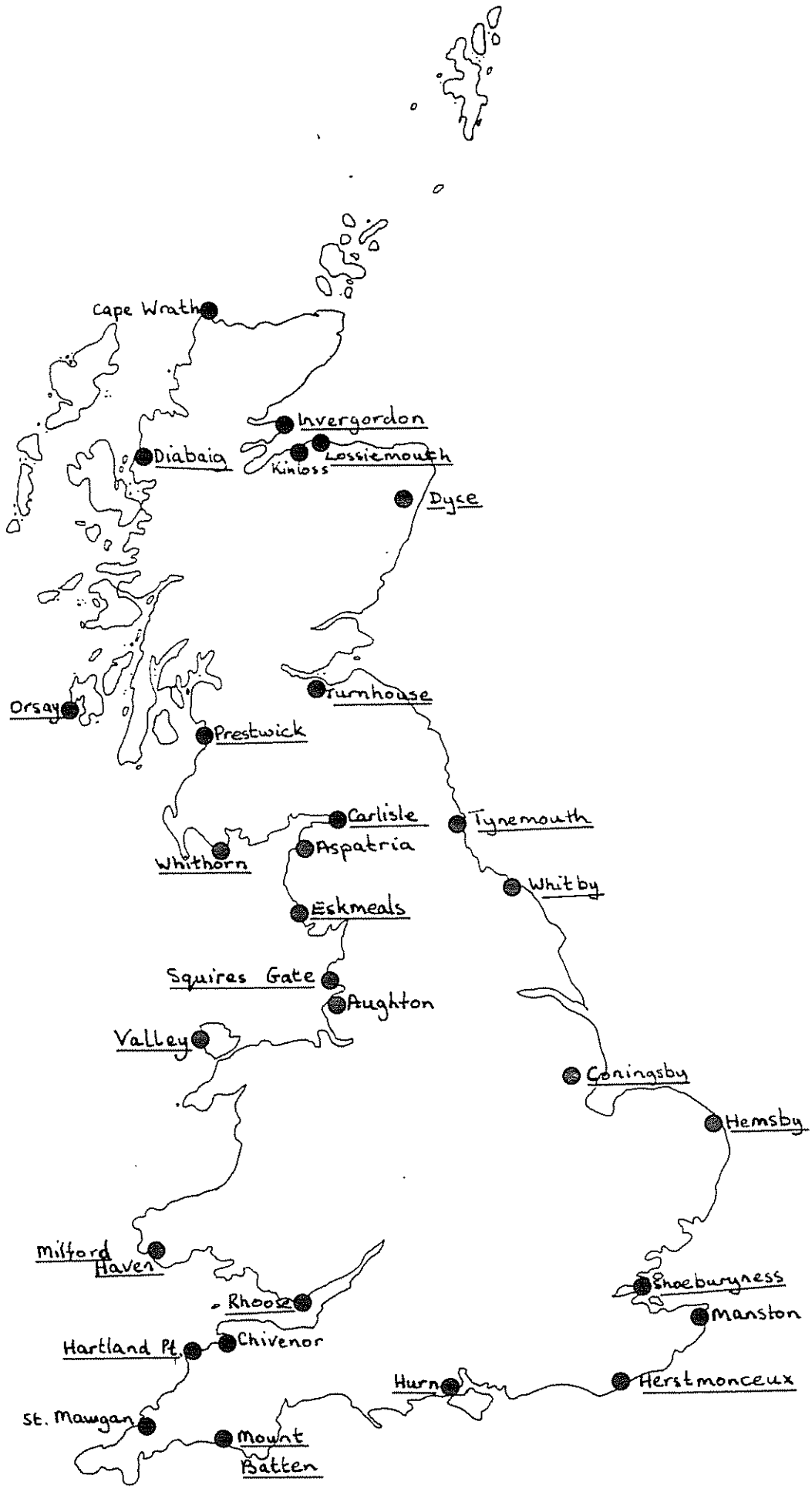
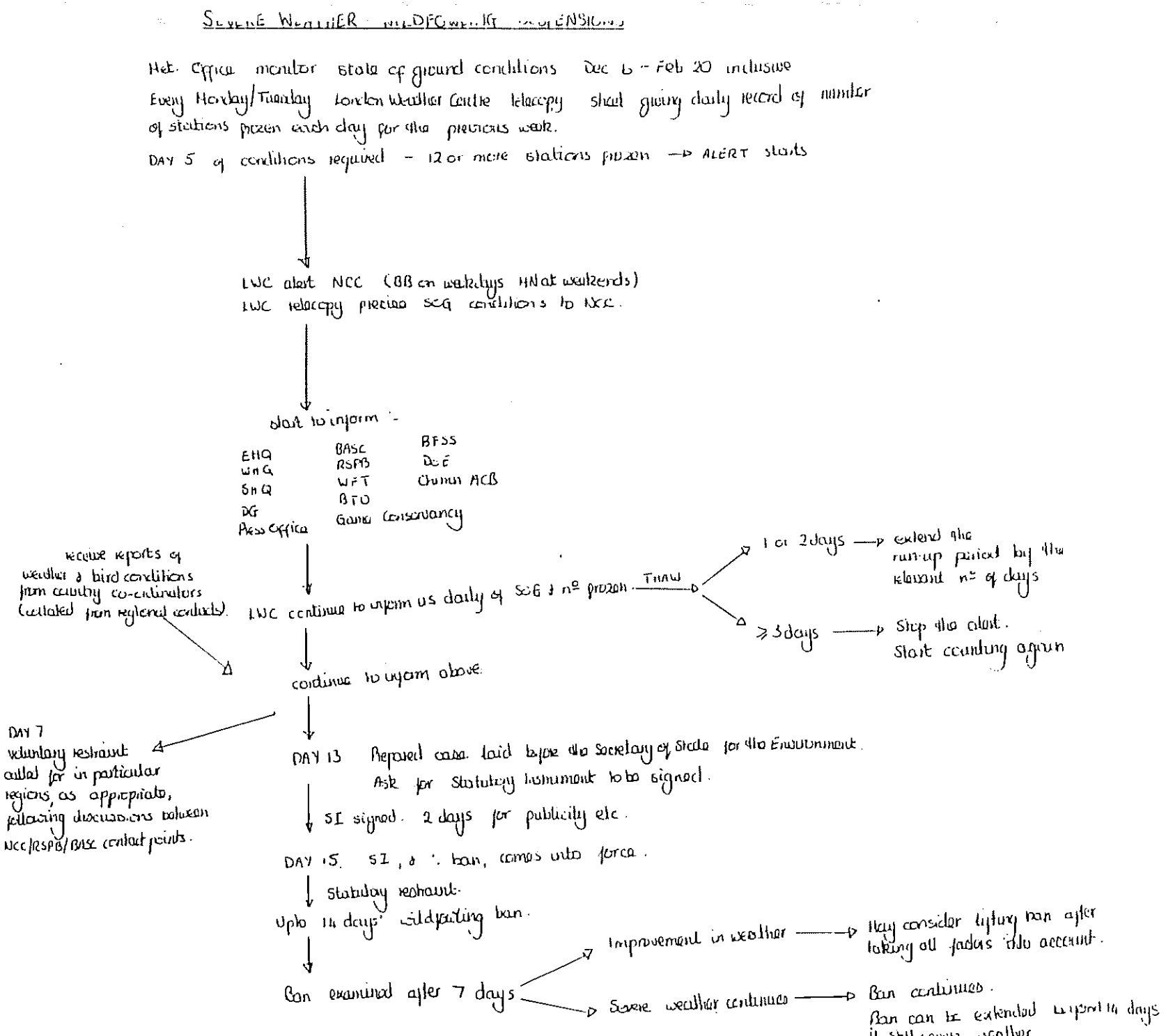


FIGURE 2. The 23 Meteorological stations agreed after the 1984/85 winter, together with any subsequent changes. (Underlined are original 23 stations).

FIGURE 3.


SEVERE WEATHER MEDIUM-TERM EXTENSIONS
Met. Office monitor state of ground conditions Dec 6 – Feb 20 inclusive
Every Monday/Tuesday London Weather Centre telecopy sheet giving daily record of number of stations frozen each day for the previous week.
DAY 5 of conditions required – 12 or more stations frozen → ALERT starts
LWC alert NCC (CBB on weekdays HN at weekends)
LWC telecopy precise SCG conditions to NCC.
start to inform :-
EHQ
WHQ
SHQ
DG
Press Office
BASC
RSPB
WFT
BTO
Game Conservancy
BFSS
DoE
Chiefs ACBs
receive reports of weather & bird conditions from country co-ordinators (collated from regional contacts).
LWC continue to inform us daily of SCG & nº frozen
THAW
1 or 2 days → extend the run-up period by the relevant nº of days
≥ 3 days → Stop the alert. Start counting again
continue to inform above.
DAY 7 voluntary restraint called for in particular regions, as appropriate, following discussions between NCC/RSPB/BASC contact points.
DAY 13 Report case laid before the Secretary of State for the Environment. Ask for Statutory Instrument to be signed.
SI signed. 2 days for publicity etc.
DAY 15. SI, & ∴ ban, comes into force.
Statutory restraint.
Upto 14 days' cold spating ban.
Ban examined after 7 days
Improvement in weather → May consider lifting ban after taking all factors into account.
Severe weather continues → Ban continues. Ban can be extended in part in 14 days if still severe weather

Manston was replaced by Shoeburyness for a single year (1985/6) after the 1985 Working Group meeting. Diabaig was replaced by Cape Wrath in 1990/91 and Lossiemouth by Kinloss in 1991/92 as the former was closed at weekends. Mount Batten was close and replaced by St. Mawgan in 1991/92, Hartland Point. by Chivenor (Tovington at weekends) and Squires Gate by Aughton in 1991/92 following the closure of Squires Gate. Carlisle was replaced by Aspatria in 1990/91 and Eskmeals was not replaced in 1991/92 when it shut down at weekends, leaving only 22 monitoring stations for that winter.

Table 5. The 23 meteorological stations agreed by the Working Group after 1984/85 winter.

	Period in which stations used for monitoring
Diabaig	1985/86 to 1989/90 replaced by Cape Wrath 1991/91
Invergordon	1985/86 to 1991/92
Lossiemouth	1985/86 to 1989/90 replaced by Kinloss 1990/91
Dyce	1985/86 to 1991/92
Turnhouse	1985/86 to 1991/92
Orsay	1985/86 to 1991/92
Prestwick	1985/86 to 1991/92
Whithorn	1985/86 to 1991/92
Carlisle	1985/86 to 1989/90 replaced by Aspatria 1990/91
Eskmeals	1985/86 to 1990/91 and not replaced 1991/92
Tynemouth	1985/86 to 1991/92
Whitby	1985/86 to 1991/92
Squires Gate	1985/86 to 1989/90 replaced by Aughton 1990/91
Coningsby	1985/86 to 1991/92
Hemsby	1985/86 to 1991/92
Shoeburyness	1985/86 to 1985/86 replaced by Manston 1986/87
Herstmonceux	1985/86 to 1991/92
Hurn	1985/86 to 1991/92
Mount Batten	1985/86 to 1990/91 replaced by St. Mawgan 1991/92
Hartland Point	1985/86 to 1989/90 replaced by Chivenor/Tovington 1990/91
Rhoose	1984/85 to 1991/92
Milford Haven	1984/85 to 1991/92
Valley	1984/85 to 1991/92

Following the Working Group meeting NCC regional staff were informed that wildfowling bans were considered separately in Scotland from England and Wales. A system of regional contacts was introduced whereby, in each region a representative from NCC, RSPB and BASC should keep in touch during an alert period and while a ban is in force. They should exchange information on general weather conditions, the conditions of the birds and movements of birds. Such information would then be disseminated to each respective organisation.

Regional staff of NCC would be informed of an alert period through their country HQs. Any information collected on general conditions would then be given back to their country HQs. An outline of the sequence of procedures is shown in Figure 3.

Winter weather

December was a mild month and January had 11 days of severe weather, in three short periods. February started mild but from 5-28 February weather was very severe. The Meteorological Office contract was extended until 28 February but there is no record on file of a voluntary restraint being requested after seven days of severe weather. As the cold weather was again at the end of the open season no statutory ban would have been considered necessary.

3.6 Winter 1986/87:

December was quite mild but from 7 - 18 January there were thirteen days of continuous freezing weather. Conditions eased for the next nine days followed by four freezing days at the end of January.

On the sixth day of freezing conditions the Meteorological Office informed NCC who in turn contacted BASC, RSPB, WT,BFSS and Game Conservancy. BASC arranged for a voluntary restraint request to be sent to all their affiliated club secretaries on 13 January. By the thirteenth day, and daily contact with RSPB and BASC, they recommended a suspension order to be made beginning on 15th day (21 January). On 14th day a thaw set in with only the southeast and parts of eastern England remaining frozen. There was agreement that if there were seven frost-free days by 26 January the ban would be lifted. This was carried out with the Revocation Order being made on 23 January and ban being lifted at 1200 hrs on the 26th. There was good publicity and the operation went very smoothly, with little controversy.

A temporary suspension of hunting was also applied in Ireland.

Meeting to Review Severe Weather Suspensions of Wildfowling, DoE, 5 May 1987

Representatives from BTO, NCC, Scottish Development Department (SDD), WO, BASC, DoE, RSPB, WT, Game Conservancy, BFSS attended the meeting, chaired by Prof. GV Matthews (WT). There was general agreement that the suspension period in January 1987 had gone well and BASC thought they could best improve things by preparing guidelines for wildfowlers during future periods of restraint. There were still some problems with Woodcock as they had been in good condition throughout the winter and there had been complaints about their inclusion in the ban. The Welsh Office and NCC agreed to have better communications in the future as there had been some confusion.

The DoE had proposed regional bans and SDD also felt there may have been a need for them. This had been discussed at length at the 1985 meeting. As birds are very mobile and move to milder areas in severe conditions they need disturbance free areas to regain condition. These movements may be within Britain or there may be European movements. Also, it was felt that the boundaries of regions would be impossible and impracticable to draw since divisions would inevitably be arbitrary. All other representatives agreed that to change a system that had been developed over a number of years and was now working well was unnecessary.

The meeting concluded by DoE and SDD agreeing that the current system worked well and withdrawing their proposal for regional bans

Effects of severe weather on birds:

In contrast with the previous two severe winters, no large-scale mortality of waders occurred. There had been a large influx of European birds on the east coast and Wildfowl Count data showed an influx of Wigeon into Britain and a movement of Teal, Shoveler and Gadwall out of Britain. There had also been unusual movements of birds across Britain e.g. Pinkfooted Geese.

BASC were still working on weight analysis and IWRB reported that a nine month study of the Analysis of Cold Weather Movements of Waterfowl wintering in western Europe was being set up. The WSG project was continuing at a lower level and there was a temporary halt in the Durham University wader work. Two studies were taking place on ducks and geese: the effects of disturbance, at WT, and a BASC/WT study looking at the numbers, distribution and energy levels of wildfowl in relation to shooting and other disturbances. The two studies were to be integrated and a joint BASC/WT report written, funded by RSPB and NCC.

3.7 Winter 1987/88:

BASC information to members:

During 1988 BASC sent a paper to all wildfowling clubs explaining the voluntary restraint procedure in periods of severe weather (Appendix 7). Voluntary restraint is called from day 8 of 'severe weather' up to the time when statutory suspension takes place. Decisions about a response are made at a local level and it may be that a voluntary ban is the best form of restraint, depending on conditions. Clubs were asked to monitor the situation, keep their members informed and liaise with other clubs as necessary. In the paper, guidance was also given as to how influxes of birds, abnormal behaviour, the effects of wind-chill and signs of loss of body condition together with local ground conditions could help in making decisions of appropriate action in the event of severe weather voluntary restraint periods.

Winter weather:

This was an exceptionally mild winter with only four days when more than twelve stations recorded any freezing conditions at all between 6 December and 20 February. As usual, at the beginning of the winter cannon-netting exemptions were applied for.

3.8 Winter 1988/89:

This was another exceptionally mild winter. No meteorological data is available on file for 3-9 January and 14-20 February. There were no days between 6 December - 2 January and 10 January - 13 February when more than seven stations recorded freezing conditions.

3.9 Winter 1989/90:

No inormation on winter conditions.

3.10 Winter 1990/91:

December and the first half of January remained relatively mild and after four days of severe weather 13-16 January there was a second severe spell between 2-14 February with continuous frost. BASC sent out letters calling for a voluntary restraint in shooting and several clubs stopped shooting on the Wash because of the severity of conditions there.

A statutory suspension would have been called on the 16th but as this was so close to the end of the foreshore shooting season, and because a thaw then set in on the 15th BASC, NCC, RSPB and DoE agreed to continue to urge voluntary restraint until the end of the season.

In 1990, the IWRB Special Publication No. 13 was published entitled *'Cold Weather Movements of Waterfowl in Western Europe'* by SC Ridgill and AD Fox. The summary of this report is included as Appendix 8.

The Merseyside Ringing Group was added to the list of cannon-netting exemptions.

Effects of severe weather on birds:

BTO reported heavy mortality of waders on the Wash by 18th February. Redshank and Grey Plover were the worst hit and generally the weight of birds was low during the severe conditions.

3.11 Winter 1991/92

In April 1991 the NCC was split into three country agencies, English Nature, the Nature Conservancy Council for Scotland (now Scottish Natural Heritage) and the Countryside Council for Wales, together with the Joint Nature Conservation Committee (JNCC). The state of ground monitoring contract with the Meteorological Office and the Severe Weather Shooting Suspensions became the responsibility of JNCC, specifically with its Ornithology and Landscape Ecology Branch.

An information note was produced (Appendix 9) and circulated to the statutory conservation agencies when it appeared that a period of severe weather might be prolonged. Contacts in the three country agencies were agreed and regional co-ordinators were appointed. These national and regional contacts are:

Great Britain: Joint Nature Conservation Committee
David A. Stroud, Vertebrates and Landscape Ecology Branch (National Co-ordinator)

England: English Nature
P. Clement, Licensing Officer (Country Co-ordinator)
Regional Co-ordinators:
David Denman, East Region, Peterborough
Peter Spencer, East Region, Norwich
Helen Smith, North-east Region
Tania Roe, North-west Region
Colin Tubbs, South Region
Rosann Sparshott, South Region
Dagmar Junghanns, South-east Region
Andy McDouall, South-west Region
David Heaver, West Midlands

Wales: Countryside Council for Wales
Iwan Hughes, Licensing, Bangor (Country Co-ordinator)
Regional Co-ordinators:
Ian Tillotson, Dyfed-Powys Region, Aberystwyth
Bob Sutton, South Wales Region, Cardiff
Warren Martin, North Wales Region, Bangor

Scotland: Scottish Natural Heritage
John Ralston, Licensing Officer (Country Co-ordinator)
Regional Co-ordinators:
R.V. Collier, North-west Scotland, Inverness
D. Balharry, North-east Scotland, Aberdeen
C. Placido, South-west Sotland, Balloch
N. Gubbins, South-east Scotland, Riccarton

Winter weather:

December and the first half of January were very mild followed by a period of seven severe weather days punctuated by one less severe day. After that the weather continued very mild until the end of the season.

4. International Dimensions

The Second Technical Meeting on Western Palearctic Migratory Bird Management in Paris 11-13 December 1979 (Scott & Smart 1982) passed a recommendation (no. 10 of the meeting) addressing problems of severe weather and birds. It recommended that 'the relevant authorities in Ireland,the Federal Republic of Germany, Denmark, the Benelux countries and France select a number of meteorological stations distributed in those areas frequented by waterfowl and examine the state of ground for as many past winters as possible. It urged that this information should be considered in relation to any action taken to restrict or ban the shooting of waterfowl in these winters so that each country may arrive at a realistic set of criteria and policy for triggering this exceptional control of hunting'.

The meeting further recommended that 'nations that have not yet done so, [should] create the legislative tools necessary to enable such emergency and restrictive measures to be taken on the national and regional level, in case of severe weather conditions'.

Finally, the meeting recommended that 'these procedures include a series of conservation measures co-ordinated by the International Council for Game and Wildlife Conservation (CIC) and the IWRB to be taken all along the flyway, including those areas not experiencing severe weather, going from a strict control of hunting pressure or even a total shooting ban'.

There is no information regarding whether these recommendations have been implemented by all countries concerned. IWRB may have details of any measures taken, and this information may well prove valuable should another period of severe winter weather occur.

In the final draft of the Western Palearctic Waterfowl Agreement and Action Plan under the Bonn Convention, 1991, all parties 'shall agree without delay to take the following measure for conserving and managing Western Palearctic ducks, geese and swans' - 'To establish a mechanism by which temporary emergency protection can be given at short notice to certain species within certain areas when temporary unfavourable conditions (e.g. cold spells, oil spills, extended periods of drought) are expected seriously to affect their populations' (Page 14 section 1c).

Whilst individual countries may have mechanisms for protecting waterfowl in severe weather there is an urgent need for a co-ordinated approach on at least a European level. During severe weather in the more northerly European countries many species move south, only to experience high shooting pressure in the countries where they have sought refuge from unfavourable conditions (Ridgill & Fox 1990).

With the forthcoming implementation of the Western Palearctic Waterfowl Agreement of the Bonn Convention, ways of strengthening links between existing national schemes and encouraging the exchange of information should be examined. This might be initially undertaken by means of an international workshop to examine these matters more closely.

5. Analysis of Meteorological Ground State Data

Information on ground state has been made available to NCC/JNCC from 1959/60 until present (1991/2). The periods under contract within each winter for which data was sent are shown in Table 6. There are three winters with gaps in the data sets and there is no information on file for 1989/90. Figures 4 - 14 give the data on spreadsheets. A '1' is entered next to a station on any day when freezing/snow conditions prevail and if at least half the stations record these conditions then an 'X' is placed after the total for each day. These figures clearly illustrate periods of severe weather and are used in the following analysis.

Table 6. Dates for which meteorological station ground state data obtained by NCC/JNCC.

Winter	No. stations	Start date	End date	Missing data
1959-1979	10 - 12	1 November	28 February	
1979/80	12	21 December	28 February	
1980/81	13	6 December	23 February	
1981/82	13	6 December	28 February	
1982/83	13	7 December	21 February	28 December-3 January
1983/84	13	6 December	20 February	
1984/85	13	6 December	5 February	
1985/86	23	10 December	28 February	6-9 December
1986/87	23	6 December	20 February	
1987/88	23	8 December	20 February	
1988/89	23	6 December	3 February	3-9 January
1989/90	data set not found			
1990/91	23	6 December	18 February	
1991/92	22	6 December	20 February	

The total number of days per winter recording severe weather (Figure 15) show that although the most recent winters have been mild, the late 1970s and mid-1980s were much colder than the 1960s and early 1970s, if the exceptionally severe winter of 1962/63 is excluded.

The proportion (%) of the winter monitoring period at each Meteorological Station registering severe weather from 1980/81 onwards (Table 7) highlights those stations such as Dyce in NE Scotland that regularly experience more severe weather than those stations such as Aberporth and Milford Haven in Wales and Plymouth in SW England with relatively mild conditions.

In the NCC's preliminary analysis of the 1959-79 Meteorological data from November through to March, January had the highest number of severe weather days (Figure 16), with the 1962/3 winter excluded as the freezing conditions were continuous from late December until March. When each winter is looked at in turn between 6 December and 20 February (Figure 17) it is noticeable that several of the more recent winters have had more days of frost and snow in February than in January. This may have implications for the disturbance of waterfowl since a shooting suspension is less likely to be called in February as the open season ends on the 20th.

In waders it has been found that mortality is highest in February and that in that month normal fat levels are smaller than in January (Davidson & Clark 1985). This leads to a shorter survival time when using these reserves of fat. Thus if the survival period in severe weather is likely to be reduced in February and a statutory suspension is *not* brought in, owing to the proximity to the close season, then disturbance by wildfowlers, and others, may lead to increased mortality. The proximity of the end of the shooting season should not be taken as a reason, in itself not to introduce a shooting suspension. In fairness to the wildfowlers, during such conditions, such as in 1990/91 many clubs

Table 7. Proportions (%) of recording days registering frost/snow ground conditions at recording stations: 1980/81 - 1991/92 [6 December - 20 February].

Station	Station name	1980/81	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92
137	Whithorn						32	29	7	0		21	6
140	Abbotsinch	38	51	37	34	55							
135	Prestwick						50	49	16	0		36	23
102	Orsay						16	13	3	0		13	3
033	Diabaig						55	30	21	0			
049	Cape Wrath											33	0
058	Invergordon						47	33	20	3		45	18
066	Kinloss												33
068	Lossiemouth						55	46	26	3		36	
091	Dyce	57	55	44	39	39	52	49	26	3		51	46
171	Leuchars	43	58	44	49	46							
160	Turnhouse						43	44	22	5		51	31
262	Tynemouth	18	35	21	23	31	29	29	8	3		25	26
282	Whitby						21	23	4	0		19	14
388	Binbrook	38	53	43	46	56							
391	Coningsby						49	47	18	11		37	36
493	Gorleston	17											
496	Hemsby		44	21	26	49	41	44	7	8		27	21
693	Shoeburyness						23						
797	Manston	22	38	24	17	40		33	10	3		23	22
884	Herstmonceux						40	52	14	8		32	35
862	Hurn	20	29	29	18	48	38	48	12	10		29	30
827	Plymouth/Mount Batten	17	14	17	14	42	0	27	12	5		24	
817	St. Mawgan												18
704	Hartland Point						25	23	4	0			
707/712	Chivenor/Tovington											33	21
715	Rhoose	22	39	17	14	48	26	38	12	6		33	22
604	Milford Haven						25	21	1	0		16	4
502	Aberporth	10	34	17	10	42							
302	Valley						21	29	10	0		29	18
322	Aughton												28
318	Squires Gate						45	40	8	2		33	
318	Blackpool	20	51	27	26	44							
213	Eskmeals						37	31	5	0		24	
215	Aspatria											49	30
222	Carlisle	32	52	37	38	48	47	48	17	0			
	Total 'X' status	212	425	266	273	452	594	635	216	44		541	376

instigated their own voluntary shooting suspensions which shows their responsible attitude to local conditions.

Whilst the present report has considered shooting suspensions, there has been no comparable reduction in disturbance from RAF low-flying, birdwatchers or walkers, all activities which have the potential to cause severe local disturbance. These problems need to be addressed in the future.

During the 13-day period of severe weather in February 1990/91 very large numbers of waders, particularly Redshank, died on the Wash (BTO Press Releases on file). These severe local conditions prompted the action by wildfowlers as outlined. However, there may be a case for making provision for a statutory suspension to be called if there are severe conditions in the last two weeks of the open season.

It is the length of severe conditions that leads to a wildfowling suspension. When the frequency of different lengths of continuous periods of feezing weather are analysed between 6 December and 20 February (Figure 18) for each year most spells lasted for less than five days.

The period for which records exist was arbitrarily divided into two. Between 1959/60 and 1974/75, there were only two winters with spells lasting longer than ten days. One of these was the exceptional winter of 1962/63, with 59 continuously freezing days to 20 February. Since 1974/5 however, the frequency of periods longer than ten days has increased, with two such periods in each of the 1981/2 and 1984/5 winters. In both these years statutory suspensions were imposed, twice in 1981/2. Four of these periods, however, have occurred close to the end of the open season (1982/3, 1984/5, 1985/6 and 1990/91) with either no action taken or only voluntary restraints on wildfowling. In February 1983 two periods of severe weather punctuated by two days of thaw (Figure 16) totalled eleven days.

These results emphasise the need to monitor severe weather if it occurs in February and consider taking further action to prevent unnecessary disturbance to waterfowl which may have particularly low fat reserves at this time.

As most of the evidence of weight changes comes from waders more investigations into the condition of wildfowl might be appropriate.

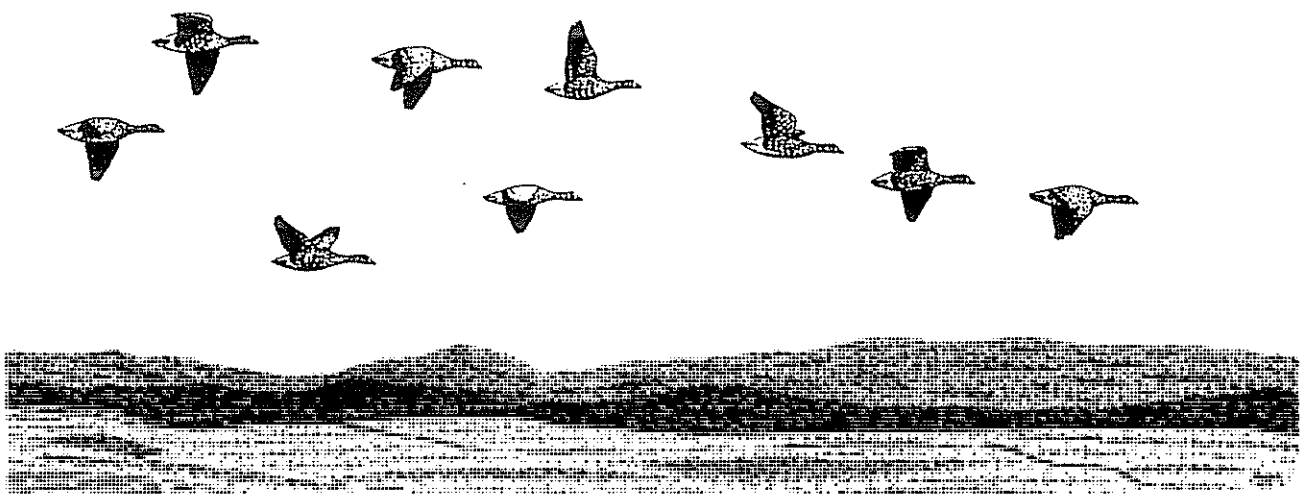


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Figure 4. Summary of ground state at recording stations, winter 198/81.

Winter 1980/81

Daily codes

Station code	Station name	Total Station		December																									
				6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
827	Plymouth	10	17%																										
862	Hurn	12	20%																						1			
797	Manston	13	22%																						1			
715	Rhoose	13	22%																					1				
502	Aberporth	6	10%																									
496	Hemsby	10	17%																					1	1			
388	Binbrook	23	38%																					1				
318	Blackpool	12	20%																					1				
222	Carlisle	19	32%																				1	1				
262	Tynemouth	11	18%																									
140	Abbotsinch	23	38%																				1	1				
171	Leuchars	26	43%																			1	1	1				
091	Dyce	34	57%																			1	1	1				
	Total	212		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4	8	3	0	0	0
	X status																								X				

Station code	Station name	January																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
827	Plymouth					1						1		1					
862	Hurn					1						1		1					
797	Manston												1	1			1		1
715	Rhoose					1		1			1	1		1					
502	Aberporth																		
496	Hemsby							1						1			1	1	
388	Binbrook					1	1	1			1	1		1		1	1	1	1
318	Blackpool					1		1				1		1			1		
222	Carlisle				1	1		1				1		1		1	1		1
262	Tynemouth	1			1	1		1						1		1	1	1	
140	Abbotsinch	1			1	1					1		1	1		1	1	1	1
171	Leuchars	1			1	1	1	1			1	1	1	1		1	1	1	1
091	Dyce	1			1	1	1	1	1		1	1	1	1	1	1	1	1	1
	Total	4	0	0	5	10	3	8	1	0	5	8	4	12	1	6	9	6	6
	X status					X		X				X		X			X		

Figure 4. Summary of ground state

Winter 1980/81

Station code	Station name	Total Station	February 20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
827	Plymouth	10													1									1	1			1	1	1			1	
862	Hurn	12																						1	1			1	1	1	1		1	1
797	Manston	13											1		1	1			1						1		1						1	1
715	Rhoose	13																						1	1		1	1	1	1			1	
502	Aberporth	6											1		1												1	1	1				1	
496	Hemsby	10																	1						1	1				1				
388	Binbrook	23	1	1															1					1	1	1	1	1	1			1	1
318	Blackpool	12																							1			1	1		1	1		1
222	Carlisle	19	1																					1	1			1		1	1	1	1	1
262	Tynemouth	11																							1			1	1					
140	Abbotsinch	23	1															1					1	1	1			1		1	1	1	1	
171	Leuchars	26	1																				1	1	1			1		1	1	1		1
091	Dyce	34	1	1	1					1	1						1	1	1				1	1	1				1	1	1			1
	Total	212	5	2	1	0	0	0	0	1	1	0	2	0	3	1	1	2	4	0	0	0	3	8	12	2	4	10	8	8	6	4	8	7	0	0	0	0	0	0	0	0
	X status																							X	X			X	X	X			X	X								

Figure 5. Summary of ground state at recording stations, winter 1981/82.

Winter 1981/82

Daily codes

Station code	Station name	Total Station		Dec 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
827	Plymouth	11	14%							1						1	1						1						
862	Hurn	22	29%				1	1		1	1			1	1	1	1			1	1	1	1						
797	Manston	29	38%			1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
715	Rhoose	30	39%				1	1	1	1	1			1	1	1	1				1	1	1		1				
502	Aberporth	26	34%					1		1	1	1	1	1	1	1	1			1	1	1	1	1					
496	Hemsby	34	44%		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
388	Binbrook	41	53%		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
318	Blackpool	39	51%			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
222	Carlisle	40	52%		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
262	Tynemouth	27	35%			1	1	1	1	1	1	1		1	1	1	1	1			1		1	1					
140	Abbotsinch	39	51%		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
171	Leuchars	45	58%		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
091	Dyce	42	55%		1	1	1	1	1	1	1	1	1	1	1	1	1	1			1	1	1	1	1	1	1		
	Total	425		0	6	9	11	12	9	13	12	10	9	12	12	13	13	9	7	9	12	11	13	10	9	8	5	2	2
	X status					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		

Station code	Station name	Jan 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
827	Plymouth								1	1	1	1	1	1	1				
862	Hurn									1	1	1	1	1	1	1	1	1	
797	Manston								1	1	1	1	1	1	1	1			
715	Rhoose							1	1	1	1	1	1	1	1	1	1	1	1
502	Aberporth							1	1	1	1	1	1	1	1	1	1	1	
496	Hemsby							1	1	1	1	1	1	1	1	1	1		
388	Binbrook	1					1	1	1	1	1	1	1	1	1	1	1	1	
318	Blackpool	1	1				1	1	1	1	1	1	1	1	1	1			
222	Carlisle	1	1		1	1	1	1	1	1	1	1	1	1	1	1			
262	Tynemouth	1					1	1	1	1	1	1	1	1		1		1	
140	Abbotsinch				1	1	1	1	1	1	1	1	1	1	1	1	1		
171	Leuchars	1	1			1	1	1	1	1	1	1	1	1	1	1	1	1	1
091	Dyce	1	1			1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Total	6	4	0	2	4	7	10	12	13	13	13	13	13	12	12	8	7	3
	X status						X	X	X	X	X	X	X	X	X	X	X	X	

Figure 5. Summary of ground state

Winter 1981/82

															February																											
Station code	Station name	Total Station	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
827	Plymouth	11																																			1					
862	Hurn	22																																1			1	1				
797	Manston	29									1																								1	1	1	1	1	1		
715	Rhoose	30			1		1		1																									1			1					
502	Aberporth	26																																1								
496	Hemsby	34					1																												1			1				
388	Binbrook	41								1																			1					1	1	1	1	1		1		
318	Blackpool	39																											1			1		1	1							
222	Carlisle	40								1												1							1					1	1		1					
262	Tynemouth	27																																1				1				
140	Abbotsinch	39								1												1							1						1							
171	Leuchars	45				1				1												1						1	1			1		1	1		1					
091	Dyce	42								1													1						1	1		1										
	Total	425	0	0	1	1	2	0	1	5	1	0	0	0	0	0	0	0	0	0	0	3	1	0	0	0	0	1	6	1	0	3	0	8	7	2	7	5	1	2	0	0
	X status																																	X	X		X					

Figure 6. Summary of ground state at recording stations, winter 1982/83.

Winter 1982/83

Daily codes

Station code	Station name	Total Station		December 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	January 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
827	Plymouth	12	17%																		1																										
862	Hurn	20	29%						1			1				1				1	1																										
797	Manston	17	24%													1					1																										
715	Rhoose	12	17%						1							1				1	1																										
502	Aberporth	12	17%																																												
496	Hemsby	15	21%							1		1			1	1	1			1	1																						1				
388	Binbrook	30	43%		1				1	1	1	1			1	1				1	1	1															1										
318	Blackpool	19	27%		1					1	1					1				1	1																										
222	Carlisle	26	37%		1				1	1	1	1			1	1				1	1																										
262	Tynemouth	15	21%							1					1	1				1	1																										
140	Abbotsinch	26	37%		1				1	1	1				1	1				1	1																					1					1
171	Leuchars	31	44%		1		1		1	1	1	1		1	1	1				1	1																1										1
091	Dyce	31	44%		1		1	1	1	1		1		1	1	1				1	1															1	1					1					1
	Total	266		0	6	0	2	1	7	8	5	6	0	2	7	11	1	0	0	10	12	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0	0	0	0	2	1	0	0	0	3
	X status								X	X					X	X				X	X																										

Figure 6. Summary of ground state

Winter 1982/83

Station code	Station name	Total Station	February 20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
827	Plymouth	12	1																			1	1	1	1	1	1	1		1				
862	Hurn	20	1															1					1	1	1	1	1	1	1	1	1	1	1	1
797	Manston	17	1															1				1	1	1	1	1	1	1	1	1	1	1	1	
715	Rhoose	12	1														1	1				1	1	1							1			
502	Aberporth	12																1					1	1	1	1	1	1	1	1	1		1	1
496	Hemsby	15	1															1					1	1	1		1	1						
388	Binbrook	30	1										1	1		1	1	1			1	1	1	1	1	1	1		1		1	1	1	1	
318	Blackpool	19				1										1	1	1				1	1	1	1	1					1	1	1	1	
222	Carlisle	26	1			1							1			1	1	1			1	1		1	1	1	1				1	1	1	1	
262	Tynemouth	15				1								1			1	1				1	1	1	1						1	1		
140	Abbotsinch	26	1			1							1	1		1	1	1	1			1			1	1		1			1	1	1		1
171	Leuchars	31				1							1	1		1	1	1	1		1	1	1	1	1	1		1			1		1	1	1
091	Dyce	31			1	1		1					1	1			1	1			1	1	1	1	1	1		1				1			
	Total	266	8	0	1	6	0	1	0	0	0	0	5	5	0	5	8	12	2	0	4	10	11	12	12	10	7	8	5	3	9	9	9	7	4
	X status		X														X	X				X	X	X	X	X	X	X			X	X	X	X	

Figure 7. Summary of ground state at recording stations, winter 1983/84.

Winter 1983/84

Daily codes

Station code	Station name	Total Station		December 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
827	Plymouth	11	14%	1	1																								
862	Hurn	14	18%	1	1				1																				
797	Manston	13	17%		1				1																				
715	Rhoose	11	14%	1	1																								
502	Aberporth	8	10%										1																
496	Hemsby	20	26%						1	1	1																		
388	Binbrook	35	45%	1	1			1	1	1	1											1							
318	Blackpool	20	26%		1			1	1	1																			
222	Carlisle	29	38%	1	1			1	1	1																			
262	Tynemouth	18	23%		1				1	1																			
140	Abbotsinch	26	34%	1	1			1	1	1																			
171	Leuchars	38	49%	1	1			1	1	1														1					
091	Dyce	30	39%					1	1	1	1																		
	Total	273		7	10	0	0	6	10	8	3	0	1	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0
	X status			X	X				X	X																			

Station code	Station name	January 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
827	Plymouth									1									1
862	Hurn									1									1
797	Manston				1											1			1
715	Rhoose									1									1
502	Aberporth																		
496	Hemsby				1											1	1		1
388	Binbrook			1	1					1						1	1	1	
318	Blackpool									1						1			
222	Carlisle				1					1						1	1		1
262	Tynemouth									1						1	1		
140	Abbotsinch				1					1						1	1	1	1
171	Leuchars		1		1			1	1	1			1			1	1	1	1
091	Dyce		1		1	1				1						1	1	1	1
	Total	0	2	1	7	1	0	1	1	10	0	0	1	0	0	9	7	4	9
	X status				X					X						X	X		X

Figure7. Summary of ground state

Winter 1983/84

Station code	Station name	Total Station	February 20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
827	Plymouth	11	1	1																							1	1	1			1		1
862	Hurn	14	1	1				1																1			1	1	1	1		1		
797	Manston	13			1		1	1																			1		1			1	1	1
715	Rhoose	11	1	1				1																			1	1	1					1
502	Aberporth	8	1	1																							1	1	1	1				1
496	Hemsby	20	1	1	1	1	1	1	1						1												1	1			1	1	1	
388	Binbrook	35	1	1	1	1	1	1	1	1	1	1	1	1	1				1		1						1	1	1	1	1		1	1
318	Blackpool	20	1	1	1	1	1	1	1																		1	1	1	1		1	1	1
222	Carlisle	29	1	1	1	1	1	1	1	1	1		1	1	1						1		1				1		1	1			1	1
262	Tynemouth	18	1	1	1	1	1	1					1	1	1						1		1							1				
140	Abbotsinch	26	1		1	1	1	1	1	1	1	1	1	1							1		1											1
171	Leuchars	38	1	1	1	1	1	1	1	1	1	1	1	1	1		1		1		1	1	1					1		1				1
091	Dyce	30	1		1	1	1	1	1	1	1	1	1	1	1			1			1	1	1					1						
	Total	273	12	10	9	8	9	11	7	5	5	4	6	6	6	0	1	1	2	0	6	2	5	1	0	0	9	9	8	7	2	5	5	9
	X status		X	X	X	X	X	X	X																		X	X	X	X				X

Figure 8. Summary of ground state at recording stations, winter 1984/85.

Winter 1984/85

Daily codes

Station code	Station name	Total Station		December 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	January 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
827	Plymouth	32	42%					1	1				1			1								1	1						1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1
862	Hurn	37	48%					1	1							1								1		1	1					1		1	1	1	1	1	1	1	1	1	1	1	1	1	1
797	Manston	31	40%																				1	1										1	1	1	1	1	1	1	1	1	1	1	1	1	1
715	Rhoose	37	48%				1									1														1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1
502	Aberporth	32	42%																					1	1						1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1
496	Hemsby	38	49%													1							1		1	1	1					1		1	1	1	1	1	1	1	1	1	1	1	1	1	1
388	Binbrook	43	56%													1							1	1	1	1	1			1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
318	Blackpool	34	44%																						1	1					1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1
222	Carlisle	37	48%																					1	1	1					1	1	1		1	1	1		1	1	1	1	1	1	1	1	1
262	Tynemouth	24	31%																					1	1	1	1									1	1				1	1	1				
140	Abbotsinch	42	55%								1			1		1								1	1	1				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1
171	Leuchars	35	45%													1			1					1	1	1	1				1	1	1			1	1	1	1	1	1	1	1	1			
091	Dyce	30	39%														1	1	1					1	1	1															1		1	1	1		
	Total	452		0	0	0	1	2	2	0	1	0	1	1	0	7	1	1	2	0	0	0	3	10	10	9	5	0	0	3	7	10	8	9	9	12	12	8	10	11	13	12	13	12	10	10	9
	X status															X								X	X	X					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Figure 8. Summary of ground state

Winter 1984/85

Station code	Station name	Total Station	February																																		
			20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
827	Plymouth	32	1																						1	1	1	1	1	1	1		1					
862	Hurn	37	1	1			1			1														1	1	1	1	1	1	1	1	1	1				1	
797	Manston	31	1	1		1	1			1													1	1	1	1	1	1	1	1	1							
715	Rhoose	37	1	1	1	1				1													1	1	1	1	1	1	1	1	1	1	1	1			1	
502	Aberporth	32	1	1																			1	1	1	1	1	1	1	1	1	1	1					
496	Hemsby	38	1	1		1	1			1													1	1	1	1	1	1	1	1	1	1	1	1				
388	Binbrook	43	1	1	1	1	1	1		1	1												1	1	1	1	1	1	1	1	1	1	1	1				
318	Blackpool	34	1	1			1			1													1	1	1	1	1	1	1	1	1	1	1					
222	Carlisle	37	1	1	1	1	1	1		1													1	1	1	1	1	1	1	1	1	1		1				1
262	Tynemouth	24	1			1	1	1		1													1	1	1	1	1		1	1	1	1	1	1				
140	Abbotsinch	42	1	1		1	1	1		1	1												1	1	1	1	1	1	1	1	1	1		1		1	1		1
171	Leuchars	35	1	1		1	1	1	1	1	1		1											1	1	1		1		1	1	1		1	1				1
091	Dyce	30	1	1		1	1	1	1	1	1												1	1	1	1	1	1	1	1	1	1	1	1	1				1
	Total	452	13	11	3	9	10	6	2	11	4	0	1	0	0	0	0	0	0	0	0	0	10	12	13	13	12	12	12	13	13	11	10	7	5	1	1	2	4
	X status		X	X		X	X			X													X	X	X	X	X	X	X	X	X	X	X	X					

Figure 9. Summary of ground state at recording stations, winter 1985/86.

Winter 1985/86

Daily codes

Station code	Station name	Total Station		December																								January														
				6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
033	Diabaig	40	55%					1																1	1	1	1	1	1	1	1		1	1	1	1	1	1								1	
058	Invergordon	34	47%					1	1											1	1	1		1	1	1	1	1	1				1	1	1		1	1									
068	Lossiemouth	40	55%					1	1											1	1	1			1	1	1	1	1	1		1	1	1	1	1		1									1
091	Dyce	38	52%					1	1											1					1		1	1	1	1	1		1	1	1	1	1								1		
102	Orsay	12	16%																								1								1		1										
135	Prestwick	36	49%					1																	1	1	1	1		1		1	1	1	1	1	1								1		
137	Whithorn	23	32%																						1	1	1	1					1		1			1							1		
160	Turnhouse	31	42%					1																	1	1	1	1					1	1	1	1	1									1	
213	Eskmeals	27	37%																						1	1	1	1					1	1	1	1	1									1	
222	Carlisle	34	47%																						1	1	1	1	1			1	1	1	1	1	1								1	1
262	Tynemouth	21	29%					1																	1		1	1		1			1	1		1											
282	Whitby	15	21%																							1	1	1						1													
302	Valley	15	21%																						1	1	1	1				1		1													
318	Squires Gate	33	45%																						1	1	1	1			1	1	1	1	1	1	1								1	1
391	Coningsby	36	49%																					1	1	1	1	1	1	1			1	1	1	1	1								1	1
496	Hemsby	30	41%																						1	1	1	1	1	1			1			1		1									1
604	Milford Haven	18	25%																						1	1	1											1									
693	Shoeburyness	17	23%																								1											1									1
704	Hartland Point	18	25%																							1	1											1									
715	Rhoose	19	26%																						1	1	1	1		1			1	1				1							1		
827	Mount Batten	0	0%																							1	1	1					1					1									
862	Hurn	28	38%																						1	1	1	1		1			1					1							1		
884	Herstmonceux	29	40%																							1	1	1		1			1			1		1							1	1	
	Total	594		0	0	0	0	7	3	0	0	0	0	0	0	0	0	0	0	3	2	2	0	3	17	19	23	19	7	10	3	5	17	14	12	12	9	15	0	0	0	0	0	0	9	10	0
	X status																								x	x	x	x					x	x	x	x		x									
		till 20/2/8 only	till 20/2/86 only																																													

Figure 9. Summary of ground state

Winter 1985/86

Station	Station name	Total													February																											
code		Station	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
033	Diabaig	40					1	1	1			1	1	1	1	1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1		1	1
058	Invergordon	34				1	1	1	1		1	1	1							1	1	1	1			1	1	1	1			1	1	1	1	1	1	1	1		1	1
068	Lossiemouth	40					1	1	1	1	1	1	1							1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
091	Dyce	38		1		1	1	1	1	1	1	1	1							1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
102	Orsay	12						1				1	1			1			1	1	1	1	1													1	1	1	1	1	1	1
135	Prestwick	36				1	1	1	1		1	1							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
137	Whithorn	23					1	1				1							1	1	1	1	1			1	1	1	1	1		1		1		1	1	1	1	1		1
160	Turnhouse	31				1	1	1	1		1								1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
213	Eskmeals	27						1	1			1							1	1	1	1	1	1	1	1	1	1	1			1	1	1	1	1	1	1	1	1	1	1
222	Carlisle	34					1	1	1		1	1							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1
262	Tynemouth	21						1	1		1									1	1	1	1		1	1	1		1				1	1	1	1	1	1	1	1		1
282	Whitby	15							1		1									1	1	1		1	1	1	1		1					1	1	1	1	1	1	1	1	
302	Valley	15						1											1	1	1	1	1	1		1							1			1		1	1		1	
318	Squires Gate	33						1	1			1							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
391	Coningsby	36					1	1	1	1	1	1							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1
496	Hemsby	30					1	1	1	1	1								1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1
604	Milford Haven	18						1											1	1	1	1	1				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
693	Shoeburyness	17					1			1	1								1	1	1		1		1	1	1	1				1	1	1	1				1	1	1	1
704	Hartland Point	18											1							1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
715	Rhoose	19						1											1	1	1	1	1		1	1			1					1		1			1	1		
827	Mount Batten	0						1					1						1	1	1	1	1		1	1	1				1	1	1		1	1	1	1	1	1	1	1
862	Hurn	28						1	1		1		1						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
884	Herstmonceux	29						1	1	1	1								1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Total	594	0	1	0	4	11	20	15	6	13	11	8	1	1	2	0	0	17	23	23	22	22	13	18	21	18	17	18	14	14	18	19	20	19	22	17	21	23	20	20	20
	X status							X	X		X								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		till																																								
		20/2/8																																								
		only																																								

Figure 10. Summary of ground state at recording stations, winter 1986/87.

Winter 1986/87

Daily codes

Station code	Station name	Total Station		Dec 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Jan 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
033	Diabaig	23	30%	1			1					1					1															1			1	1			1	1	1	1	1	1		1	1
058	Invergordon	25	32%														1			1				1								1			1	1	1	1	1	1	1	1	1	1	1	1	1
068	Lossiemouth	35	45%	1				1		1	1	1		1	1	1	1							1	1					1		1		1			1	1	1	1	1	1	1	1	1	1	1
091	Dyce	38	49%	1				1		1		1		1	1	1	1			1				1	1					1		1		1			1	1	1	1	1	1	1	1	1	1	1
102	Orsay	10	13%																																						1			1	1		1
135	Prestwick	38	49%							1									1	1	1											1				1	1	1	1	1	1	1	1	1	1	1	1
137	Whithorn	22	29%																	1	1															1	1		1	1	1	1	1	1	1		1
160	Turnhouse	34	44%	1				1		1		1							1	1	1											1				1	1	1	1	1	1	1	1	1	1	1	1
213	Eskmeals	24	31%																	1	1											1				1	1	1	1	1	1	1	1	1	1	1	1
222	Carlisle	37	48%	1				1				1					1	1		1	1	1										1			1	1	1	1	1	1	1	1	1	1	1	1	1
262	Tynemouth	22	29%																													1				1	1	1		1	1	1	1		1	1	1
282	Whitby	18	23%																																		1	1	1	1	1	1	1	1	1		1
302	Valley	22	29%																													1				1	1			1	1	1	1	1	1	1	1
318	Squires Gate	31	40%																	1												1				1	1	1	1	1	1	1	1	1	1	1	1
391	Coningsby	36	47%							1		1							1	1	1				1							1				1	1	1	1	1	1	1	1	1	1	1	1
496	Hemsby	34	44%							1		1							1																		1	1	1	1	1	1	1	1	1	1	1
604	Milford Haven	16	21%																													1				1	1			1	1	1	1	1	1	1	1
704	Hartland Point	18	23%																													1					1			1	1	1	1	1	1	1	1
715	Rhoose	29	38%					1				1							1	1	1											1				1	1			1	1	1	1	1	1	1	1
797	Manston	25	32%																																			1	1	1	1	1	1	1	1	1	1
827	Mount Batten	21	27%					1												1	1											1				1	1			1	1	1	1	1	1	1	1
862	Hurn	37	48%	1				1		1									1	1	1	1										1				1	1			1	1	1	1	1	1	1	1
884	Herstmonceux	40	52%							1								1	1	1	1	1			1											1	1	1	1	1	1	1	1	1	1	1	1
	Total	635		6	0	0	1	7	0	8	1	8	0	2	2	2	5	2	7	13	10	3	0	3	4	0	0	0	0	2	0	17	0	2	3	16	20	14	15	22	23	22	22	22	22	20	23
	X status																	X												X				X	X	X	X	X	X	X	X	X	X	X	X

Figure 10. Summary of ground state

Winter 1986/87

Station code	Station name	Total Station	February																												
			20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
033	Diabaig	23												1	1												1	1	1	1	1	1		
058	Invergordon	25													1											1		1	1	1	1	1		
068	Lossiemouth	35	1												1						1						1	1	1	1	1	1		
091	Dyce	38	1	1								1		1	1						1							1	1	1	1	1	1	
102	Orsay	10									1																1	1	1	1	1			
135	Prestwick	38				1	1		1	1	1	1	1	1	1		1				1					1	1	1	1	1	1	1	1	1
137	Whithorn	22									1			1	1												1	1	1	1	1	1	1	
160	Turnhouse	34	1							1	1			1	1						1				1		1	1	1	1	1	1		
213	Eskmeals	24									1	1	1	1	1																1	1	1	
222	Carlisle	37	1							1	1	1	1	1	1			1											1	1	1	1	1	1
262	Tynemouth	22										1	1	1	1														1	1	1	1	1	1
282	Whitby	18											1	1	1														1			1	1	1
302	Valley	22										1	1	1													1	1	1	1	1	1		1
318	Squires Gate	31					1			1	1	1	1	1	1			1									1	1	1	1	1	1	1	1
391	Coningsby	36		1	1	1	1	1				1	1	1	1												1		1	1	1	1	1	1
496	Hemsby	34	1	1	1	1	1	1	1	1	1	1	1	1	1			1	1	1												1	1	1
604	Milford Haven	16												1																1	1		1	1
704	Hartland Point	18										1		1															1	1		1	1	1
715	Rhoose	29	1								1	1	1	1	1														1	1	1	1	1	1
797	Manston	25	1	1	1	1	1					1	1	1	1											1	1					1	1	1
827	Mount Batten	21												1															1	1	1	1	1	1
862	Hurn	37		1	1	1	1	1	1	1		1	1	1	1												1		1	1	1	1	1	1
884	Herstmonceux	40		1	1	1	1		1	1	1	1	1	1	1		1	1	1								1			1	1	1	1	1
	Total	635	7	6	5	6	7	3	4	7	10	14	13	20	18	0	2	4	2	1	4	0	0	0	1	3	12	10	18	19	19	21	17	15
	X status											x	x	x	x												x		x	x	x	x	x	x

April 12, 1992

Figure 11. Summary of ground state at recording stations, winter 1987/88.

Winter 1987/88

Daily codes

Station code	Station name	Total Station		December 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	January 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
033	Diabaig	16	21%			1		1	1	1	1	1		1																				1													1
058	Invergordon	15	19%			1				1	1	1	1																					1	1		1										1
068	Lossiemouth	20	26%			1	1			1	1	1	1																				1	1	1					1					1		1
091	Dyce	20	26%			1	1				1	1	1																				1	1	1		1			1					1		1
102	Orsay	2	3%					1					1																																		
135	Prestwick	12	16%			1	1	1			1	1	1																																		1
137	Whithorn	5	6%			1	1	1	1																																						1
160	Turnhouse	17	22%			1	1	1		1	1	1	1																					1													1
213	Eskmeals	4	5%			1	1	1					1																																		
222	Carlisle	13	17%			1	1	1	1		1	1	1																							1											
262	Tynemouth	6	8%				1			1																																					
282	Whitby	3	4%			1	1																											1													
302	Valley	8	10%			1	1	1	1	1	1	1	1																																		
318	Squires Gate	6	8%			1	1	1				1	1																																		
391	Coningsby	14	18%			1		1				1	1																								1			1							
496	Hemsby	5	6%							1																											1										
604	Milford Haven	1	1%					1																																							
704	Hartland Point	3	4%				1	1	1																																						
715	Rhoose	9	12%			1	1	1	1			1																																			
797	Manston	8	10%			1	1	1																													1										
827	Mount Batten	9	12%			1	1	1																																				1	1	1	
862	Hurn	9	12%			1	1	1	1	1																																					
884	Herstmonceux	11	14%			1	1	1	1		1																																				
	Total	216		0	0	18	17	17	8	8	9	11	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	6	3	1	5	0	0	3	0	0	0	1	3	1	7
	X status					x	x	x																																							

Figure 11. Summary of ground state

Winter 1987/88

Station code	Station name	Total Station	January 20	21	22	23	24	25	26	27	28	29	30	31	February 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
033	Diabaig	16			1	1				1	1	1													1	1							
058	Invergordon	15			1	1															1				1		1					1	
068	Lossiemouth	20		1	1	1					1										1	1			1		1						
091	Dyce	20		1	1	1					1										1	1			1		1						
102	Orsay	2																															
135	Prestwick	12								1	1							1		1							1						
137	Whithorn	5																															
160	Turnhouse	17		1		1				1										1	1	1			1		1						
213	Eskmeals	4																															
222	Carlisle	13								1										1	1	1			1								
262	Tynemouth	6				1		1											1						1								
282	Whitby	3																															
302	Valley	8																															
318	Squires Gate	6				1																											
391	Coningsby	14		1	1	1				1										1	1				1					1			
496	Hemsby	5								1											1				1								
604	Milford Haven	1																															
704	Hartland Point	3																															
715	Rhoose	9		1																	1				1				1				
797	Manston	8		1		1															1			1									
827	Mount Batten	9																			1								1	1			
862	Hurn	9		1										1											1					1			
884	Herstmonceux	11		1		1								1							1				1					1			
	Total	216	0	8	5	10	0	1	0	6	4	1	0	2	0	0	0	1	1	4	11	4	0	0	1	12	1	5	0	2	4	0	0	1
	X status																									X								

Figure 12. Summary of ground state at recording stations, winter 1988/89.

Winter 1988/89

Daily codes

Station code	Station name	Total Station	December 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	January 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
033	Oiabaig	0	0%																																											
058	Invergordon	2	3%																																				1								
066	Lossiemouth	2	3%																																						1						
091	Dyce	2	3%																																			1				1					
102	Orsay	0	0%																																											
135	Prestwick	0	0%																																										
137	Whithorn	0	0%																																										
160	Turnhouse	3	5%	1	1															1																										
213	Eskmeals	0	0%																																										
222	Carlisle	0	0%																																										1
262	Tynemouth	2	3%																																										
282	Whitby	0	0%																																										
302	Valley	0	0%																																										
318	Squires Gate	1	2%																										1																
391	Coningsby	7	11%																																				1			1					1
496	Hemsby	5	8%																																										
604	Milford Haven	0	0%																																										
704	Hartland Point	0	0%																																										1
715	Rhoose	4	6%																																										1
797	Manston	2	3%																																										1
827	Mount Batten	3	5%																																										1
862	Hurn	6	10%																																										1
884	Herstmonceux	5	8%								1																																		1
	Total	44		1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2	4	0	3	0	0	0	0	7
	X status																																												

Figure 12. Summary of ground state

Winter 1988/89

Station code	Station name	Total Station	February 20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
033	Diabaig	0																																
058	Invergordon	2																				1												
066	Lossiemouth	2																								1								
091	Dyce	2																																
102	Orsay	0																																
135	Prestwick	0																																
137	Whithorn	0																																
160	Turnhouse	3																																
213	Eskmeals	0																																
222	Carlisle	0																																
262	Tynemouth	2						1																										
282	Whitby	0																																
302	Valley	0																																
318	Squires Gate	1																																
391	Coningsby	7										1				1									1									
496	Hemsby	5	1									1				1									1									
604	Milford Haven	0																																
704	Hartland Point	0																																
715	Rhoose	4										1				1									1									
797	Manston	2																																
827	Mount Batten	3										1	1																					
862	Hurn	6										1	1				1								1									
884	Herstmonceux	5											1												1									
	Total	44	1	0	0	0	0	1	0	0	0	5	3	0	0	3	1	0	0	0	0	1	0	0	5	1	0	0	0	0	0	0	0	0
	X status																																	

Data for winter 1989/90 to follow

Figure 13. Summary of ground state at recording stations, winter 1990/91.

Winter 1990/91

Daily codes

Station code	Station name	Total Station		December																										January																	
				6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
049	Cape Wrath	25	33%			1		1																			1	1	1	1							1	1	1		1				1	1	
058	Invergordon	34	45%			1		1																	1		1	1	1	1		1				1	1	1	1	1	1	1	1	1	1	1	1
068	Lossiemouth	27	36%					1																													1	1	1	1			1	1	1	1	1
091	Dyce	38	51%			1			1	1		1														1	1	1	1	1		1	1				1	1	1	1	1	1	1	1	1	1	1
102	Orsay	10	13%			1		1																																		1					
135	Prestwick	27	36%			1		1			1	1																								1	1	1			1	1	1	1	1	1	
137	Whithorn	16	21%								1	1																													1	1	1	1			
160	Turnhouse	38	51%		1	1					1						1								1	1	1	1		1						1	1	1	1	1	1	1	1	1	1	1	1
213	Eskmeals	18	24%								1	1					1																										1	1	1		
215	Aspatria	37	49%			1	1	1	1	1	1	1	1				1													1							1	1	1	1	1	1	1	1	1	1	
262	Tynemouth	19	25%																									1		1						1		1				1	1				
282	Whitby	14	19%																											1							1						1	1	1		
302	Valley	22	29%								1	1	1		1	1																										1	1	1			
318	Squires Gate	25	33%								1	1	1		1																											1	1	1	1		
391	Coningsby	28	37%	1			1						1															1	1	1			1				1				1	1	1	1	1		
496	Hemsby	20	27%	1																										1											1	1	1		1		
604	Milford Haven	12	16%			1							1																																		
712/707	Tovington/Chivenor	25	33%	1							1	1	1																											1		1	1	1			
715	Rhoose	25	33%								1		1				1																								1	1	1	1			
797	Manston	17	23%																											1														1	1		
827	Mount Batten	18	24%				1					1	1																													1					
862	Hurn	22	29%	1									1				1													1												1	1	1			
884	Herstmonceux	24	32%	1			1						1		1			1												1												1	1	1	1		
	Total	541		5	1	8	4	6	2	2	9	9	10	0	3	1	5	1	0	0	0	0	0	0	2	2	4	6	4	12	0	2	2	0	0	4	9	8	6	6	10	17	18	17	14	7	4
	X status																													X												X	X	X	X		

Figure 13. Summary of ground state

Winter 1990/91

Station code	Station name	Total Station	February 20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
049	Cape Wrath	25									1			1	1	1	1		1	1	1	1	1	1	1		1							
058	Invergordon	34									1			1		1	1	1	1	1		1	1	1	1	1	1	1						
068	Lossiemouth	27	1					1			1	1			1	1		1	1	1	1	1	1	1	1	1	1	1						
091	Dyce	38						1	1	1	1			1		1					1	1	1	1	1	1	1	1						
102	Orsay	10												1							1	1	1	1	1		1							
135	Prestwick	27							1					1		1	1	1	1	1	1	1	1	1	1		1	1						
137	Whithorn	16												1		1		1			1	1	1	1	1		1	1						
160	Turnhouse	38		1				1	1						1	1	1		1		1	1	1	1	1	1	1	1	1					
213	Eskmeals	18			1	1												1	1	1	1	1	1		1	1	1	1						
215	Aspatria	37			1	1			1							1	1	1	1	1	1	1	1	1	1	1	1	1						
262	Tynemouth	19				1		1	1	1											1	1	1	1	1	1	1	1						
282	Whitby	14				1															1		1	1	1	1	1	1						
302	Valley	22			1	1									1		1	1	1	1	1	1	1	1	1	1	1							
318	Squires Gate	25			1	1			1				1		1	1	1	1	1	1	1	1	1	1	1		1	1						
391	Coningsby	28			1												1	1	1	1	1	1	1	1	1	1	1	1						
496	Hemsby	20					1										1	1	1	1	1	1	1	1	1	1	1	1						
604	Milford Haven	12												1	1					1	1	1	1	1	1		1	1						
712/707	Tovington/Chivenor	25			1	1								1	1	1	1	1	1	1	1	1	1	1	1	1	1	1						
715	Rhoose	25			1	1	1								1	1	1	1	1	1	1	1	1	1	1	1	1	1						
797	Manston	17												1			1	1	1	1	1	1	1	1	1	1	1	1	1					
827	Mount Batten	18			1		1								1	1	1			1	1	1	1	1	1	1	1	1						
862	Hurn	22			1										1	1	1	1	1	1	1	1	1	1	1	1	1	1						
884	Herstmonceux	24												1			1	1	1	1	1	1	1	1	1	1	1	1						
	Total	541	1	1	9	8	3	4	6	2	4	1	1	10	10	13	15	15	16	17	22	22	23	22	23	17	23	20	8	0	0	0	0	0
	X status															x	x	x	x	x	x	x	x	x	x	x	x	x						

Figure 14. Summary of ground state at recording stations, winter 1991/92.

Winter 1991/92

Daily codes

Station code	Station name	Total station		December 6	7	8	9	10	11	12	13	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	January 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
049	Cape Wrath	0	0%																																												
058	Invergordon	14	18%	1	1			1	1								1																1				1	1					1				
066	Kinloss	26	33%	1	1			1	1								1	1									1					1	1					1					1				
091	Dyce	36	46%		1	1	1	1	1	1				1			1	1							1		1					1	1				1	1	1		1	1	1				
102	Orsay	2	3%																																		1										
135	Prestwick	18	23%		1	1	1	1	1	1																											1	1		1							
137	Whithorn	5	6%																																			1		1							
160	Turnhouse	24	31%		1	1	1	1	1	1							1							1													1	1		1							
215	Aspatria	23	29%		1	1	1	1	1	1							1																					1		1							
262	Tynemouth	20	26%		1	1	1	1	1	1							1																										1				
282	Whitby	11	14%						1	1							1																										1				
302	Valley	14	18%	1	1			1	1																													1	1								
322	Aughton	22	28%		1	1	1	1	1	1																												1	1	1							
391	Coningsby	28	36%	1	1	1	1	1	1	1	1	1	1									1																1	1	1		1					
496	Hemsby	16	21%			1	1		1	1	1	1	1									1																	1	1							
604	Milford Haven	3	4%																																				1						1		
712/707	Tovington/Chivenor	16	21%	1	1	1		1	1	1																													1		1						
715	Rhoose	17	22%					1	1	1	1																											1	1						1		
797	Manston	17	22%		1			1	1	1	1	1	1									1																									
817	St. Mawgan	14	18%						1	1																													1	1	1	1				1	
862	Hurn	23	29%	1	1			1	1	1	1	1										1																		1		1					
884	Herstmonceux	27	35%	1	1		1	1	1	1	1	1	1								1	1		1	1															1							
	Total	376		7	14	9	9	15	18	15	6	5	4	1	0	0	7	2	0	0	1	5	0	2	2	0	2	0	0	0	0	2	3	0	0	0	5	11	9	10	3	4	5	0	2	1	0
	X status				X			X	X	X																																			

Figure 14. Summary of ground state

Winter 1991/92

Station code	Station name	Total station	February																														
			21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
049	Cape Wrath	0																																
058	Invergordon	14						1	1				1																	1		1		
066	Kinloss	26		1	1	1		1	1		1	1	1	1			1							1		1				1		1	1	1
091	Dyce	36		1	1	1		1	1	1	1		1	1			1						1		1	1			1	1		1	1	
102	Orsay	2						1																										
135	Prestwick	18		1	1			1	1		1	1	1																	1		1		
137	Whithorn	5						1	1																						1			
160	Turnhouse	24	1	1	1			1	1	1	1													1	1				1	1	1	1		
215	Aspatria	23	1	1	1	1		1	1	1	1	1	1											1						1	1	1		
262	Tynemouth	20		1	1	1		1	1	1	1		1	1																1	1	1		
282	Whitby	11			1	1			1	1	1		1																			1		
302	Valley	14	1	1				1	1	1		1	1																			1		
322	Aughton	22	1	1	1	1	1	1	1	1	1	1	1	1																1				
391	Coningsby	28	1		1	1	1	1	1	1	1			1									1							1	1		1	
496	Hemsby	16		1	1		1	1						1																	1			
604	Milford Haven	3							1																									
712/707	Tovington/Chivenor	16	1	1	1	1				1	1		1																				1	1
715	Rhoose	17	1	1	1	1	1		1	1	1		1																				1	1
797	Manston	17	1	1	1	1	1					1																			1	1	1	1
817	St. Mawgan	14	1	1	1	1			1	1																							1	1
862	Hurn	23	1	1	1	1	1		1	1	1	1		1	1															1			1	1
884	Herstmonceux	27	1	1	1	1	1			1	1	1									1	1								1		1	1	1
	Total	376	11	15	16	13	7	13	16	13	13	8	11	7	1	0	2	0	0	1	1	0	2	3	2	2	0	0	2	11	6	12	9	7
	X status			X	X	X		X	X	X	X																					X		

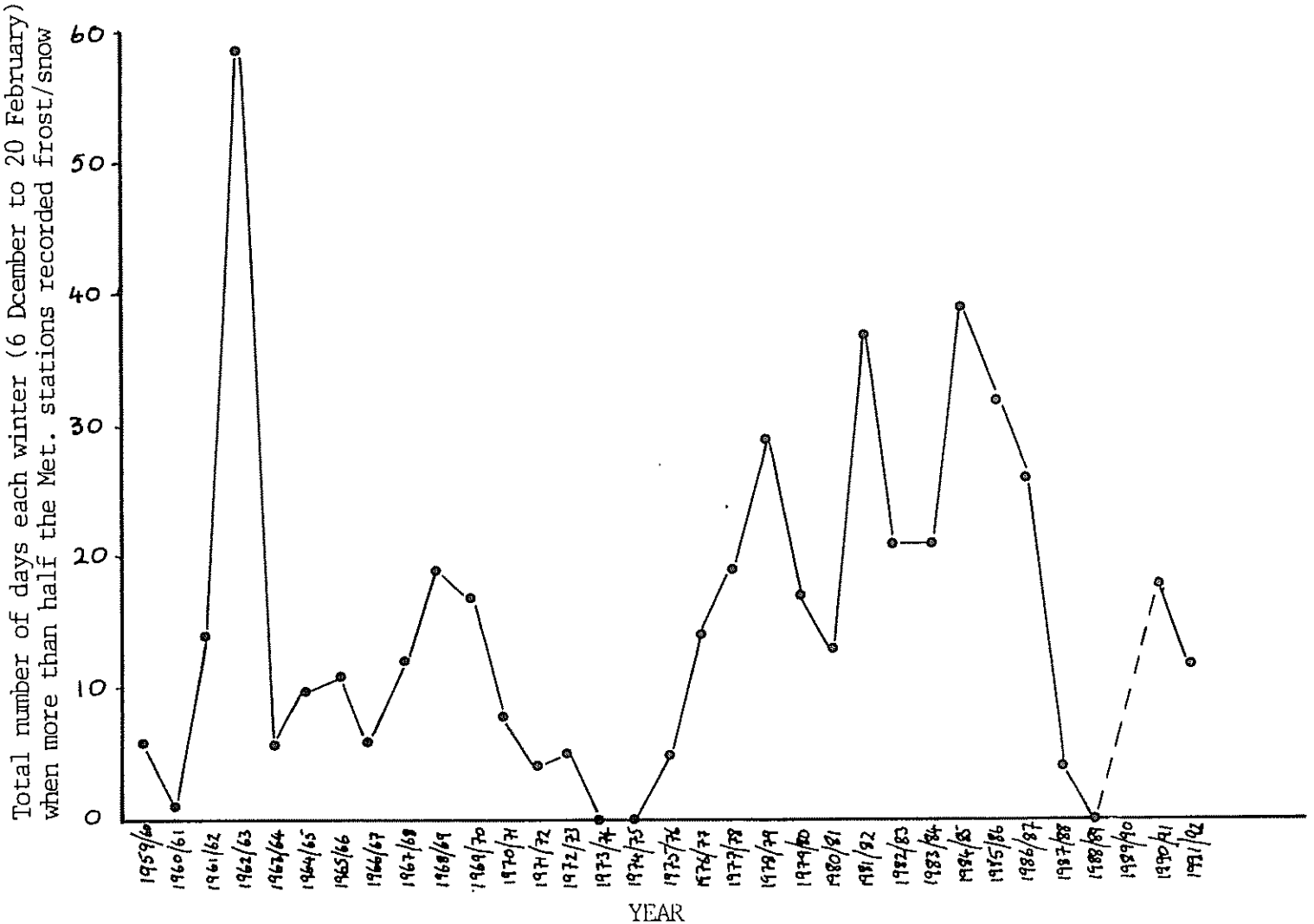


FIGURE 15. The total number of days per winter recording severe weather, 1959/60 to 1991/92.

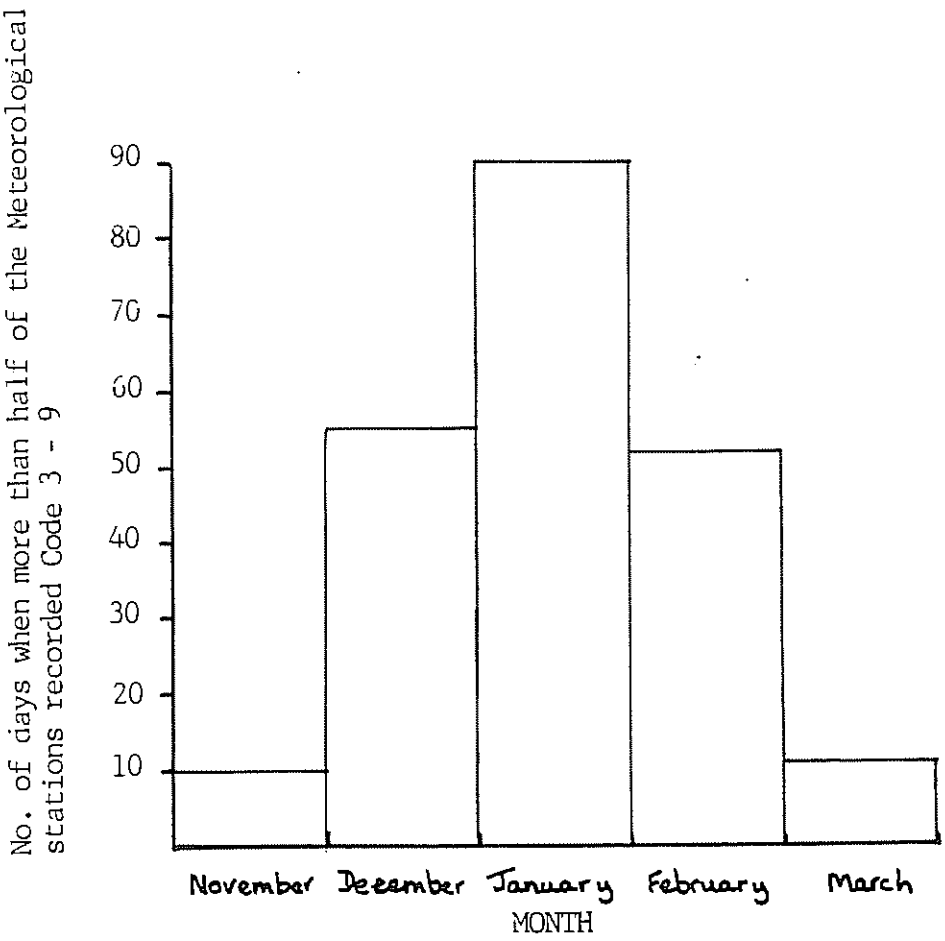


FIGURE 16. The total number of days per month between 1959/60 and 1978/79, excluding 1962/63, recording severe weather. (Reproduced from file)

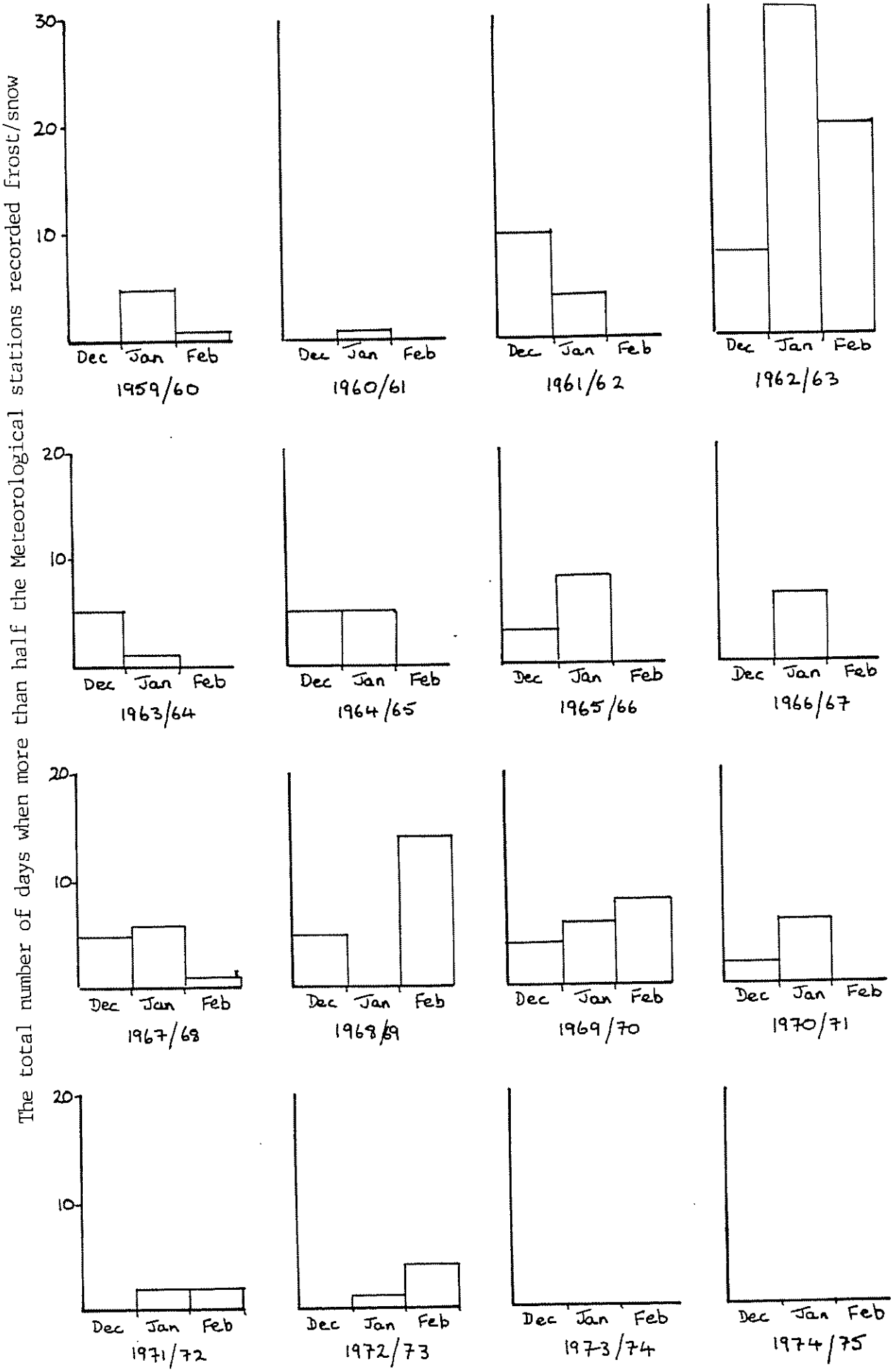
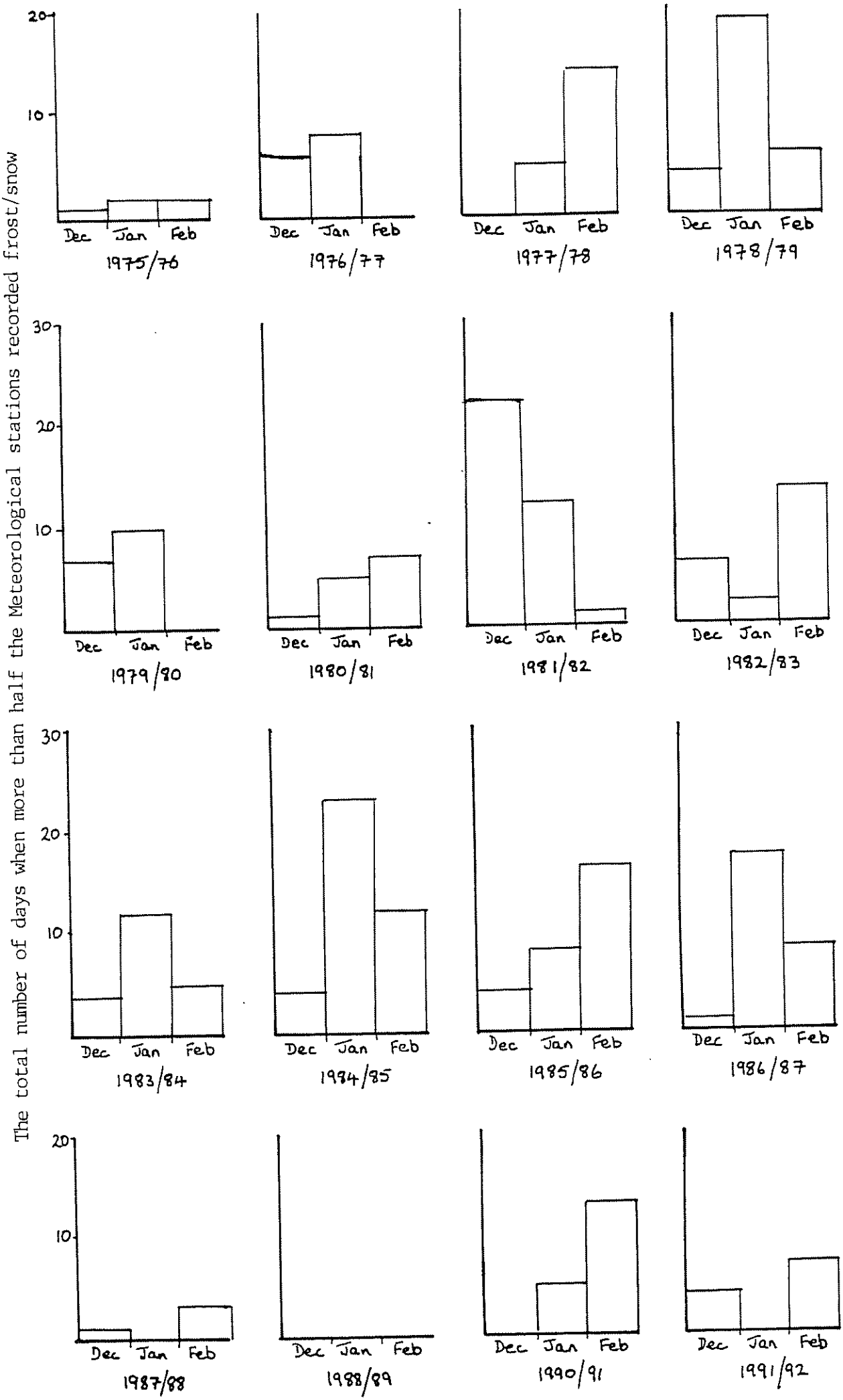


FIGURE 17. Monthly analysis of the total number of severe weather days (6 December to 20 February) from 1959/60 to 1991/92

continued.....

FIGURE 17 continued



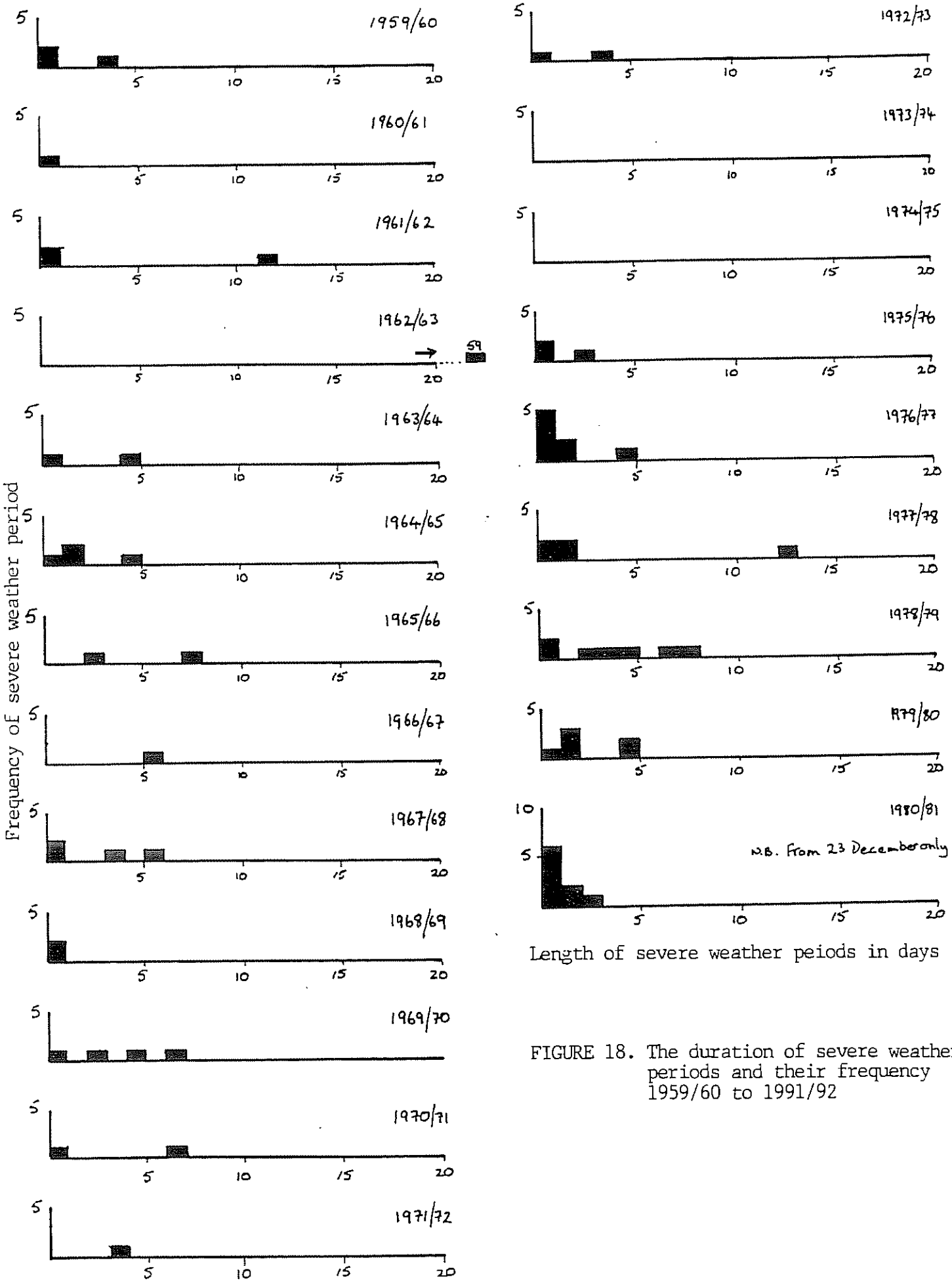
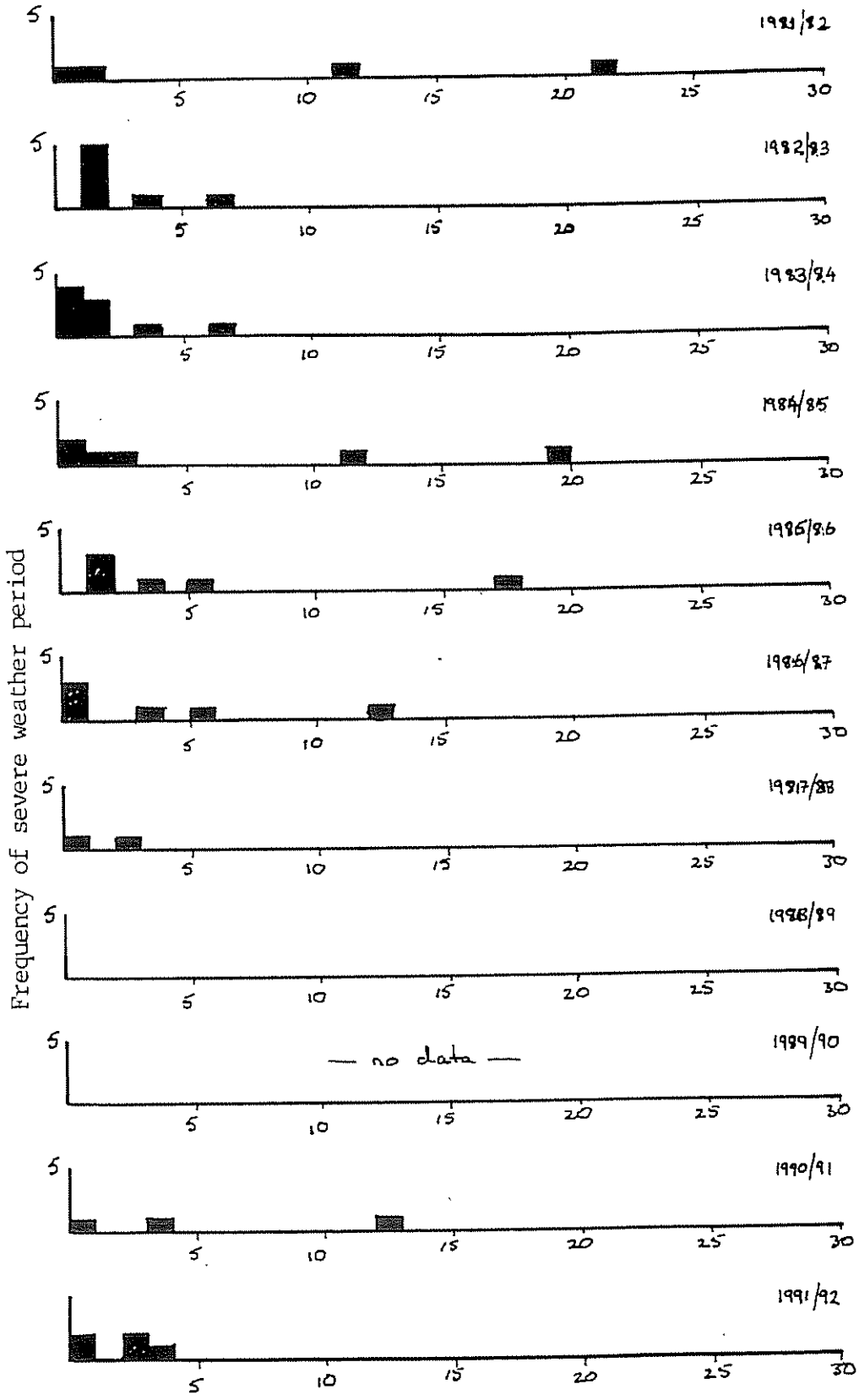


FIGURE 18. The duration of severe weather periods and their frequency 1959/60 to 1991/92

continued.....


1981/82
1982/83
1983/84
1984/85
1986/86
1986/87
1987/88
1988/89
1989/90
— no data —
1990/91
1991/92
5
10
15
20
25
30
Frequency of severe weather period
Length of severe weather periods in days

APPENDICES

APPENDIX 1.

BRITISH CRITERIA FOR CALLING A BAN ON WILDFOWLING IN SEVERE WEATHER

L A BATTEN and J A SWIFT

As a result of disagreement over calling the January 1979 ban on wildfowling in Britain due to lack of universally accepted criteria and procedures, a working party was set up at the Waterfowl Liaison Committee meeting on 8 February 1979, and chaired by the Nature Conservancy Council (NCC). Its remit was to find simple and universally acceptable criteria for calling a ban on wildfowling in severe weather. The members of the group consisted of representatives from the Wildfowlers' Association of Great Britain and Ireland (WAGBI), the Royal Society for the Protection of Birds, the Wildfowl Trust, the British Trust for Ornithology, the Game Conservancy, the Department of the Environment, and the Nature Conservancy Council.

The group considered biological data such as the weights and numbers of birds found dead or shot. There are, however, a number of disadvantages to these.

(1) Weights are variable, and fluctuations of up to 20% may be normal.

(2) There is a lack of good data on winter weight patterns for many species.

(3) Large samples are needed for males, females and juveniles.

(4) There are even fewer data on weights in severe weather, because birds are not usually trapped at this time for reasons of welfare.

(5) Average weights can be misleading, because they could remain high due to weak individuals dying quickly.

(6) There is a time-lapse between the collection of data and their availability for assessment.

Influxes of unusual numbers and species have been used in the past, but, apart from the time-lapse in the availability of the data, influxes may be masked by emigration.

An alternative is to use meteorological data of some kind. For this to be practical, the data need to be collected regularly and be available from the whole country quickly. G V T Matthews suggested that the freezing of the intertidal zone and state of the ground at selected meteorological stations would be worth examining. Unfortunately, no objective system of recording the freezing of the intertidal zone has been developed, and no record of its frequency has been kept. The state of the ground, however, is recorded daily at 9 am at many meteorological stations. A system of codes is used and these are given in Table 1. Only codes 3 to 9 would be relevant for our purpose.

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Table 1: State of ground codes used by the Meteorological Office.

0 : Surface dry (no appreciable amount of dust or loose sand).

1 : Surface moist.

2 : Surface wet (standing water in small or large pools on surface).

3 : Surface frozen.

4 : Glaze on ground but no snow or melting snow.

5 : Ice, snow or melting snow covering less than one half of ground.

6 : Ice, snow or melting snow covering more than one half of ground (but not completely).

7 : Ice, snow or melting snow covering ground completely.

8 : Loose, dry snow, dust or sand covering more than one half of ground (but not completely).

9 : Loose, dry snow, dust or sand covering ground completely.

Matthews suggested selecting thirteen coastal or near-coastal meteorological stations distributed around the coasts of Britain. If over half of these stations recorded the state of the ground in code range 3 to 9 for seven days, a call for restraint should be made by WAGBI. A statutory ban should be imposed after fourteen days. The meteorological stations selected are given in Table 2. The working party considered these criteria to be very promising and suggested an analysis should be carried out

Table 2: Meteorological stations selected for monitoring state of ground.

Mount Batton (Plymouth)
Hurn (Bournemouth)
Manston (Kent)
Rhoose (Cardiff)
Aberporth (West Wales)
Gorleston (Norfolk)
Kilnsea (Humber) — now replaced by
Binbrook as Kilnsea did not record
Squires Gate (Blackpool)
Carlisle
Tynemouth
Abbotsmith (Glasgow)
Leuchars (Fife)
Dyce (Aberdeen)

on what action would have been taken in past winters if these criteria had been operational. WAGBI agreed to obtain the relevant data from the Meteorological Office and to carry out the analysis for the last twenty winters. The results of this analysis are given in Figure 1, which indicates on which days more than half of the meteorological stations recorded the state of ground in the code range 3 to 9.

An examination of Figure 1 will reveal that a statutory wildfowling ban would have been called on only three occasions since 1959, in 1961–62, 1962–63 and 1978–79. Although conditions in 1968–69 would have warranted a statutory ban from 19 February, it would not have been brought in as the shooting season ended on 20 February.

Periods of voluntary restraint would have operated in thirteen out of the twenty years examined.

In the first five years examined, the system would have worked as follows:

(1) In 1959, restraint would have been called for on 11 January, following a seven-day period of freezing, but there would have been no statutory ban since although the freezing continued until 17 January, it was followed by five days' thaw, and there were no subsequent periods of freezing severe enough to warrant action.

(2) In 1959–60, there would have been no action until 19 February, when restraint might have been called for following ten days of intermittent freezing and seven days of continuous freezing. However, as the season ended on the following day, it is unlikely that this would have been implemented.

(3) There would have been no action in 1960–61.

(4) In 1961–62, there would have been a period of restraint on 29 December followed by a full ban on 2 January. However, in view of the mild period following from 5 January, it is unlikely that the ban would have been allowed to run for the full fourteen days.

(5) In 1962–63, there would have been a period of restraint on 28 December, following seven days of freezing, and a full ban on 4 January which would have continued for the rest of the season.

During the 1978–79 winter, restraint would have been called for on 5 January, followed by a full ban on 13 January. It is likely that this ban would have continued for the rest of the season.

As a result of this analysis, the working party agreed the following criteria based on the state of the ground:

> Restraint would be called for after seven days of frosty weather, or after ten days when frosty weather occurred, interspersed with one or two days of thaw. Frosty weather is defined as periods when more than half the meteorological stations selected record state of ground 3 to 9. The thaws are defined as periods when less than half the meteorological stations record state of ground 3 to 9, and they do not contribute to the total of ten days mentioned above. Should the conditions which necessitated a call for restraint be recorded on fourteen days, then a statutory ban would be invoked. If a thaw

Days when more than half the Meteorological Stations reported State of Ground Codes 3-9 at 09.00 hrs.

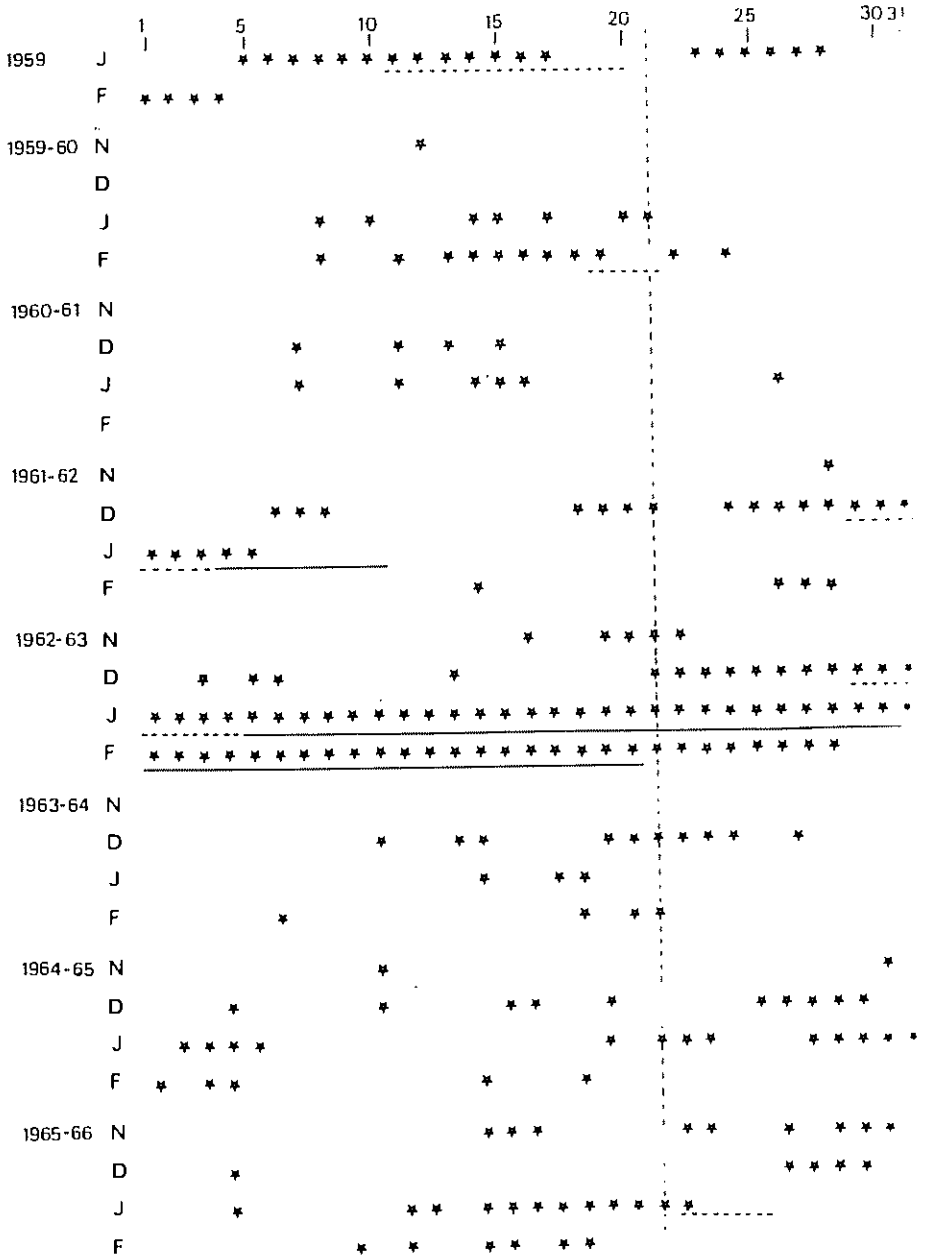


Figure 1.

Days when more than half the Meteorological Stations reported State of Ground Codes 3-9 at 09.00 hrs.

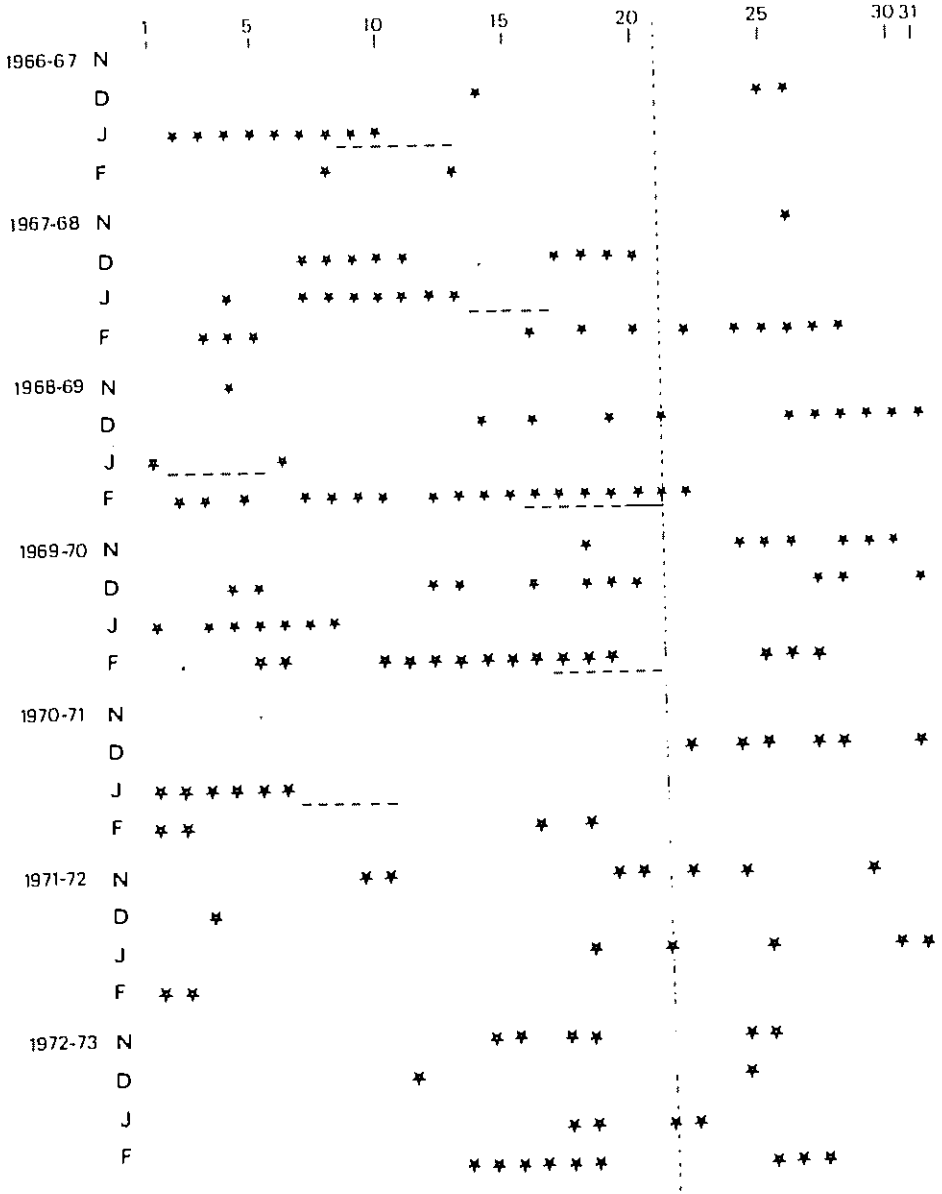
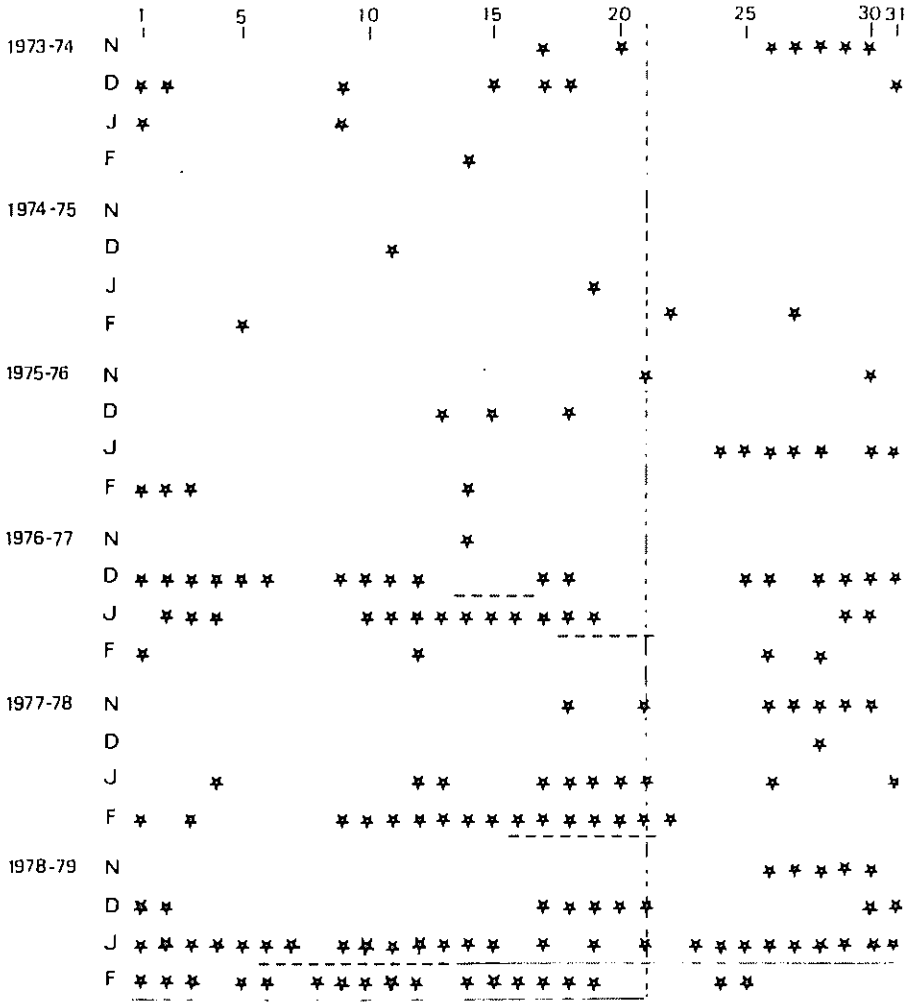


Figure 1 (continued).

Days when more than half the Meteorological Stations reported State of Ground Codes 3 - 9 at 09.00 hrs.



Key

* days when over half the meteorological stations recorded state of ground codes 3–9

—— days when a statutory ban would have been in force

- - - days when a period of voluntary restraint would have been requested

Figure 1 (continued).

of three or more days occurred, then the earlier period of freezing would be disregarded.

An examination of Figure 1 will show when voluntary restraints and statutory bans would have occurred over the last twenty years, should these criteria have been in operation.

The working group agreed that the imposition of a ban on the mainland of Europe should be noted and its significance discussed, particularly if conditions in Britain did not warrant calling a national ban. It was also agreed that our criteria should be presented to other European countries for their consideration on a wide geographical basis. This was done through the IWRB and discussed at the joint International Foundation for Game and Wildlife Conservation/IWRB meeting in Paris in December 1979. The discussion resulted in Recommendation X of this Meeting (see page 211).

The recommendation on when to lift a ban or restraint in any year would have to be agreed by the parties concerned, based on how severe the conditions had been, for how long they had occurred, and what the weather forecast was. It has not as yet been possible to arrive at any clearly defined criteria, and flexibility is considered desirable at this stage. Owing to delays in receiving the daily weather report, it was necessary to arrange with the Meteorological Office to have this information available direct from their computer. The NCC has finalised a contract with the Meteorological Office whereby NCC will be informed by telephone during working hours should half or more of the selected stations report state of ground in the range 3 to 9 on five successive days, or on five days punctuated by up to two days with less than half the stations recording the required ground state. If the NCC cannot be contacted at the weekend, WAGBI will take the call. Following the alert after five days, the Meteorological Office will then await NCC's instructions for the preparation of five day forecasts, covering items such as frost, ground state, wind, and likelihood of snow. Once the instruction for forecasts has been given, a new forecast will be issued at 10 am on each day unless otherwise specified. The service will start on 20 December and continue until 20 February, although if necessary it could start earlier than 20 December. If the Meteorological Office is unable to provide a particular station's observations, they will provide one as near to the original as possible. This has already happened in the case of Kilnsea (Humber) which has now been replaced by Binbrook, Lincolnshire; this station is a little way inland to the southwest.

The working party discussed publicity arrangements, and the Department of the Environment has agreed to liaise with the Central Office of Information with a view to working out the best method of publicising both restraints and bans. The Department will also liaise with WAGBI to produce a report for circulation to other organizations, who would then suggest how they could help in publicising

the matter to their members.

It was felt that, given the fact that restraints would be publicised as leading automatically to a statutory ban if the weather conditions continued, it should be possible to dispense with the normal 48-hour period between an order being made and its coming into effect. A certain amount of flexibility would be necessary over weekends; for example, if it appeared likely that a ban would be called on a Friday, then the requisite period should be thirteen days, rather than fourteen. Similarly, if the fourteenth day fell on a Sunday, then the ban would be called on the following day.

A call for restraint would cover the country as a whole, and it would be necessary to publicise the fact that wildfowlers had a collective responsibility for a common resource. The reactions to restraint may, however, vary regionally according to the severity of the weather. WAGBI is at present working on the sorts of measures which could be taken. A statutory ban would, however, cover the whole country.

It was noted that wildfowlers were not the only section of the community who were likely to disturb wildfowl; birdwatchers frequently congregated in areas where unusual species or numbers of birds were found, and could cause just as much disturbance. It was therefore necessary to ensure that the birdwatching public as well as wildfowlers were requested to avoid disturbance during severe weather. The British Trust for Ornithology also agreed that routine cannon netting operations would be suspended under such conditions, although exceptions would be made for scientific studies on the effects of cold weather on birds. A code of conduct for birdwatchers is also being prepared by the Royal Society for the Protection of Birds.

Summary

In February 1979, a working group was set up in the United Kingdom to find simple and universally acceptable criteria for calling a ban on wildfowling in severe weather. Census and biological data were considered unsuitable. Criteria were developed on the basis of the state of the ground, as recorded daily at 0900 hrs at thirteen coastal or near-coastal meteorological stations around Britain. It was agreed that a call for restraint on wildfowl hunting should be made after seven days of frosty weather (more than half of the stations recording state of ground in the code range 3 to 9, ie with ice or snow), or after ten days interspersed with one or two days of thaw. After fourteen days of frosty weather, a statutory ban would be invoked. If a thaw of three or more days occurred, the earlier period of freezing would be disregarded.

Meteorological data for the past twenty years are analysed to demonstrate the effectiveness of these criteria, and details of operation are discussed. No clear criteria have yet been defined for lifting a restraint or ban. Disturbance by birdwatchers is recognized as a problem in severe weather, and some measures to reduce this are proposed.

Résumé

CRITERES BRITANNIQUES POUR L'APPLICATION DE LA FERMETURE DE LA CHASSE AU GIBIER D'EAU EN PERIODE DE CONDITIONS CLIMATIQUES RIGOUREUSES

En février 1979 on a établi au Royaume-Uni un groupe de travail chargé de dégager des critères simples et universellement acceptables pour l'application de la fermeture de la chasse au gibier d'eau en période de conditions climatiques rigoureuses. On a estimé que les données biologiques et les informations recueillies grâce aux recensements d'oiseaux d'eau ne sont pas adaptées à cette fin. Les critères élaborés se basent sur la condition du sol, enregistrée tous les jours à 0900 h à 13 stations météorologiques situées sur les côtes ou près des côtes britanniques. Le groupe de travail s'est mis d'accord pour faire appel aux chasseurs de gibier d'eau de faire preuve de modération sous certaines conditions: soit après sept jours de gelée (pendant lesquels plus de la moitié des stations météorologiques enregistre des valeurs entre 3 et 9 sur l'échelle de valeurs décrivant la condition du sol, c'est-à-dire des jours de neige ou de glace), soit après dix jours de gelée, interrompus d'un ou de deux jours de dégel. Une interdiction légale est imposée après quatorze jours de gelée. Au cas ou un dégel interviendrait pendant une période de trois jours ou plus, on ne tient pas compte de la période de gelée précédente.

Les auteurs présentent une analyse des données météorologiques des vingt dernières années pour démontrer l'efficacité de ces critères, et passent en revue l'opération detaillée du système. On n'a pas défini jusqu'ici de critères pour la suspension de l'appel à la modération ou de l'interdiction. On constate également que le dérangement provoqué par les ornithologues constitue, lui aussi, un problème en période de conditions climatologiques rigoureuses et on propose certaines mesures pour y remédier.

A-D/P45/82

APPENDIX 2. Sent to Minister by Chairman 17 September 1982

WORKING GROUP ON WILDFOWLING BANS IN SEVERE WEATHER: REVIEW OF OPERATION OF THE ARRANGEMENTS DECEMBER 1981 - JANUARY 1982

The legal basis and experience in 1979

1. Section 7 of the 1967 Protection of Birds Act allows for the Secretary of State to ban the shooting of Schedule 3 birds because of severe weather. This provision has been kept under Section 2(6) of the Wildlife and Countryside Act 1981.

2. As a result of disagreement over calling the January 1979 ban in Britain due to lack of universally accepted criteria and procedures, a Working Party was set up at the Waterfowl Liaison Committee meeting on 8 February 1979 and chaired by the NCC. Its remit was to find simple and universally acceptable criteria for calling wildfowling bans in severe weather. The members of the group consisted of WAGBI (now the British Association for Shooting and Conservation), the Royal Society for the Protection of Birds, the Wildfowl Trust, the British Trust for Ornithology, the Game Conservancy, the Department of the Environment and the Nature Conservancy Council.

3. The group concluded that because of the difficulties of quickly collecting during spells of severe weather adequate data on weights and numbers of birds dying, a better alternative was to use state of ground data at 13 meteorological stations situated near major estuaries in so far as state of the ground was an indication of how critical were the feeding conditions, and the major estuaries were the most important areas for substantial numbers of quarry species and associated other waterfowl. As a result of an analysis of state of ground data at these stations each winter since January 1959 the following criteria were agreed:

> Restraint would be called for after seven days of frosty weather, or after ten days when frosty weather occurred, interspersed with one or two days thaw. Frosty weather is defined as when more than half the meteorological stations selected record state of ground 3-9. (Frost or snow cover to various degrees). The thaws are defined as when less than half the meteorological stations record state of ground 3-9, and they do not contribute to the total of ten days mentioned above. Should the conditions which necessitated a call for restraint be recorded on fourteen days, then a statutory ban would be invoked. If a thaw of three or more days occurred, then the earlier period of freezing would be disregarded.

4. These criteria were accepted by the Minister at the time for the basis on which he would receive advice from NCC on the calling of shooting bans.

The period of severe weather, December 1981 - January 1982 - record of the course of events

5. The severe weather in December 1981 and January 1982 provided the first opportunity to test the criteria agreed in 1980.

6. Following seven consecutive days from 7 December, when state of ground 3-9 was reported from at least seven stations, a request was made by NCC on 15 December for voluntary restraint.

After a further seven days meeting the same criteria, a statutory ban was recommended and this came into force at 0001 hours on 22 December in England and Wales, and 0001 hours on 23 December in Scotland.

29 December was the first day when less than seven stations recorded state of ground 3-9, but a further seven such days followed and on 5 January 1982 the ban ended, the eight days recovery period having previously been agreed as a minimum period after a thaw commencing on 29 December.

From 5 January all three Scottish stations recorded state of ground 3-9 and although the ban had ended in Scotland, voluntary restraint and, if necessary, local voluntary bans were requested. After continued reports of the severity of weather in Scotland, NCC recommended a re-imposition of the ban on 8 January, this came into force at 0001 hours on 11 January.

From 6 January state of ground 3-9 was again recorded from seven or more stations throughout the country and a statutory ban was again recommended for England and Wales. This came into force at 0001 hours on 13 January. These second bans were lifted at midnight 22 January in England and Wales and at midnight 24 January in Scotland. This was two days earlier than the NCC on advice from the group had recommended in England and Wales. With mild weather continuing throughout the winter no further action was necessary.

Effects on birds

7. The BTO rapidly carried out under contract to NCC a study on the effects of the hard weather on birds as shown by ringing recoveries. This revealed that during the period there had been substantial increases in the mortality of certain species, particularly Redshank, Oystercatcher, Pochard, Heron, Shag and a number of passerine species.

Review of the criteria

8. Ministers had asked for the criteria to be reviewed at the end of any year in which a restraint is called for or a ban imposed. NCC called a meeting on 18 January to make an urgent interim review of the criteria and the associated procedures for bringing bans into operation and to get agreement and co-ordinated action on information that should be assembled to ensure that the full review would be truly comprehensive. Further meetings took place on 21 April and 19 July 1982. A list of members and the organisations they represent is contained in Annex 1.

The problems raised

9. The BFSS had already questioned the timing of the ban and the need to include Woodcock and Capercaillie. The Parliamentary Under-Secretary of State, DoE, Neil Macfarlane MP, attended the first meeting and asked for a number of points to be included in this review. These included:

(a) whether there is a case for varying the criteria depending on the habitat of a species or group of species;

(b) the adequacy of the 13 Meteorological Stations given the extent of any regional variations in conditions;

(c) the validity of the timing for calling for voluntary restraint and statutory bans, particularly in view of the possible cumulative effect of severe weather even if this were interspersed with temporary thaws;

(d) the need for better communication with the Meteorological Office and the possibility of using more fully the technology available for weather forecasting;

(e) the case for improving the monitoring of severe weather bird movements in Britain and North West Europe as a whole (to help in deciding the relevance of regional bans).

10. In addition to these points all the relevant organisations expressed very great concern about the poor publicity which the bans had and considered this to be by far the most important matter needing review.

The BFSS who became members of the working group at the second meeting also recommended that the review should look at the length of bans, the place of regional bans, the triggering period for bans and the relevance of using the 3 p.m. state of ground reading as well as to the 0900 a.m. reading. They also recommended that there should be a meteorological station covering the Western Isles off Scotland.

Dr Evans of Durham University suggested that a wind chill factor combined with the state of ground data might more accurately reflect the effect of severe weather on waterfowl. The practicability of using this extra factor needed examination.

11. These points have now been investigated to varying degrees and the findings are summarised below.

THE GROUP'S ASSESSMENTS

The case for varying the criteria depending on the habitat of a species or group of species.

12. It was agreed that waders should not be considered separately from wildfowl because shooting of one group would frequently cause disturbance to the other. A possible exception was Woodcock and this species was the subject of a special meeting on 8 June, chaired by the Game Conservancy and attended by BASC, BFSS, RSPB, BTO, NCC, DoE and University of Durham.

13. The meeting considered: (1) the justification of using shooting records as indicators of population change; (2) whether Woodcock is sufficiently distinct from ducks, geese, Snipe and Golden Plover in ecological terms to warrant special treatment and (3) the practical difficulties of enforcement.

14. The conclusion of the meeting regarding (1) was that in the case of Woodcock the justification for using shooting records alone was inadequate. Although bag sizes for other species had been shown to be reasonably accurate indicators of population change when compared with other techniques, no independent estimate of population size for Woodcock existed and there was no clear idea of the possible errors involved. The meeting therefore agreed that any change in the treatment of Woodcock would need to be supported by better data than at present available.

15. The group also concluded that although the proposal to allow shooting of Woodcock in woods was on the face of it reasonable the problems of defining habitats where Woodcock could be shot were too great to make enforcement possible. The legislation was also not sufficiently flexible to allow for habitat distinctions as to where species could be shot.

16. In the case of the Capercaillie it was agreed that the food supply of this species would probably not be affected by hard weather; furthermore its inclusion in the Bird Protection Acts resulted from its exclusion from the Game Acts. It was extinct in Scotland at the time these were drawn up. It

was agreed that the review team should recommend the exclusion of Capercaillie from future orders banning wildfowling.

The adequacy of the thirteen meteorological stations

17. At a special meeting at the BASC Marford Mill on 16 March 1982 representatives of the BASC, BFSS and the Game Conservancy concluded that the 13 selected meteorological stations are sufficient to reflect the national weather situation.

18. The SHHD requested that the agreed procedures relating to wildfowling bans should specifically allow for Orders for bans covering Scotland only. It was agreed that recommendations relating to Britain as a whole should still be based on state of ground reports from the 13 meteorological stations currently used. When the circumstances required it, NCC would give additional advice, based on meteorological data, to the Secretaries of State for Scotland and Wales.

19. BASC have analysed what would have happened on a national scale if 3 p.m. readings, that had been suggested, had been used as well as the 9 a.m. readings. The analysis of the 3 p.m. readings suggested that there would be little difference compared to the 9 a.m. readings. There was a disadvantage in that the data would not be available in time for it to be used that day. It is therefore recommended that only the 9 a.m. readings continue to be used.

The validity of the timing for calling for voluntary restraint and statutory bans

20. Work carried out on seasonal changes in fat content of certain wader species by Durham University indicates that these birds tend to carry more fat in December than in January and are more likely to survive longer in severe weather before the New Year than after. Systematically collected data on other waterfowl are lacking.

The group acknowledged that the data on which to base a recommendation on the length of the trigger period was less than was desirable. It was necessary also to incorporate the recommendation (see para 33) that two days notice should be given before a ban takes effect. There was extensive discussion at two of the meetings seeking an arrangement acceptable to all parties before a middle course could be agreed upon. The group recommended that after 13 days of continuing frost confirmed by the Meteorological Office at 9.00 am on the thirteenth day a recommendation should be given to the Minister for an Order to be made. Following publication and publicity of an impending ban during the remainder of the thirteenth and the whole of the fourteenth days, an Order should be made commencing at 9.00 am on the fifteenth day.

21. The group considered the principle of a rolling ban during prolonged periods of severe weather but considered that to incorporate them within criteria would make these too complicated in practice. The group agreed that as Orders could be extended or curtailed according to circumstances at the time the 14 day period of initial Orders should not be changed.

22. The group also considered the length of time birds require for recovery purposes after severe weather. Again very little information was available but work carried out by Durham University specially commissioned by the NCC for this purpose indicates that recovery to normal or near normal weight occurred within two weeks in Dunlins and Grey Plover, but appears to take longer in Redshanks. These are not quarry species but are likely to be disturbed by wildfowling and hence it is relevant to quote these data. No equivalent

information exists for ducks and geese, although data on weights of geese and ducks shot at Loch Leven between bans and after the second ban was lifted indicated that at least those birds were not significantly different from the average November to January weight. Observations on the behaviour of these birds at the time, however, suggested that in order to conserve energy Mallards remained out on the ice with their heads tucked in, and geese allowed a much closer approach than usual, and were very reluctant to fly. In these circumstances they were very easy targets.

Studies of gross weights from different samples of birds are also open to biases due to light individuals dying early or undetected movements of birds through the area.

23. Further work on this subject is under way and the group agreed that it was important to allow cannon netting of birds during cold weather bans in the case of projects specifically designed to gather data on the effects of cold weather on birds and the times taken for birds to recover their weight.

The Advisory Committee on Birds agreed to this proposal.

24. It is still not possible to give specific guidance on the length of time a ban should continue after the cold weather has ceased. It seems likely that waders will take longer to recover than many ducks and geese, and it is recommended from the evidence presented above that a minimum of seven days when less than half the meteorological stations record state of ground 3-9 should be allowed and that this period might need to be increased according to the length and severity of the cold weather and any regional differences there may be.

25. The group also discussed criteria for second bans in a season, and concluded that it would be difficult to draft strict criteria for the imposition of second bans in a form that could adequately take account of the great variations in conditions from year to year, and that it would be better to rely on consultations and collective judgement as occurred during the last ban.

Since birds entering a second period of severe weather may already be in a weakened state the period of continuing hard weather trigggering a second ban may need to be shorter than the period leading to the first ban. However, as with the first ban a two day period of notification would apply.

<u>The need for better communication with the Meteorological Office, and the possibility of using more fully the technology available for weather forecasting.</u>

26. The group agreed that the arrangements had worked well and saw no need for changing them. Subsequent enquiries by the NCC confirmed the belief that it was not possible to have a report on the state of the ground readings taken at 9. a.m. before 11 a.m. On some days all the information may not have been in and processed before 11.30 a.m.

27. When the information was available the NCC would inform BASC, BFSS, BTO, Game Conservancy, RSPB, SHHD, Welsh Office and Wildfowl Trust, in periods when restraint or bans had been called for. The NCC would also ask the Meteorological Office for a general forecast each day during this period except when a decision was needed about bringing in a ban or lifting one when a more detailed five-day forecast would be called for.

28. Recent research by Dr Evans and others has suggested that in cold weather strong wind may be a significant cause of mortality in birds, and for shore

birds it may be a more important source of mortality than are low temperatures.

29. The Meteorological Office have confirmed that they would be able to supply the necessary data on mean air temperatures and mean wind speeds during the night prior to 9 a.m. state of ground readings. However, the cost could be high.

30. The group agreed that research into these questions should be encouraged but believed the criteria should be kept as simple as possible. The group concluded that while future recommendations for any initial Orders should be based principally on the present state of ground criteria, information on wind speed and temperatures would be helpful in reinforcing such recommendations or as grounds for pressing for a more rapid introduction of an Order than would normally be necessary.

The case for improving the monitoring of severe weather bird movements in Britain and North West Europe as a whole.

31. The group concluded that data from wildfowl counts could not be made available sufficiently rapidly to be of assistance. The National Wildfowl counts are made by volunteers at monthly intervals and take some time to be assembled and analysed. Likewise it was not considered feasible to augment these with special counts at the onset of severe weather.

32. There appears to be no major study on the movements of birds in Britain in relation to cold weather. The NCC are considering commissioning a study which will bring together the available data on this subject. The information gained on the amount and direction of movement should help in deciding the relevance of regional bans. It will also help to identify those sites which are of particular importance for birds in severe weather. Results from such a study could be available within about a year.

33. As far as the wider issue of bird movements in North West Europe is concerned the NCC will be exploring the possibility of a study being carried out by the EEC and the Council of Europe in relation to the implementation of the Berne Convention. This would develop aspects of work on movements of birds in Europe already being carried out by the Wader Study Group and the IWRB. This study would be helpful in deciding the relevance of regional, national and international bans. It is not expected that the results of this study would be available for several years.

Publicity

34. There was a general agreement that the bans had received totally inadequate publicity, though a lot better in Scotland than elsewhere. This was partly due to the short notice given and the lack of co-operation from the media who refused to give adequate space to the bans as they misguidedly considered them of little interest. While the voluntary organisations would do everything possible to help publicity, the group considered strongly that it was the Government's duty to provide funds for publicity. It was agreed that two days notice should be given for any future bans. The RSPB considered that 12-24 hours should be sufficient and this would avoid the problem of irresponsible shooters taking advantage of the notice period.

35. A special meeting was held in May to discuss ways of publicising the bans. The following methods are now considered worthwhile:

(1) Preparing radio tapes for use by local radio.

(2) Securing co-operation of presentation and continuity units of radio and TV for messages between programmes. The weather forecast slot is one possibility.

(3) Use of public service announcement periods of radio and TV.

(4) The DoE would provide the telephone number for its Public Inquiry Office to which calls could be referred in office hours.

(5) DoE should ask the Home Office to transmit announcements of future bans to local police stations as quickly as possible.

36. The main group agreed that a short announcement at the end of television and radio weather forecasts would be extremely effective as attention to these forecasts is likely to be given by many wildfowlers as well as bird watchers. Unfortunately, there is no guarantee that the media will agree to this. Nevertheless if the various shooting organisations agreed to include in the autumn issues of their journals details of ways in which announcements might be made most wildfowlers would be listening out for them. It should be emphasized in these articles that the media may not always co-operate and the lack of an announcement after, for example, a weather forecast, does not necessarily mean there is no wildfowling ban is about to be implemented. The group were firmly of the view that as this was a Ministerial Order that the Departments concerned should find any monies necessary for the publicity to be effective.

It is essential that at least one national newpaper carries an advertisement about the ban coming into force. It is recommended that all the relevant interests should inform their members that a statement would definitely be made in that newpaper.

SUMMARY OF THE CONCLUSIONS AND RECOMMENDATIONS OF THE GROUP

The group concludes waders should not be considered separately from wildfowl and that the Woodcock could not be treated differently from the rest.

The group concludes that the Capercaillie should not be included in any future bans.

The group concludes that the thirteen Meteorological Stations are sufficient to reflect the national weather situation, and that the 9.00 am readings only should be used.

The group recommends that where circumstances require it, NCC would give additional advice, based on meteorological data, to the Secretaries of State for Scotland and Wales.

The group recommends that a decision should be reached that an Order should be made after 13 days of continuing frost confirmed at 9.00 am on the thirteenth day from the Meteorological Office. Following publication and publicity if this decision during the remainder of the thirteenth and the whole of the fourteenth days, an Order should be made commencing at 9.00 am on the fifteenth day.

The group also recommends a minimum period of 7 days, when less than half the Meteorological Stations record state of ground 3-9, should be allowed before the ban is lifted.

The group concluded that it would be difficult to draft strict criteria for the imposition of second bans in a season, and that it would be better to rely on consultations and collective judgement.

The group concludes that the present arrangements with the Meteorological Office worked well and it is not possible to obtain the data any earlier each day. It recommends NCC informs BASC, BFSS, BTO, DoE, SHHD, Welsh Office, RSPB, Wildfowl Trust and Game Conservancy of the state of ground data each day when restraint or a ban has been called for.

The group recommends that further research on the efficacy of wildfowling bans is carried out. This would entail studies on the movements of birds, their body-weight changes and behaviour particularly related to disturbance in mild, normal and cold winters.

The group concludes that publicity arrangements were totally inadequate for the latest bans and recommends further examination of what methods would be most appropriate to bring to the attention of wildfowlers that Orders were coming with force.

The group acknowledged that to be effective, publicity will need some financial backing by Government, including the placing of an advertisment in an appropriate national newspaper.

The group was of the view that most wildfowlers would see reports on the ban if these were announced before or after the television and radio weather forecasts.

The group recommends that notice of these and other arrangements mentioned in the report should be made in the journals of interested organisations during each autumn.

The group recommends that the criteria be reviewed at the end of any season in which restraint is called for or a ban imposed.

ANNEX 1

MEMBERSHIP DURING 1982 OF WORKING GROUP ON WILDFOWLING BANS IN SEVERE WEATHER

The following list includes all those who attended at least one of the three review meetings held.

Professor G V T Matthews (Chairman)	Deputy Director, The Wildfowl Trust
Mr Stanley Cramp	Chairman, Advisory Committee on Birds
Cdr. J Anderton	Director, BASC
Mr J A Swift	Director of Conservation and Research, BASC
Mr A R Laws	Conservation Officer, BASC
Dr R J O'Connor	Director, BTO
Mr R Spencer	Senior Research Officer, BTO
Dr G R Potts	Director of Research, The Game Conservancy
Mr R M Van Oss	Director, The Game Conservancy
Mr J L F Parslow	Director (Conservation) RSPB
Mr F Hamilton	Director, Scotland, RSPB
Mr C Tyrell	Shooting Committee Chairman, BFSS
Dr P R Evans	University of Durham
Dr N C Davidson	University of Durham
Dr M Pienkowski	University of Durham
Dr D Langslow	Chief Scientist Team, NCC
Mr M J Hudson	Regional Officer, N.E. England, NCC
Mr C Placido	Chief Warden, S.W. Scotland, NCC
Mr D Waymouth	DoE, Directorate of Rural Affairs
Miss S Carter	DoE, Directorate of Rural Affaris
Mr D Paddon	DoE, Directorate of Rural Affairs
Mr F J Burtles	DoE, Information Directorate
Mr R Young	DoE, Information Directorate
Mr S Walker	SHHD
Mr G Aitken	SHHD
Miss E Dudgeon	SHHD
Mrs N Barry	Welsh Office
Dr P A Gay	Head of Scientific Services Divison, NCC
Mr W D Park	Head of Policy & Operations Division, NCC
Ms J Ross	Press Officer, NCC
Dr L A Batten (Secretary)	Wildlife Advisory Branch, NCC
Mr H B Ginn	Wildlife Advisory Branch, NCC
Mrs M H Green	Wildlife Advisory Branch, NCC
Mr M Mallalieu (Minuting Secretary)	Wildlife Advisory Branch, NCC

The first meeting, on 18 January was opened by Neil Macfarlane MP., Parliamentary Under-Secretary of State at the Department of the Environment.

Meeting to consider treatment of Woodcock, held on 8 June

This meeting was attended by the following:

Mr R M Van Oss (Chairman)	Game Conservancy
Dr G R Potts	Game Conservancy
Mr J A Swift	BASC
Mr A Cawthorne	BTO
Dr J Cadbury	RSPB
Dr M Pienkowski	University of Durham (Deputising for Dr Evans)
Mr D Starkie	BFSS

Mr D Paddon	DoE
Dr L A Batten	NCC
Dr D Langslow	NCC
Mr M Mallalieu	NCC

Meeting to discuss publicity for wildfowling bans

This meeting was attended by the following:

Mr F J Burtles	DoE
Mr D Graham-Hogg	BASC
Mr C Piggot	Scottish Office
Mr R Tracey	BFSS
Ms J Ross	NCC
Mr J Stubbs	DoE

APPENDIX 3i

THE EFFECTS OF SEVERE WEATHER ON WADERS: GUIDELINES FOR THE COLLECTION OF DATA AND ANNOUNCEMENT OF WADER STUDY GROUP PROJECT

by Nick Davidson and Nigel Clark

As a result of the two recent severe winters (1978/79 and 1981/82), there has been increased awareness of, and interest in, the effects of severe weather on waders, particularly since the implementation of statutory wildfowling bans and their consequent effects on wader-catching. In the last issue of the Bulletin we summarised the known effects on waders in Britain of the severe weather in 1981/82, and the consequences of the wildfowling bans during this period (Clark 1982, Davidson 1982, Evans 1982, Townshend 1982). Since then, national ringing recoveries have also been used to attempt to quantify the effects of severe weather in 1981/82 on mortality (O'Connor & Cawthorne 1982). Despite better collection of information than in previous cold spells, much valuable data was lost during last winter. There are still large gaps in our knowledge of how waders coped with the severe weather in different areas, and whether the timing and duration of wildfowling bans aided the survival of waders. As promised in Bulletin 34, we now discuss how information should be collected when severe weather next strikes, so as to maximise the value of the data. Since severe weather may occur in many different areas, we propose to coordinate data collection as a new Wader Study Group Project. First, we shall outline some of the questions about the behaviour of waders in cold weather, on which further information is needed. Second, we shall discuss how data should be collected. Most of these questions were outlined by Evans (1981). Others raised in his article, such as the effects of high winds on waders, and the consequences of different patterns of interestuarine movements by waders on their seasonal weight cycles and survival in severe weather, are not covered by this survey.

Information is particularly needed on three points:

1. Mortality

a) When and where do waders die? Mortality seems generally higher on the east than on the west and south coasts of Britain, but heavy mortality is often very localised. For example, at Montrose Basin and the Moray Firth in 1981/82 (Clark 1982). However, mortality in some other areas such as the Wash has undoubtedly been underestimated. On previous occasions site checks have been too infrequent to establish on which specific date waders died. This information is extremely important to establish which weather conditions, acting for which time periods, cause mortality.

b) Which species die; and are some individuals in a population more vulnerable than others? Some previous localised surveys have yielded useful information, for example on the north coast of the Wash (Pilcher 1964, Pilcher et al. 1974), but there has been no comprehensive widespread survey other than the RSPB's Beached Bird Survey which was not primarily concerned with waders or cold weather. Redshanks Tringa totanus, Oystercatchers Haematopus ostralegus and Dunlins Calidris alpina often suffer the highest mortality (e.g. Davidson 1981a, Clark 1982) but appreciable numbers of other species such as Grey Plovers Pluvialis squatarola, Curlews Numenius arquata and Turnstones Arenaria interpres are sometimes reported dying. A higher proportion of juveniles than of adults are often thought to die, but this has seldom been quantified. Very recently, we have found evidence that small individuals are more at risk in severe weather than large individuals of the same species (Evans & Davidson 1982). Both the age and size of waders dying in severe weather need further study.

c) What is the body condition at death of waders dying in severe winters? Even in the very low temperatures of January 1982, waders at Montrose were able to mobilise their fat reserves fast enough to balance heat loss. However, once fat had been used up, many died because they could not metabolise protein fast enough to maintain body temperature and not because protein reserves were exhausted (Evans & Davidson 1982). Few carcasses were collected elsewhere so we need to find out if this is the cause of death elsewhere, and at other times of year.

2. Numbers and Movements

a) Do numbers, and dates of arrivals and departures, of waders differ between mild and severe winters? Although "cold-weather movements" by Lapwings Vanellus vanellus and Golden Plovers Pluvialis apricaria are well known, it has only recently been proved that some coastal waders move between estuaries in response to the onset of severe weather (Davidson 1981a, Townshend 1982). Does this occur more widely? Do such movements occur only if cold weather occurs exceptionally early in the winter?

b) How are the numbers of birds dying related to the number of birds present?

c) How do movements affect weights of waders? (see below). Low weights could indicate the recent arrival of birds from other areas, as seems to happen in some winters in Dunlins and Knots at Teesmouth in early December (Davidson 1981b).

3. Weights of Live Birds

a) What are the normal (mild winter) weights of each species in different British estuaries? Data on these are needed for comparison with weights in severe weather.

b) When do weights fall below their normal levels in severe weather? i.e. under what weather conditions are internal reserves of fat and muscle protein used? Which species are most severely affected?

c) How rapidly do waders regain their normal weights? Very little reliable information exists on this point (Evans & Davidson 1982). During 1981/82 the failure to obtain such information was chiefly a consequence of the limited amount of wader catching allowed due to the confusion over cannon-netting bans. In other years, birds have often not been weighed during cold weather, or catches have not been made frequently enough to determine recovery rates accurately.

Answers to these questions are important in their own right. They will also allow us to see if the timing and conditions under which statutory wildfowling bans are imposed are indeed those times when waders are having most difficulty in meeting their energy requirements. We will also be able to assess whether the duration of a ban (currently lifted eight days after the end of severe weather) is sufficient to allow waders to regain fully the fat and protein reserves lost during severe weather. The present meteorological criteria for imposing and continuing wildfowling bans are detailed by Evans (1982).

The new WSG project aims to answer these questions by coordinating the collection of information on future winters in three ways: (1) tideline searches for corpses, (2) population counts, and (3) catching. To collect this information

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we need a network of observers covering as many areas, especially coastal areas, as possible. It is equally important to monitor those areas, for example in southern and western England, where coastal weather conditions seldom become severe, as to monitor areas where severe weather is often recorded. There are three reasons for this. Firstly, mortality of waders does sometimes occur during severe winters in normally mild regions (Ash 1964, Dobinson & Richards 1964). Secondly, we need to establish the extent of the regions in which waders are being affected in each future severe period, thus providing information should future wildfowling bans be applied on a regional basis. Thirdly, do waders move to milder areas to avoid severe weather?

Details of suggested methods for collecting the information are listed below.

1. Tideline Searches. Searches for wader carcasses should be made as frequently as possible throughout the winter, and during severe weather at intervals of no more than one week. Try to search the same area or length of tideline on each visit. On each visit, collect all wader carcasses: otherwise the exact timing of mortality is difficult to judge. We need to examine all carcasses for two reasons: 1) to identify their age, sex, body size and racial origin, and 2) to assess their body condition and to establish the cause of death. Black plastic dustbin bags (or similar) are suitable for the collection and storage of carcasses. Label each carcass clearly with a numbered tag on one leg, or place each, with a label, in a separate small ploythene bag. On each label, and/or a separate sheet, record the date and place of finding, weight, and any measurements that you have taken. You should then either 1) store the carcasses in a deep-freeze, and contact us so that we can arrange their transfer or collection, or 2) (only within the UK) post the carcasses to us immediately. If you post carcasses, they should be well wrapped in polythene bags inside strong external wrapping, preferably a tin (to prevent leakage in the post, which contravenes Post Office regulations), and sent by first-class mail. Mark the package "Pathological Specimens - URGENT". All intact or nearly-intact carcasses must be weighed (to the nearest 1 g if possible) soon after finding, certainly before freezing or postal despatch: carcasses lose water whether deep-frozen or at normal temperatures, so we cannot assess body condition without a weight taken as soon after death as possible. If, as a last resort, you cannot for any reason store or post carcasses, and you are unable to contact us, record the weight and biometrics of each carcass on standard WSG green forms.

2. Population counts. Try to standardise when and where you count, since we need comparable counts through the winter to find changes in numbers. Therefore, counts do not necessarily have to be comprehensive. In general, it is better to count birds at roost rather than at low water, but local conditions may sometimes preclude this. During severe weather make sure that the roosts do not move to other sites! Try to count at intervals of one week or less. During mild weather, counts should ideally be made at fortnightly intervals, on spring tides. If counting all wader species is not possible, concentrate on those that are usually most sensitive to severe weather: Redshank, Oystercatcher, Dunlin and Sanderling. We will discuss with the new BTO Estuaries Officer how to maximise the value of cold weather counts in relation to the Birds of Estuaries Counts, and how to avoid any conflict between this project and the Birds of Estuaries Enquiry.

3. Catching. The announcement in the most recent Ringer's Bulletin (Vol.6(1), June 1982) is now out of date: after considering a document prepared by Durham University (P.R.Evans) and the Wader Study Group (M.W.Pienkowski), the Advisory Panels to the Secretaries of State approved exceptions to the wader-catching bans during future severe weather for those groups actually participating in the type of study described in this article. Groups likely to be able to contribute have been contacted. Ringers not exempted from wader-catching bans are encouraged to participate in this project, particularly by collecting data before and (especially) after severe weather, to examine recovery times. The main justification for catching waders during severe weather is to assess their body condition, to see if they are meeting their energy requirements. Therefore, all waders caught during severe weather must be weighed, and measurements taken. Under no circumstances should waders be ringed and released without weighing, as has happened frequently during previous severe winters. Both during and after severe weather, pay particular attention to any previously-ringed bird, since weights of individuals yield more valuable information on recovery times than weights of unringed samples can provide. Large catches are not necessary (and may not be advisable in severe weather) but if they are made it is important to estimate weight loss during captivity, so that this can be corrected for in analysis of the weights. Measure weight loss by ringing and weighing a small sample of each species immediately after capture, and reweighing them after all others have been processed. [See Wilson & Davidson (this issue) for more details.] Whenever possible, concentrate on making a series of catches of the same species before, during and after severe weather. This will yield the best information on any losses and subsequent recovery of weight. Particular when increased mortality is noted, try to catch vulnerable species such as Redshank and Oystercatcher so that the condition and identity of the surviving birds can be determined. In severe weather remember that good data is essentia and that the welfare of the bird is of paramount importance. Smallish catches efficiently and expeditiously handled are best. All catch data should be sent, as usual, on WSG green forms to Mike Pienkowski. Please send in sheets for catches during and after severe weather as quickly as possible, and enclose a note pointing out that information from such periods is included.

To ensure that adequate coverage of any severe weather is achieved, monitoring should start on 1 October and end on 31 March. We intend to start the project for the forthcoming winter, i.e. on 1 October 1982. There are two reasons for this. Firstly, if the 1982/83 winter is mild it will provide valuable baseline information of 'normal' mortality, numbers and weights, with which to compare data collected during severe weather. Secondly, we (like weather forecaste are not clairvoyant. Therefore, we cannot predict when severe weather will occur, so the project must be running befo the onset of severe weather. During mild weather, we suggest that tideline searches and counts should be made at fortnightly intervals, just after the highest spring tides. After one week of minimum air temperatures at or below 0° try to increase the frequency of monitoring to intervals of one week or less. This increased frequency should continu for two weeks after a wildfowling ban is lifted. However, even if you feel unable to monitor an area as often as this please participate in the project, since any information will be useful. If you can help by searching tidelines, counting birds or catching before, during and after severe weather, please complete the registration form enclosed with this Bulletin and return it to us as soon as possible.

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APPENDIX 3 ii

THE EFFECTS OF THE SEVERE WEATHER IN DECEMBER 1981 AND JANUARY 1982 ON WADERS IN BRITAIN

by Nigel A. Clark

This is a preliminary round-up of the effects of the recent severe winter weather on waders in various parts of Britain. My main aim was to draw together information from various observers around the country, that might have otherwise have become difficult to collate in the future. It is not intended as a complete survey covering all parts of Britain; some of the information is not directly comparable between estuaries, since methods of collecting it varied. Most of the data available at the time of writing concerns the number of waders found dead, but I have included some further information, where it seems relevant, on other effects of the severe weather. Names in parentheses in the text refer to contributors for the area indicated. Localities mentioned in the text are shown in Figure 1.

In northern Britain, severe weather occurred in two periods: 6 - 26 December 1981 and 5 - 16 January 1982. On most days in both periods, mean daily temperatures were below 0°C. Between the two severe periods there were ten days of milder weather. On most of the east coast of Britain, winds were light throughout the severe weather, but were generally stronger to the north of the Firth of Forth.

The information that I summarise below shows that there were marked differences between estuaries in the severity of the effects, on waders, of the cold weather. Reported mortality was highest on two parts of the east coast of Scotland: the Montrose Basin and the Moray Firth. As in some previous severe winters (see e.g. Goss-Custard et al. 1977, Baillie 1980), highest mortality seems to have been amongst Redshanks Tringa totanus and Oystercatchers Haematopus ostralegus. Waders on several south and west coast estuaries were apparently unaffected by the severe weather.

Moray Firth (F.L.Symonds). The first dead waders were found on 8 January, with most being found between 17 and 22 January. Forty-three Oystercatchers were found. These comprised 6 adults, 7 sub-adults, 9 juveniles and 17 of undetermined age. In Findhorn Bay, an additional 150 Oystercatchers were found dead before 20 January. The only other wader corpses found were 2 Redshanks and 5 Curlews Numenius arquata.

Ythan estuary, Grampian (S.P.R.Greenstreet). Complete counts of all waders were made on 15 December and 14 January. On both occasions there was complete snow cover on land, and no waders were present on the fields. Redshanks were counted also on four other days (Table 1). Numbers of both Redshanks and Oystercatchers were lower on 14 January than in other, mild, winters.

Table 1. Numbers of waders on the Ythan estuary in 1981/82.

		Dec.			Jan.	Feb.	
		3	15	17	14	1	11
Redshank	*Tringa totanus*	649	874	742	586	623	596
Oystercatcher	*Haematopus ostralegus*		495		393		
Curlew	*Numenius arquata*		147		242		
Dunlin	*Calidris alpina*		715		1254		
Bar-tailed Godwit	*Limosa lapponica*		68		51		

When the mudflats froze over, Redshanks moved to other parts of the estuary. As the flats thawed, they moved back, territorial birds arriving first. Some birds returned later, and may have been away from the Ythan estuary: one colour-marked bird seen at the same site on the Ythan, on thirteen occasions between 2 November and 18 December 1981, was recorded at Tyninghame, East Lothian, 150 km to the south of the Ythan, on 9 January 1982. No corpses were found on the tideline during the severe weather, but remains of 30 Redshanks were found in late January away from the tideline. Four of these were birds ringed on the Ythan.

Montrose Basin, Tayside (N.K.Atkinson, N.A.Clark). The first reports of dead birds were received on 12 January. On that day, a search of the tideline by the roost site at the south-east corner of the basin found corpses of 122 Redshanks, 19 Oystercatchers, 5 Dunlins, 1 Curlew and 13 individuals of several species of ducks and geese. There were also many corpses floating in the water. At this time, all Redshanks at Montrose were using the south-east roost, as the other roost site, in the north-west corner of the basin, was completely covered by ice. The roost consisted of 300 Redshanks, all of which were reluctant to fly: 100 would fly only 5 to 10 metres when disturbed, and 20 seemed incapable of flight. Other waders seemed less seriously affected. Some further Redshanks were found freshly dead, or dying, on 16 January, after another two nights of severe frost. All the tideline of the basin was searched between 17 and 23 January, as the ice melted. This revealed additional corpses, bringing the total found to 341 Redshanks, 104 Oystercatchers, 16 Dunlins, 3 Knots Calidris canutus and 5 Curlews. However, these figures underestimate the total mortality for several reasons. Firstly, most deaths probably occurred at the south-east roost, less than 300 metres from the exit of the basin to the sea, so many were washed out to sea. There is some corroborative evidence for this: on the north side of the entrance, where little tiderack is normally deposited because of steep banks, only 4 Oystercatchers, 1 Dunlin and 1 Redshank were found dead, but these corpses formed most of the tide-rack; also, 6 Oystercatchers and 4 Redshanks were found dead on the beach just to the north of the entrance, where few Oystercatchers and no Redshanks fed or roosted. Secondly, many birds were washed up in large ice-fields, and were seen to be eaten by scavengers as the ice thawed. The remains of these corpses were not found during tideline searches. Thirdly, many birds died on fields near the basin, but only a few corpses were recovered from these areas.

By 23 January, the Redshank population had increased to 600 birds, 165 of which were caught on 24 and 28 January. All but three of the 30 already ringed birds in these catches had been ringed on the Basin. No juveniles were caught. By 7 February, about 1,000 Redshanks were present at the Basin, but even this was well below the mild winter population of 1,500 to 2,000 birds.

Firth of Forth. (Dr. M.Marquis, N.A.Clark). Observations made on waders at Musselburgh, on the south side of the Forth, between 18 and 23 December suggested that Dunlins and Redshanks were being adversely affected by the weather conditions, because they returned to the feeding grounds from their roost site within half an hour of high tide. There, they were forced to feed near the tideline at all times, because the mud froze within twenty minutes of becoming exposed. Redshanks caught on 23 December had very low weights, but only 1 Redshank and 1 Curlew were found dead. By 5 January,

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weights of Redshanks were higher, although some were still lighter than in mild winters. Redshanks and Turnstones Arenaria interpres seemed worst affected by the second cold spell, and on 12 January they were reluctant to fly when disturbed from their feeding grounds. However, only 2 Redshanks were found dead. On 23 January, Redshanks had weights that were normal for mild winters (cf. Davidson in press).

8 kilometres of the north shore, checked between 21 and 29 January, yielded corpses of 8 Curlews, 3 Redshanks, 2 Bar-tailed Godwits, 2 Oystercatchers, 1 Knot and 2 Lapwings Vanellus vanellus. Regular counts of Redshanks in North Queensferry Bay showed that the population had decreased by half by the end of the cold weather.

At Aberlady Bay, waders moved from their usual roost sites because of the formation of large ice-fields, but few waders were found dead.

Tyninghame Bay, East Lothian (A.Clunas, P.Whitfield). The numbers of Oystercatchers (580 to 509) and Dunlins (560 to 488) decreased at Tyninghame between 6 December 1981 and 24 January 1982, but numbers of Redshanks (171 to 238), Grey Plovers Pluvialis squatarola (67 to 122), Curlews (30 to 47) and Bar-tailed Godwits (69 to 109) increased. On 24 January the numbers of Grey Plovers and Bar-tailed Godwits were higher than any in recent mild winters, and Redshanks also showed possible immigration (see the record of a movement from the Ythan estuary). A tideline search at the end of January found corpses of 6 Oystercatchers, 1 Dunlin, 10 Redshanks, 4 Curlews, 1 Bar-tailed Godwit, 3 Lapwings and 1 Woodcock Scolopax rusticola. On the nearby rocky shores, neither Redshanks nor Turnstones appeared adversely affected.

Teesmouth, Co. Cleveland (N.C.Davidson). Tideline checks within the estuary revealed corpses of 2 Redshanks and 1 Curlew. Some Dunlins, Redshanks and Grey Plovers had lower weights than normal for mild winters (see Davidson this issue). No notable changes in foraging behaviour were recorded. Counts of Bar-tailed Godwits, Curlews, Grey Plovers and Sanderlings Calidris alba were similar to previous, mild winters.

The Humber (I.Shepherd). Weekly low water counts at Pyewipes, on the south shore of the Humber, suggested a possible decrease in the numbers of Redshanks, but increases in the numbers of Grey Plovers and Bar-tailed Godwits. However, these may have been due to movements within the estuary, rather than inter-estuarine movements. Two miles of the tideline in the lower estuary were checked for corpses on 1 January, and 2 Redshanks, 1 Grey Plover, 1 Golden Plover Pluvialis apricaria and 1 Lapwing were found. Additionally, 3 Redshanks were found dead on a factory roof, a regular roost site.

The Wash (A.Ball, J.Kew, M.Peat, N.Watts). Seven kilometres of the east shore were searched between 23 and 28 December, and corpses of 25 Redshanks, 4 Dunlins, 2 Knots, 2 Oystercatchers, 1 Bar-tailed Godwit and 5 Grey Plovers were found. On 5 January, 1.6 kilometres of the north-west shore were searched, and 41 Redshanks, 1 Bar-tailed Godwit, 2 Curlews, 3 Turnstones and 1 Grey Plover were found dead.

Also in early January, 20 Redshanks, three of which were ringed, were reported by a wildfowler at Terrington, on the south shore. During the second cold spell (5 - 16 January) much ice was pushed up on the tideline, covering all corpses. These were probably eaten by scavengers as they became exposed, so few corpses were found in tideline searches. The Wash Wader Ringing Group had, by the end of February, received ringing recoveries of 13 Redshanks, 5 Oystercatchers and 4 Grey Plovers found dead on the tideline between 25 December and 4 January.

Sandwich Bay, Kent (P.J.Findley). No dead waders were reported. There were small increases in the numbers of Dunlins, Grey Plovers and Bar-tailed Godwits, but numbers of Oystercatchers, Golden Plovers and Lapwings decreased. On neap high tides, birds tended to roost and feed on exposed mud, rather than assemble on normal roosts.

Poole Harbour, Dorset (C.Reynolds). Plym estuary, Devon (R.Swinfen). Severn estuary, Gwent (Dr. P.N.Ferns). No mortality, or unusual movements, of waders were noted in these areas.

North Wales/Menai Straits, Gwynnedd (D.Stanyard). Counts were made regularly at Foryd Bay throughout the winter. On 10 January 1982, numbers of several species differed markedly from those in mild winters (Table 2). The number of Curlews on 10 January was too high to have arisen only through local movements of birds from frozen fields to the shore. No wader corpses were found on two kilometres of the shore.

Table 2. Numbers of waders at Foryd Bay, North Wales.

	early Jan., mild winters	10 Jan. 1982
Oystercatcher	800	800
Lapwing	250	210
Ringed Plover	1 or 2	40
Grey Plover	1 or 2	33
Turnstone	50	40
Curlew	400	1300
Redshank	200 - 450	45
Knot	5 - 10	120
Dunlin	200 - 400	75

On Anglesey, in early October 1981, juvenile Redshanks formed 10.6% of a catch of 200 birds. This was about the normal winter proportion. However, in a catch of 500 birds on 7 February 1982, there were only 3.5% juveniles. Numbers of Redshanks were also lower (500 on 7 February 1982, compared with 1500 - 2000 during mild winters), but the difference in the percentage of juveniles can account only partly for the low number on 7 February.

Morecambe Bay (J.Sheldon). A check of all the sites where large numbers of waders have been found dead in some previous severe winters produced 15 Redshanks, 1 Turnstone, 9 Oystercatchers, 4 Curlews and 4 Knots. This is very few compared to the 1978/79 and 1962/63 winters.

Solway Firth (B.Turner). Most of the north shore of the Solway was checked for corpses, but none were found.

Clyde estuary (Dr. R.W.Furness). 2.5% of the Lapwings on the Clyde were colour-marked by the middle of November 1981. Throughout the winter, the proportion of colour-marked birds in the population, and the total population, remained stable. This suggests that there was no immigration into, or emigration from, this coastal population. The only dead waders found were 4 Lapwings and 3 Oystercatchers. Samples of Redshanks were caught on 12 December 1981, 27 January and 6 February 1982. On all three occasions, weights were within normal winter ranges.

I would like to thank all those who have been out, often in inclement weather, watching and catching waders, and collecting corpses, for their help in compiling this report; and Dr. N.C.Davidson and Dr. M.W.Pienkowski for helpful comments on an earlier draft.

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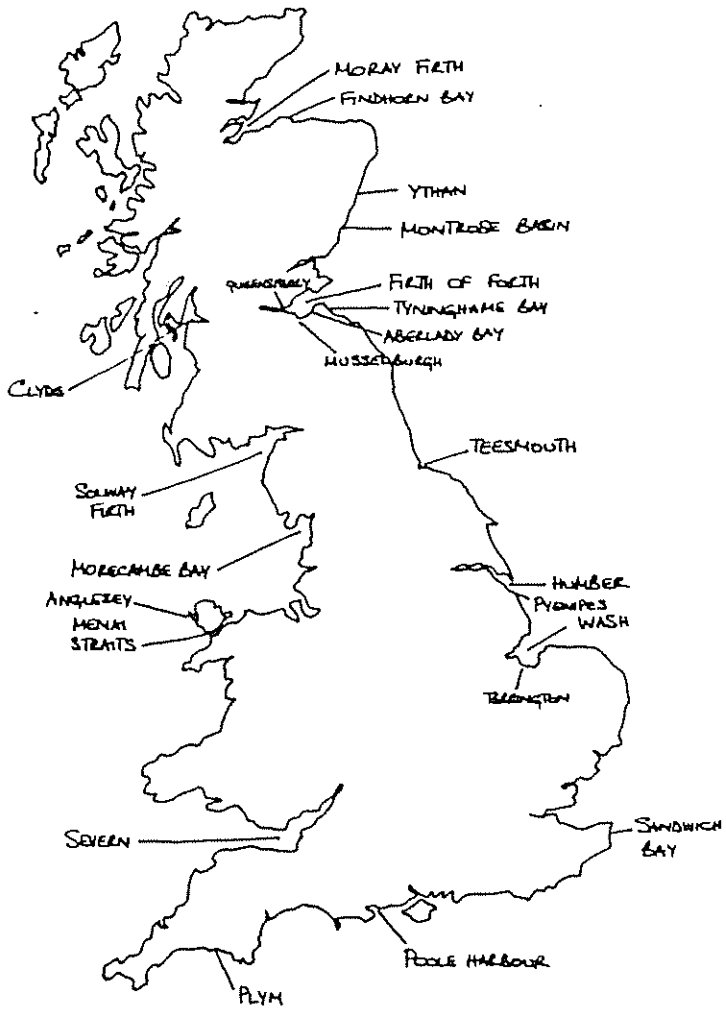

Figure 1. Intertidal areas mentioned in the text.

WHAT THE PAPERS SAID

British newspapers maintained their usual record of accuracy in reporting when describing the effects of cold weather on birds, and the imposition of the ban. Scotland's 'Sunday Standard' found some difficulty in identifying the usual habitat of waders: "Mr Mower said the society had evidence of duck and geese being forced to desert frozen inland lochs and move to coastal areas in search of feed [sic]. Similarly, other wading bids [sic], like Curlews, redshanks and ring plovers were being spotted on beaches."

Even the imposition of the wildfowling ban itself went unreported in most newspapers. However, the 'Durham Advertise , a local paper in north-east England, seemed to work on the principal of 'better late than never'. The following noti duly appeared: "Michael Heseltine, Secretary of State for the Environment, has signed a further order under section seven of the Preservation of Birds Act 1967 banning the shooting of wildfowl, including snipe, woodcock, redshank and golden plover and of wild ducks and geese . The ban came into effect at midnight last night and remains in operation, unless modified for 14 days until midnight on Tuesday, January 26. The Government has been advised by the Nature Conservancy Council that the continuing severe weather is having an adverse effect on all wild birds and in particular ducks and shore-waders."

Despite the reference to "last night", the notice was not published until 22 January. The ban was lifted at 0001 on 23 January.

APPENDIX 4. Movement of migratory species during periods of severe cold weather

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Winterfütterung : Unternehmen Badewanne : Wintereinbruch Januar 1979
Jahrgang 12, Jan/Febr. 1980, page 16
WIR UND DIE VÖGEL (D-3508 MELSUNGEN)
(some non-traditional possibilities for the survival of owls and birds of prey during January 1979)

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GVTM/AW

18th January 1983

A.D. Williams Esq.,
Nature Conservancy Council,
19-20 Belgrave Square,
London, SW1X 8PY

Dear Mr Williams,

As I said on the 'phone, I am sorry to have been so long in answering your letter of 9 December. The intervention of the Christmas/New Year break has much for which it must answer. Also the Council of Europe's requirement did not seem very urgent.

I think you have already got a pretty comprehensive bibliography. I would, however, draw attention to the Proceedings of the Second Technical Meeting of Western Palearctic Migratory Bird Management, Paris 1979, (pub. 1982) particularly:-

Th. Saint-Gerand. Les stationnements d'Anatides en France en janvier 1979. 170-173.

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I did wonder if Boyd et al (1964) was not a bit too compressive of a series of independent papers, with varying approaches, even though with a common theme.

Yours sincerely,

G.V.T. Matthews.

P.S There are some relevant American papers, but I guess you want to keep to Europe. GM

APPENDIX 5.

THE EFFECTS OF SEVERE WEATHER IN JANUARY AND FEBRUARY 1985 ON WADERS IN BRITAIN

by N.C. Davidson and N.A. Clark

WSG Project on the effects of severe weather on waders: fifth progress report.

INTRODUCTION

The winter of 1984/85 was the most severe in Britain and western continental Europe since 1981/82. There were two periods of severe weather. The first began on 2 January 1985 and lasted for 22 days. In Britain it was especially severe in south-east England. Heavy snowfall and prolonged freezing conditions were accompanied by generally light winds. Prolonged freezing conditions extended as far south as the Mediterranean coast of France, and in the Camargue thousands of Flamingoes *Phoenicopterus ruber*, herons and egrets died. The severity of the conditions in Britain resulted in the Secretary of State for the Environment introducing Statutory Wildfowling Bans in England and Wales on 16 January and in Scotland on 18 January. These wildfowling bans lasted until 29 January in England and Wales, and 30 January in Scotland. Restrictions on wildfowling were also made in most continental European countries. After nearly 2 weeks of milder weather, a second severe spell began on 9 February 1985 and lasted until 20 February. In Britain, this second spell again was most severe in East Anglia and south-east England. It differed from the severe weather in January in having several days of severe easterly winds associated with low temperatures and heavy snowfalls.

1984/85 was the first severe winter since the start of the WSG Project on the Effects of Severe Weather on Waders. The information collected by participants in the project, both during the 1984/85 winter and the previous milder winters, has proved extremely valuable in assessing the impact of severe weather on wader populations, and we thank all these participants for their efforts in often unpleasant conditions. We have used the information collected during the project as the basis of reports to the Nature Conservancy Council and the Working Group on the Implementation of Wildfowling Bans in Severe Weather, detailing the impact of the severe weather on waders.

This report summarises information on the impact of the two periods of severe weather, in January and February 1985, on coastal waders (Charadrii) in Britain. The WSG project has been run since winter 1982/83 and aims to collect comparative information on the impact of severe weather on waders, from examination of mortality patterns and sub-lethal effects during both mild and severe winters. Data is collected largely by the counting and collection of tideline corpses and the catching of the waders. The project aims to achieve representative sample coverage of coasts throughout Britain (and also Europe), rather than attempting complete coastal coverage. Full details of the objects of the project, and the methods of data collection, are described in Davidson and Clark (1982).

4 aspects of the impact of the severe weather in early 1985 on waders are covered in this report:

1. the seasonal pattern of mortality;
2. the geographical distribution of mortality;
3. the body condition (fat and protein reserves) of corpses; and
4. sub-lethal effects.

The analysis covers waders that extensively use coastal habitats during severe weather, and so includes Golden Plover *Pluvialis apricaria* and Lapwings *Vanellus vanellus*, but excludes essentially inland waders such as Snipe *Gallinago gallinago* and Woodcock *Scolopax rusticola*.

Finally we give details of changes in the running of the project for winter 1985/86.

SEASONAL MORTALITY PATTERNS

During mild winters, mortality of waders in Britain occurs chiefly between December and March, with peak mortality in February (Figure 1). Mortality in 1984/85 reached a peak also in February (Figure 1), but the pattern differed

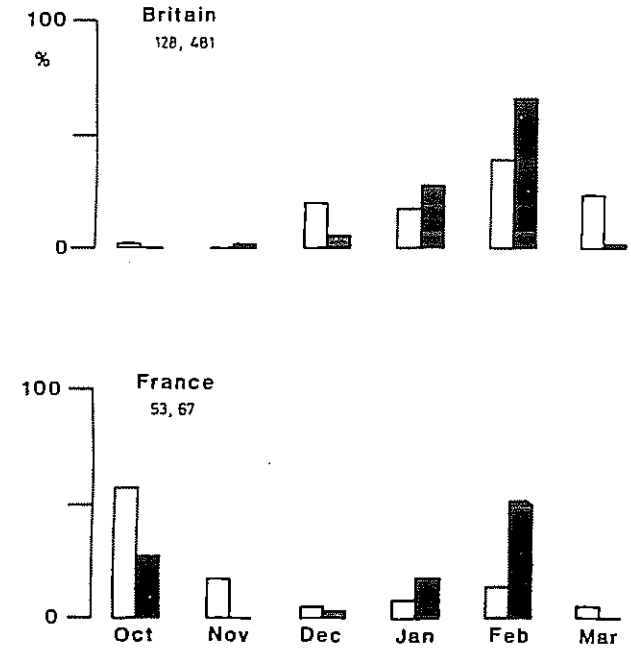

Figure 1. Seasonal occurrence of tideline corpses (all waders) in 1983/84 (open boxes) and 1984/85 (solid boxes) in Britain and northern France. Numbers give sample sizes for 1983/84 and 1984/85.

Wader Study Group Bull. 44: 10-16

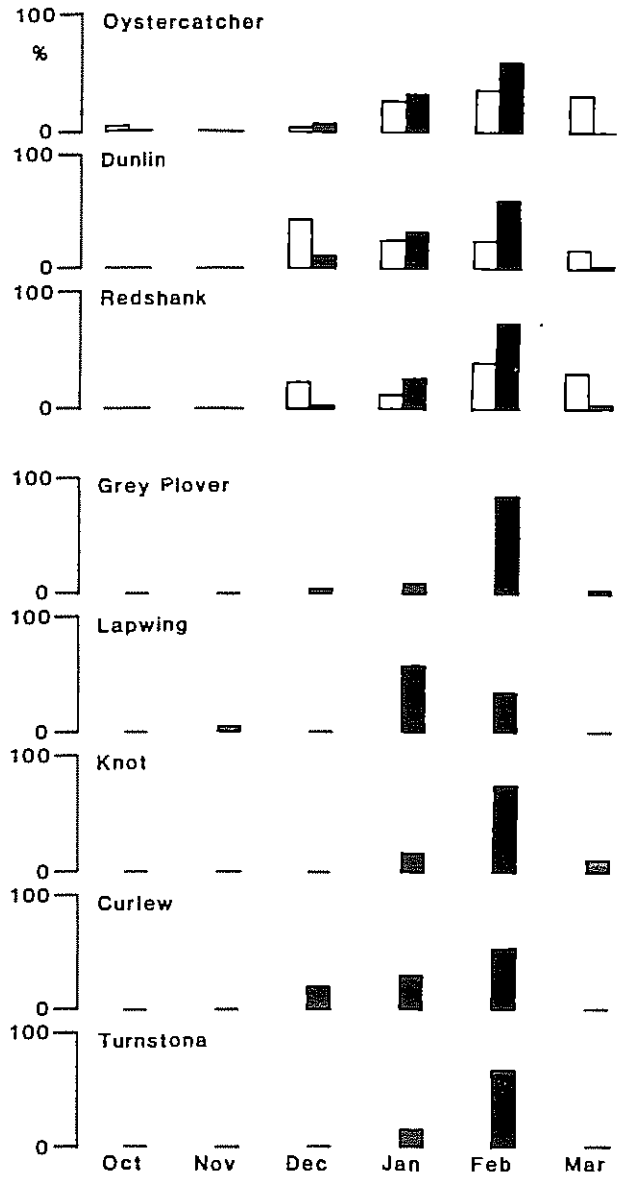

Figure 2. Seasonal occurrence of tideline corpses of 8 species of waders in 1983/84 (open boxes) and 1984/85 (solid boxes). Only species for which the sample for each year was >10 are included.

significantly from the previous winter (X^2 = 128.61 P<0.001): in 1984/85 a much higher proportion of mortality occurred during January and February (94.2% of mortality in 1984/85 compared to 57.0% in 1983/84). There was a similar, significantly different (X^2 = 25.99 P<0.001), mortality pattern in northern France. In that area there was also high mortality in early winter from wildfowling. During mild winters, this mortality was higher than that in midwinter. In 1984/85 this pattern was reversed (Figure 1).

The seasonal mortality pattern for single species in Britain (Figure 2) followed the overall pattern shown in Figure 1. In the 3 species (Oystercatcher *Haematopus ostralegus*, Dunlin *Calidris alpina* and Redshank *Tringa totanus*) for which there were sufficient samples for between-year comparisons the mortality pattern differed significantly between 1983/84 and 1984/85 (each X^2, P<0.001). In these 3 species, and in 4 others (Grey Plover *Pluvialis squatarola*, Knot *Calidris canutus*, Curlew *Numenius arquata* and Turnstone *Arenaria interpres*) peak mortality occurred in February 1985. In all these 7 species, the February 1985 mortality was more than 50% of mortality in the 1984/85 winter. In contrast, most mortality (58%) of Lapwings occurred in January.

As in many previous periods of severe weather (e.g. Dobinson & Richards 1964, Davidson & Evans 1982), and also during mild winters (Davidson & Clark 1984), more Redshanks than other species were found dead. In 1984/85, 49% of corpses found were Redshanks, 15% were Dunlins and 11% were Oystercatchers. Other species contributed less than 6% each to the total mortality.

GEOGRAPHICAL DISTRIBUTION OF MORTALITY

Figure 3 shows sites from which comparable data on the incidence of wader mortality were collected in 1983/84 and 1984/85. In January 1985, higher mortality than in the previous January was reported largely from the east and south-east coasts of England. However, some sites in western and northern Britain also had higher mortalities than in the previous year. Heavy mortality of waders also occurred in northern France, and in the Netherlands (E. Marteijn pers. comm.).

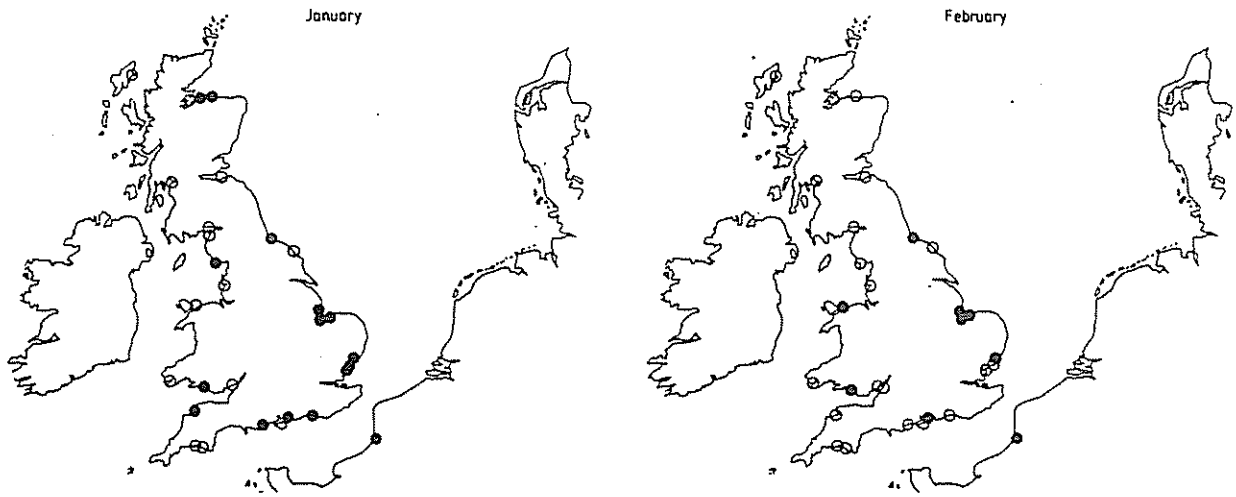

Figure 3. Geographical distribution of mortality of coastal waders in early 1985. Solid symbols show sites where higher mortality was reported for 1985 than the same month in 1984; open symbols show sites where no such increased mortality was reported.

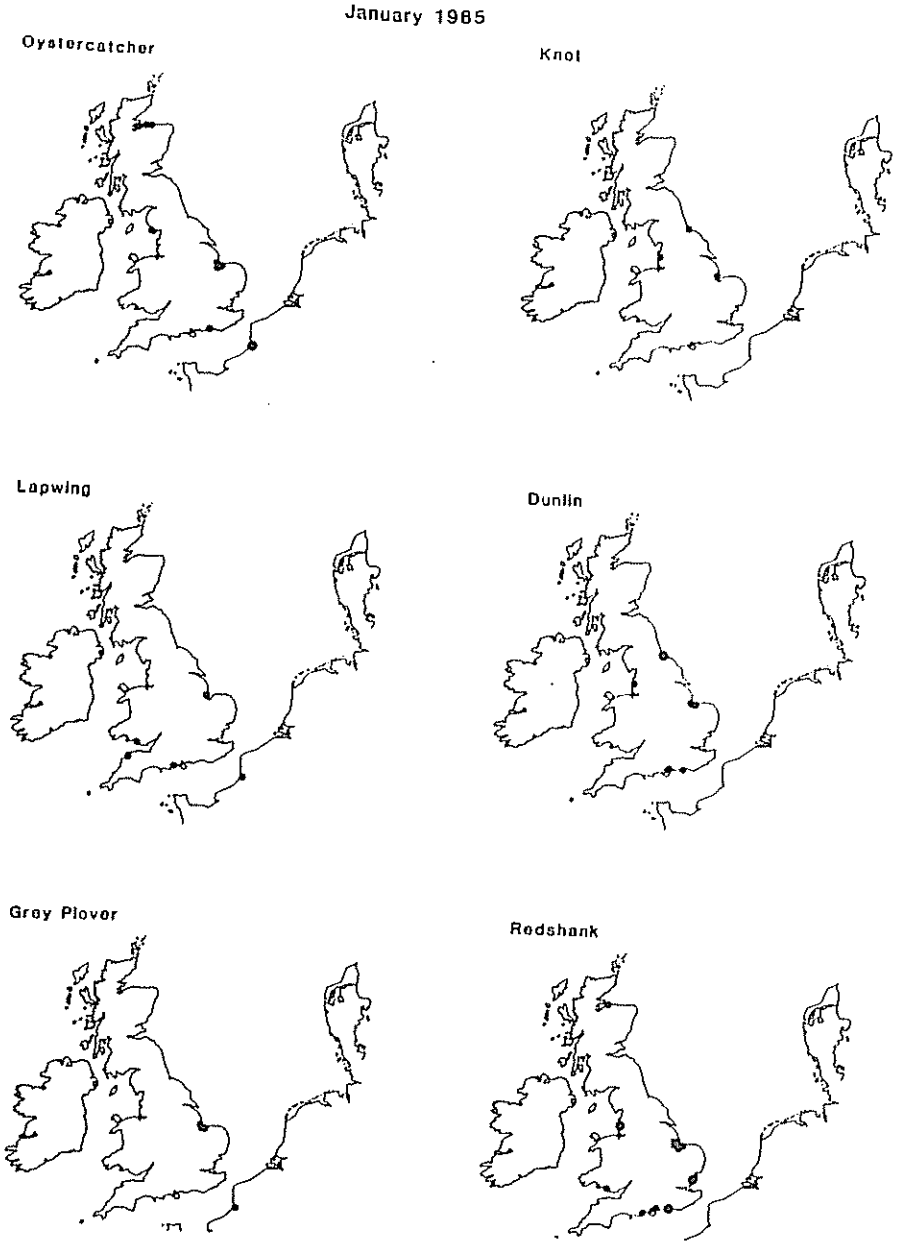

Figure 4. Distribution of mortality of 6 wader species in January 1985. Sites covered were as in Figure 3. Symbols show the number of corpses reported: • 1-5, ⊙ 6-20, ■ >20.

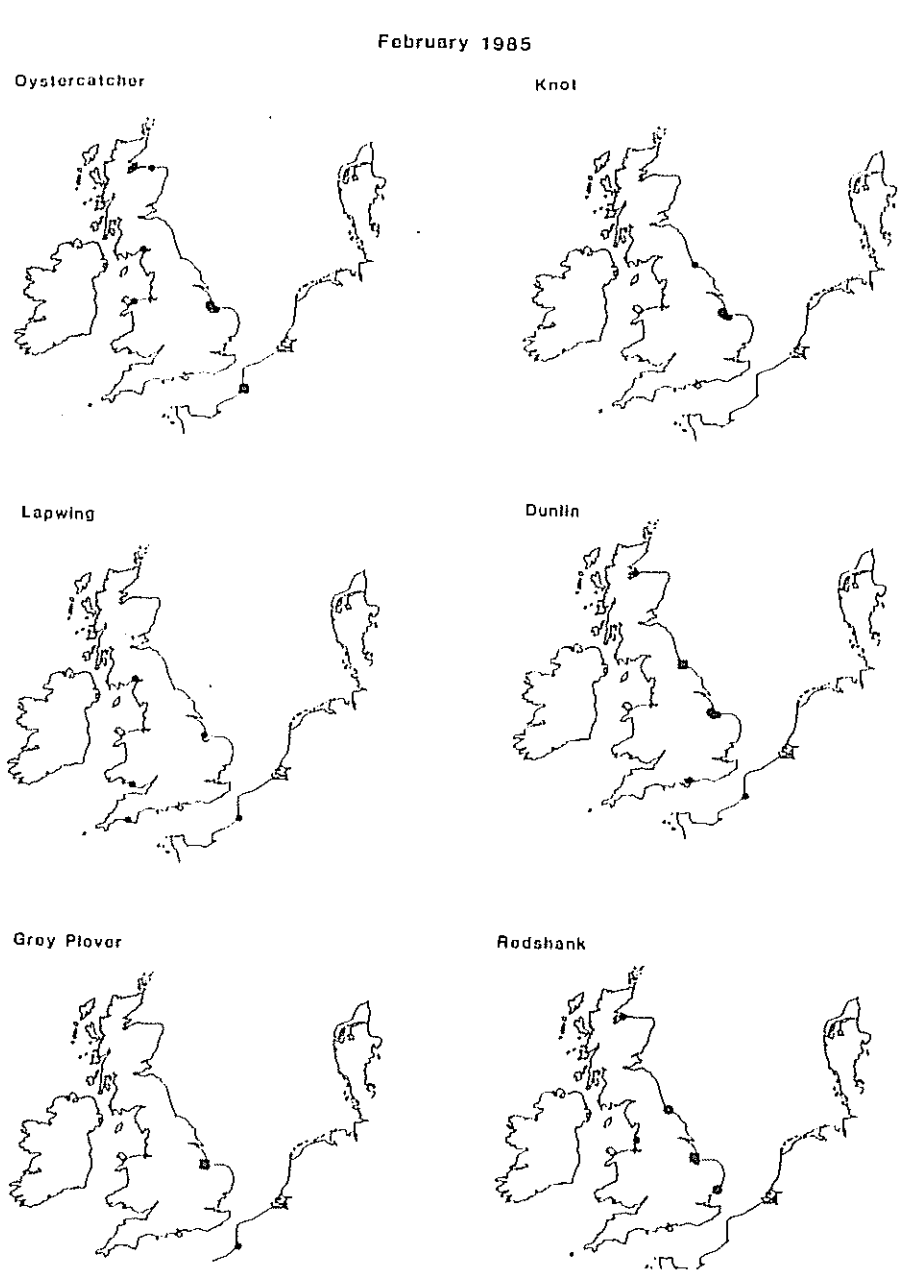

Figure 5. Distribution of mortality of 6 species of waders in February 1985. Legend as Figure 4.

The geographical extent of heavier mortality than during mild weather was even further restricted in February 1985, and centred on the east coast of Britain from Teesmouth to the Thames. Even within this area there was no appreciable increase in wader mortality at some sites. As in January, there was increased mortality at some southern and western sites, but no high mortality was reported from Scotland. The distribution of mortality reflected largely the regional occurrence of the most severe weather.

The distribution of mortality for most species (Figures 4 and 5) followed the overall pattern. Mortality of Oystercatchers and Redshanks was widespread in January 1985, but was more geographically restricted in most other species. Mortality of most species in February 1985 was largely restricted to eastern England. In contrast, mortality of Lapwings in both January and February occurred on both east and west coasts of Britain. Indeed, most reports of mortality in south-western Britain (Figure 3) refer to Lapwings. Mortality of Lapwings was also reported from the Portuguese coast (A. Teixera pers. comm.). Such mortality is consistent with the widely reported south-westerly movements of Lapwings in response to the onset of severe weather (e.g. Dobinson & Richards 1964).

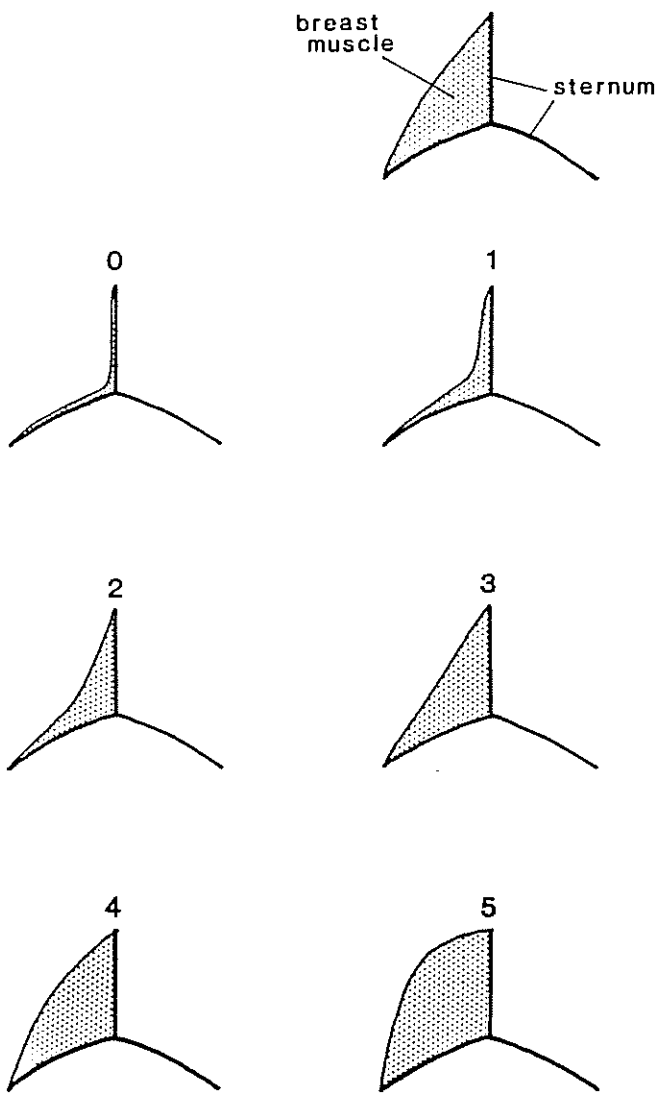

Figure 6. The Breast Muscle Index used to assess protein reserve condition in waders found dead during January and February 1985.

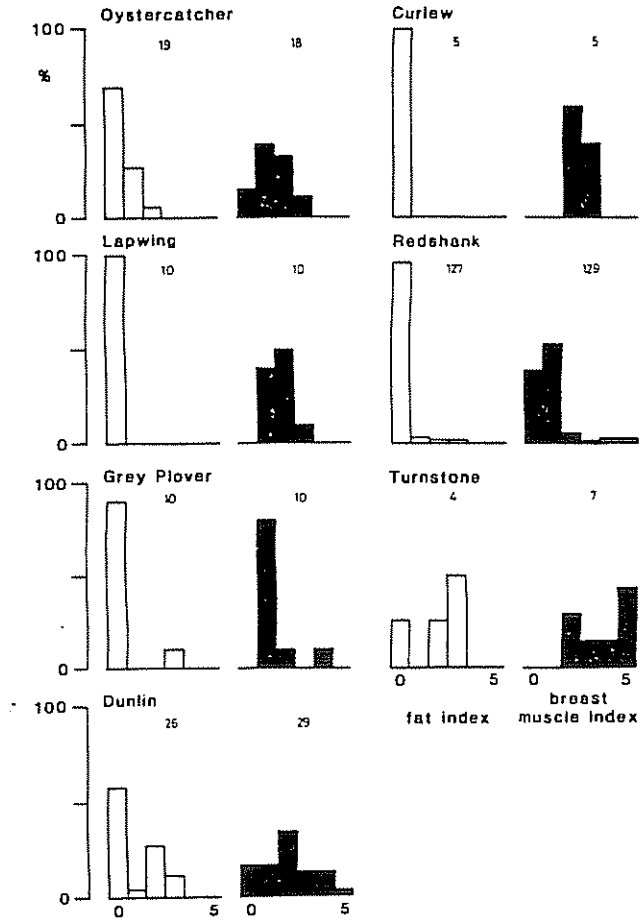

Figure 7. Fat indices (open boxes) and breast muscle indices (solid boxes) of waders found dead during January and February 1985. For description of the breast muscle index see text and Figure 6. Numbers give sample sizes.

BODY CONDITION OF WADERS FOUND DEAD IN JANUARY/FEBRUARY 1985.

230 waders found dead during January and February 1985 were in a sufficiently intact state for their body condition to be assessed. For most, fat reserves were estimated as a fat index ranging from 0 (no visible fat deposits) to 5 (extensive thick fat layer over clavicles, breast muscles and abdomen). Protein reserves were assessed as a breast muscle index from 0 (muscles extremely emaciated) to 5 (muscles very plump) (Figure 6). Breast muscle size is a good index of protein reserves in waders (see Piersma et al. 1984). In previous cold spells, waders died of starvation after they had exhausted their fat reserves (Davidson & Evans 1982). (The proximate cause of death is likely to be hypothermia due to an inability to metabolise protein fast enough to maintain body temperature.) Figure 7 shows that during January and February 1985, most waders likewise died of starvation after exhausting their fat reserves. However, in 2 species, Dunlin and Turnstone, only part of the sample had died with exhausted fat reserves, and 38% of Dunlins and 75% of Turnstones examined had substantial fat reserves at death.

Breast muscle size was more variable, and many waders died with breast muscles that must still have retained some protein reserve (Figure 7). This supports the view that exhaustion of protein reserves is seldom the direct cause of death of waders during severe weather: rather that breast muscle size at death depends largely on the time at which fat reserves become exhausted.

Results of laboratory analysis of the body condition of Dunlins that died in January and February 1985 are summarised in Figure 8. (For details of methods see Davidson & Evans (1982).) At Teesmouth, both the fat and protein reserves were significantly depleted in comparison to normal mild winter levels in both January and February 1985. The body condition of a sample from Langstone Harbour (Sussex) in January was also seriously depleted. Whilst birds died after using part of their internal reserves there were marked differences in the condition at death of Dunlins at Teesmouth in the 2 severe weather spells. Fat reserves (Student's $t = 3.49$ $P<0.02$) and pectoral muscle size (Student's $t = 4.05$ $P<0.01$) were significantly higher at death in January than February. Dunlins found dead in January carried substantial fat reserves, sufficient for survival for several days (cf. Davidson (1981)). In February, Dunlins died after exhausting their fat reserves (the residual 1-2% fat is structural rather than part of the labile reserve). Similarly, the breast muscles of Dunlins dying at Teesmouth in January were only partly depleted, whilst those in February were extremely emaciated. The average muscle size (0.106 SMI) of this latter group was very similar to the muscle sizes of Redshanks and Oystercatchers that were considered to have exhausted their protein reserves (Davidson & Evans 1982). The condition of Dunlins at Teesmouth in January (and the circumstances under which corpses were found) strongly suggests that these birds died from an inability to mobilise fat reserves fast enough to meet their energy requirements during severe weather, i.e. *before* rather than after exhaustion of their fat reserves.

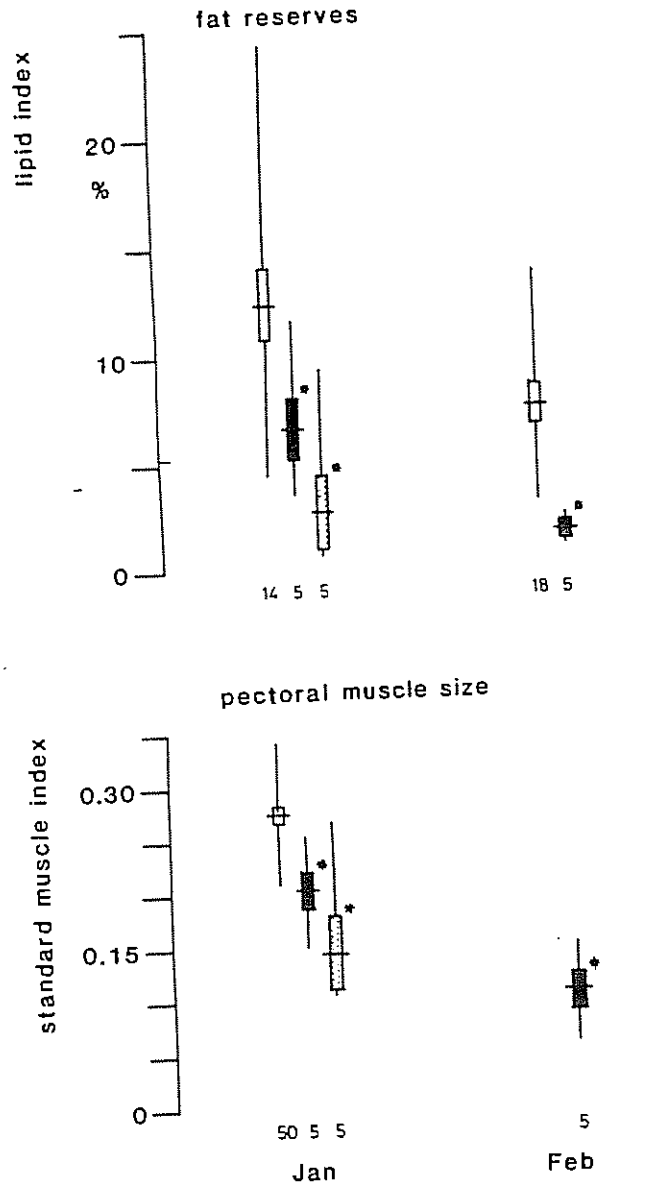

Figure 8. Body condition of Dunlins found dead during severe weather in January and February 1985, in comparison with the mild winter body condition at Teesmouth at the same times of year (data from Davidson 1981). Mean 1 standard error, and range are given. Numbers give sample sizes. Open boxes are Teesmouth mild winters (pectoral muscle size remains unchanged through January and February (Davidson 1981)); solid boxes are Teesmouth in severe weather 1985; and stippled boxes are Langstone Harbour, in January 1985. * indicates a significant difference (Student's t, $P<0.05$) from the relevant Teesmouth mild winter sample. Details of the Standard Muscle Index (SMI) of pectoral muscle size (used as an index of protein reserves) are given in Piersma *et al.* (1984). Lipid index is fat mass as a percentage of total mass.

SUB-LETHAL EFFECTS

Data on the masses of live waders during January and February 1985 from several parts of Britain showed that at most sites, most waders maintained normal levels of body condition, and that by the onset of severe weather in February, most waders had regained any condition lost during severe weather in January. At the onset of the February cold spell, Redshanks on the Wash had an average body mass 35g higher than normal, suggesting that these birds may have responded to deteriorating weather conditions by storing additional fat (cf. a similar response reported for Dunlins by Clark (1983)). Despite these high weights there was substantial mortality of Redshanks on the Wash during the February cold spell (Figure 5). Some Redshanks from North Wales were also close to starvation mass during the February cold spell. Some Dunlins on the Firth of Forth had lower than normal mass by the middle of the February cold spell, but no increased mortality of Dunlins was noted on the Firth of Forth. Also on the Firth of Forth, Golden Plovers had at least partly depleted fat reserves by mid-February, but were unaffected by the severe weather in January.

Most coastal waders are thought to remain on their wintering sites in Britain at the onset of severe weather. During January and February 1985 there was some evidence of at least local movements of Oystercatchers and Black-tailed Godwits *Limosa limosa* on the Suffolk/Essex coast. Birds from adjacent estuaries moved to feed on the Orwell estuary, especially during February, as mudflats froze on adjacent estuaries (Davidson & Evans 1985). Many waders,

especially Dunlins, were forced to leave continental European coasts (E. Marteijn pers. comm.). In January and February 1985 the very high populations of Dunlins and Grey Plovers on estuaries such as the Orwell may reflect movements from these continental coasts. Some Grey Plovers returned to Teesmouth during the severe weather, as during previous cold spells (Townshend 1982). These birds are believed to spend mild winters in the West German part of the Wadden Sea. All these instances are of movements into estuaries on which some of the most severe weather in Britain occurred during early 1985.

CONCLUSIONS

The information provided by the project has allowed one of the most detailed assessments of the impact of a period of severe weather on waders. It has been especially valuable in giving detailed information on the impact on the body condition of waders. The following conclusions can be drawn about the severe weather in early 1985.

1. The severe weather of January and February 1985 had an impact on waders in Britain. Mortality was substantially higher than in recent mild winters.
2. Mortality was higher in February than January. In February, normal regulated fat loads are smaller than in January, so that birds can survive for shorter periods when using those fat reserves (see e.g. Davidson 1981). In addition, weather conditions, especially windchills, were more severe in February than January, so reserves may have been depleted more rapidly.
3. Mortality occurred largely in the areas of most severe weather (eastern and southern England), but mortality occurred at some places also in western and northern Britain. As in previous cold spells, Redshanks, Oystercatchers and Dunlins died in largest numbers.
4. As in previous cold spells, most waders died when they had exhausted their fat reserves, but not necessarily their protein reserves.
5. In January, some Dunlins and Turnstones died before exhausting fat reserves. Thus these birds were at risk from the onset of the severe weather, rather than only after several days of severe weather as in the case of birds mobilising fat until the full depletion of their reserves.
6. The condition of live waders at many sites was largely unaffected by the severe weather, but some Dunlins and Golden Plovers had low mass on the Firth of Forth in February, although no substantial mortality of these species occurred.
7. There were some movements of waders into east coast estuaries during the severe weather. Some were local movements; others probably involved several species moving from more severely affected parts of continental Europe. Lapwings moved south and west to milder areas.

THE PROJECT IN 1985/86

The project will continue to run during the winter of 1985/86. As in previous years data collection should start on 1 October 1985 and continue until 31 March 1986. There will however be some changes in the administration and data collection procedures. We have now examined in some detail the identity and condition of the very extensive collection of wader corpses sent to us during the last 3 years of the project. However changing circumstances and pressures on freezer storage space mean that we will be unable to accept routinely-collected corpses as we have in previous years. The main change in data collection procedures for 1985/86 is that we are now asking participants to leave wader corpses that they find during mild weather. Corpses should however be moved to above the high tide mark so that they are not counted during subsequent searches. The number and condition of corpses found during tideline searches should be recorded on the report forms as in previous years. We do ask, however, that anyone finding unusually large numbers of wader corpses, especially during severe weather, should contact us immediately: it may be possible to make special arrangements for the collection of corpses under these circumstances, since these offer a particularly valuable resource for impact assessment.

The second change in the project is that pressure of other commitments mean that Nick Davidson will have to take a lesser role in the running of the project than in past years. The administration of the project during 1985/86 will be dealt with largely by Nigel Clark, and all enquiries should be addressed to him at *Department of Zoology, University of Edinburgh, West Mains Road, Edinburgh EH9 3JT, U.K.* Recording forms and details of the project during 1985/86 will be sent to all participants shortly.

As in past years, WSG will be negotiating, with the Nature Conservancy Council, for exemptions for winter 1985/86 from any cannon-netting ban during the period of imposition of a statutory wildfowling ban in Britain. As in the past, such exemptions are permitted by the NCC only for specified groups who have agreed to participate in the WSG project on the effects of severe weather, so that the impact of severe weather on live waders can be assessed. The groups concerned will be contacted directly once exemptions have been finalised.

REFERENCES

Clark,N.A. 1983. The ecology of Dunlin (*Calidris alpina* L.) wintering on the Severn estuary. Ph.D. Thesis, University of Edinburgh.

Davidson,N.C. 1981. Seasonal changes in the nutritional condition of shorebirds during the non-breeding seasons. Ph.D. Thesis, University of Durham.

APPENDIX 6

AGREED SUMMARY OF THE RECOMMENDATIONS MADE AT THE MEETING TO DISCUSS SEVERE WEATHER SUSPENSIONS OF WILDFOWLING ON JUNE 14 1985 at DoE, MARSHAM STREET, LONDON SW1

A. Increased number and improved distribution of National Climatological Message stations to monitor better coastal environmental conditions during severe weather.

The meeting agreed to increase the number and widen the distribution of meteorological stations but the final details will be discussed in a subgroup of NCC and BASC representatives.

B. Exclusion from the state-of-ground codes those which are not relevant to wildfowl and waders and which lead to unnecessary suspensions.

The meeting did not agree to exclude any of the state of ground codes presently used. The BASC asked for BASC/NCC to be given daily, the raw state of ground data (that given to the central Met. Office) as this may help in decisions on lifting the ban. NCC agreed to put this into operation. A request was made that future meetings be attended by a representative of the London Weather Centre.

C. Sub-division of Britain into severe weather regions, serviced by regional advisory groups, to provide the basis for voluntary regional suspensions, and advice.

There were some misgivings in the meeting about the need for 15 regional groups. NCC felt that the work involved would be disproportionate to the conservation benefit and was concerned about introducing another level of bureaucracy. BASC appreciated this but felt strongly the need to have more local wildfowlers involved. NCC did not agree to any formal regional committees but agreed to circulate its regional offices for views on the merits of establishing contact points in each region to aid the flow of information and report back to the group.

D. Statutory suspensions to continue to be imposed and lifted, based on state-of-ground monitoring, but taking into account recommendations from the regions.

This was rewritten by deleting the words after monitoring and substituting "recommendations from the regions will be available if necessary to assist in making the decision".

E. Statutory suspensions to apply separately to England/Wales and Scotland, according to need. Within each country the recommendations of the regional advisory groups to be taken into account in deciding the extent of any suspensions.

The meeting agreed that statutory suspensions could be applied separately in England/Wales and Scotland. Within each country the regional group's advice to be taken into account in deciding the extent of any voluntary suspensions.

F. Statutory suspensions to last for a maximum of seven days, renewable for further seven day periods.

After discussion, wording of the recommendation now altered to "statutory suspensions (which can run for a varying period up to a maximum of 14 days) should be re-examined after a maximum of seven days."

G. A minimum five-day recovery period after the imposition of a statutory suspension.

After discussion the re-phrased F covered this and the recommendation was dropped.

H. Substantially improved publicity of the statutory suspensions through the Department of the Environment/Scottish Home and Health Department in conjunction with the BASC.

The meeting supported the need for improved publicity in the light of BASC's comments on the DoE and SHHD handling of the publicity for the January 1985 ban. It was felt that an agreed wording for the press advertisement or statement should be prepared well in advance and issued when appropriate, to a wider range of national and regional newspapers. Also needed was a quicker system for the police forces in England and Wales to be alerted to the ban by the Home Office. It was also felt that approaches be made to i) the Met Office to have the ban announced on weather forecasts; ii) British Telecom to have a recorded message and a special number allocated to give details of the ban; or iii) put a recorded announcement on regional telephone weather forecasts. A leaflet for use in police stations was suggested although this was felt not to be as effective as further advertisements notifying the ban. No firm conclusions were reached but a meeting with the police was proposed.

I. A delay by seven days from the start of any suspension in the protection of woodcock, this protection ending with the end of the suspension period.

It was felt that not enough is known of the habits of woodcock in severe weather. It was thought not possible to ban woodcock shooting only on the foreshore and not inland but this needed confirmation. BASC thought that if done this would result in the shooting community becoming divided. The DoE was asked to investigate the legality of shooting woodcock inland whilst a coastal ban is in force. It was agreed that the shooting organisations, in particular the Game Conservancy, investigate the implications of separate treatment.

J. Cooperative research between the conservation and shooting bodies to obtain information of assistance to severe weather arrangements, grant aided by the NCC.

NCC replied to the recommendation that whilst funds are made available for research it would have to consider any request as part of the overall programme for grant-aiding projects and other needs. Chris Mead thought that some research the BTO had recently done on this was with the NCC. N Davidson felt that more research was needed into the periods that birds were at risk and said that data already existed but needed examining. D Salmon thought that the winter wildfowl counts were a likely basis for recording bird movements in hard weather, if more frequent counts could be made during severe weather. It was noted that many of the arrangements, particularly relating to the precise timing

of bans during severe weather needed further research into their biological significance. The need for more research was emphasised to help develop more relevant criteria and arrangements. A start is being made by BASC members to monitor wildfowl weights and body condition in relation to state of ground data. A meeting to identify research needs was proposed.

K. Financial assistance from the government for the voluntary organisations administering statutory suspensions of wildfowling.

DoE and SHHD said that recompensing BASC retrospectively could not now be done but it may be possible if the situation arose again in the future. Government accounting does not allow for payments to be made out of current Financial Years.

It was proposed that the BASC should seek financial assistance from NCC for its valuable contribution to the administration of the January 1985 suspension. The meeting expressed its appreciation and wished the BASC's approach well.

November 1985
(Revised)

APPENDIX 7. BRITISH ASSOCIATION FOR SHOOTING AND CONSERVATION

VOLUNTARY RESTRAINT IN PERIODS OF SEVERE WEATHER

The procedures for the introduction of a statutory suspension of the shooting of wildfowl and waders, coot and moorhen include a call by the B.A.S.C. for voluntary restraint from day eight of 'severe weather' up to the time when any statutory suspension takes effect. From past experience, it is apparent that some misunderstanding prevails about what is meant by voluntary restraint. As a result, and after consideration by the Wildfowling Liaison Committee, the B.A.S.C. have produced this paper to give some guidance on the subject.

It should be recognised that the period of voluntary restraint is an essential element in the severe weather arrangements now established, and if seen to be effective, provides a strong argument against pressures to shorten the trigger period preceding statutory suspensions. Furthermore, the demonstration of action having been taken before a statutory suspension can be most helpful in ensuring appropriate flexibility when the subsequent lifting of such suspensions is being considered by the organisations involved.

It should be emphasised that it is a voluntary restraint not a voluntary ban that is sought by the B.A.S.C.. This is not to say, however, that a ban may not be the most appropriate action. However, that decision can only be taken at the local level. No hard and fast rules can be established since conditions and needs vary so much around the country. Wildfowlers are best placed to consider all the factors relevant to their particular locality and to decide what is most appropriate under the circumstances.

As to the practicalities of appropriate action during a period of voluntary restraint, we urge wildfowling clubs to consider the following points. Moreover, these matters should be considered at the earliest opportunity so that a club can agree the course of action which it will take, should it be necessary in the future.

Who takes the decisions during a period of voluntary restraint?

Clubs need to consider carefully who takes the decisions on what action is appropriate during a period of voluntary restraint. Monitoring of the situation will be needed and this might well involve marsh wardens reporting regularly to the committee on the prevailing conditions of both birds and marsh.

How are the members informed?

Secondly, the club must consider how it will inform its own members of any decision, as well as any non-club permit holders. The posting of notices at access points is an obvious action. However, on some marshes wildfowlers will be travelling considerable distances and a system whereby they are able to phone in for the latest information has considerable merit. However, such a system requires pre-planning and publicity among members and permit holders. Notices in local newspapers and use of local radio stations should also be considered.

Club committees should also consider what Liaison with other wildfowling clubs or groups would be appropriate at these times together with the degree fo any coordinated action with neighbouring clubs which might be appropriate. Again agreement of consultation procedures at an earliest opportunity would help

ensure that any lines of communication work smoothly when required.

What action is appropriate?

Clubs may find the following points helpful in enabling them to decide what action is appropriate during a period of voluntary restraint. Such actions may be as a response to small changes in bird behaviour which require some reduction of disturbance to birds during that period to conditions of very difficult feeding which might require a total voluntary ban on shooting in the locality. Problems which may arise from possible large influxes of wildfowlers using the marshes and practical difficulties in wardening may also need to be considered in some localities.

The appearance of unusual species and influxes of unusual numbers of wildfowl often suggests conditions hardening over a wide area. Tameness and other abnormal behaviour often follows, perhaps presenting opportunities of excessive bags. Appropriate responses might be to introduce bag limits or reduce those which already exist.

Increasing evidence of birds under stress, particularly coupled with high winds (the wind chill factor being a key element in how much energy birds expend in order to keep warm) might lead to time limits on shooting, so as to help birds conserve energy and to provide periods of undisturbed feeding.

Any signs of loss of body condition, freezing foreshores, and/or total snow cover on saltmarsh or inland feeding grounds might be thought enough to warrant a voluntary club ban on shooting until such time as the birds have recovered.

It should also be borne in mind that after particularly hard and/or prolonged severe weather it might be appropriate for clubs to phase in normal shooting levels.

Throughout any period of voluntary restraint and subsequent statutory suspensions wildfowling clubs have the opportunity to demonstrate through the local media their responsible attitude to management of their shooting.

Finally, clubs are asked to maintain close liaison with their B.A.S.C. Regional Officer over any actions which they take. It is most important that your Association is fully abreast of the situation around the country when consulting with other parties involved in the severe weather arrangements.

If there are any aspects of the severe weather arrangements you would like to discuss then please get in touch with John Harradine.

Issued by:

B.A.S.C. Headquarters
Marford Mill
Rossett
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Clwyd
LL12 0HL

ICLJ38

THE BRITISH ASSOCIATION FOR SHOOTING AND CONSERVATION

Current Arrangements for the Suspension of Wildfowling during Periods of Prolonged Severe Weather

The arrangements currently applying for suspending the shooting of wildfowl and other wader species during periods of severe weather are detailed below.

They provide the basis for the Secretary of State, under Section 2(6) and (7) of the Wildlife and Countryside Act, 1981, to declare any period not exceeding 14 days as a period of special protection for any birds included in Part I of Schedule 2 with respect to the whole or any specified part of Great Britain. Before making such an order he must consult a person appearing to him to be a representative of persons interested in the shooting of those birds. The species normally covered by such an order are mallard, teal, wigeon, pintail, tufted duck, pochard, shoveler, gadwall, goldeneye, pink-footed goose, greylag goose, white-fronted goose, Canada goose, golden plover, woodcock, snipe, coot and moorhen.

The criteria for triggering severe weather procedures are based on the state-of-ground data collected daily by 23 coastal National Climatological Message Stations around Britain. The locations of the stations are given in Figure 1. They undertake standard climatological recording of state-of-ground at 09.00hrs, seven days a week, passing the data to Bracknell, London, the same morning.

The state-of-ground is determined according to two series of codes as below.

E - State of the ground without snow or measurable ice cover

0	Surface of ground dry (without cracks and no appreciable amount of dust or loose sand)
1	Surface of ground moist
2	Surface of ground wet (standing water in small or large pools on surface)
3	Flooded
4	Surface of ground frozen
5	Glaze on ground
6	Loose dry dust or sand not covering ground completely
7	Thin cover of loose dry dust or sand covering ground completely
8	Moderate or thick cover of loose dry dust or sand covering ground completely
9	Extremely dry with cracks

E'- State of the ground with snow or measurable ice cover

0	Ground predominantly covered by ice
1	Compact or wet snow (with or without ice) covering less than one-half of the ground
2	Compact or wet snow (with or without ice) covering at least one-half of the ground, but ground not completely covered
3	Even layer of compact or wet snow covering ground completely
4	Uneven layer of compact or wet snow covering ground completely
5	Loose dry snow covering less than one-half of the ground

6 Loose dry snow covering at least one-half of the ground (but not completely)
7 Even layer of loose dry snow covering ground completely
8 Uneven layer of loose dry snow covering ground completely
9 Snow covering ground completely; deep drifts

'Severe weather' is defined as occurring when more than half the meteorological stations record state-of-ground E 4 or 5 or E' 0 to 9. 'Thaw' occurs when fewer than half the stations record the above states-of-ground.

When seven days of frozen or snow-covered ground have been so recorded in Scotland or in England/Wales or both, the Nature Conservancy Council informs the B.A.S.C. accordingly. If the severe weather looks likely to continue the B.A.S.C. informs [illegible] by first-class post the secretaries of its wildfowling and gameshooting clubs, Joint Councils and syndicates, that, if the severe weather continues for a further seven days, and looks likely to continue, a statutory order suspending the shooting of ducks, geese and waders in the appropriate county is likely to be signed on the 13th day to take effect on the 15th day, for a maximum period of 14 days. Press releases are also issued to all press and media outlets.

The B.A.S.C. also calls on the shooting community to exercise voluntary restraint were appropriate. Advice is given that any signs of changes in bird behaviour, or of changes in the numbers or species using a given area might suggest the need to introduce bag limits or reduce those already existing or to introduce time limits on shooting so as to provide periods of undisturbed feeding. Where evidence appears of very difficult feeding for wildfowl, such as declining body condition, freezing foreshore or snow-covered feeding grounds, then a total ban on wildfowling in the locality might be the appropriate response. The decision,though, is taken by the individual wildfowler or the wildfowling club, perhaps in liaison with other wildfowling groups in the vicinity, in response to local needs.

Should the conditions which necessitated the call for restraint continue until the 13th day and look likely to continue, the NCC , having consulted with the B.A.S.C. and other conservation bodies, advises the appropriate Secretary of State to sign a suspension order which would come into effect at 09.00hrs on the 15th day. If a thaw of three or more days occurs within this period then the earlier days of severe weather are disregarded. Before signing, the Secretary of State normally consults with the B.A.S.C., as representing the persons interested in shooting wildfowl and waders.

Once the suspension order has been signed the B.A.S.C. telephones as many as possible of its wildfowling and game shooting club secretaries, Joint Councils and syndicates, issues press releases to all newspaper, sporting magazine. radio and television editors and institutes a 24-hour telephone information service. Similarly the Department of the Environment and Scottish Development Department, as appropriate, issue press releases and place public notices of the suspension in the following national and regional newspapers; The Times, Daily Telegraph, Daily Express, Daily Mail, Sun, Scotsman, Glasgow Herald, Dundee Courier and Advertiser, Aberdeen Press and Journal, Dumfries and Galloway Standard, Edinburgh Gazette and the Western Daily Mail.

Throughout the period of restraint and any statutory suspension, the local contact groups provide detailed information on local conditions and needs, coordinated by the B.A.S.C. and NCC regional offices for their respective Headquarters, to be used in monitoring the conditions around the country, where voluntary restraint might be needed and, in due course when the lifting of any

statutory suspension is appropriate. They pay particular attention not only to the foreshore and freezing of inland waters and feeding grounds but also to the condition of birds, bird numbers and movements, appearance of unusual species, significance of wind chill and to snow cover, the last especially in Scotland.

A suspension order is signed for a maximum period of 14 days although it is reviewed after a maximum of seven days. This review takes into account not only the state-of-ground information but also the reports from the local contact groups and the weather forecasts. It is undertaken by the NCC in conjunction with the B.A.S.C. and other conservation bodies. The lifting of a statutory suspension before the end of the maximum 14-day period takes into account the need for a period of recovery for wildfowl after the end of the severe weather itself. In this event the Department of the Environment or Scottish Development Department and the B.A.S.C. undertake publicity campaigns as extensively as possible to inform the shooting community of the fact. If the suspension runs to the full 14 days and then lapses it is likely that the B.A.S.C. only will undertake the appropriate publicity. It is clearly the responsibility of all shooting sportsmen to appraise themselves of any restrictions applying during periods of severe weather, and to act accordingly. The most up-to-date information is always available from the B.A.S.C. Headquarters or Regional Offices.

If the severe weather continues beyond the end of the first 14-day period the appropriate Secretary of State, following agreement between the main organisations, is likely to be asked to sign another suspension order for a further maximum period of 14 days, which would then be managed in a similar way to the first. Once any suspension order has formally ended there is scope, if the local contact groups indicate the need, for continuing voluntary restraint to be encouraged in any parts of the country still not fully recovered.

After the end of any winter when these arrangements are actually used, the NCC Working Party, comprising all the relevant shooting and conservation organisations and appropriate government departments, reviews then considers whether any further ammendments are required.

JOHN HARRADINE
Head of Research
5th September 1988
D2*/006

APPENDIX 8. Ridgill, S.C. and A.D. Fox (1990). Cold weather movements of waterfowl in Western Europe. IWRB Spec. Publ. 13.

SUMMARY

1. Cold weather movements of nine common species of wildfowl (Shelduck, Wigeon, Teal, Mallard, Pintail, Shoveler, Pochard, Tufted Duck and Coot) were investigated in Western Europe using ringing recovery data and International Waterfowl Census count information.

2. Recovery data from birds ringed between 1950 and 1986 and count information from the period 1967-1986 were analysed. During this period, six hard winters were recognised, namely: 1 February 1956 - 21 February 1956, 22 December 1962 - 4 March 1963, 31 December 1978 - 1 March 1979, 8 December 1981 - 17 January 1982, 3 January 1985 - 20 February 1985, 24 January 1986 - 4 March 1986.

3. Recovery data were obtained from Britain, the Netherlands, France, Belgium and Finland, although generally too few recoveries were available from the latter two schemes to enable statistical comparison with the remaining three. Ringing data for Mallard were not obtained for the analysis, and recoveries of Shelduck were too few to permit adequate analysis.

4. Distance between ringing location and ultimate recovery site was used as an index of movement by these birds. Comparisons were made between the distribution of movement distances in mild and cold winters and, more rigorously, between cold and mild spells.

5. Analysis showed that recovery distances were greater in cold winters than mild winters for Wigeon (within-winter recoveries from the Netherlands only), Teal (all schemes except the French), Pintail, Pochard and Tufted Duck (using shot recoveries only). Recovery distances were greater in cold spells compared with equivalent mild periods for Wigeon (Dutch-ringed birds only), Teal (all schemes except the French), Pintail, Pochard and Tufted Duck. Shoveler and Coot showed no significant differences.

6. Using the numbers of recoveries reported in each of a series of standard regions (North Britain, West Britain and Ireland, East Britain, Denmark and Germany, Netherlands, West France, North France, East France, South France, Italy, South-east Europe, Spain and Portugal, North Africa), comparisons were made between the recovery numbers during severe weather spells and those of mild spells in the years immediately before and after each hard winter.

7. In all areas, more recoveries of Wigeon, Teal, Pintail, Pochard, Tufted Duck and Coot were reported in severe weather than in equivalent mild periods. Shoveler did not show the same overall pattern, but significantly more birds were reported in Waddensee and North France during severe weather than during equivalent mild periods.

8. In particular, the increases in the numbers of recoveries reported from North and West France in severe weather spells varied between 1.82 (Pintail) and 8.00 (Pochard) times those reported during equivalent mild periods. Since reporting rates are unlikely to increase during periods of hard weather, these increases are considered to reflect genuine increases in mortality.

9. Analysis of count information shows that some species (such as Wigeon) show highly stable wintering patterns in mild weather, whilst others (such as Teal) show marked variations in wintering distributions between all winters.

10. During hard weather Shelduck move out of continental coasts seeking refuge throughout Britain and possibly in Ireland. Some also move to North and West France, but this involves relatively few birds in the severest of conditions.

11. Count data also showed that Wigeon, Teal, Pintail, Shoveler, Tufted Duck and Pochard show some movement out of North Britain and the Waddensee to South and West Britain and North and West France, with some species moving down into Spain and Portugal. These patterns correlate with meteorological conditions in northern parts of the wintering range for all these species.

12. Ringing recovery data support the count information in the direction and extent of hard weather movements. Longer and more extensive movements occur during the most severe conditions.

13. Results suggest that severe weather causes movement to a differing extent in all the nine species considered here. Such movements are associated with greater mortality (not shown for Mallard and Shelduck), particularly as a result of birds resorting to particular areas. Whether this is due to the movement or increased hunting activity is not evident from the data analysed here. It is also impossible to assess whether such hard-weather mortality has a direct impact on overall population size.

14. What is clear is that these quarry species do move out of areas suffering severe weather towards more amicable conditions. While it has not been demonstrated that these have any effect on overall population size, it would seem wise to protect birds which have fled to refuge areas as a result of hard conditions in their normal wintering areas.

15. Future research should concentrate on improvement of the count network to cover all habitats more adequately throughout the winter. This would give more confidence in the description of patterns observed and enable the fine-grained analysis of species responses to specific meteorological patterns presently beyond the scope of this investigation because of the limit to January counts in each year.

16. Future expansion of ringing programmes must aim to increase the numbers of birds marked, computerise the ringing information as well as recovery data and to attempt to ring birds before the open season in order to facilitate the use of Brownie *et al.* (1985) methods for the estimation of survivorship rates based on ringing recoveries.

JOINT NATURE CONSERVATION COMMITTEE

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APPENDIX 9.

Information note

Statutory suspension of wildfowling in severe weather

The season for wildfowling inland closes on 1 February and for foreshore shooting it closes on 21 February (Section 2(4) of the Wildlife and Countryside Act 1981).

In periods of severe or particularly harsh winter weather (usually when freezing weather conditions are persistent) the relevant Secretary of State(s) have the power under Section 2(6) of the Wildlife and Countryside Act to make a Protection Order temporarily banning or suspending the shooting of wildfowl. The following guidelines have been agreed between the statutory conservation agencies, DoE, the Scottish Office and the principal non-governmental organisations involved in the monitoring of, and calling for cold-weather bans: RSPB, the Wildfowl and Wetlands Trust and the British Association for Shooting and Conservation.

Criteria for a ban

A JNCC contract with the Meteorological Office provides daily data on the state of ground conditions at 23 meteorological stations throughout England, Scotland and Wales. These stations are chosen for their proximity to major estuaries and centres of wildfowling on the foreshore. Measurements of the amount of snow and ice cover at the stations are recorded and the results forwarded to JNCC.

When more than half of these meteorological stations have recorded frozen conditions for five consecutive days, JNCC are alerted. The weather conditions are monitored more closely. On the 13th day, if more than half the meteorological stations are still frozen, a case is presented to the relevant Secretary of State(s) requesting a ban of wildfowling due to the severe weather.

Once this Statutory Instrument has been signed, it comes into force at 9 am on the 15th day of severe weather. The two intervening days are used to publicise the impending ban as widely as possible.

Contact points

J Ralston, Nature Conservancy Council for Scotland: 031 554 9797
P Stuttard, Countryside Council for Wales: 0248 370444
P Clement, Nature Conservancy Council for England: 0733 340345
British Association for Shooting and Conservation: 0244 570881

David A. Stroud
Ornithology and Landscape Ecology Branch
JNCC

10 December 1991

The British Association for Shooting & Conservation

FOUNDED IN 1908 BY STANLEY DUNCAN F.Z.S. AS THE WILDFOWLERS ASSOCIATION OF GREAT BRITAIN AND IRELAND
INCORPORATING THE GAMEKEEPERS ASSOCIATION OF THE UNITED KINGDOM FOUNDED IN 1900

PATRON: HIS ROYAL HIGHNESS, THE PRINCE PHILIP, DUKE OF EDINBURGH, K.G., K.T., O.M.
PRESIDENT: THE VISCOUNT OF ARBUTHNOTT, C.B.E., D.S.C., M.A., J.P.
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JPH/LT

19th December 1991

Dr. David Stroud,
Ornithology & Landscape Ecology Branch,
Joint Nature Conservation Committee,
Monkstone House,
City Road,
Peterborough. PE1 1JY

Dear David,

Wildfowling Suspension in Severe Weather

Many thanks for the information note on the above, just received. It has arrived at an appropriate time in view of the recent spell of weather that at least some parts of the country experienced. I would be interested, at some time, to know whether we got the point of the JNCC being informed by the Met. Office that we had reached at least five days of 'severe weather'.

With respect to the information note, it does omit reference to a number of points which I think are important, particularly as they relate to the vital role that the B.A.S.C. and wildfowling community play. Firstly, when seven days of "severe weather" have been recorded then JNCC informs the B.A.S.C. (I am the contact point). We then institute a comparable information gathering and condition monitoring exercise through our regional staff and local contacts in order, inter alia, to provide the day-to-day basis for discussions with JNCC, DOE and other appropriate bodies. Furthermore, once we have been alerted, we call for voluntary restraint in wildfowling in those parts of the country where it appears to be necessary. This is an essential element to the whole set of procedures applying during the course of prolonged severe weather. Such voluntary measures would continue up to the point of any statutory suspension or as considered necessary in the light of prevailing conditions and information.

Secondly, with respect to the criteria applying in such periods it would be helpful if it were noted that there is provision for short periods of "thaw" within the run-up period to any statutory suspension - namely, that a thaw of one or two days has no effect on the triggering process but one of three or more days has the effect of terminating the process.

/continued .....

I think it should also be noted that the system now provides for the Secretary of State for Scotland, based on a similar application of the criteria to the monitoring stations around the Scottish coast, to sign a suspension order in the same way as the Secretary of State for England and Wales can do on the basis on the remaining stations - in other words, that there is provision for a separate suspension to take effect in Scotland, and in England/Wales, according to the prevailing conditions and needs.

As indicated above, I should be regarded as the contact point for the B.A.S.C.

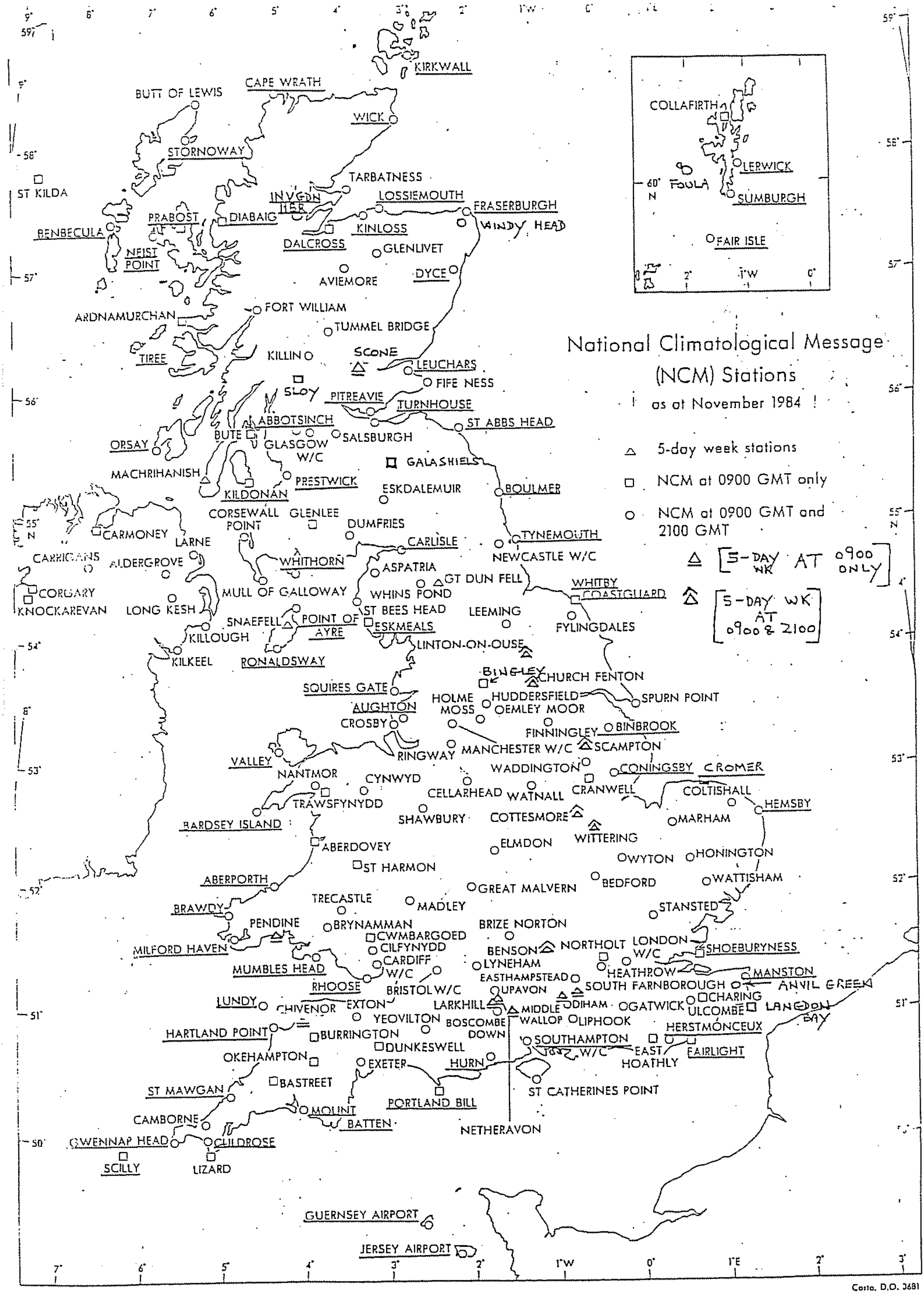
Finally, a comment on your advice to your regional staff (whereby they await communication from their headquarters over any prospective suspension) - I welcome this since I believe it is important that each country (or Britain) as a whole adheres to the agreed procedures even if, locally, conditions appear to be rather more severe than elsewhere. We do become aware of regional staff of national organisations (country conservation agencies included) pressing for wildfowling suspensions on local sites in advance of any national measures.

I enclose a copy of the information sheet that we have been using since 1988 which sets out the arrangements as we understand them. I would respectfully urge that the JNCC information note be amended to taken into account these points so that everybody involved in the procedures is clear on what does happen and who is responsible for what during periods of prolonged severe weather. If there are any aspects which you would like to discuss further please do not hesitate to get back in touch.

Yours sincerely

John Harradine (Dr)
HEAD OF RESEARCH

Enc



Corto. D.O. 3681