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Report

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INSTITUTE OF TERRESTRIAL ECOLOGY
(NATURAL ENVIRONMENT RESEARCH COUNCIL)

Project. T02083j5

Countryside Survey 2000
Module 7

LAND COVER MAP 2000

Ninth Quarterly Progress Report

CSLCM/Prog9

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- This is the ninth progress report on Land Cover Map 2000 (LCM2000), a part of Countryside Survey 2000. The Report covers work done to 31 May 2000.
- LCM2000 is making a census survey of the widespread Broad Habitats of the United Kingdom using satellite imagery and automated image processing techniques to map target classes with a 'classification accuracy' of 90%.
- Progress is reviewed here against the updated GANNT chart in Figure 1.
- In this quarter, the scheduled Consortium Meeting was combined with the Advisory Group meeting of 2 March 2000. There was a single Technical Advisory Group workshop, on calibration, on 17 May 2000; its conclusions are summarised here. A paper on LCM2000 method was submitted to, and accepted by, the Remote Sensing Society annual conference (Smith *et al.* in press).
- Image purchases still only cover 90% of the UK. Northern Scotland was awaiting new acquisitions in winter 1999-2000; stock Northern Ireland winter images have also proved to be poor, with much scattered cloud-speckle, and coverage would benefit from infill-data. Unfortunately, no useful imagery of Scotland or Northern Ireland was added during last winter. The team will now need to piece together the best combination of existing datasets, to maximise winter coverage while restricting the complexity of the mosaic to one offering practicable analyses. Parts of eastern Scotland also require better summer coverage; we will consider summer 2000 acquisitions before deciding on the best final choice of this cover.
- The consequence of the poor winter coverage is that estimated number of image sections required for mapping all the UK may well exceed the 69 scenes estimated in the *Fourth Interim Report*. Conclusion of the project at the end of May 2001 is still the target. However, this will need to be reviewed once image selection is finalised.
- Sample field reconnaissance data cover *c.* 95% of the UK, with only north-west Scotland to be covered in June 2000.
- The widespread Broad Habitats are now fixed in type and definition. In practice, the 32 subclasses of LCM2000 will offer far greater detail than the Broad Habitat classification: and many of these subclasses will be further subdivided in the class-variants, for even greater detail.
- Figure 2 records progress in map production: 38% of the UK is completed; a further 8% offers provisional classifications requiring knowledge-based correction (a few days work); 19% is pre-processed (i.e. halfway through the production process). This level of progress represents about 55% of the total production task. Production rates are now many times that recorded at the start of the project.
- Procedural developments now concern calibration; this is using squares from the CS2000 field survey.
- Users demand flexibility in the calibration system (with reliability estimates from thematically generalised to detailed classes, and local to national scales); aggregation can be made as required.
- Residual geometric errors of satellite images will, if appropriate, be accommodated by a 'shift' in placement to match the field data.
- The field survey data are not the 'truth'; the Quality Assurance exercise showed 88% repeatability for primary codes from which Broad Habitats are generated objectively.
- Calibration will use grid analysis, in effect a sample, at 2.5 m and 25 m resolutions to generate correspondence matrices. The 'bootstrapping' procedure, described in the *Third Interim Report*, will be adopted: it will apply to any regionalisation where there is an

adequate sample size of 1 km field survey squares; and for larger regionalisations, the bootstrapping method might be weighted through the ITE Land Classes.

- For Northern Ireland, where there is no digitised field dataset, scoring a grid of points is seen as appropriate.
- The data to be generated and the proposed method of storage lend themselves to later integration and other analyses, both in terms of the detail and the accessibility of information.
- There are methods for attaching reliability estimates to parcels, but these need further consideration: they are beyond the immediate scope of LCM2000.
- Despite problems which will extend the size of the processing job and delay its completion, other issues continue to go to plan.
- For the CS2000 launch in November, there will be demonstrable outputs for all Broad Habitats, for all 4 countries of the UK, and for the 6 Environmental Zones; there will be example data for localised regions (e.g. county statistics) to contrast with the field survey outputs; it will be possible to provide detail for urban areas, where the field survey offers limited scope. The complementarity of the two surveys will be stressed.
- It is intended (subject to an adequate solution to the image shortages in Scotland) that 99% of the UK will be mapped by the project's intended end-date on March 2001, with just small sections to be completed over the following two months.
- In conclusion, the significant production and calibration issues have all been fully addressed; widespread Broad Habitats have been shown generally to be mappable and with the target 90% 'accuracy'; the extra detail provided by subclasses and variants builds much more flexibility into the dataset than does the Broad Habitat listing. LCM2000 will provide the update and the upgrade that was intended but with considerable refinement of the GIS over that originally expected.

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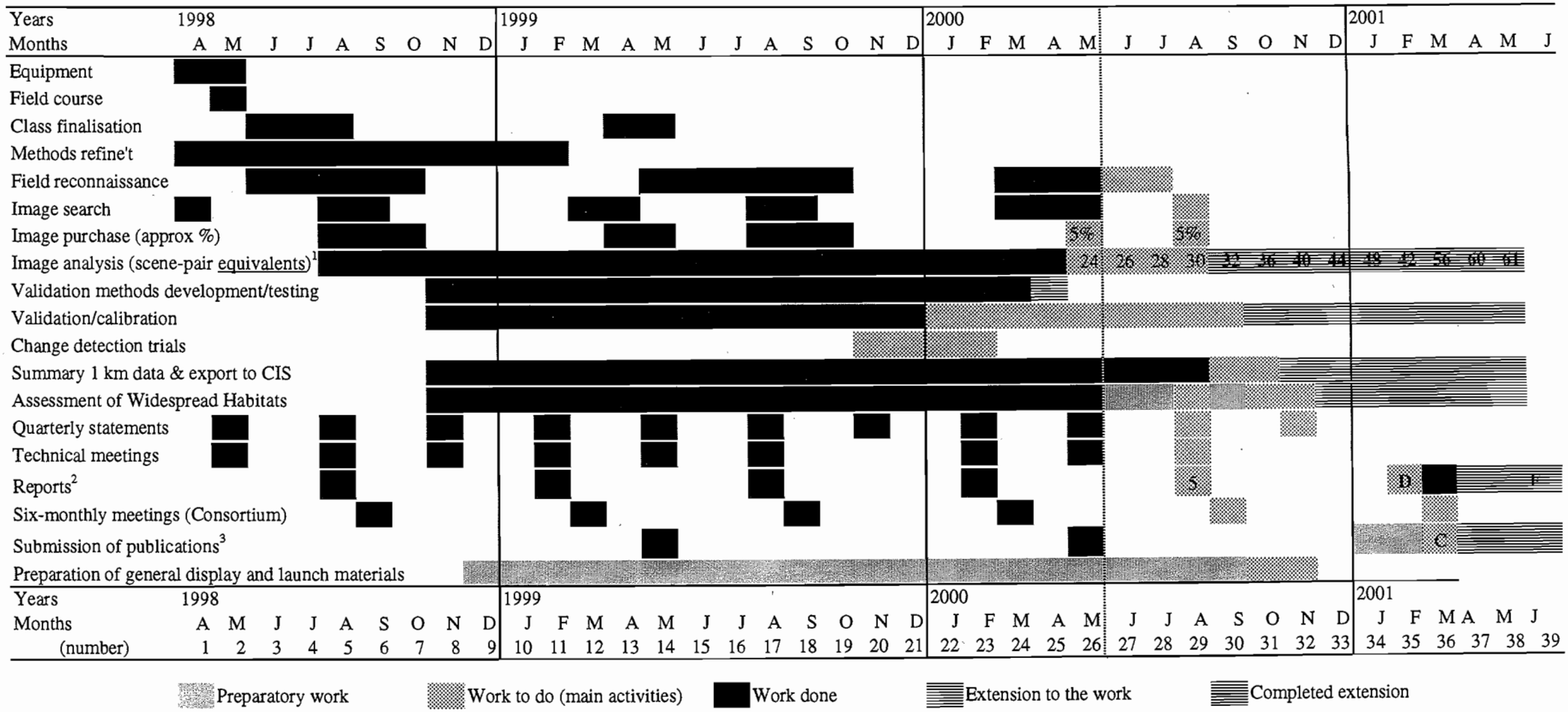
Smith, G.M., Fuller, R.M., Hoffmann, A. & Wicks, T. In prep. Parcel-based approaches to the analysis of remotely sensed data. *RSS2000*

Figure 1. GANNT - The revised timetable for Land Cover Map 2000 (UK) and estimated progress in production (to the end of May 2000).



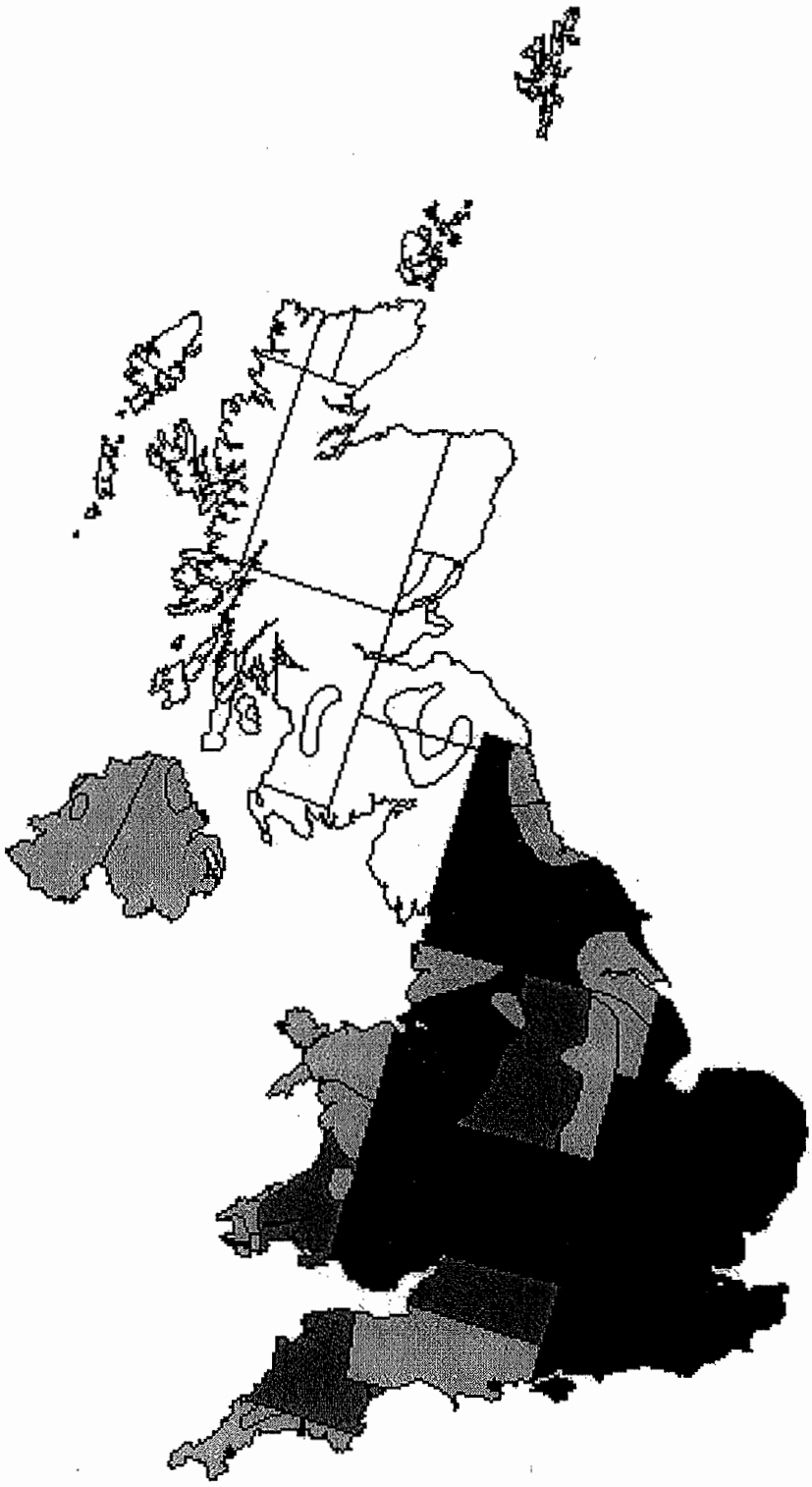


Figure 2. Progress in the production of Land Cover Map 2000: black - completed classifications; dark grey - classified images awaiting knowledge-based correction; light grey - geo-registered images; white - areas in earlier stages of pre-processing.

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