INSTITUTE OF TERRESTRIAL ECOLOGY
(NATURAL ENVIRONMENT RESEARCH COUNCIL)

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Countryside Survey 2000, Module 11:

NORTHERN IRELAND COUNTRYSIDE SURVEY LINK

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Final Report

Contract Report to the
Department of the Environment, Transport and the Regions

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CONTENTS

Executive Summary

Early visits were made to Northern Ireland (NI), firstly to discuss correspondence between the Northern Ireland Countryside Survey (NICS) recording categories and the Broad Habitats of the UK Biodiversity Steering Group and secondly, to attend the Field Training Course and participate in quality control. Although contact has been made with an appropriate agency in Eire, no joint meeting has yet taken place. The initial key conclusion was that "*the Broad Habitats will provide for the first time, a consistent reporting framework for biodiversity in the UK*". In a subsequent visit, minor alterations were made to the allocation of NICS categories to the Broad Habitats according to changes made by the Joint Nature Conservation Committee (JNCC). The present document firstly presents the tabulation of the correspondence between NICS recording categories and Broad Habitats. Secondly, a worked example (for broadleaved woodland) is provided in which the independent figures produced for NI and Great Britain (GB) from Countryside Survey 1990 (CS1990) are combined into a single figure for the UK with associated standard errors. The overall estimate of error is lower than the separate figures. Thirdly, a summary of the Quality Assurance exercise, funded by the Environment & Heritage Service for Northern Ireland (EHSNI) and managed by the Institute of Terrestrial Ecology (ITE) is provided. This exercise demonstrated the reliability of NICS data and confirmed that the mapping procedure will provide statistically robust results for the Province. The results are comparable to a similar independent assessment for carried out for Countryside Survey 2000 (CS2000). Finally, the framework for joint reporting is described, based on two environmental zones, NI7 and NI8 comparable to zones 4 and 5 for Scotland. The deliverables for stock, change and associated standard errors that can be produced for Broad Habitats are then defined.

1. Introduction

ITE and the University of Ulster have been collaborating for the last 18 years over common approaches to Countryside Surveys in GB and NI respectively. Differences between the two surveys have involved modifications made to adapt the GB approach to the different scale and character of Northern Ireland but the principles involved are identical. The present report mainly concerns the correspondence between the recording categories of NICS and the Broad Habitats of the UK Biodiversity Steering Group Report. ITE has also constructed a comparable tabulation for CS2000 recording codes. The correspondence between definitions of NICS categories and Broad Habitats was developed during an initial visit to NI in April, but some modifications were made during the attendance of ITE at the training course of NICS and subsequently during quality control in Fermanagh. The Broad Habitats have been under discussion and modification over the last two years and have recently been finalised. The most recent modifications have been included in this report updating the allocation of the NICS categories provided in the first interim report in August 1998. The adoption of mutually exclusive categories, to cover the entire land surface removed the main difficulty in determining correspondence with Broad Habitats within NICS. Futher minor modifications of the Broad Habitats may be made eg. the separation of sand dune and salt marsh, but it is not envisaged that these will cause any significant problems. It has been decided that no further work will be done on the match between the NI recording codes and the CS1990 58 reporting codes, developed under the ECOFACT project, as the Broad Habitats will be used in future for reporting.

In both NICS and CS2000, definitions are provided, for all the codes used in the field in handbooks which are used for the guidance of field surveyors. Both surveys held field training courses before the surveys took place and ITE attended the NICS training courses in 1990 and 1998. Both surveys have also maintained the integrity of their original land cover codes, although details of the definitions of the codes have been improved in order to improve subsequent interrogations of the database. These modifications are discussed in the CS1990 Main Report and in the NICS Summary Report; and are designed to use the experience built up over the surveys to improve definition in the field, whilst maintaining the same land cover criteria.

In both CS1990 and CS2000 species records from vegetation plots were made in each 1 km square whereas NICS has recorded plots only in grassland and heath/bogs. Whilst this has no implications for land cover recording, it has influenced the strategy for CS2000 in unenclosed semi-natural vegetation. The emphasis has shifted from mapping, to recording plots as it was found in ECOFACT that species composition is necessary in the assessment of change in upland vegetation. Only major changes eg. afforestation have therefore been mapped in the uplands in CS2000 whereas in enclosed land all changes have been mapped. In NICS this separation has not been made because there are relatively few unenclosed upland squares and the landscape is on a smaller scale (recognised in the 0.25 km^2 sampling unit. However the mapping procedure followed in the unecnlosed land is similar with GPS now being used to confirm boundaries accurately.

Some grasslands and heathlands have already been surveyed in NI but analyses of vegetation data for calcareous grasslands in Britain and NI by Duckworth (1998) and for other grasslands (Bunce *et al.* 1999), show that some of the species assemblages in Northern Ireland are indeed distinct from those in GB. A comparable vegetation survey would confirm these differences and also demonstrate the extent of the botanical resource in NI which, in the view of many observers, is likely to be significant in the British context. This would have further impact if EIRE were included but although

contact has been made wit hthe appropriate agency in EIRE, no joint meeting has yet been arranged.

A worked example is presented to demonstrate the satisfactory execution of the statistical procedure for combining NI and GB estimates to obtain UK figures.

A further section summarises the conclusions of a small subcontract on quality assurance carried out for the Environment & Heritage Service in addition to the main DETR contract. This was carried out by ITE, as an organisation independent of the main NI survey, using a comparable approach to that used by the external consultants who report on quality assurance of the GB Countryside Survey.

Finally, several reporting issues are discussed, principally concerning Environmental Zones in NI and deliverables for the production of joint UK estiamtes.

2. Correspondence with Broad Habitats of the UK Biodiversity Action Plan

As a result of regular consultation between the University of Ulster and ITE and the fact that some of the NICS categories correspond more closely to the Broad Habitats than the 58 reporting codes used in CS1990, there has been no serious problem in matching NICS codes with the Broad Habitats. It is also probable that some of the NI categories are likely to be coincident with the Key Habitats that are nested into Broad Habitats eg Fen/Meadow (NICS) within the wetland Broad Habitat and the Culm grasslands Key Habitat in GB. The dry species-rich grassland of NICS is also likely to be coincident with the herb-rich grasslands within CS2000 that has now been incorporated into the wider neutral grassland category. Within the NICS Steering Committee Meeting in December 1999 it was recognised that NI may well contain a high proportion of the total UK resource of both these habitats; this will be masked by reporting at the Broad Habitat level. However, further financial resources would be needed to derive estimates for these Key Habitats from the the CS2000 database.

Allocation of the NICS recording codes to Broad Habitats require less approximations than were previously needed for correspondence with the definitions of the 58 categories described byBarr *et al. (*1993). A key conclusion is therefore that "*the Broad Habitats will provide for the first time, a consistent reporting framework for biodiversity in the UK*".

Below the NICS codes are allocated to Broad Habitats with the full list of NICS names and their associated Broad Habitats given in Appendix 1.

BAP1 Broadleaved woodland

The figure of 10% cover of broadleaved trees for NI corresponds to the lower band suggested for Broad Habitats, and, although NICS separates semi-natural from plantation broadleaved woodland, this is not important because NI WO1 and NI WO2 can be combined. In addition, NI WO5, NIWO6 and NI W48 should also be included. Ecological scrub i.e. shrub as used in CS1990 because of the confusion with the Forestry Commission category "*poor woodland*", is represented by NI WO7 and NI WO8.

In addition, NI S27 (dune scrub), 50% of NI S58 (a mixture of gorse and heath) and is restricted to NI and parts of lowland heaths in southern England) should also be added. The other 50% is included under BAP9.

In NICS, the parcel moves into agriculture or semi-natural grassland, where trees and shrubs are less than 25%, so these parcels should not be included in BAP1. Parkland in NI would be recorded as if the cover of trees reaches 25% or over. In CS1990 tree cover in parkland did not reach this figure, so parcels were included in grassland of the appropriate code. The area concerned is small and therefore represents only a minor inconsistency.

Gorse in NICS is separated into areas where trees are invading (NI WO7) as opposed to gorse/heath which would be NI SO7. The former should therefore go into BAP1 and the latter split 50:50 between BAP1 and BAP10.

NI SO8 (gorse/heath-scattered) should also be included in BAP1 until the gorse falls below 25%. Felled woodland should be included in the same category as the tree cover before the forest was felled, which is coincident with CS2000 and BAP definitions.

BAP2 Coniferous woodland

This category is equivalent to NICS cover codes NI WO3 (coniferous semi-natural, unplanted with a mixed age structure) and NI WO4 (coniferous plantation).

BAP3 Boundaries and linear features

This category includes NICS landscape feature codes NI LO6 (verge/embankment) and NI L10 (road/track). The former would actually be recorded as an area, if it was large enough to be a mappable unit. Following the initial meeting between ITE and the University of Ulster, certain minor points of difference were identified between BAP3 and NICS NI LO6 and L10. Most of the differences are minor and can be covered by footnotes but could be fully evaluated with some additional work.

The differences are as follows:

- Gorse is not considered as a hedge species in NICS, so that in the Mournes a fence with gorse beside it would only be recorded as a fence, whereas in the CS2000, gorse on banks in Cornwall are considered as hedgerows;

- There is no hedge laying in NI;

- Almost all NI hedges are on banks;

- The minimum mappable length in NI is 10 metres as compared with 20 metres in GB. This will cause minor differences in detail;

- Although in certain regions, e.g. Fermanagh, the NI hedges have often grown up to the extent that they appear as lines of trees, they still largely fit into the definition of hedgerows as many of them have evidence of management. Very few hedges have changed into lines of trees in a comparable way to GB, so that although lines of trees were not recorded in NI, this is not a serious problem.

- Following the visit before the field survey, the number of woody species was recorded in NI although *Rubus* was included as a woody species, which does not appear in the list used in CS2000. Because of its ubiquitous nature, one species will therefore be removed from all records to make them comparable with GB.

- There is no firm detail on condition in NICS which can only therefore be inferred by the relative proportion of types e.g. ‘hedges’ in comparison with ‘hedges with gaps’.

- Hedges were recorded around farmsteads in NI but not in CS2000 but these are likely to contribute a small length to the total resource in the province.

NICS has not yet processed the hedgerow data and, once this has taken place, it will be necessary to have joint discussions between the University of Ulster and ITE to cover database management issues.

BAP4 Arable and horticulture

This category includes NICS codes NI A12-14, NI A01-05, NI A10 and NI A39 which are the same as comparable codes in CS2000. There is no set-aside in NI.

BAP5 Improved grassland

This category includes NI A07 (Italian ryegrass), NI A08 (perennial ryegrass) and NI L05 (amenity grassland).

BAP6 Neutral grassland

This category includes NI A09 (mixed grassland) and NI A11 (other grassland) both of which are abundant in NI. NI S34 (ruderal vegetation – equivalent to tall grassland in CS2000) should also be included here as should NI S01 (species-rich dry grassland); this was confirmed during field visits to be consistent with CS2000 herb-rich grassland which is important for subsequent database management.

BAP7 Calcareous grassland

Equivalent to NI SO6 (calcareous grassland) and to calcareous grassland in CS2000.

BAP8 Acid grassland

This category includes NI SO3 (bent/fescue hill pasture) and NI SO4 (mat grass hill pasture). NI S33 (bracken-scattered) should also be included here, as virtually all this category occurs in acid grassland. 50% of NI S12 (dry heath mosaic) should also be included here because the mosaic is of dry acid grassland and heath.

BAP9 Dense bracken

This is coincident with NI S33 (bracken-continuous) and with the dense bracken CS2000 code. In addition, 50% of NI S58 (gorse heath/bracken mosaic) needs to be added.

BAP10 Heath

The cover of at least 25% ericaceous species is the same defintion as in CS2000. The following categories should therefore be included: NI SO9 (ericaceous (dry) heath) and 50% of NI S12 (dry heath mosaic). NI S59 (mixed heath vegetation) should also be included here although it contains some bog species, because of the presence of *Calluna* and *Vaccinium.*

BAP11 Wetland

NI SO2 (species-rich wet grassland) should be included here with the comment that in NI these are within the farmed area. NI S65 (fen meadow) should also be included here, although it may contain some *Molinia* the cover does not reach 25%. It can therefore be separated from other units dominated by *Molinia* which fall within BAP12 (bog). These wetlands frequently contain *Cirsium dissectum* and are comparable with the Culm grasslands in England, which also contain some *Molinia*. NI could well contain a large proportion of the UK resource of this category. NI S16 (poor fen), a category that has more upland affinities than NI S65, containing more *Carices* and *Juncus* species, should also be included here because of its coincidence with the flush category of CS2000. NI S17 (reedbeds), NI S18 (fen), NI S66 (swamp) and NI S68 (water inundation vegetation) also fall within BAP11.

BAP12 Bog

This is coincident with the following NI categories: NI S10, NI S13 and NI S14. NI S10 (wet heath) is coincident with blanket bog in NI. NI S13 (wet heath mosaic) belongs here because its main affinity is with bog; it has probably originated from this category and will regenerate back into bog in due course. NI S14 (bare soil/peat/mud) should also be included here. Finally, NI S05 (*Molinia* grasslands) also needs to be included, following the most recent decision by JNCC.

BAP13 Waterbodies

Although NI L20 (lough/lake) and NI L21 (reservoir) belong here, although they have not been digitised. However, EHSNI have the digital outlines of all waterbodies in NI and are prepared to produce a figure for freshwater for the final report. Canals are not relevant to NI. Finally, NI S19 (freshwater vegetation), also belongs here.

BAP14 Rivers

Although this is directly coincident with NI L22 (river/stream) and with the same width definition of 2.5 metres as in GB, these have not been digitised. However, they are likely to occupy a negligible area in NI.

BAP15 Subarctic/montane

Not relevant to NI as the mountains do not reach sufficient altitude to override the mildness of the climate.

BAP16 Inland rock

This category includes NI L15, 17, 18 and 19 (landfill/dumping, sand/gravel, boulders/scree and rock) and also NI S29 (crevice/ledge vegetation). These categories have also not been digitised, but occupy a negligible area.

BAP17 Urban

Directly coincident with NI L01-04 (urban, industrial/commercial/public, agricultural buildings and domestic buildings). These have not been digitised and also are not distinguished from the area of roads (NI L10) and railway tracks (NI L11). The estimates for NI are obtained by subtraction from the total land area, excluding waterbodies.

BAP18 Maritime

Directly coincident with NI S28 (coastal cliff vegetation).

BAP19 Supralittoral sediment

Includes NI S20 (inter-tidal), NI S24 (fore dune) and NI S25 (dune grassland).

BAP20 Littoral rock

Not recorded.

BAP21 Littoral sediment

NI S21 (saltmarsh) and NI S22 (shingle/gravel/ridge with vegetation present).

3. Procedure for Combining Estimates and Standard Errors between NI and GB

The University of Ulster and ITE have used identical statistical procedures. NICS has already applied the appropriate statistical procedure for combining errors between separate independent estimates, as they have been obtaining regional figures from separate surveys eg. Fermanagh and the Mournes, to produce overall estimates for the province. This procedure has also been approved by ITE statisticians and the first example of a combined estimate is given below.

The figures are for broadleaf woodland, taken from Table 3.9 of the main report for CS1990 and from the appropriate section in the NICS summary report. In Northern Ireland the estimate for woodland is 24 787 ha with a standard error of 3 148, giving a coefficient of variation of 12.7%. In GB there are 23 180 000 ha of woodland with a standard error of 90 000 with a coefficient of variation of 10.1%. The combined figure is 24 534 197 ha with a standard error of 90 055 and a coefficient of variation of 9.8%. It is likely therefore that all the combined estimates will also have lower error terms, because of the increase in sample size.

4. NICS Quality Assurance

This project was mainly carried out by David Kershaw, who had been trained as a field surveyor in NICS, with support from ITE and the University of Ulster. Within NICS, 25 sample squares were located, stratified by region and weighted by land class area, to provide a basis for an independent quality assurance survey (QA). ITE assisted with the design of the sample, visited the province prior to, during and following the survey and produced a contract report "*Northern Ireland Countryside Survey 2000 Quality Assurance*" to EHSNI detailing the results.

Within each sample square, nine regularly spaced points were marked on the sample map and used as a basis for a fully independent quality assurance assessment. A total of 225 land cover points and 200 boundaries were surveyed.

QA results show a similar balance of land cover and boundary types for the whole of NI, from a baseline survey completed 10 years ago, indicating that the QA sample is representative and covers the principal land cover and boundary types.

Correspondence between QA and NICS at the UK Broad Habitat level was 90.7%. The main reason for disagreement between the two surveys was due to different interpretations in the field of land cover criteria (4.9%). Categorical error only accounted for 0.9% of the disagreements.

At the NICS type level, correspondence of land cover types between QA and NICS was 70.4%. Of the disagreements, interpretation of land cover criteria accounted for 14.4%; splitting of one land cover type into two others accounted for 4.4%; seasonal changes accounted for 3.6%; interpretation of land parcel border location accounted for 1.8%; difficulty in identification of *Lolium perenne* varieties accounted for 1.3%; and categorical error accounted for 4.0%.

Within woodland land cover types, the correspondence between QA and NICS was 88.9%. Within semi-natural land cover types the correspondence was 47.9%. Within agricultural land cover types, the correspondence was 69.8%. Within landscape land cover types, the correspondence was 81.3%.

These results are in broad agreement with the QA carried out during CS2000 in GB.

5. Reporting

The NI results will be presented in two environmental zones, lowland and upland, using the same principles as the enviornmental zones in England and Wales and Scotland. In order to be consistent with the numbering of these zones, it would seem sensible to number these zones: NI7 and NI8. Short definitions and characterisation of the two zones will be provided by Dr Alan Cooper, in due course, to be consistent with the approach used in reporting CS2000.

The NI Land Classification, although using the same principles as GB, was determined from data only recorded in the province. However the European Environmental Classification (Bunce *et al.* 1996) enables GB and NI to be compared. The majority of NI falls within European class 23 (Atlantic coastal plains and low mountains) with the extreme west and north coming within class 15 (oceanic exposed, medium/low atlantic mountains). The former only occurs in the British Isles within Europe whereas the latter is also distributed in south west Norway. Within GB, class 23 occurs around the margins of the main mountain areas in England, Wales and Scotland. However, because of its geographical position, NI7 is probably closest to environmental zone 4 in Scotland. Similarly, class 15 occurs in the mountain areas of England and Scotland and NI8 is probably therefore comparable to environmental zone 5 in Scotland. There are some issues which will need to be resolved by NICS before the production of estimates for the whole of NI, principally concerning the different dates of the field survey within the districts of the province. However, all these will have to be resolved by database management within NICS and the deliverables outlined below can therefore be achieved.

- Estimates of stock and change for each Broad Habitat with the exception of freshwater and incorporating the comments made in section two of this report, with standard errors;

- Measurement of the total area of freshwater in NI;

- The matrix of change between Broad Habitats;

- Stock and change for linear features, with standard errors incorporating the comments of the present report;

- An estimate of the length of species-rich hedgerow, as defined by the Hedgerow Biodiversity Action Plan within NI.

All the above results will be presented by the two zones and will then be merged with the GB estimates to provide UK statistics for stock and change with associated standard errors. Any database management issues will need to be discussed subsequently between ITE and the University of Ulster, who will also need to assist with interpretation of the significance of the NI figures in the UK context.

6. References

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7. Appendix 1 – Correspondence of NICS Recording Codes with BAP Categories

The following table gives the complete list of correspondence given in the order of the NICS handbook with BAP categories.

Woodland

BAP1	NI W01	Broadleaf semi-natural
BAP1	NI WO2	Broadleaf plantation
BAP1	NI W48	Fen car
BAP2	NI WO3	Coniferous semi-natural
BAP2	NI WO4	Coniferous plantation
BAP1	NI WO5	Mixed semi-natural
BAP1	NI WO6	Mixed plantation
BAP1	NI WO9	Parkland
BAP1	NI WO7	Dense scrub
BAP1	NI WO8	Scattered scrub

Semi-natural Vegetation

BAP6	NI SO1	Species-rich dry grassland
BAP11	NI SO2	Species-rich wet grassland
BAP8	NI SO3	Bent/fescue hill pasture
BAP8	NI SO4	Mat-grass hill pasture
BAP12	NI SO5	Molinia grassland
BAP7	NI SO6	Calcareous grassland
BAP1	NI SO7	Gorse heath-continuous
BAP1	NI SO8	Gorse heath-scattered
BAP10	NI SO9	Ericaceous (dry) heath
BAP12	NI S10	Wet heath
BAP08 (50%)		
BAP12 (50%)	NI S12	Dry heath mosaic
BAP12	NI S13	Wet heath mosaic
BAP10	NI S57	Mixed heath vegetation
BAP01 (50%)		
BAP09 (50%)	NI S58	Gorse heath/bracken mosaic
BAP12	NI S14	Wet bog
BAP08	NI S15	Dry bog
BAP11	NI S16	Poor-fen
BAP11	NI S65	Fen meadow
BAP11	NI S17	Reedbeds
BAP11	NI S18	Fen
BAP13	NI S19	Freshwater vegetation
BAP11	NI S66	Swamp
BAP11	NI S67	Ditch vegetation
BAP11	NI S68	Water inundation vegetation
BAP09	NI S32	Bracken-continuous
BAP08	NI S33	Bracken-scattered
BAP6	NI S34	Ruderal vegetation
BAP16	NI S29	Crevice/ledge vegetation
BAP19	NI S20	Intertidal
BAP19	NI S21	Saltmarsh
BAP19	NI S22	Shingle/gravel ridge
BAP19	NI S24	Foredune

BAP19	NI S25	Dune grassland
BAP01	NI S27	Dune scrub
BAP18	NI S28	Coastal cliff vegetation

Agriculture

BAP05	NI A07	Italian ryegrass
BAP05	NI A08	Perennial ryegrass
BAP06	NI A09	Mixed species grassland
BAP06	NI A11	Other agricultural grassland
BAP04	NI A12	Orchard
BAP04	NI A13	Soft fruit
BAP04	NI A14	Vegetables
BAP04	NI A01	Wheat
BAP04	NI A02	Barley
BAP04	NI A03	Oats
BAP04	NI A04	Potatoes
BAP04	NI A05	Brassicas
BAP04	NI A39	Root crops
BAP04	NI A10	Ploughed/fallow
BAP13	NI A20	Lough/lake
BAP13	NI A21	Reservoir
BAP14	NI A22	River/stream

Landscape

BAP17	NI L01	Urban
BAP17	NI L02	Industrial/commerical/public
BAP17	NI L03	Agricultural buildings
BAP17	NI L04	Domestic building
BAP05	NI L05	Amenity grassland
BAP03	NI L06	Verge/embankment
BAP03	NI L10	Road/track
BAP03	NI L11	Railway track
BAP16	NI L15	Land fill/dumping
BAP16	NI L16	Bare soil/peat/mud
BAP16	NI L17	Sand/gravel
BAP16	NI L18	Boulders/scree
BAP16	NI L19	Rock

Boundaries

BAP03	NI B02	Hedge
BAP03	NI B04	Dry stone wall
BAP03	NI B06	Ruined dry stone wall
BAP03	NI B10	Earth bank
BAP03	NI B07	Mortar/brick/concrete wall
BAP03	NI B09	Sheep wire fence
BAP03	NI B11	Wood post and wire fence
BAP03	NI B12	Other fence