Scottish Borders Council & Tweed Forum Consortium
Tweed Aerial Survey Phase 2
Aerial Photography Interpretation
Land Cover Classification & Habitat Mapping

Final Report

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1. Introduction and Background

Maintaining and enhancing biodiversity is a key priority for local authorities and government organisations in Scotland and the UK, and there is a requirement, under the UK Biodiversity Action Plan (UKBAP) process and particularly the Local Biodiversity Action Plan (LBAP) process to identify key habitats and key species at a local level. Without an inventory of the habitats and their distribution it is difficult to make decisions on land use related issues, or to know where it would be best to encourage habitat restoration schemes. Such information can help inform public bodies in meeting their obligations under the *Biodiversity duty* (Part 1 Nature Conservation (Scotland) Act 2004) and will help them deliver key objectives of the Scottish Biodiversity Strategy.

This project is the result of an initiative by the Scottish Borders Council and the Tweed Forum Consortium to establish a baseline of habitats, which will help provide an input to other spatial planning and sustainable development initiatives in the area. The baseline is a land cover and habitat map, at Phase 1 level, of the Tweed catchment area, based on the interpretation of recent aerial photography imagery of the area. The inventory also provides an initial assessment of the amount of land under Local Biodiversity Action Plan criteria.

The aerial photography was captured over a period of two years at different dates, but most of the area was covered by a flight at the end of September 2007. The southernmost area (17%) was captured in the spring of 2009 and various other smaller parts of the catchment later on in autumn 2009.

The Tweed catchment covers a large area of land across the border between Scotland and England, extending from the uplands of the Lammermuir Hills in the north, the Southern Uplands in the west and the Cheviots Hills in the south, through the valleys of the Tweed, Teviot and Till, to the town of Berwick in the east. In Scotland the area is administratively within the Scottish Borders Council (SBC). In England the catchment extends into Northumberland. The whole area is covered by the Tweed Catchment Management Plan of the Tweed Forum. The catchment has a rich diversity of habitats and species and it is an area of exceptional natural beauty. Many of the landscapes and wildlife within the Tweed catchments are recognised as highly important and some are protected through specific nature conservation designations.

Figure 1: Scottish Borders Council and Tweed Forum Area

Some of the most important habitats in the area include:

- Hills, Heather and High Tops with blanket bogs and grassy moorlands in the uplands
- Mooses, lochs and clarty holes with an outstanding variety of wetland habitats, which range from the internationally recognised mosses and lowland raised bogs to large lochs and reservoirs.
- Small but significant areas of native and riparian woodland, important policy woodland in designed landscapes and large areas of forestry plantations
- More intimate areas of Hummels and Haughs and Knowes, with more interesting species rich grassland, scrub and wetter pasture in enclosed farmland
- Coastal Braes and Deans
- Urban fringe areas around the main settlements

This report documents the innovative methods used to help delineate the different parcels of habitats. It reports on the methods of attribution of the habitats and how additional datasets including field National Vegetation Classification (NVC) surveys were incorporated into the survey. Results are shown at the Phase 1 habitat level for Scottish Border region and for the whole of the Tweed catchment. Geographic Information System (GIS) data files accompany this report, split into the Scottish Borders region, Tweed catchment and the Till catchment in North Northumberland. In addition to the Phase 1 work an initial assessment has been presented for the Local Biodiversity Plan (LBAP) habitat inventories.

2. Methodology

In order to meet the requirement for a consistent baseline across the whole of the area, a technique called image segmentation was used to delineate different habitats from the aerial photographs. Image segmentation is an automated GI raster analysis which uses similarities in pixels within the image to consistently identify areas with common spectral features. It has the advantage over the traditional method of drawing polygons of similar colour and texture 'by eye' of using a 'rule base' which can be set to pull out the same level of feature and can be run again at a later data for monitoring purposes.

Two issues were overcome during the segmentation process. In previous studies using this technique we have always concentrated on using the Near Infra Red (NIR) band from Colour Infra Red (CIR) photography. Although CIR photography was available for the area, it had not been orthorectified and therefore could not be used within the 'GIS' environment. Establishing the correct image segmentation, which merged and splits the habitats in the correct places, without the use of the Near Infra Red band took a considerable amount of time. However, a robust, repeatable and reliable method of segmentation which gave topologically correct smoothed polygons was achieved using the Red, Green, Blue (RGB) aerial photography. Segmentation also avoids a certain amount of the subjectivity in delineation of vegetation by manual aerial interpretation. There is a tendency for some operators to have a broad scale outlook and naturally tend to 'clump' communities together into larger scale mosaics. Others have a targeted view and like to delineate very small areas and zones as specific habitats. Avoiding both of these tendencies and to apply a consistent approach is of prime importance where the vegetation map is to be the basis for a long term monitoring programme. Where CIR photography is available a better overall segmentation can be achieved which requires minimal manual intervention. As we did not have CIR photography some manual intervention was required, but strict rules on merging and splitting of the habitat units were established in order to minimise 'user interpretation' errors.

2.1 Minimum Mapping Units and Mosaics

Within any mapping project it is important to establish the minimum mapping unit. In this case it was generally taken that any area less than a quarter hectare (0.25ha) was considered to be a part of the habitat surrounding it. The exceptions to this were built land and water features which followed Ordnance Survey (OS) MasterMap boundaries and hedges which were shown as linear features.

Certain complex habitat mixes were mapped as mosaics, where it was impossible to map small areas of individual habitat separately, or where transitions from one habitat to the next were broad and indistinct. In these areas attributes were given for the first three dominant habitat types.

The results of the image segmentation (based on just the RGB photography) did need a manual editing stage, as they were sometime at 'too fine' a scale for a Phase 1 habitat survey. Also in many cases the segmentation identified different 'land use'

units within the same habitat type as different features. For example, cut heather and mature heather were often separately identified, but are all part of upland heath land, so needed to be merged into one larger polygon, rather than shown as two separate ones.

In order to match the existing SBC data OS Master Map, polygons were 'cut' into the data. This included roads, urban areas, rivers, ponds and lakes. Occasionally, if there was a disparity with the air photography then the polygon was extended or cut (for example a new development). The field boundaries were also burned into the database in the lowland areas, as these are invariably 'habitat units'. Segmentation was carried out within the field boundaries to separate 'flushes' and scrub areas. The forestry blocks were also used to supplement the segmentation around the larger plantations. Figure 2 below shows an example of the final level of segmentation.

Figure 2: Segmentation example

Within the segmentation the Tweed catchment was split into distinct areas, in the north these were strips approximately 7 by 50 km in size, whereas the southern area based on the 2009 photography was treated as three units based on the date of the air photography.

2.2 Classification of Habitats

2.2.1 Automatic attribution

The image segmentation resulted in around 70,000 Phase 1 polygons in the first part of the work on the 2007 photography and a total of 82,432 polygons for the whole area. Following the segmentation each of the polygons was attributed with the likely

Phase 1 habitat class based on aerial photo interpretation. Two methods were used for this. One was an automatic attribution of three classes that could be separated using aerial photography and 'rule' based classification techniques based on the colour and texture of the 'objects'. In this way it was possible to attribute 'B4 improved grassland' 'J1.1 arable land' and 'A1.2.2 coniferous woodland'. This attribution was approximately 85% accurate. Where the attribution was wrongly assigned this was picked up during attribution of adjoining polygons or the QA process, and the correct designation was input.

2.2.2 Manual attribution and recognising habitats from air photography

Three experienced ecologists with aerial photography identification skills attributed the remaining Phase 1 habitat polygons.

Manual attribution is based on the characteristics of the habitats observed on the imagery. This includes colour, texture and locational context.

In order to aid the attribution it was necessary to confirm the major habitats in the field. The initial field work on the September imagery was carried out from the 2nd to the 8th May 2008 and further visits were undertaken throughout the summer to confirm the attribution and to advise on the correct classification and collect a landscape photographic reference library. The May 2009 imagery was field checked on the 29th-30th October.

The colour of vegetation is a key indicator of habitat type. Some colours are obvious, for example bright green for improved grassland, dark brown for heather. Other colours are more subtle and potentially confusing. With the September 2007 imagery bracken is particularly difficult to identify consistently by colour, appearing as green, orange or brown on different and often adjoining images and on different sides of a valley.

Texture is also a key indicator. Grasslands are generally fine textured and bracken very coarse, reflecting the height and density of the vegetation. Heather can appear very smooth and even on imagery, especially in larger even-aged stands, which belies its shrubby nature.

Where colour and texture are both confusing, locational context can often be used to help in identification. For example bracken normally occurs on steep slopes, in and amongst dry acid grassland. Conversely blanket bog occurs only on flat or gently sloping upland plateaux, often surrounded by wet grassland habitats.

As necessary the manual attribution included edits to the polygon boundaries, especially where the initial segmentation had been less successful in identifying discrete habitat areas. The boundaries of bracken habitats were often edited manually.

2.2.3 The effects of date of photography on the photos

A seamless aerial photography data layer was been created from all the individual tiles. Whilst this provides a single view of the imagery, it is important that the seasonal variation of the constituent parts is borne in mind when using it for vegetation interpretation.

The southern area flown in spring 2009 had a very different appearance than the late September 2007 photography. Bracken was largely dormant in the 2009 photos and a very light yellowy, brown colour whilst in the 2007 September photography it was at every possible stage in its growth cycle from bright green (well growing), to dying back, to dormant. In order to establish the difference in habitat appearance a further field visit was undertaken and further landscape photo points collected. In addition the very large and comparatively recent Phase 2 NVC survey of the Langholm SSSI gave a good indication of habitat types. Several areas in the south were not flown until later on in the year, these were subject to large amounts of shading, and similar colour and contrast issues as the 2007 photography.

2.2.4 Final processing stages

Following attribution, the 7km by 50km strips were stitched together, manually joining the polygons, to give two seamless layers, a western and eastern area. These areas then underwent a QA sense check; in particular looking for problems with the automated update of the grassland and arable. They were then ‘cleaned’ to remove slivers and gaps and the OS MasterMap road and river layer was ’re-burned’ into the dataset to give an exact match with other Scottish Borders datasets which use OS MasterMap features. The southern area using the 2009 aerial photography did not have the OS MasterMap features re-burned as they were added at the start of the process to aid efficiency.

The two data sets were then joined into one seamless layer. The rest of the attribution was completed. For the LBAP and BAP classes where they had not been manually added, those Phase 1 Habitat types that fell into the correct areas were identified by GIS (SQL-based) queries and the table updated. Finally as OS MasterMap TOID lookup table was attached and the fieldwork photos and data were added. The fields for the primary, secondary and tertiary Phase 1 codes were then updated from the alpha numeric Phase 1 codes using a standard lookup table.

2.3 Combining Air Photo Interpretation and Field Surveys

Several existing habitat datasets were available over small parts of the area, where traditional field survey work had been undertaken. The grassland NVC sites, and the wetland and lowland bog datasets were extremely useful. Although these were older surveys, they were carried out at a much more detailed level than Phase 1 interpretation.

Major issues in comparing or bringing together different datasets are scale and accuracy. When comparing data at different scales, dates of survey and levels of

precision and accuracy we have found it helpful to carry out a detailed and rigorous evaluation of the processes and issues involved in production of each dataset, so that any final combined map can be represented, in a transparent and easily understood way, at different confidence levels.

This involves the use of 'belief' and 'certainty' measures. Belief and certainty are formal statistical measures, are well documented and understood, but are not widely used at present in habitat mapping. They acknowledge that data is not always correct, and help put across to the user the uncertainty associated with use of the data, especially when many different datasets are considered of different accuracies.

For example, in the Tweed catchment we needed to combine knowledge gained from 20 year old Phase 1 data from field survey drawn on paper maps and scanned in, with a 2009 air photo survey with detailed semi-automated digitisation. In order to have a good final inventory map the field survey classification (from the old Phase 1 survey) had to match the newly segmented image (2009 AP survey) in terms of likely change over 20 years. In terms of mapping confidence, in this instance, we 'believed' the current air photos habitat data and only considered a change where it clearly didn't match the older field survey.

Where both old and new surveys agreed that some of the land was at least partly of the same Phase 1 class a simple rule was applied based on our knowledge of the mapping accuracies of the two methods. In general field scale mapping, when compared to aerial imagery over-emphasised linear features such as flushes and also had very imprecise boundaries on other features, such as the edge of the blanket bog and start of the heath. As the extent of these features is always more 'accurately' seen from recent air photo analysis, the class was read from the field work and the boundary from the current air photo mapping.

Where the air photo class did not match the 20 year old field survey data a table was made of 'believable classes'. For example, if the old Phase 1 survey specified the area as blanket bog and the newer air photo survey showed modified blanket bog then this was 'believable' as the change was very possible in 20 years. However, if the area in the 2009 air photo survey was recorded as bracken, then it is highly unlikely that blanket bog would have changed to bracken and the area would be revisited in the air photo survey to ascertain which was most likely to be correct. In most cases scale difference between surveys was the reason for this sort of mismatch as small rocky outcrops in the bog could contain bracken. The change would be decided based on the minimum mapping unit appropriate to the air photo survey.

In some areas very recent NVC surveys were available for comparison with the 2009 air photo survey. NVC surveys are both more precise and more accurate than air photo interpretation; indeed many NVC classes cannot be distinguish from the air. Where the surveys disagreed, the NVC was always accepted. With older surveys, the rules about likely changes to the vegetation types were implemented. For example, it is not possible to identify species rich calcareous grassland from RGB

photography; this is because many of these grasslands rely on the presence of small numbers of infrequent herbs such as wild thyme (*Thymus praecox*). With CIR photography – especially if different dates are available, some attempt can be made to pull out the class, based on texture and productivity. Therefore, the NVC calcareous grassland boundaries were added to the map.

In summary where a mismatch occurred the issues were split into several types of error each with its own 'belief function' or 'certainty':

- **Scale:** of each survey (the survey which had the most accurate boundaries was always chosen to represent the object)
- **Age:** A combination of the newest dataset and the belief that the datasets could change into certain classes but not others were used to attribute each area.
- **Detail of the surveys**: Very detailed surveys such as NVC and species recording with a GPS would be taken as more accurate than more general remotely sensed survey data. It was found possible to nest more detailed data within broader data where it leads to better understanding of the data.

Thus the inventory maps produced have 'belief' maps accompanying them. This is represented in the form of a certainty column for each BAP and LBAP class. Where both data sets agree, the class is entered as 'very probably'; where there is strong evidence of the class from one or more of the data sets then the certainty is 'probably'; where there is some evidence of the class, then the data is marked as 'possible'. Using this method it will therefore be possible to target field work resources in the most efficient manner.

2.4 Priority Habitats and Local Biodiversity Habitats

The key requirement was for a habitat map with Phase 1 codes, but that also included UKBAP and LBAP habitats. Not all Phase 1 habitats match successfully with BAP habitats - for example 'A2.1 Dense Scrub' includes gorse scrub, hawthorn / blackthorn scrub and wet woodland, and out of this list only wet woodland is a BAP habitat. We disaggregated the Phase 1 habitats into their constituent BAP habitats where possible. In this case we recorded wet woodland as a sub category of scrub using nomenclature agreed with the Scottish Borders Council. A list of how Phase 1 categories match with BAP habitats can be found in Appendix 3.

In a previous work (Lucas *et. al.* 2006) we have found that it is possible to identify some BAP habitats from remotely sensed data, but that these have degrees of certainty. For example, wet woodland can be identified by looking at the landform data and choosing flat areas near streams that are woodland. However, without field checking it is not possible to confirm the woodland as the BAP type. Therefore, we attributed such areas with their likely BAP class and a 'possible' certainty.

For the LBAP and BAP classes where they had not been manually added, those Phase 1 Habitat types that fell into the correct areas were identified by SQL queries

and the table updated. Finally a TOID lookup table was attached and the field work photos and data were added.

2.5 Hedges

A hedge layer was created for the whole of the Tweed catchment. It was not possible to use Environment Systems normal method to identify hedges which involved the NIR data. However, it was possible to separately identify 'hedge' boundary features through an automatic rule-base process, essentially from shadows cast. This tended to over-classify features (encompassing stone walls and tree lines as well) and a manual process was then carried out to attribute the specific hedge features. The dataset is presented as a separate layer.

2.6 Considerations for Areas Outside Scottish Borders Council

The LBAP attribution work outside of the Scottish Border Region area was carried out based on a look up table comparing Northumberland LHAPs to the Phase 1 classes and the Scottish Borders LBAP classes, this look up table is attached as Appendix 5. This data did not include any NVC survey data for the Northumberland area as this data was not provided and it would therefore be possible to produce a more complete audit at a later time with this additional information.

3. Results

3.1 Scottish Borders Council: Phase 1 Habitats

Figure 3 below provides an overview of the Phase 1 habitat map of the Scottish Borders, with more detailed maps and associated table of Phase 1 habitat classes identified in the Scottish Borders area given in Appendix 1. Appendix 2 show the Phase 1 habitat table for the whole of the Tweed catchment and example habitat maps.

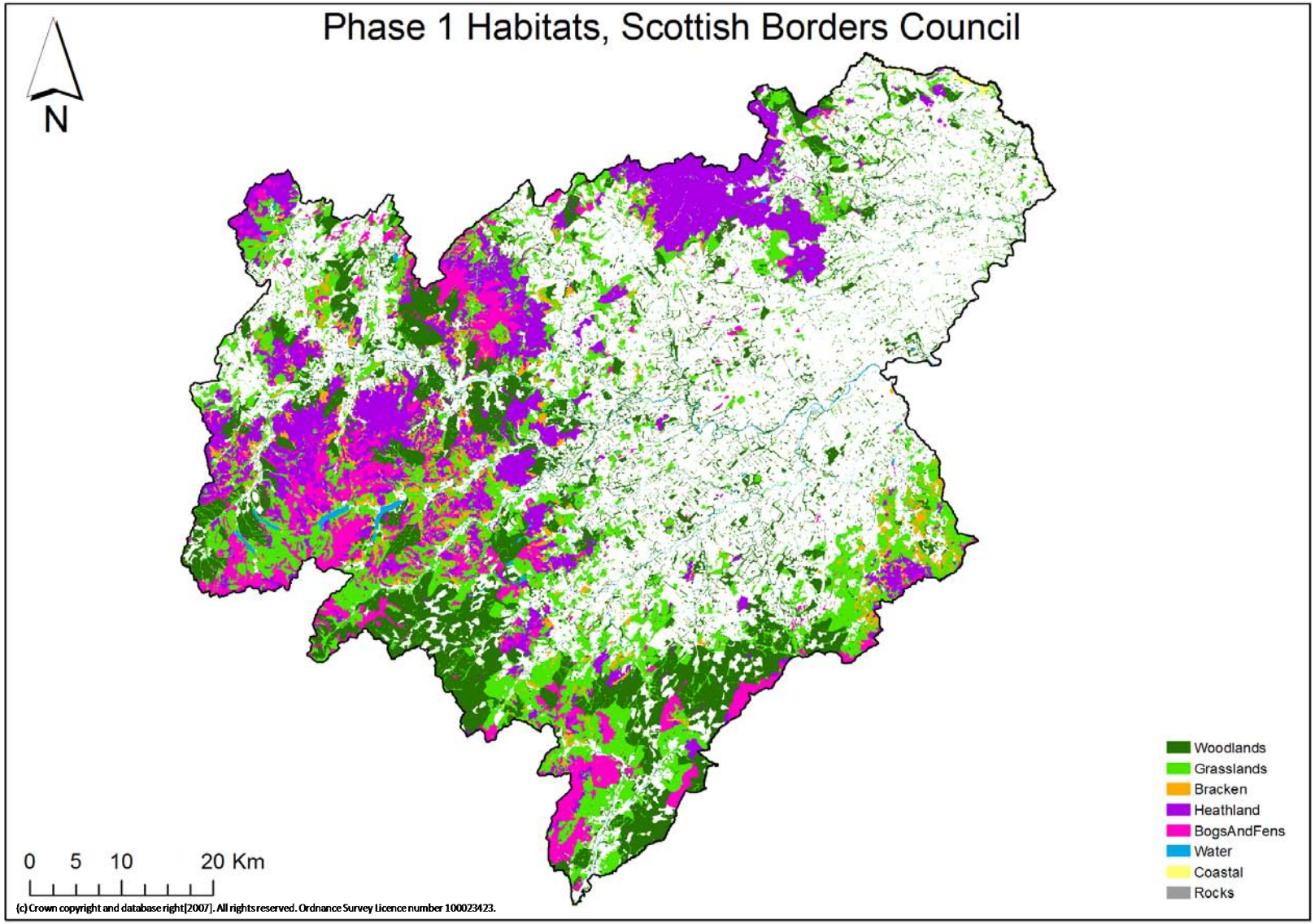

Figure 3: Overview map of habitats in the Scottish Borders Council

3.1.1 Woodlands, scrub and hedges

Broadleaved woodland (A1.1.1, A1.1.2)

Broadleaved woodland is a common habitat in the Tweed catchment, although occurring generally in small blocks. Woodlands classified as semi-natural (A1.1.1) are generally small and long and linear shaped, often following steep-sided valley sides, and in small deeply incised valleys in the uplands, sometimes grading into deciduous scrub. Planted broadleaved woodlands (A1.1.2) have been identified mainly around farm houses, in more regular shaped areas. Many semi-natural broadleaved woodlands including ancient woodlands (Planted Ancient Woodland Sites) have been planted up with conifers, creating mixed or largely coniferous woodland plantations, although relicts of the semi-natural broadleaved woodland remain. These areas have not generally been separately classified as broadleaved; unless a large area of distinct broadleaved woodland remains.

Coniferous woodland (A1.2.2)

Coniferous woodland occurs in the main as large plantations, generally in the uplands. Smaller coniferous plantations occur in the lowlands, often associated with shelter belts or small areas of game cover. They are in the main regular-shaped areas. Larger unplanted areas within coniferous plantations have been classified as separate habitats where appropriate.

No semi-natural coniferous woodland has been identified.

Mixed woodland (A1.3.2)

Mixed woodland has been identified where different woodland types occur in the same canopy.

Mixed woodland occurs throughout the Tweed catchment, in a range of situations:

- There are areas planted as mixed woodland, as either smaller blocks, shelter belts and game cover in the lowlands, or as linear blocks of ‘Policy Woodlands’ along roadsides. These create a network of woodland blocks throughout the lowlands.
- Larger blocks of land have been classified as mixed where old broadleaved woodland has been planted up with conifers and extended.

No land has been classified as semi-natural mixed woodland (A1.3.1)

It is often difficult to distinguish whether woodland cover is mixed or broadleaved from summer imagery, and indicators such as regularity of planting and outline of shadow throw have been used to guide decision-making.

Scrub (A2.1, A2.2)

Scrub occurs throughout the Tweed catchment area in a very wide range of situations. These include:

- Underutilised land around urban areas, allowed to scrub over through lack of management,
- Gorse scrub on steep dry slopes in lowland areas,
- Unused land around and on the fringe of true woodland areas, where not grazed and allowed to scrub over,
- Small steep valleys in the uplands, where grazing is restricted by topography,
- Willow carr scrub has been classified on wet fens and bogs in the lowlands, part of a natural plant succession, often grading into continuous birch woodland, although the height of the willow carr is difficult to estimate from imagery,
- Areas of conifer scrub, either self-seeded or randomly and thinly planted.

Juniper scrub has not been separately identified in the uplands. Areas where junipers grow are sparsely colonised with individual juniper bushes, and within the context of Phase 1 do not generally comprise a large enough area of scrub to warrant mapping separately.

Scattered scrub has been classified in the lowlands along field margins, ditches, and old disused railway lines, normally with grassland cover in between the scattered scrub bushes.

Parkland (A3.1, A3.3)

Areas of parkland have been mapped around a number of major houses and large estates in the Tweed catchment. It has been difficult always to distinguish from the imagery between purely broadleaved (A3.1) and mixed parkland (A3.3). No land has been mapped as coniferous parkland (A3.2).

Recently-felled woodland (A4.1)

A number of areas have been mapped as recently-felled woodland; these are generally former coniferous plantations, adjoining other areas of existing coniferous plantations.

3.1.2 Hedges

Hedges have been mapped throughout the Tweed catchment area, forming a large interconnecting network in the lowlands, with more scattered and isolated hedges in the uplands.

Lines of trees have not generally been included as hedges unless they form a continuous feature along a field parcel boundary. Hedges within urban areas (i.e. garden hedges) have not been included within the data layer.

3.1.3 Grassland and marsh

Acid grassland (B1.1, B1.2)

Acid grassland has been mapped over large areas in the uplands of the catchment. Mapped areas cover a range of conditions, from very dry *Fescue/Agrostis* swards on steep banks through to wet rush- and *Molinia*-infested grasslands bordering wetter bogs and mires.

Where some improvement can be seen (which may include mechanical improvement of the soil or regular cutting, or long-term heavy grazing management), then such areas have been classified as semi-improved.

Neutral grassland (B2.2)

Areas of neutral grassland have been mapped largely in the lowlands, comprising essentially areas of semi-improved grassland or old permanent pastures along streams on steeper slopes or the margins of arable land. It is often difficult to distinguish neutral grassland from improved grassland, from aerial imagery, and geographic location (for example along stream sides) has been taken into account to assist the process of mapping.

Calcareous grassland (B3.2)

Calcareous grasslands have been mapped in restricted areas where limestone outcrops occur, generally on rocky knolls, often isolated and surrounded by improved land on deeper soils. Again identification is difficult from imagery, and the presence of rocky outcrops has been taken as an indicator of calcareous conditions.

Improved grassland (B4)

B4 is essentially a catch-all category for improved agricultural pasture within the enclosed agricultural lowlands, and for improvements, sometimes but not always enclosed, in the uplands. Individual enclosures of improved land have normally been mapped, even where each enclosure is simply a small part of a much bigger area of improved land.

Marshy grassland (B5)

Marshy grassland has been mapped in two markedly contrasting situations:

- In the hills, large areas of *Molinia* dominated grassland occur on generally flat or gently sloping ground, often surrounding wetter areas of mire or bog,
- In the lowlands, generally smaller areas of wet grassland, again dominated by *Molinia* or *Juncus*, occur where agricultural improvement has been less successful, usually surrounded by more improved land. Drainage is often seen within such areas, as evidence of attempts at further improvement.

3.1.4 Poor semi-improved grassland (B6)

Poor semi-improved grassland has been mapped widely, largely in the lowlands, where improvement has been less successful, especially on wet soils, and has left a

sward that is poor both agriculturally and environmentally, generally rush-dominated but with little overall biodiversity. This class was largely identified to guide future efforts to identify fields with the potential to become interesting habitats. From the air it is not always possible, with the less productive pastures, to tell if an area has lots of agricultural weeds such as docks and thistles or whether it has a good amount of native herb species. Where there was a possibility that the land may have some native species this was then marked as B6, and could be the focus of further field checks.

3.1.5 Tall herb and fern

Bracken is the main category of tall herb and fern that has been mapped. It is found largely in the uplands on dry slopes, but often extending into wetter marshy areas, and coalescing to form extensive areas.

Mapping has distinguished between largely continuous bracken (C1.1) and scattered bracken, the latter normally with an acid grassland understorey (C1.2). Bracken is also often associated with, and is an invader of heathland.

On the imagery, taken largely in September 2007, bracken is a very difficult category to map because, due to the time of year, it can be seen in any combination of summer (green), autumn (orange) and winter (brown) colours. There is also evidence in places of bracken spraying and bracken cutting, which affects the assessment of bracken dominance on the ground.

A few small areas of other tall ruderal vegetation (C3.1) have been mapped, where for example thistles or nettles are dominant in unused enclosures around major farms in the area.

3.1.6 Heathland

All heathland in the Tweed catchment has been classified as upland heath.

Mapping has distinguished between dry heath (D1.1) and wet heath (D2). Often a difficult distinction to make from imagery, guided by indicators such as, for dry heath – steep slope, rocky, with bracken and acid grassland, and for wet heath – evidence of drainage, areas of water etc

Under Phase 1 only 25% cover of heathland plants is required for land to be classified as heathland. This is particularly problematic on heathland/grassland mosaics. Many areas of heath grassland mosaic (D5 and D6) have been mapped but it is a difficult distinction from true heath given the 25% heath rule.

In terms of land use much heathland is used for shooting purposes, and often characterised by burning management, forming a patchwork of burnt areas of different age, easily visible on imagery. Heathland used primarily for grazing can be the subject of overgrazing, showing signs of degradation, again visible from imagery.

3.1.7 Mire

Mire, of various kinds, has been mapped extensively in the Tweed catchment.

Bogs occur throughout the upland area. Blanket bog (E1.6.1) has been mapped extensively on the tops of ridges and upland plateau, using the extent of peat hagging as a primary indicator for the extent of blanket bog. Wet modified bog (E1.7) and dry modified bog (E1.8) have been mapped in areas where the blanket bog has been degraded by grazing or burning, the distinction between the two from imagery largely linked to the extent of heather and Molinia in the vegetation cover.

In the lowlands a small number of raised bogs have been mapped (E1.6.2), generally heather covered, of small extent and surrounded by improved agricultural land.

Flushes and Springs (E2.1) have been mapped throughout the area, as small areas of wet land, mostly in the uplands, often triangular shaped, and often following spring lines along valley sides.

Fens have also been mapped throughout the catchment. In the hills, valley mires are extensive (E3.1), forming linear features along flatter valley sides. In the lowlands basin mires (E3.2) and smaller valley mires have been mapped as largely small and isolated features, forming in the many small basins and wetter areas that are scattered over the lowland part of the catchment.

3.1.8 Swamp, marginal and inundation

A small number of areas have been mapped as swamp and marginal vegetation habitats, largely on the margins of reservoirs and other water bodies, and subject to regular inundation. However the small nature of many of these features means that fewer are mapped than may be present due to the minimum mapping size employed.

3.1.9 Open water

Water has been mapped as standing water (G1) or running water (G2). Standing water in particular occurs as a small number of larger reservoirs, and a large number of small ponds and other water bodies, both natural and man-made, and scattered throughout the whole Tweed catchment. Running and standing water has been mapped from OS MasterMap.

3.1.10 Coastland

Coastland habitats have been mapped along the coastal strip of Northumberland and Scottish Borders. These include:

- Intertidal habitats (H1.1, H1.2, H1.3), especially along the River Tweed itself at Berwick,
- A small area of saltmarsh (H2) again along the lower River Tweed at Berwick,
- Areas of rocks (H4) and hard cliffs (H8.1) along the coast itself,
- Small areas of sand dune (H6).

Larger areas of coastal grassland (H8.4) have been mapped along the cliff top, and extending inland, although the precise boundary between coastal grassland and other grasslands as one proceeds inland is difficult to define accurately from imagery.

3.1.11 Rock exposure and waste

Naturally occurring and unvegetated scree slopes (I1.2) have been mapped occasionally in the upland parts of the catchment, generally as small, often irregularly-shaped areas, and intersected with areas of vegetation. They occur more commonly on steeper slopes, and where soils are shallow.

In the lowlands, areas of existing and disused quarries have been mapped (I2.1).

3.1.12 Miscellaneous

Miscellaneous categories cover a wide range of land cover types, many of which occur within the Tweed catchment.

Arable land/temporary grassland (J1.1) has been mapped extensively in the lowlands, generally in the eastern half of the catchment, with smaller areas in the predominantly upland western half. This category is distinguished from improved grassland on the imagery by the presence of bare soil, growing crops or obvious signs of recent cultivation. Many arable fields are bordered by uncultivated arable field margins, or land left as game cover along field margins, which have been mapped separately where appropriate.

Amenity grassland (J1.2) as a Phase 1 category has been used to include urban parkland and open space, as well as golf courses in the wider countryside.

Urban areas (J3.6) have been mapped from a combination of OS MasterMap – for the road network – and segmentation from the imagery for the boundaries of urban areas themselves.

A category for gardens has been mapped (J1.5), largely to take account of large gardens associated with large houses in the countryside. Gardens have not been separately mapped within urban areas.

Caravan sites (J3.4) have been mapped where appropriate, with a major concentration along the coastal belt.

Bare ground (J4) has been used occasionally to map unvegetated land. In particular two large commercial peat workings in the extreme north-west of the catchment have been mapped as bare ground.

3.2 Scottish Borders Council: LBAP Inventory

Where habitats are made up of large single stand communities they can be accurately assessed from air photography or satellite imagery. However, in many cases the difference between one community and another rests on the presence of certain species that may be present in low numbers or as an understory. In such cases is it possible to provide some idea of where to look for priority habitats but the discussion about whether a particular example is a priority habitat community or not would need confirmation on the ground. The more data available the better an estimate of priority habitat can be gained. For example with two dates and NIR band aerial photography with a spring and a summer image it is possible to assess the productivity of grasslands and get a much better idea of whether land is improved or not.

In the analysis of the autumn RGB photography we have used the context of the communities, and their appearance from the air, together with any further data we have about the site to suggest where they are the priority habitat or the LBAP. The certainty class indicates our ideas for the chance being the priority habitat community. The classes use includes:

- Very Probable, where it is very likely that our community contains the habitat (e.g. coniferous plantation) ,
- Probable, where the there is a fair likelihood that our community contains the habitat,
- Possible, where there is some chance of the priority habitat being found but it would need to be checked.

In all cases the ideal situation is for the sites to be checked by a field visit.

Probability of LBAP habitats

LBAP habitat	Probability (expressed as area of habitat (ha))			Total (ha)	Percentage of SBC area
	Possible	Probable	Very probable		
Acid Grassland	18300	20681		38981	8.22
Arable Field Margin	575			575	0.13
Blanket Bog	4381	12470	8542	25393	5.36
Calcareous Grassland			413	413	0.09
Coastal Sea and shore	423			423	0.09
Coniferous Plantation	4		67526	67530	14.14
Fens, Marsh, Swamp and Reedbed	13445			13445	2.84
Flush	1208	2		1210	0.26
Gorse Scrub		117		117	0.03
Inland and Coastal Rock	36		435	471	0.10
Lowland Fen		2913		2913	0.62
Lowland Raised Bog		409		409	0.09
Maritime Cliff and Slope	142		259	401	0.09
Marsh and Swamp			1	1	0.01
Montane		141		141	0.03

Mosaic with Upland Heath	11631			11631	2.46
Native Woodland	8	1065		1073	0.23
Native Wet Woodlands	38			38	0.01
Neutral Grassland	3608	145		3753	0.8
Purple Moor Grass and Rush Pasture	13930			13930	2.94
Rivers and Burns			1950	1950	0.42
Scrub	1874	1037		2911	0.62
Sea and Shore			12	12	0.01
Standing Open Water			1576	1576	0.34
Swamp		13		13	0.01
Upland Cleuch and Scrub Woodland		126		126	0.03
Upland Heath			42989	42989	9.07
Wood Pasture and Parkland		1812		1812	0.39
Not LHAP - Amenity Grassland	1141			1141	0.25
Not LHAP - Arable Field			73272	73272	15.45
Not LHAP – Bare ground/ Other Non-Habitat		51		51	0.02
Not LHAP - Bracken			10551	10551	2.23
Not LHAP - Broadleaved Plantation			875	875	0.19
Not LHAP - Built Environment, Urban	2	55	9879	9936	2.1
Not LHAP - Felled Woodland			8311	8311	1.76
Not LHAP - Gardens	468			468	0.1
Not LHAP - Improved Pasture			119135	119135	25.03
Not LHAP - Mixed Woodland			8334	8334	1.76
Not LHAP - Poor Semi-Improved Grassland			6111	6111	1.29
Not LHAP - Ruderal Communities	24		56	80	0.02
Not LHAP - Scattered Bracken			1718	1718	0.37
Grand Total	**71238**	**41037**	**361945**	**474220**	**100**

LBAP habitat	**Probability (expressed as length in (km)**			
	Possible	**Probable**	**Very probable**	**Total (km)**
Hedgerow		5,377.7		**5,377.7**

3.2.1 Woods and scrub

It is not possible to tell priority native woodlands from the air at this scale; however there were 1,073 ha of semi-natural woodland identified which may well correspond to one of the BAP types in addition there are about 38ha of wet woodlands. These areas were where the air photo interpretation and the Ancient Woodland datasets agreed. Many of these woodlands are in steep valley sides. Several areas are surrounded by coniferous plantation, and this study may have under-recorded the amount of native woodland contained within coniferous forest blocks. It is not possible from just RGB photography to identify the type of woodland. The Forestry Commission is undertaking a very detailed survey to update the Priority woodland map of Scotland; it is recommended that the BAP classes be updated with the data from this survey when it is completed.

Scrub, can be clearly seen from the air, and gorse scrub has been pulled out as a separate class. It is not possible to tell hawthorn from blackthorn scrub from the air. However, it is likely that the scrub areas not identified as gorse scrub will contain these species. Gorse scrub covers an area of 117 ha and account for just 0.03% of the land area of the SBC.

3.2.2 Mosses, Lochs and Clarty Holes

Fens, were identified from the air photos, in nearly all the cases there were also field surveys of the sites to confirm the air photo finds. Fens, make up an important features in the SBC region. There were 13,445 ha of fen features identified, mostly they were valley mires or basin mires with a couple of flood plain mires being identified from the Tweedmuir Phase 1 survey.

Marsh, swamp and reedbed are generally very small features, extremely hard to spot from the air. There were few NVC records for these habitats and as they are quite ephemeral in nature it was hard to see them in the photos, they were therefore mostly identified by the NVC survey data.

The area of Loch and Lakes and Ponds provide a significant area of aquatic habitat. The distribution of standing water can be seen in Figure 4.

3.2.3 Rivers and burns

The rivers and burns are an extremely important part of the habitats of the Scottish Border area. The following two maps show the extent of rivers and of open water.

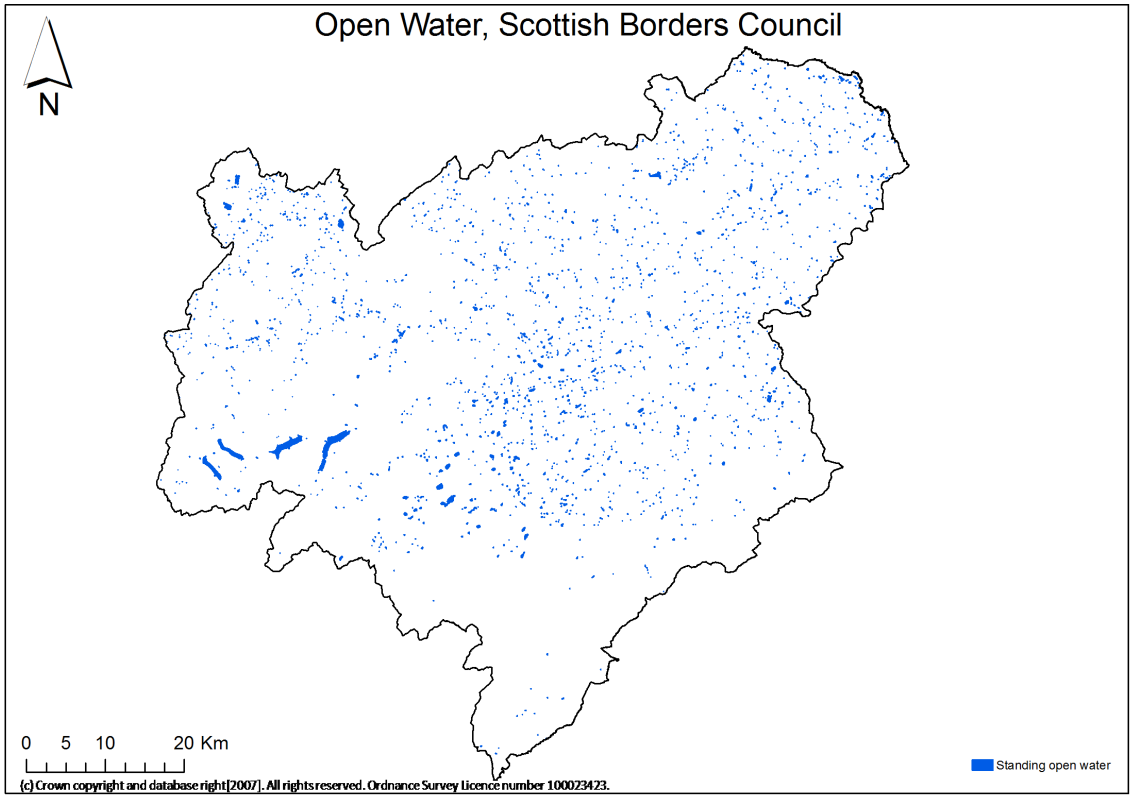

Figure 4: Map of Open Water

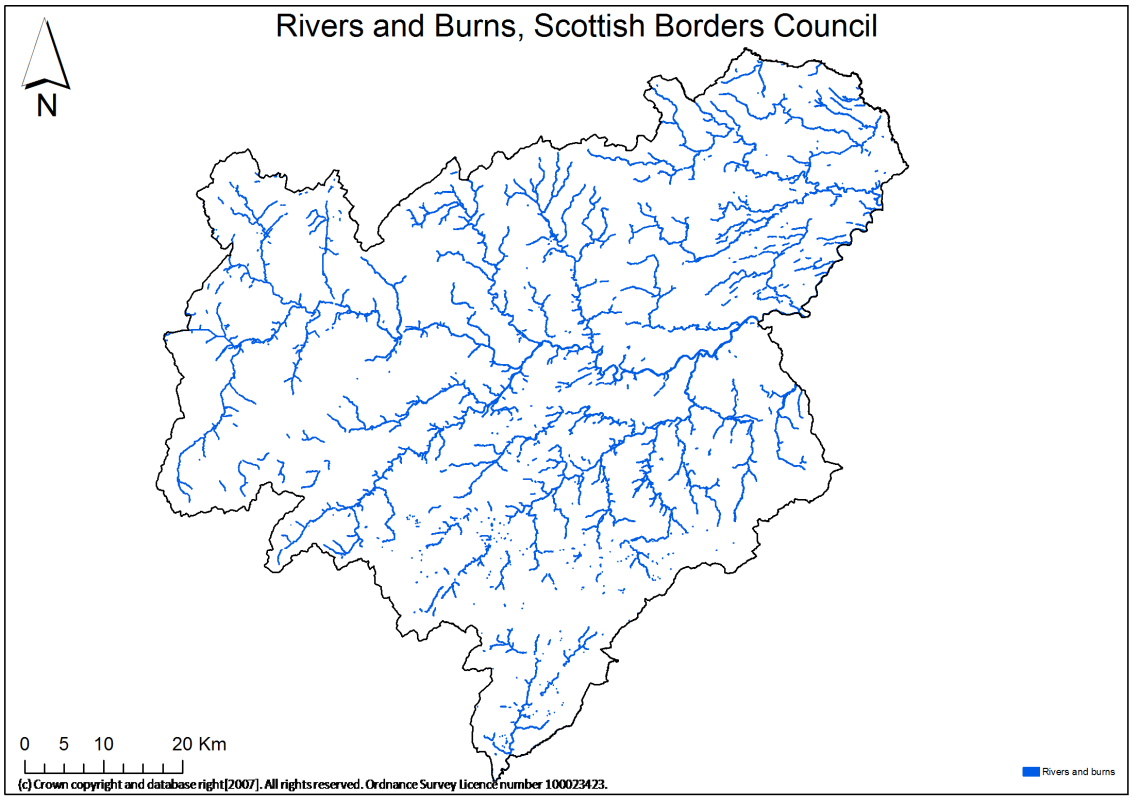

Figure 5: Map of Rivers and Burns

3.2.4 Hummels, Haughs and Knowes

Within the arable valleys of the area several geological features run as ridges across the landscape. The rocky tops of these and the steep sides contain interesting species rich grassland communities and scrub and scrub woodland. It is extremely hard to pull out species rich grassland by air photo survey and many of the sites with a degree of certainty attached have been identified from NVC surveys. Neutral grassland was identified on 3,753 ha of land, but generally with a low certainty. It is strongly recommended that these sites be field visited to assess whether they do contain species rich grasslands, see the map below.

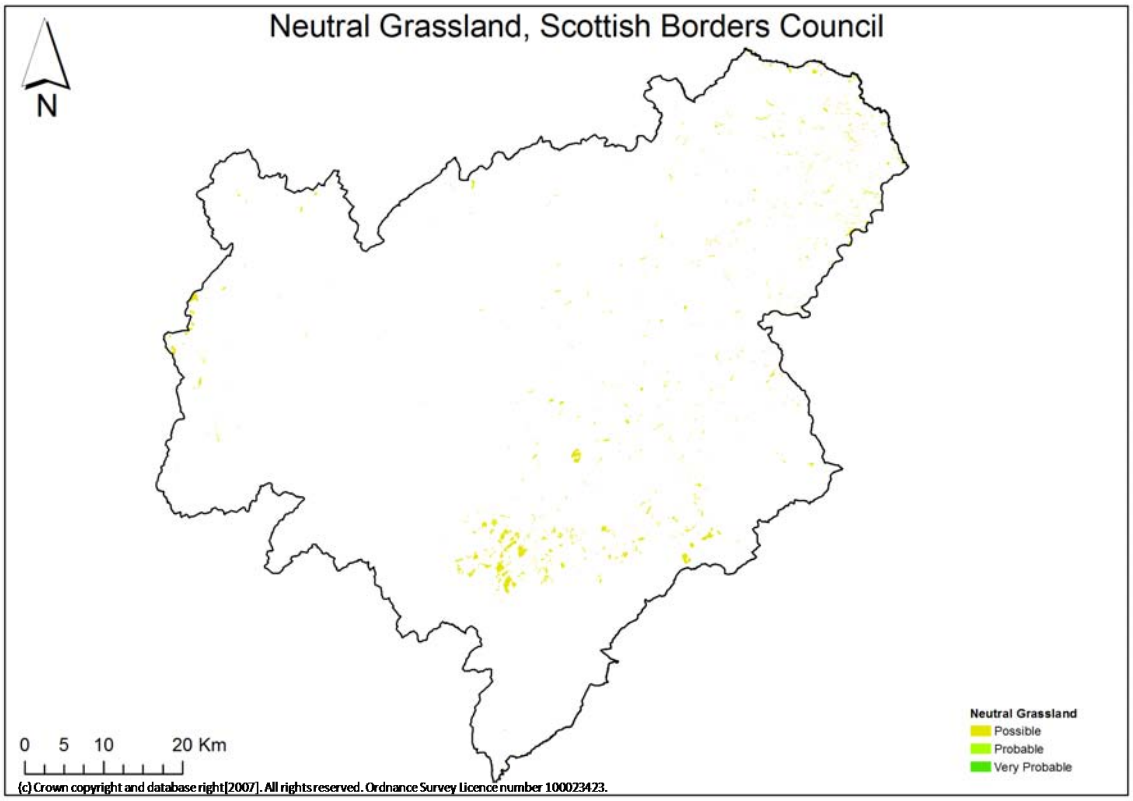

Figure 6: Map of Neutral Grassland

There are several areas of rocky outcrops with a mixture of acid grassland, neutral grassland and calcareous grassland. We found the geology map insufficiently detailed to guide us in the type of rock outcrop and have therefore had to make a decision based on the look from the air. In many cases there are field surveys which have guided the choice, where there is no additional field data, the grassland type should be checked in the field.

3.2.5 Boundary and linear features

A dataset has been collated about hedge line boundary features noted from the air. In order to see if they meet the criteria of national BAP classification a field visit would be necessary. The hedge dataset is shown in Figure 7 below.

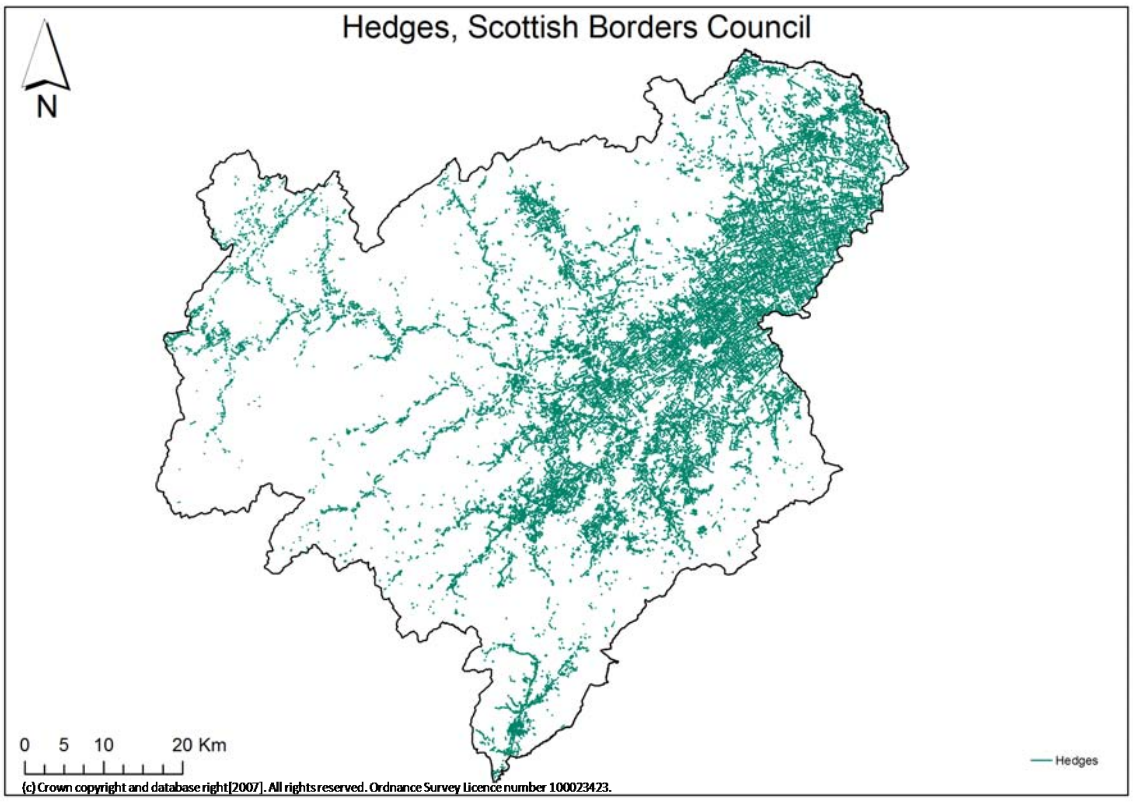

Figure 7: Map of Hedges

The arable area of the SBC had many strips of grassland acting as large field margins or as game cover. These are clearly identifiable features from the air, which will probably have been subject to much change in the last years as the agricultural subsidy rules change

3.2.6 Hills, Heather and High Tops

The upland areas of Tweed contain an important mix of semi-natural habitats and some significant amount of blanket bog and managed heathland. Over 9% of the SBC area comprises upland heathland mostly dominated with ling heather (*Calluna vulgaris*), some of this is in a mosaic with other habitats' such as grassland and bog, and therefore has a lower degree of certainty, than the heather dominated areas. Upland blanket bogs are also an important feature of the area. The difficulty in interpretation came as the bogs degraded towards wet heath and marshy grassland, these features are often less easy to separate from the air. Where we were less certain of them we have indicated this in the 'certainty of LHAP class'.

Where there is good evidence that these are intact they have been recorded as certain, where they are modified then the LBAP class is recorded as only possible. The map below shows the distribution of Blanket Bog in the SBC area. We did not separate mountain habitats in the survey as these categories depend on the presence of small mosses and are not easily identifiable from the air; they are also likely to be highly localised and very small in extent.

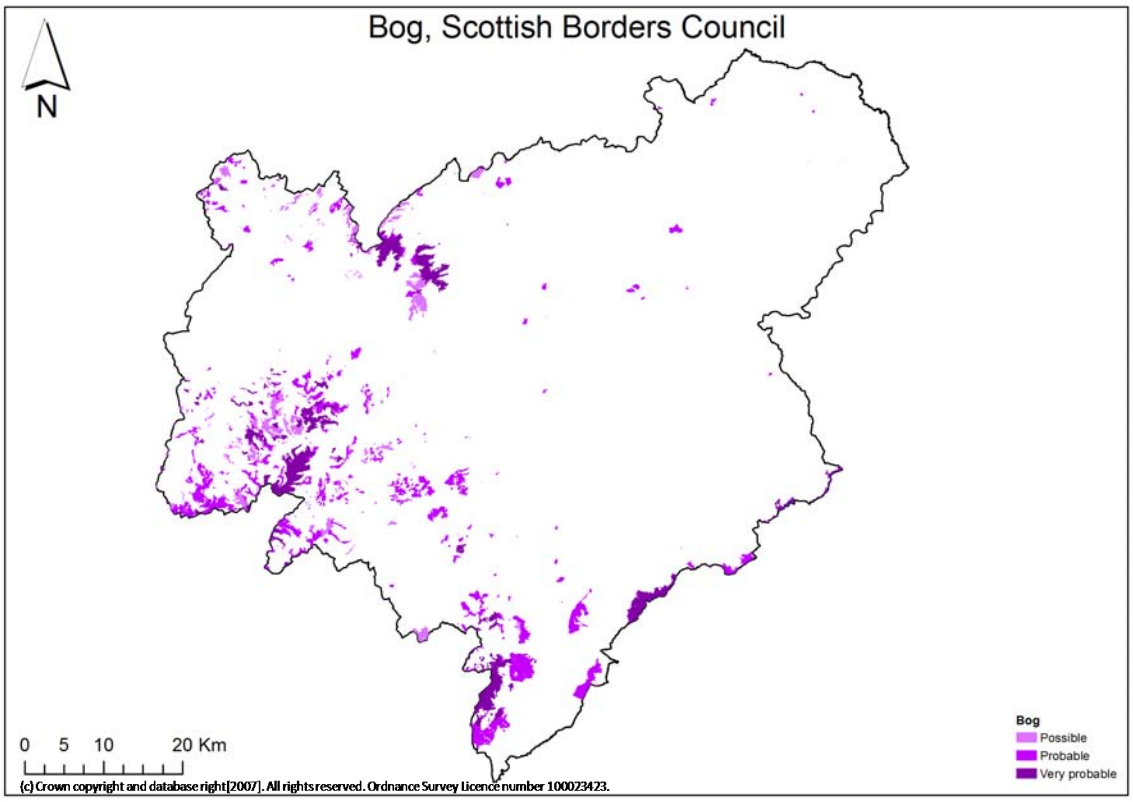

Figure 8: Map of Bog

3.2.7 Coastal Braes and Deans

The cliff and wooded valleys (deans) of this part of the east coast of Scotland contain some important habitats and species. Over 423 ha of coastal cliff and slope vegetation have been identified. The sand dune system and maritime heath are mapped in the GIS data and have associated NVC surveys.

4. Uses and Update of the Datasets

This data set is intended as an initial baseline that will be hosted on the SBC website as a live and living view of the area. When professionals are surveying in the area they will be able to update the map through the Council's website and local biological records centre (The Wildlife Information Centre) who will in turn provide updates to SBC who will the update the website. Therefore, the data set will not only be a record of what is currently present, but the accuracy and certainty of the data base should increase with time and usage. Furthermore attribution notes and photos can also be added to aid interpretation in the future.

Remotely sensed data does have differences (in spatial accuracy and common errors) from field data as explained earlier. Indeed some vegetation classes are vague and part of a wider continuum or ecotone, so inherently difficult to map by any method. Therefore by establishing the certainty of each polygon in this way and allowing update of the dataset it will be possible to build up both the certainty and

the accuracy of the data set using the everyday work of ecologists and fieldworkers within Scottish Borders LBAP and the Tweed Forum partnership.

This inventory puts the Scottish Borders in a good position, in having a complete local contribution to the development of any national inventory for habitats of Scotland.

5. Data Maintenance and Management Plan

It is recommended that all amendments are recorded using the polygon 'Id_Nmbr' along with any changes required. These are to be collected on a regional scale and then periodically submitted to the wildlife centre. The data centre would then action all amendments and release updated versions of all three areas simultaneously, replacing the existing versions in circulation.

The Phase 1 habitat classification certainty attribution is based upon existing datasets and/or field visits. To effectively improve the current classification, it is suggested that initial efforts are focused on areas which are not covered by either of the above. In addition to this, any field survey data produced by e.g. SNH or SEPA or private contractors (with supporting photographic evidence) be used to update the Phase 1 habitat classification. The following are suggested as a way of improving the data quality:

- Check the habitats the location of each of the local wildlife sites, if possible using the notes and paper files,
- Utilise the expertise of the local SNH officers to check sites known to them, particularly concentrating on any semi-natural grasslands,
- Utilise recent field survey and species recording notes to check on sites with a specific interest especially those that may be BAP habitat standard and ensure the BAP types are updated and the certainty column is changed,
- Bracken is particularly difficult to identify in the September imagery and areas of known bracken coverage should be examined and updated if necessary,
- Within the southern area there are several 'squares' of late imagery with very difficult shadowing, these would also benefit from field checking,
- Once these checks have been made it is strongly recommended that important BAP and LBAP polygons with a less sure classification of 'possible' be field checked,
- The National Forest Inventory project (Forestry Commission) is due to be completed for the Tweed catchment over the next couple of years. It is being created from a combination of air photo interpretation and ground survey. When the data is available it is suggested that it is carefully evaluated with the potential for globally replacing and updating this inventory in the following way,
    - Remove existing forest
    - Dilate surrounding polygons to prevent slithers/holes
    - Cut in new forest dataset

6. Conclusions and Recommendations for the Future

The main conclusions and recommendations are:

- The Phase 1 map illustrates well the importance and distribution of semi-natural habitats across the Scottish Borders and Tweed catchment in a comprehensive, consistent and transparent way. Where possible an indication of certainty in the classification has been tagged to each polygon to help the data interpretation process.

- The dataset provides an important knowledge resource for setting and managing biodiversity targets in Scottish Borders and the Tweed catchment area.

- This data set provides the first full baseline audit for the Scottish Borders Local Biodiversity Action Plan. This will be of use to inform targeting of agri-environment measures under Scottish Rural Development Programme and Environmental Stewardship in North Northumberland. The inventory will also form a useful tool for the identification of the environmental framework to inform Development planning and Development management and to inform SBC's Flood Protection Programme and the Solway-Tweed River Basin Management Plan and Tweed Catchment Management Plan.

- The mapping process from imagery provides a rapid and consistent approach to habitat identification, but has certain inherent limitations. In terms of major priority habitats it is difficult from imagery to identify certain habitat types, such as types of broadleaved woodland. It is also difficult to identify and map secondary habitats that might otherwise be important, such as patches of old broadleaved woodland where planted up with dense and extensive coniferous plantations.

- Of other important habitats, calcareous grassland is difficult to identify precisely, and depends very much on accompanying geological knowledge (or the extent of rocky outcrops). It is also a habitat that is at risk, being generally present in lowland areas and surrounded by improved agricultural land.

- The 2007-09 map provides a baseline and historic record of the extent of each habitat type, against which to measure future change. This is especially important for ephemeral habitats, such as some field margins and gorse scrub, the extent of which can change rapidly and regularly.

- It identifies the extent and distribution of poor improved or degraded habitats, where habitat restoration projects may be targeted in future.

- It shows the extent of habitat networks and connectivity and facilitates targeting of additional connections. It will allow an additional study of main habitat networks and potential areas for expansion of these networks. This work is currently being undertaken and is due to report in 2010.

- The network and opportunities mapping can also be expanded to include other data sets and to start an analysis of how the ecosystems of the Tweed catchment are providing 'goods and services'.

- It highlights the importance in improved lowland agricultural areas of field margins, small copses and hedges as reservoirs of biodiversity

- Future imagery acquisition should be planned and budgeted for; to ensure future monitoring and remapping exercises can be planned. Mid-summer imagery is most effective, avoiding the difficulties with early summer and late summer imagery, although this is often outside the control of those commissioning aerial photography due to weather etc.

- Image segmentation and semi-automatic mapping processes are continuously improving as more experience is gained, and may enable more precise and less uncertain mapping of a much greater range of habitats in future years.

- Although detailed local surveys can be used to inform and improve the automated classification process, there will always be a role for manual intervention, and an experienced aerial photography interpreter, in the mapping process.

- Use of satellite imagery to update the Phase 1 inventory on a 5 or 10 year cycle. Good opportunities will be available within the next five years under the European Global Monitoring for Environment and Security (GMES) project to obtain a range of high resolution satellite imagery including 10m optical data. It is understood that the current release plan is for the imagery to be made available as 'free and open' to statutory and other bodies on a regular basis. If a spring and summer image can be obtained it is possible to use a 'rule base' approach to examine habitats. It is strongly recommended that the segmentation generated during this project be looked at by BAP or LBAP habitat type to see if the polygons have remained the same, or if there is an indication of change. This can be done by looking at the spectral signatures and provides a cost effective means of rapid mapping and monitoring.

7. References and Bibliography

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Moseley D G and Ray D (2006) Forest Habitat Networks Scotland Borders and the Lothian Report . Forestry Commission.

Scottish Borders Council (2001) Biodiversity in the Scottish Borders: Overview and first steps. Scottish Borders Local Biodiversity Action Plan.

Tweed Forum (2010 Draft) Tweed Wetland Strategy.

GIS Data:

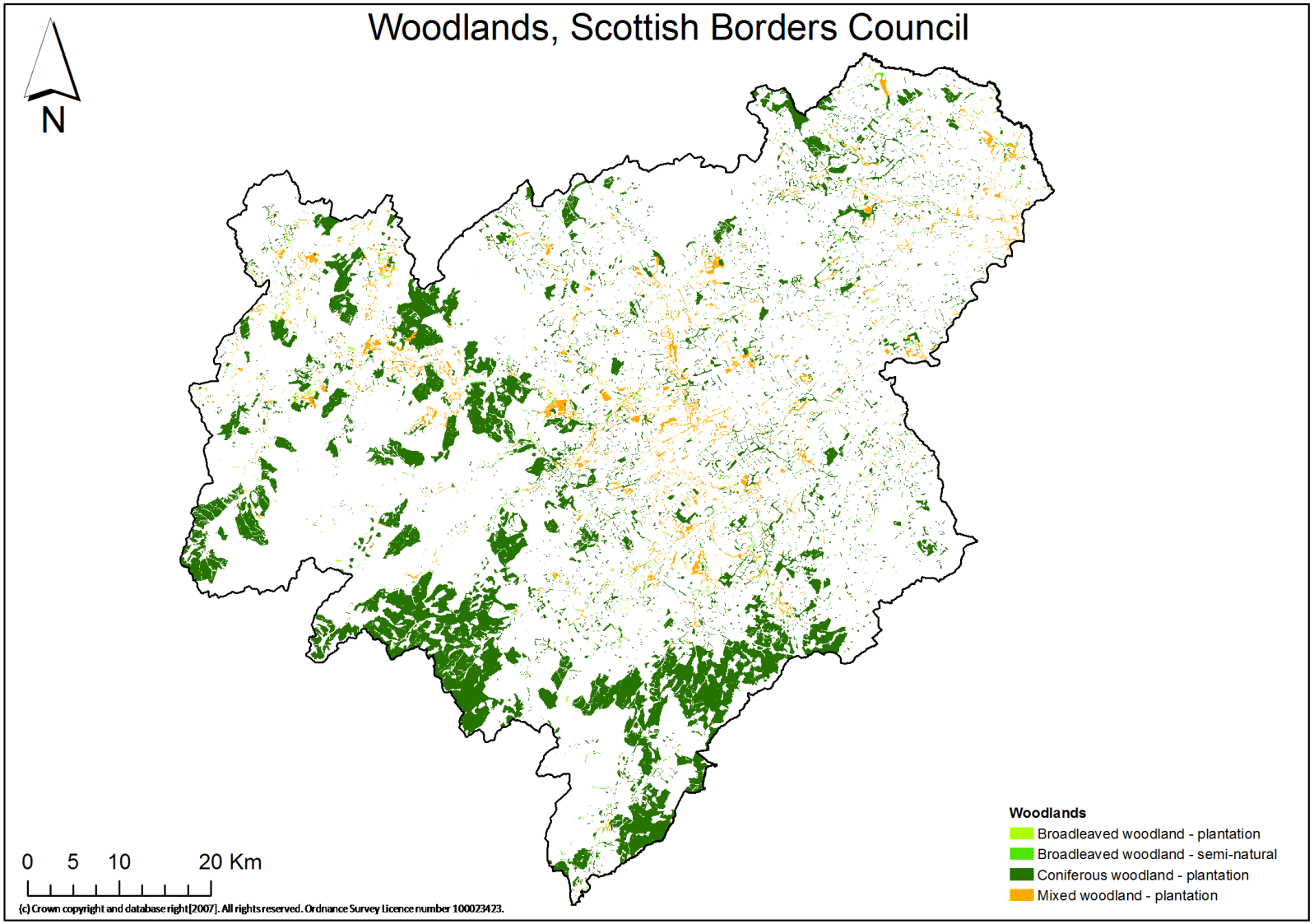
Data Set Used	Use
Allotments (SBC)	Attribution of amenity land in towns.
Ancient woodland inventory(SNH)	Attribution and location of coniferous, mixed and broadleaved woodland.
Scottish Semi Natural Woodland Inventory (SBC)	Attribution and location of woodland
Area Great Landscape Value (SBC)	General context.
Moorfoot upland survey (SBC)	Useful for helping with attribution.
Borders forest habitat network (FC / SBC)	Attribution and location of coniferous, mixed and broadleaved woodland.
NVC Surveys (SNH)	Attribution and location of habitats.
Historic Gardens & Designed Landscapes(SBC)	Identification of Parklands.
Landscape Character Assessment (SBC)	General context.
Protected Areas including: NNR, RAMSAR, SAC, SPA, SSSI (SNH)	Location of habitats where Phase 1 or 2 maps exists.
Wetlands surveys (SNH)	Attribution and location of habitats.
Salt Marsh Survey (SNH)	Location and attribution
Open water Sites (SNH)	Location of habitats.
Blanket Bog Inventory (SNH)	Assistance with attribution
Dune Survey (SNH)	Location and attribution
Lowland raised Bog Inventory (SNH)	Assistance with attribution
Vacant and Derelict Land (SBC)	Location of habitats.
NVC Grassland survey(SNH)	Attribution.
Lowland raised bog NVC surveys (SNH)	Attribution.
Moorfoot Hills upland survey (SBC)	Attribution and assistance with location of habitats.
Tweeddale Phase 1 survey(SBC)	Attribution and assistance with location of habitats.
OS Master Map	Location Information and segmentation of fields
Scottish Wildlife Trust Wildlife Sites (SWT/SBBRC)	Checking attribution (ongoing)

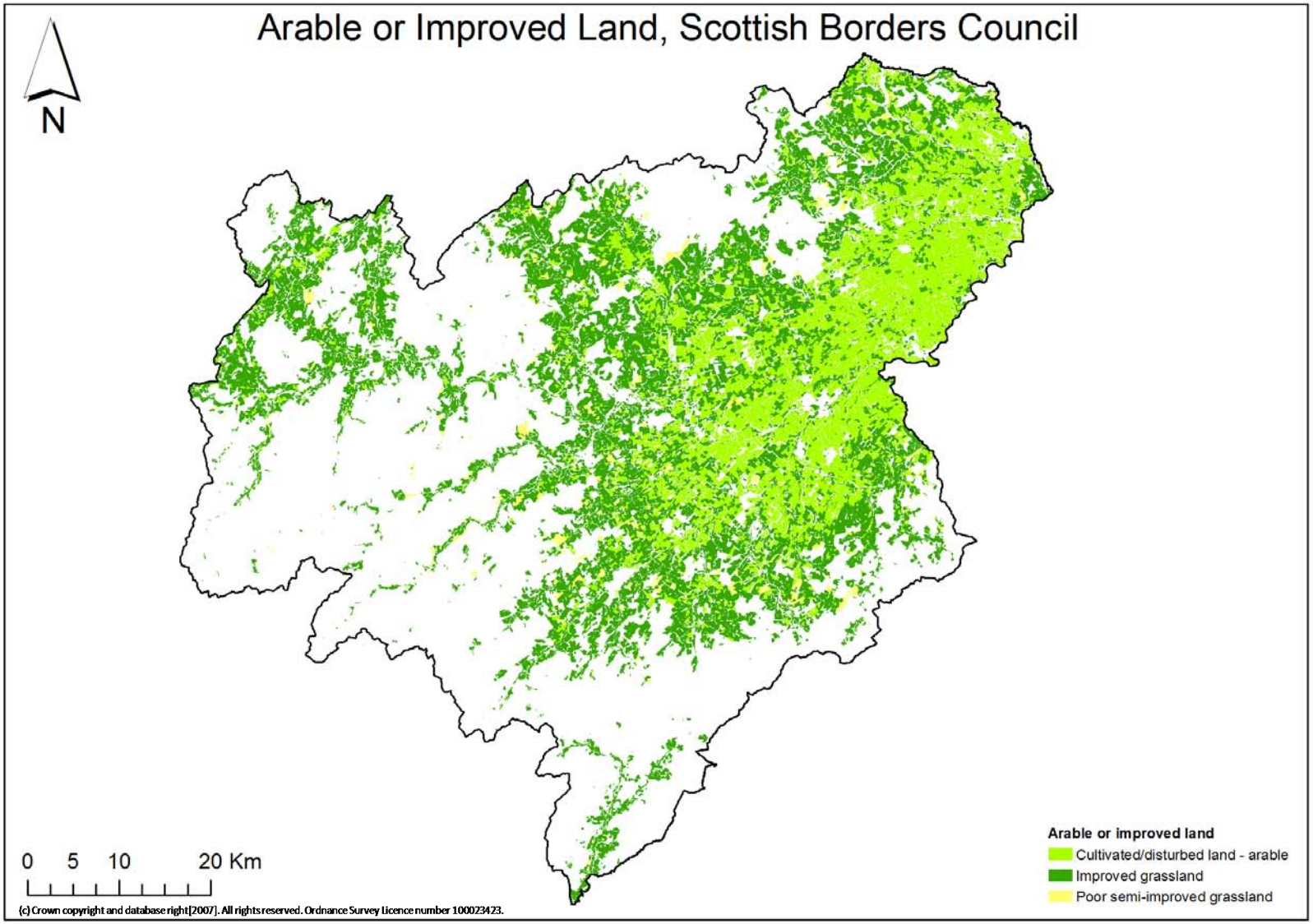
Appendix 1 Scottish Borders Council: Phase 1 Habitat Types

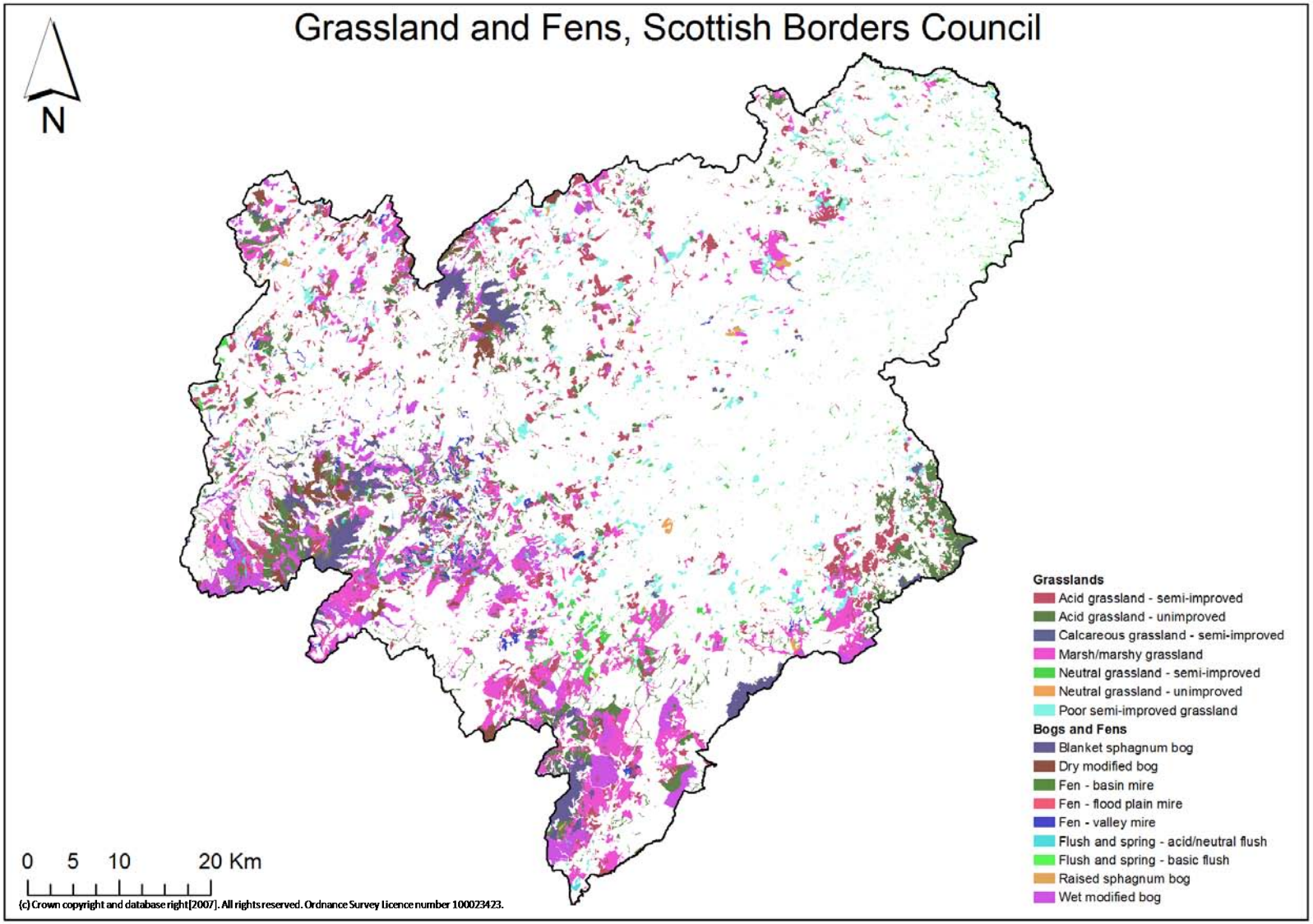
Detailed results of the Phase 1 habitat mapping of the SBC area, together with a table of all classes identified.

Phase 1 Habitat	Confidence (expressed as classified area, (ha)			Total area (ha)
	Low	Medium	High	Grand Total
Acid grassland - semi-improved	106.65	18052.57		18159.22
Acid grassland - unimproved	277.87	20403.12		20680.98
Bare ground		49.56		49.56
Blanket sphagnum bog		8541.17		8541.17
Boundaries		47.28		47.28
Bracken - continuous	27.57	10522.92		10550.49
Bracken - scattered	12.3	1705.62		1717.92
Broadleaved parkland/scattered trees		1356.34		1356.34
Broadleaved woodland - plantation		871.18	3.55	874.73
Broadleaved woodland - recently felled		51.84		51.84
Broadleaved woodland - semi-natural		1060.68	136.38	1197.05
Built land		9878.19		9878.19
Calcareous grassland - semi-improved		407.78	4.55	412.32
Caravan site		54.33		54.33
Coastal grassland		146.36		146.36
Coniferous parkland/scattered trees		0.64		0.64
Coniferous woodland - plantation	25.22	47154.23	20345.74	67525.18
Coniferous woodland - recently felled		8229.85		8229.85
Cultivated/disturbed land - amenity grassland		1140.28		1140.28
Cultivated/disturbed land - arable	0.82	73270.75	2.75	73274.31
Cultivated/disturbed land - ephemeral/short perennial		1.08		1.08
Dry dwarf shrub heath - acid	147.96	38118.6		38266.56
Dry dwarf shrub heath - basic		10.98		10.98
Dry heath/acid grassland	121.03	7922		8043.02
Dry modified bog		4368.12		4368.12
Dune grassland		1		1
Fen - basin mire	1.76	339.68	1.75	343.19
Fen - flood plain mire		52.66		52.66
Fen - valley mire	1.5	2514.97		2516.47
Flush and spring - acid/neutral flush	3.38	1204.26		1207.63
Flush and spring - basic flush		39.64		39.64
Gardens		467.28		467.28
Hard cliff		84.1		84.1
Hedge with trees		0.09		0.09
Improved grassland	112.33	119180.4		119292.7
Intact hedge		2.64		2.64

Intertidal		276.58		276.58
Intertidal - boulders/rocks		140.97		140.97
Intertidal - mud/sand		11.47		11.47
Intertidal - shingles/cobbles		5.25		5.25
Introduced shrub		22.2		22.2
Marginal and inundation - marginal vegetation		1.02		1.02
Maritime cliff and slope		141.23		141.23
Marsh/marshy grassland	105.95	27397.56		27503.5
Mixed parkland/scattered trees		454.27		454.27
Mixed woodland - plantation	1.19	8265.34	66.69	8333.2
Montane heath/dwarf herb		140.01		140.01
Neutral grassland - semi-improved	7.39	3413.57		3420.96
Neutral grassland - unimproved		345.29		345.29
Other exposure - acid/neutral		32.27		32.27
Other habitat		0.7		0.7
Other rock exposure		0.57		0.57
Other tall herb and fern - non ruderal		1.34		1.34
Other tall herb and fern - ruderal		54.24		54.24
Poor semi-improved grassland	40.33	6484.81		6525.14
Quarry	23.8	237.67		261.47
Raised sphagnum bog		408.83		408.83
Recently felled woodland		28.91		28.91
Refuse-tip		1.61		1.61
Running water		1949.3		1949.3
Scree		153.3	2.66	155.95
Scree - acid/neutral		2.46		2.46
Scrub - dense/continuous		2006.05		2006.05
Scrub - scattered	3.35	1025.29		1028.64
Spoil		17.18		17.18
Standing water	5.92	1510.26	59.71	1575.89
Swamp	3.31	9.81		13.12
Wet dwarf shrub heath	22.56	4715.4		4737.95
Wet heath/acid grassland		3587.07		3587.07
Wet modified bog		12469.76		12469.76
Total (ha)	1052.1	452563.4	20623.73	474239.2


Woodlands, Scottish Borders Council
N
0 5 10 20 Km
(c) Crown copyright and database right [2007]. All rights reserved. Ordnance Survey Licence number 100023423.
Woodlands
Broadleaved woodland - plantation
Broadleaved woodland - semi-natural
Coniferous woodland - plantation
Mixed woodland - plantation


Arable or Improved Land, Scottish Borders Council
N
0 5 10 20 Km
(c) Crown copyright and database right [2007]. All rights reserved. Ordnance Survey Licence number 100023423.
Arable or improved land
Cultivated/disturbed land - arable
Improved grassland
Poor semi-improved grassland


Grassland and Fens, Scottish Borders Council
N
0 5 10 20 Km
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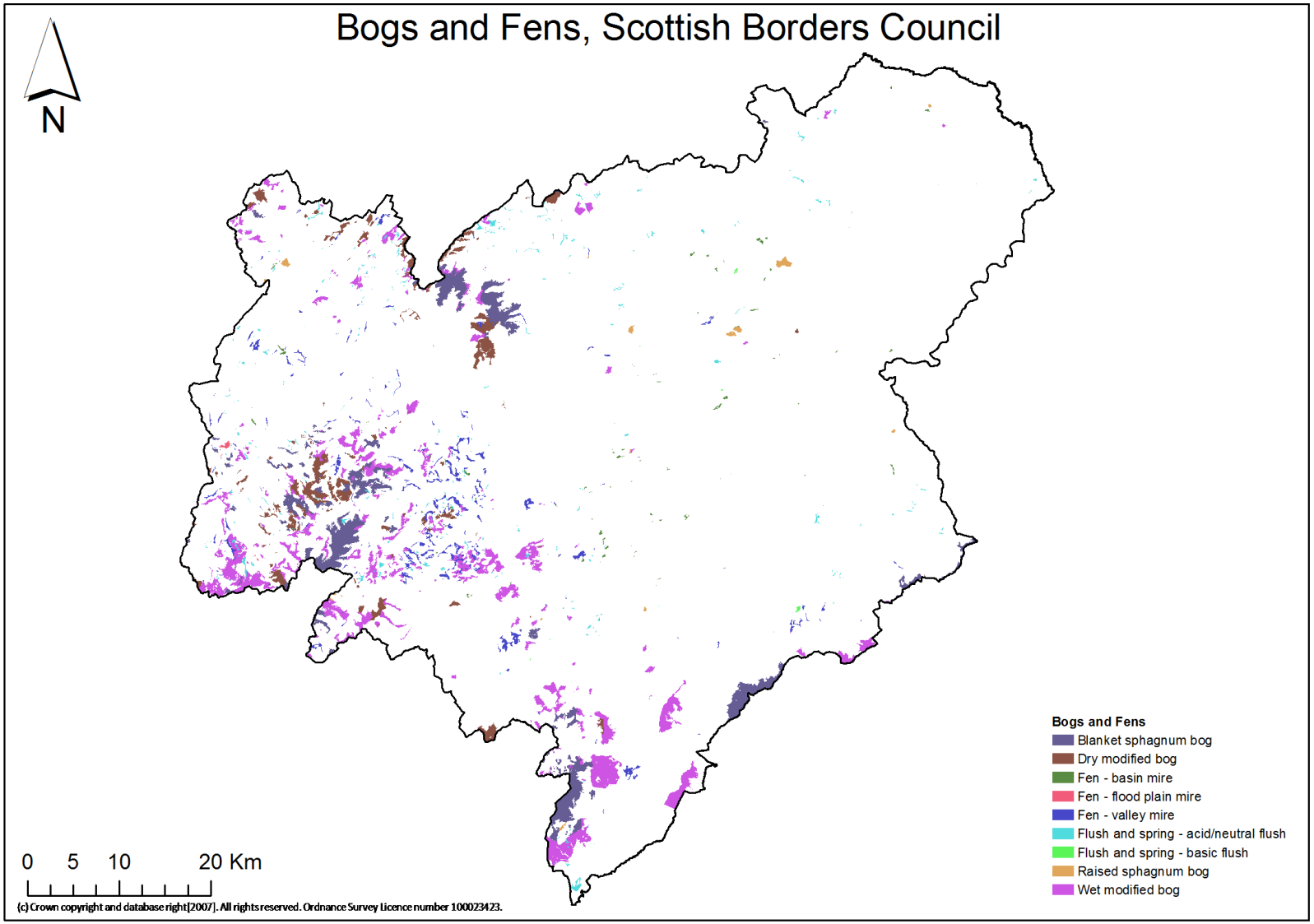
Grasslands
Acid grassland - semi-improved
Acid grassland - unimproved
Calcareous grassland - semi-improved
Marsh/marshy grassland
Neutral grassland - semi-improved
Neutral grassland - unimproved
Poor semi-improved grassland
Bogs and Fens
Blanket sphagnum bog
Dry modified bog
Fen - basin mire
Fen - flood plain mire
Fen - valley mire
Flush and spring - acid/neutral flush
Flush and spring - basic flush
Raised sphagnum bog
Wet modified bog


Bogs and Fens, Scottish Borders Council
N
0 5 10 20 Km
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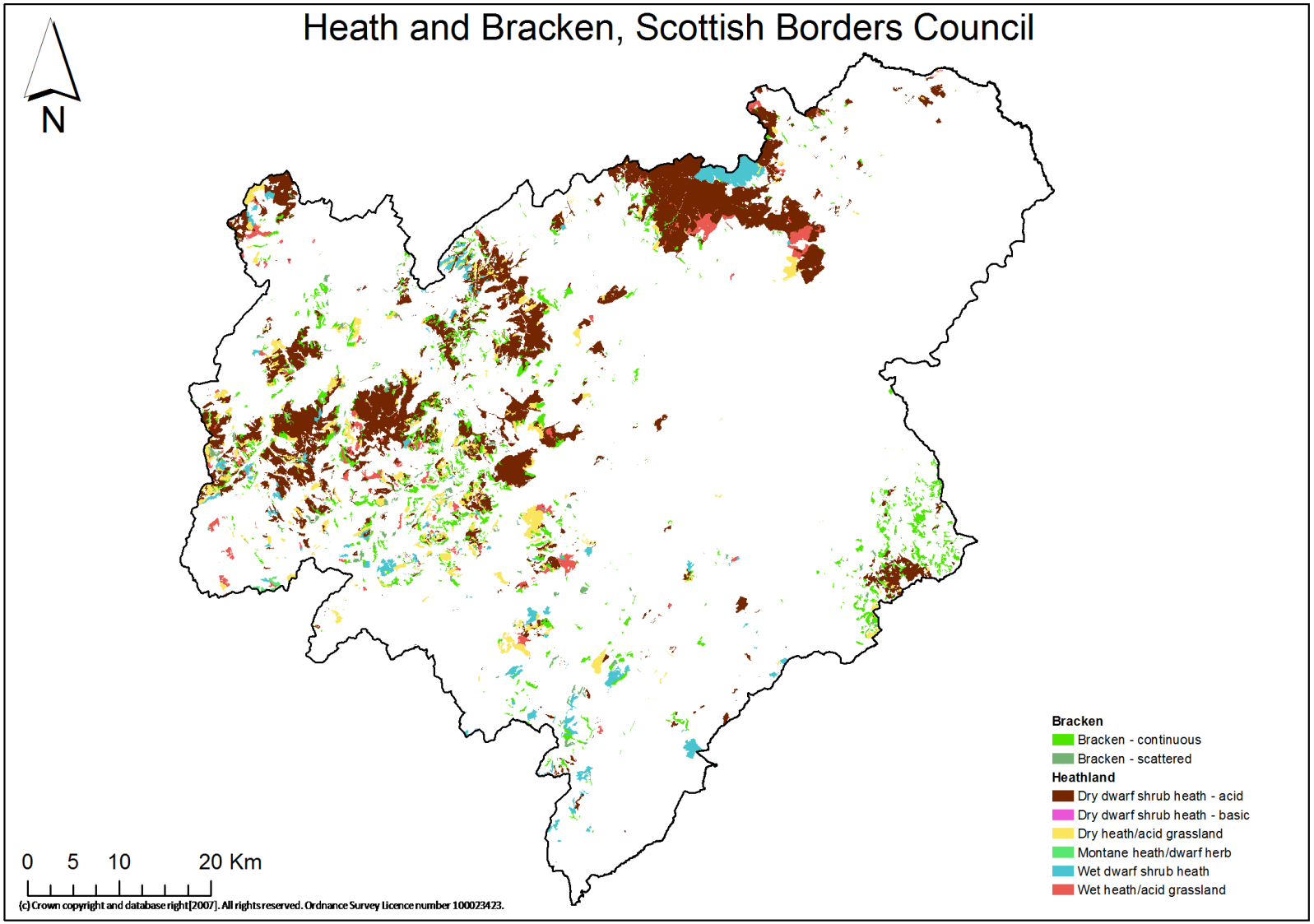
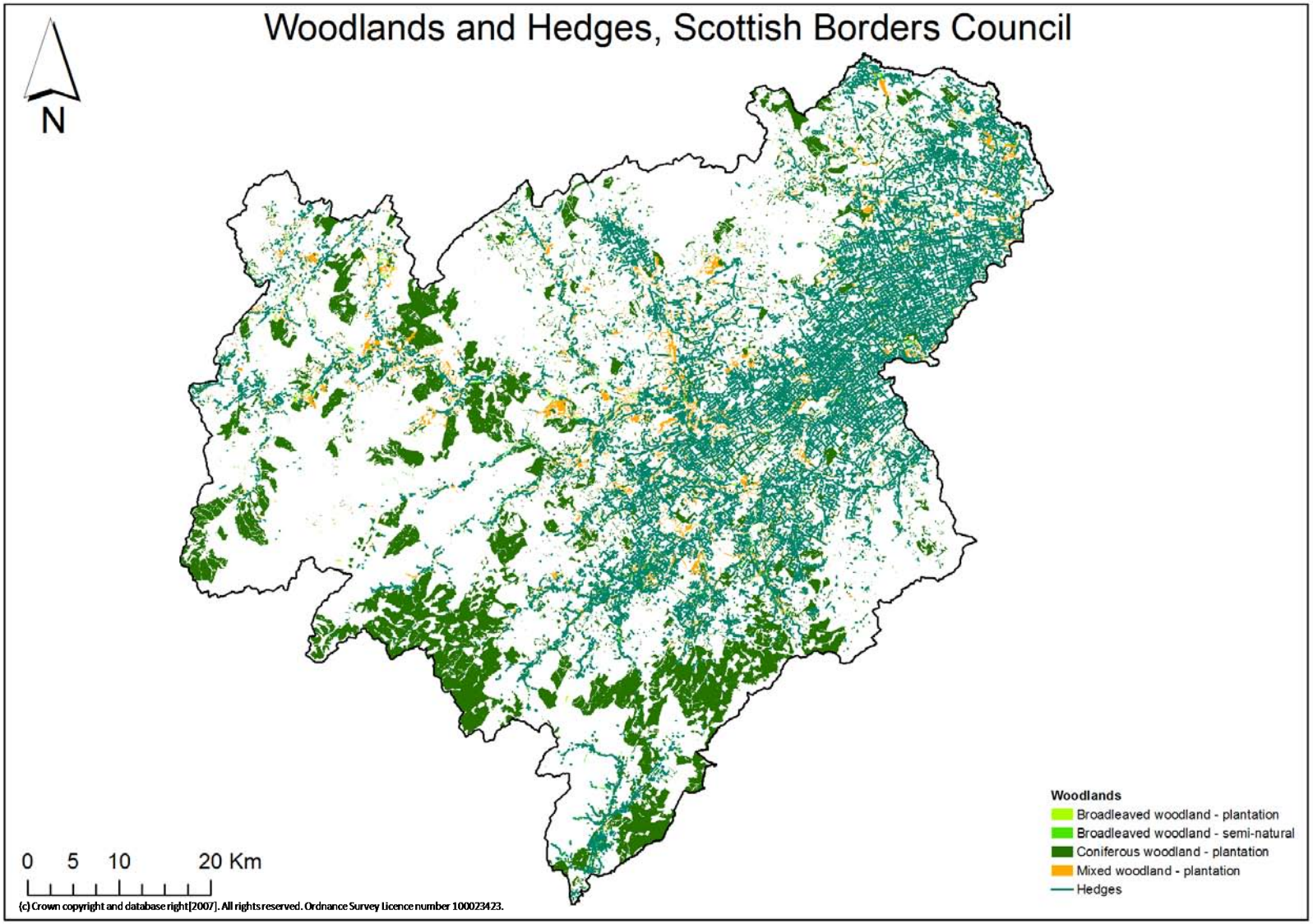
Bogs and Fens
Blanket sphagnum bog
Dry modified bog
Fen - basin mire
Fen - flood plain mire
Fen - valley mire
Flush and spring - acid/neutral flush
Flush and spring - basic flush
Raised sphagnum bog
Wet modified bog


Heath and Bracken, Scottish Borders Council
N
0 5 10 20 Km
(c) Crown copyright and database right [2007]. All rights reserved. Ordnance Survey Licence number 100023423.
Bracken
Bracken - continuous
Bracken - scattered
Heathland
Dry dwarf shrub heath - acid
Dry dwarf shrub heath - basic
Dry heath/acid grassland
Montane heath/dwarf herb
Wet dwarf shrub heath
Wet heath/acid grassland


Woodlands and Hedges, Scottish Borders Council
N
0 5 10 20 Km
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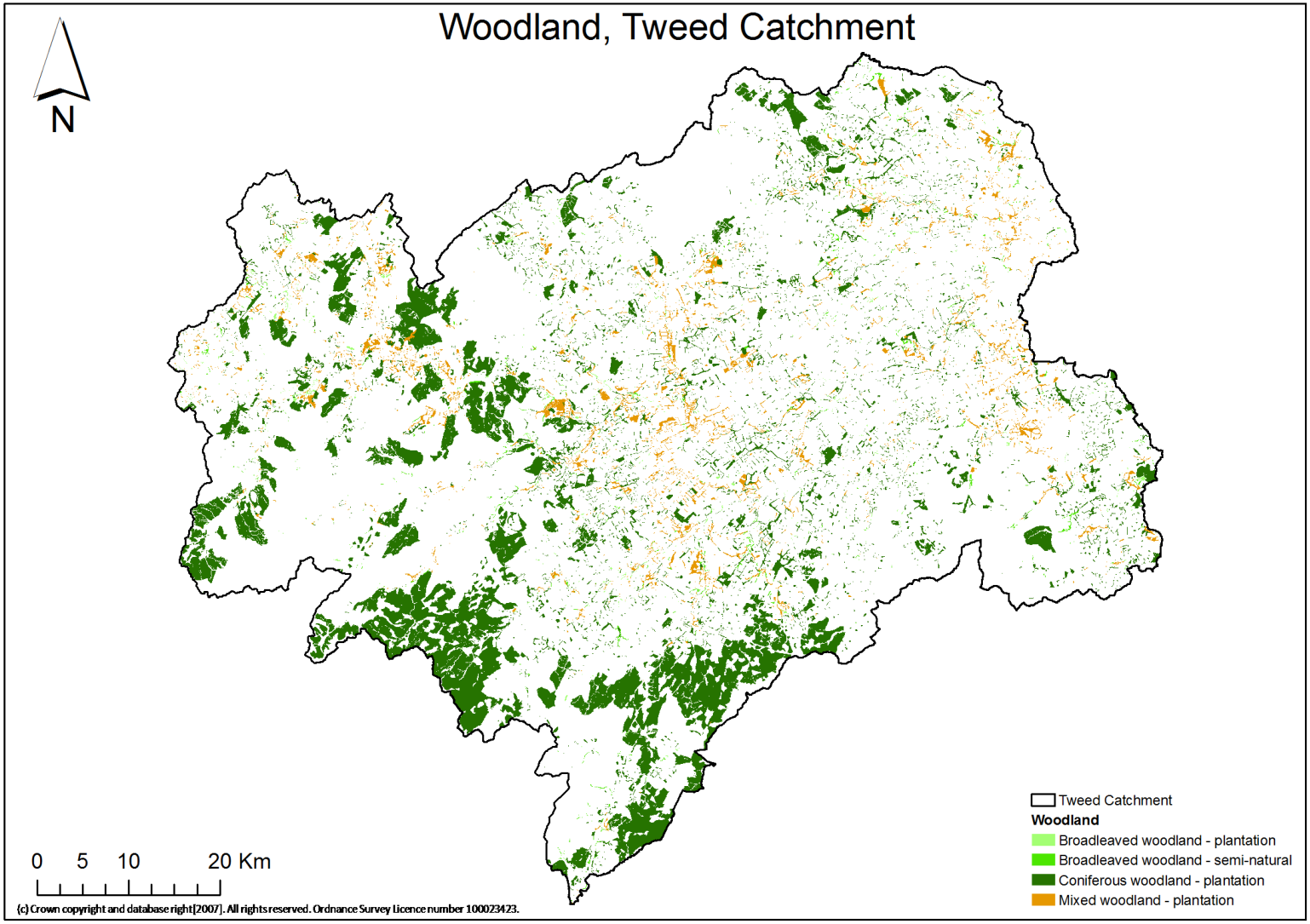
Woodlands
Broadleaved woodland - plantation
Broadleaved woodland - semi-natural
Coniferous woodland - plantation
Mixed woodland - plantation
Hedges

Appendix 2 Tweed Catchment: Phase 1 Habitat Types

Table showing Phase 1 Vegetation Classes mapped in the Tweed Catchment

Phase 1 Habitat	Confidence (expressed as classified area, ha)			Total area (ha)
	Low	Medium	High	Grand Total
Acid grassland - semi-improved	106.7	20557.6		20664.3
Acid grassland - unimproved	277.9	24935.5		25213.4
Bare ground		57.5		57.5
Blanket sphagnum bog		9719		9719
Boundaries		47.3		47.3
Bracken - continuous	27.6	13171.1		13198.7
Bracken - scattered	14.5	2094.2		2108.7
Broadleaved parkland/scattered trees		1529.5		1529.5
Broadleaved woodland - plantation		999.4	3.6	1003
Broadleaved woodland - recently felled		55.4		55.4
Broadleaved woodland - semi-natural		1299.9	136.4	1436.3
Built land		11857.4		11857.4
Calcareous grassland - semi-improved		494	4.6	498.6
Caravan site		83.2		83.2
Coastal grassland		176.9		176.9
Coniferous parkland/scattered trees				0
Coniferous woodland - plantation	25.3	54112.9	20388.9	74527.1
Coniferous woodland - recently felled		8461.5		8461.5
Cultivated/disturbed land - amenity grassland		1368.3		1368.3
Cultivated/disturbed land - arable		97157	2.8	97159.8
Cultivated/disturbed land - ephemeral/short perennial		3.1		3.1
Dry dwarf shrub heath - acid	148	49605		49753
Dry dwarf shrub heath - basic		26.1		26.1
Dry heath/acid grassland	121.1	9185.8		9306.9
Dry modified bog		4765		4765
Dune grassland		3.1		3.1
Fen				0
Fen - basin mire		350.3		350.3
Fen - flood plain mire		52.7		52.7
Fen - valley mire		2519.2		2519.2
Flush and spring - acid/neutral flush	3.4	1302.6		1306
Flush and spring - basic flush		39.7		39.7
Gardens		576.2		576.2
Hard cliff		91		91
Hedge with trees				0

Improved grassland	112.4	136390.7		136503.1
Intact hedge		2.7		2.7
Intertidal		276.8		276.8
Intertidal - boulders/rocks		161		161
Intertidal - mud/sand		59.2		59.2
Intertidal - shingles/cobbles		5.3		5.3
Introduced shrub		22.2		22.2
Marginal and inundation - marginal vegetation				0
Maritime cliff and slope		143.2		143.2
Marsh/marshy grassland	106	28608.1		28714.1
Mixed parkland/scattered trees		533.8		533.8
Mixed woodland - plantation		9900.8	66.7	9967.5
Montane heath/dwarf herb		162.8		162.8
Neutral grassland - semi-improved	7.4	4969		4976.4
Neutral grassland - unimproved		350.9		350.9
Other exposure - acid/neutral		39.4		39.4
Other habitat				0
Other rock exposure				0
Other tall herb and fern - non ruderal				0
Other tall herb and fern - ruderal		90.8		90.8
Poor semi-improved grassland	40.4	7568.9		7609.3
Quarry	23.8	247.3		271.1
Raised sphagnum bog		413.3		413.3
Recently felled woodland		29		29
Refuse-tip		2.4		2.4
Running water		2446.1		2446.1
Saltmarsh		4.3		4.3
Scree		198.8	2.7	201.5
Scree - acid/neutral		12.4		12.4
Scrub - dense/continuous		2517.2		2517.2
Scrub - scattered	3.4	1281.6		1285
Spoil		30.9		30.9
Standing water	6	1680.6	61.4	1748
Swamp	3.4	9.9		13.3
Wet dwarf shrub heath	22.6	5283.8		5306.4
Wet heath/acid grassland		4068.9		4068.9
Wet modified bog		12735.6		12735.6
Total (ha)	1049.9	536945.1	20667.1	558662.1


Woodland, Tweed Catchment
N
0 5 10 20 Km
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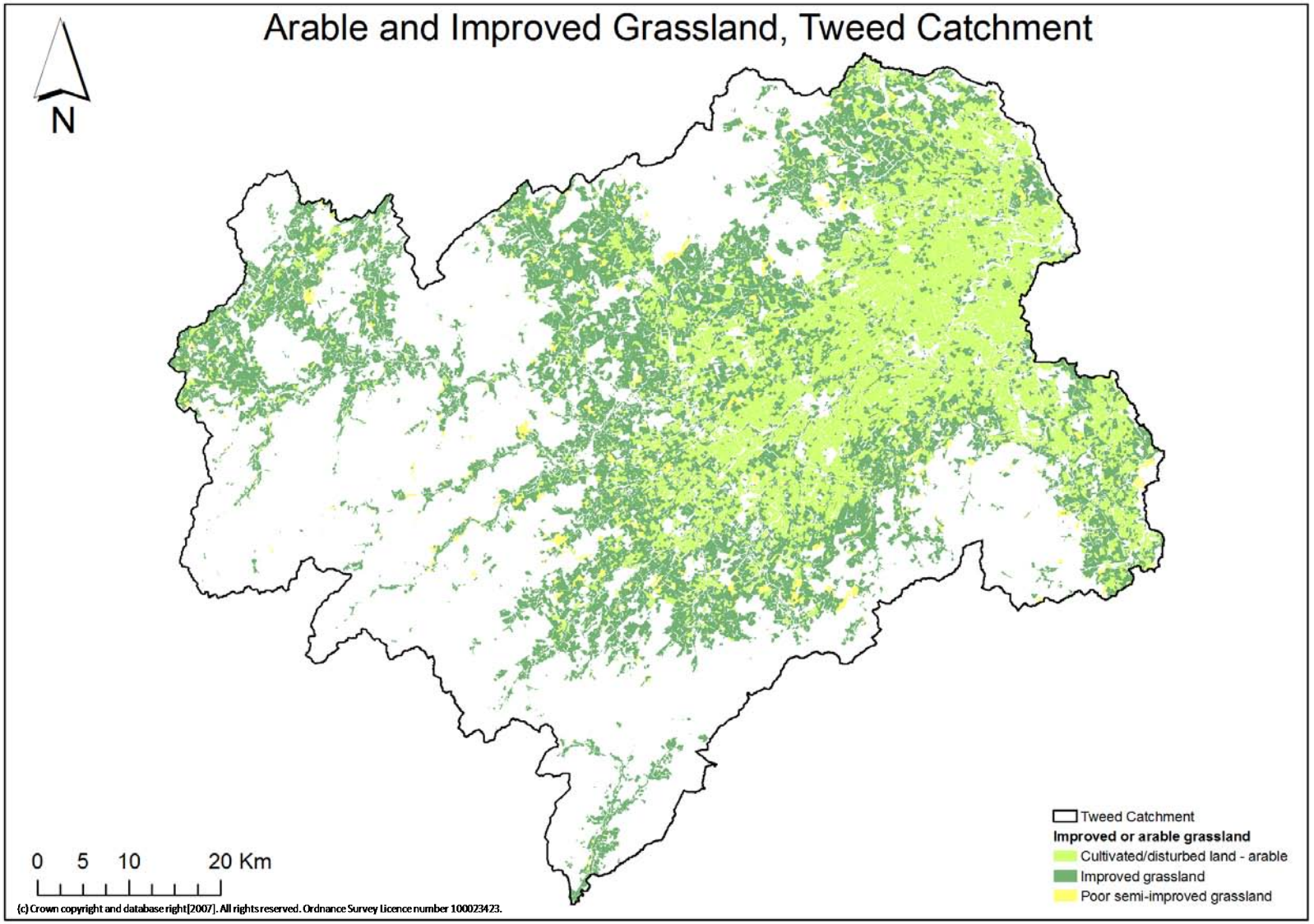
Tweed Catchment
Woodland
Broadleaved woodland - plantation
Broadleaved woodland - semi-natural
Coniferous woodland - plantation
Mixed woodland - plantation


Arable and Improved Grassland, Tweed Catchment
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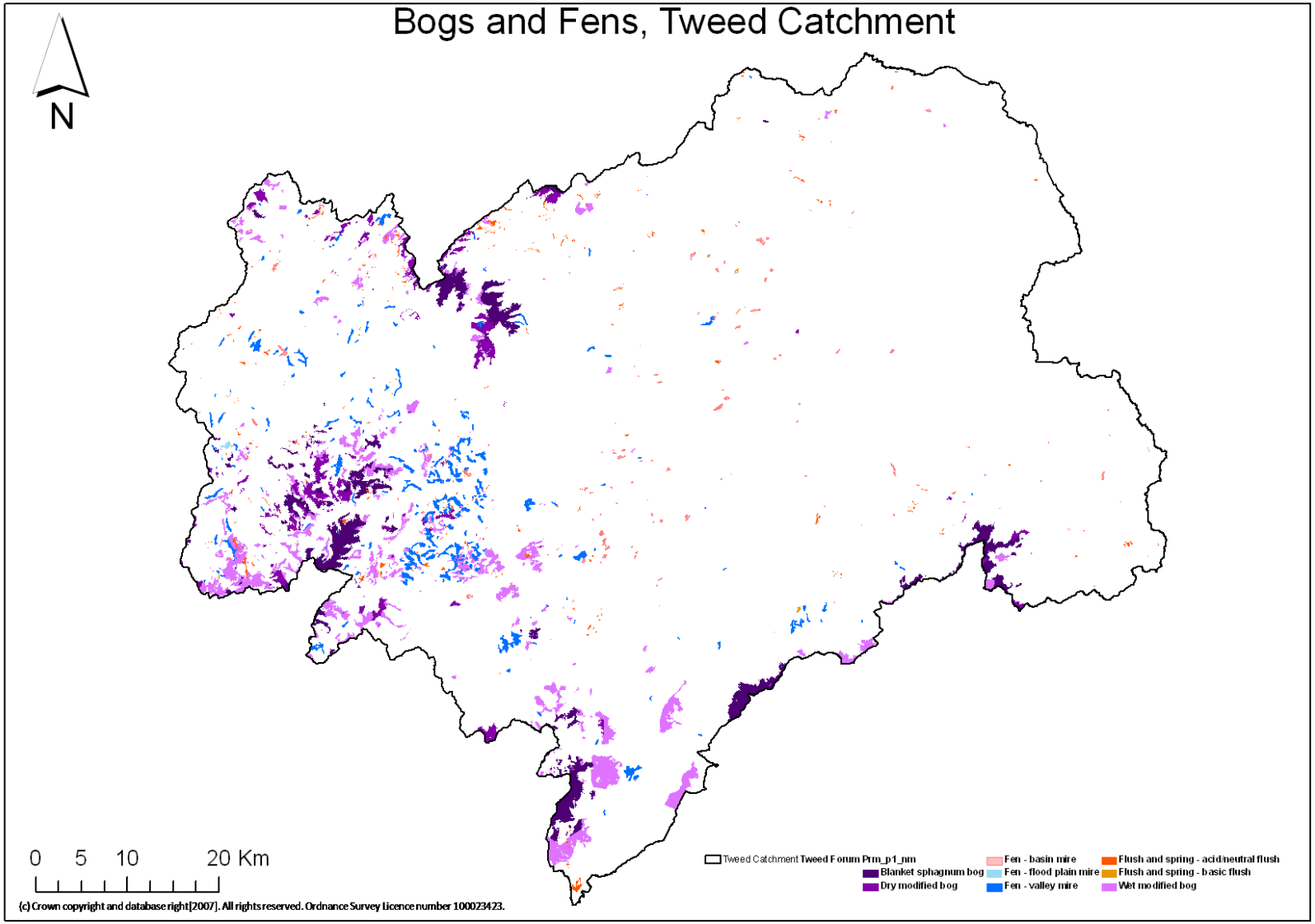
Tweed Catchment
Improved or arable grassland
Cultivated/disturbed land - arable
Improved grassland
Poor semi-improved grassland


Bogs and Fens, Tweed Catchment
N
0 5 10 20 Km
Tweed Catchment Tweed Forum Prm_p1_jun
Blanket sphagnum bog
Dry modified bog
Fen - basin mire
Fen - flood plain mire
Fen - valley mire
Flush and spring - acid/neutral flush
Flush and spring - basic flush
Wet modified bog
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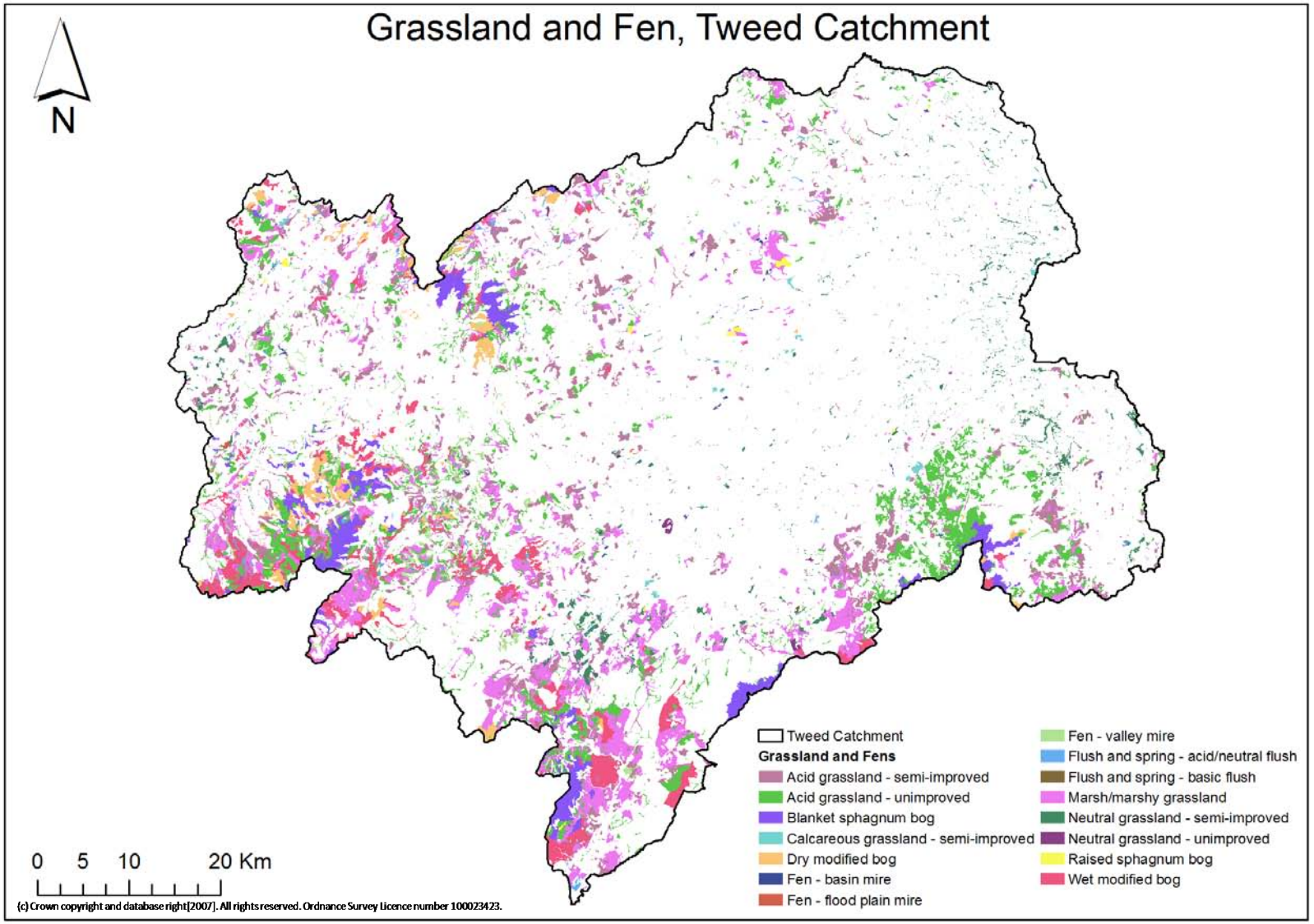
Grassland and Fen, Tweed Catchment
N
0 5 10 20 Km
Tweed Catchment
Grassland and Fens
Acid grassland - semi-improved
Acid grassland - unimproved
Blanket sphagnum bog
Calcareous grassland - semi-improved
Dry modified bog
Fen - basin mire
Fen - flood plain mire
Fen - valley mire
Flush and spring - acid/neutral flush
Flush and spring - basic flush
Marsh/marshy grassland
Neutral grassland - semi-improved
Neutral grassland - unimproved
Raised sphagnum bog
Wet modified bog
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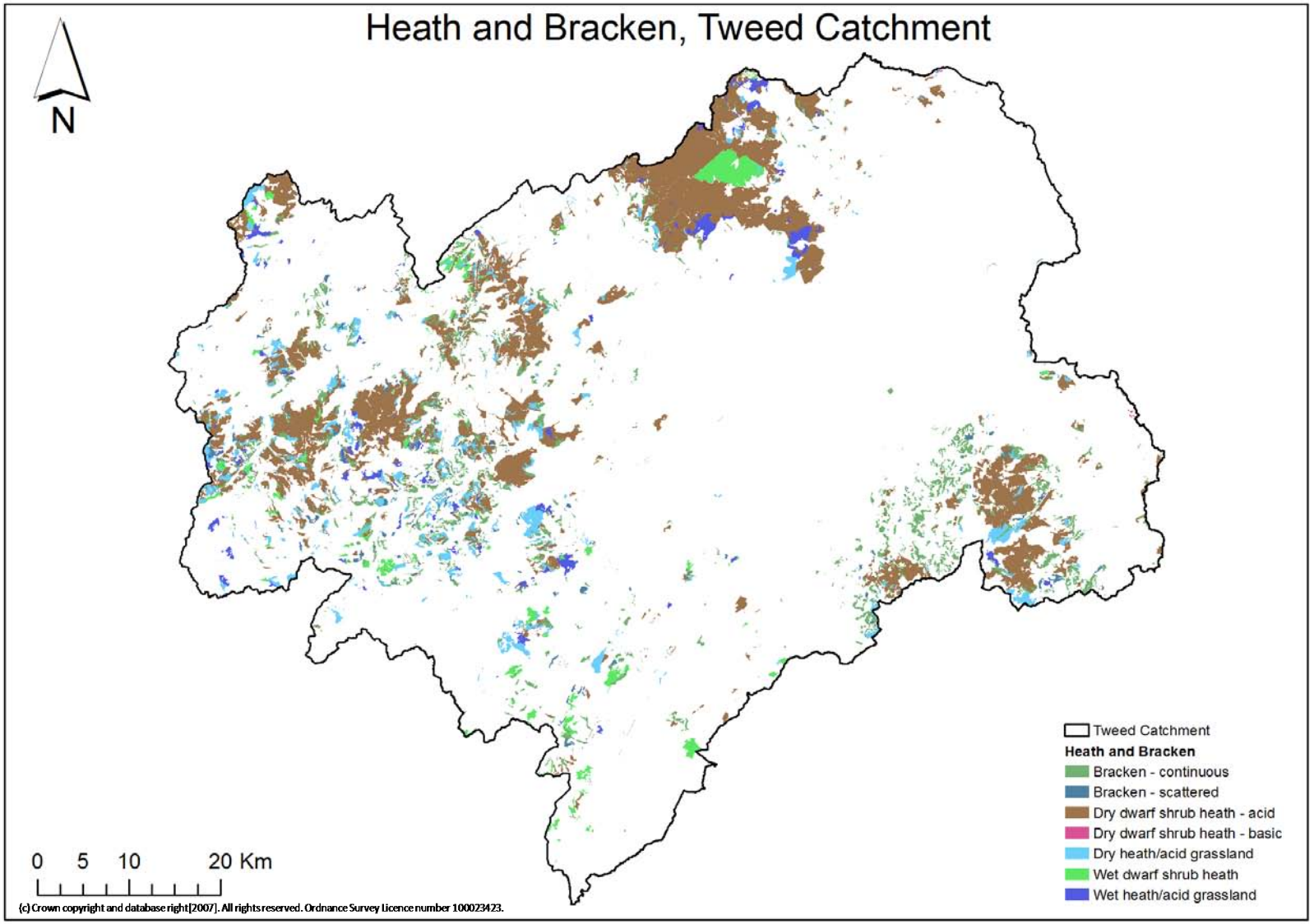
Heath and Bracken, Tweed Catchment
N
0 5 10 20 Km
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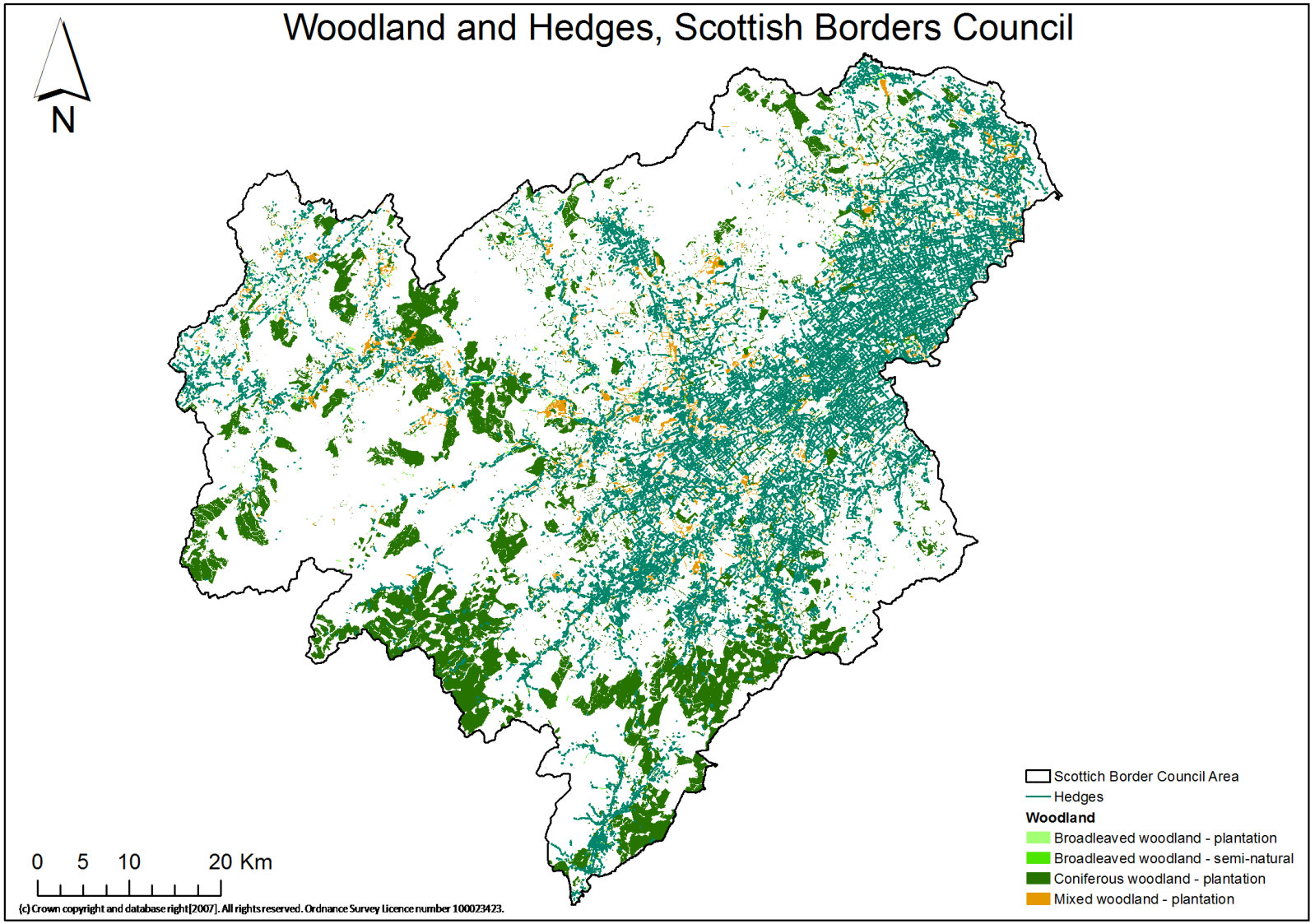
Tweed Catchment
Heath and Bracken
Bracken - continuous
Bracken - scattered
Dry dwarf shrub heath - acid
Dry dwarf shrub heath - basic
Dry heath/acid grassland
Wet dwarf shrub heath
Wet heath/acid grassland


Woodland and Hedges, Scottish Borders Council
N
0 5 10 20 Km
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Scottich Border Council Area
Hedges
Woodland
Broadleaved woodland - plantation
Broadleaved woodland - semi-natural
Coniferous woodland - plantation
Mixed woodland - plantation

Appendix 3 List of Phase 1 categories and associated BAP habitats

Acid grassland - semi-improved	**Intertidal - mud/sand**
Lowland Acid Grassland	Intertidal Mudflats
Acid grassland - unimproved	**Marginal and inundation - marginal vegetation**
Lowland Acid Grassland	Fen, marsh and swamp
Blanket sphagnum bog	**Marsh/marshy grassland**
Blanket Bog	Blanket Bog
Boundaries	Lowland Meadows
Hedgerow	Purple Moor Grass and Rush Pasture
Broadleaved parkland/scattered trees	**Mixed parkland/scattered trees**
Wood Pasture and Parkland	Wood Pasture and Parkland
Broadleaved woodland - semi-natural	**Mixed woodland - plantation**
Native Woodland	Lowland Meadows
Calcareous grassland - semi-improved	Wet Woodland
Calcareous Grassland	**Montane heath/dwarf herb**
Coastal grassland	Montane Habitats
Maritime Cliff and Slope	**Neutral grassland - semi-improved**
Coniferous parkland/scattered trees	Arable Field Margin
Wood Pasture and Parkland	Neutral Grassland
Cultivated/disturbed land - arable	**Neutral grassland - unimproved**
Arable Field Margin	Neutral Grassland
Cultivated/disturbed land - ephemeral/short perennial	**Poor semi-improved grassland**
Dry dwarf shrub heath - acid	Arable Field Margin
Dwarf Shrub Heath	Lowland Fen
Dry dwarf shrub heath - basic	Lowland Meadows
Upland Heath	Purple Moor Grass and Rush Pasture
Dry modified bog	**Quarry**

Blanket Bog	Inland Rock Outcrop and Scree Habitat
Dune grassland	**Raised sphagnum bog**
Maritime Cliff and Slope	Lowland Raised Bog
Fen	**Running water**
Lowland Fen	Rivers
Fen - basin mire	**Scree**
Lowland Fen	Inland Rock Outcrop and Scree Habitat
Fen - flood plain mire	**Scrub - dense/continuous**
Lowland Fen	Native Woodland
Fen - valley mire	**Spoil**
Lowland Fen	Inland Rock Outcrop and Scree Habitat
Flush and spring - acid/neutral flush	**Standing water**
Fen, Marsh and Swamp	Standing Open Water and Canal
Flush and spring - basic flush	**Swamp**
Purple Moor Grass and Rush Pasture	Fen, marsh and swamp
Hard cliff	Lowland Fen
Maritime Cliff and Slope	**Wet dwarf shrub heath**
Hedge with trees	Upland Heath
Boundary and Linear Features	**Wet modified bog**
Improved grassland	Blanket Bog
Arable Field Margin	
Intact hedge	
Boundary and Linear Features	

Appendix 4 Look-up for BAP Broad, Priority, LBAP and Phase 1 Habitat Classes (Scottish Borders)

BAP Broad Category	Priority BAP	LBAP Class	Phase 1 class	NVC Class	Rational	Probability
Bog	Blanket bog	Blanket Bog	E1.6.1		All good quality blanket bog is likely to be the LBAP category	Very probable
Bog	Blanket bog	Blanket Bog	E1.7		Wet modified bog especially where it has a secondary code of in tacked blanket bog is likely to contain small areas of blanket bog and / or be most easily converted back to bog	Probable
Bog	Blanket bog	Blanket Bog	E1.8		Dry modified bog, may contain areas of in tacked bog but this is less likely than wet modified bog, as the soil hydrology will have begun to change significantly.	Possible
Coniferous woodlands		Coniferous Plantation	A1.2.2		All coniferous woodlands mapped are part of the LHAP in Scottish Borders but not Northumberland. Very probable in SBC area only, it is not a LHAP in Northumberland.	Very probable
Fen, marsh and swamp	Lowland fen	Lowland fen	E3.1			Probable
Fen, marsh and swamp	Lowland fen	Lowland fen	E3.2			Probable
Fen, marsh and swamp	Lowland fen	Lowland fen	E3.3			Probable
Boundary and linear features	Hedgerow	Hedgerows	J2			Probable
Bog	Lowland Raised Bog	Lowland Raised Bog	E1.6.2		Only Lowland raised bogs in SBC area not LBAP in Northumberland	Probable
	Maritime Cliff and Slope	Maritime Cliff and Slope	H8.1			Probable

	Maritime Cliff and Slope	Maritime Cliff and Slope	H8.2			Probable
	Maritime Cliff and Slope	Maritime Cliff and Slope	H8.3			Probable
	Maritime Cliff and Slope	Maritime Cliff and Slope	H8.4			Probable
	Maritime Cliff and Slope	Maritime Cliff and Slope	H8.5			Probable
	Sandunes	Coastal Sea and Shore	H6.4			Very probable
	Sandunes	Coastal Sea and Shore	H6.5			Very probable
	Sandunes	Coastal Sea and Shore	H6.6			Very probable
	Sandunes	Coastal Sea and Shore	H6.7			Very probable
	Sandunes	Coastal Sea and Shore	H6.8			Very probable
	Saltmarsh	Coastal Sea and Shore	H2.3			Very probable
	Saltmarsh	Coastal Sea and Shore	H2.4			Very probable
	Saltmarsh	Coastal Sea and Shore	H2.6			Very probable
Broadleaved, mixed and yew woodland	Upland oak woods	Native Woodland	A1.1.1		Where A1.1.1 and intersects with SAWI then can be very Possible	Probable
Rivers and streams	Rivers	Rivers and Burns	G2			Very probable
	Upland cleuch and scrub woodland	Gorse Scrub	A2.1		Use species code 'Ue' to note only in the uplands	Possible
	Upland Cleuch and Scrub Woodland	Gorse Scrub	A2.2			Possible
Dwarf shrub heath	Upland heath	Upland Heath	D1.1			Very probable
Dwarf shrub heath	Upland heath	Upland Heath	D1.2			Very probable

Dwarf shrub heath	Upland heath	Upland Heath	D2			Very probable
	Wood Pasture and Parkland	Wood Pasture and Parkland	A3.1			Probable
	Wood Pasture and Parkland	Wood Pasture and Parkland	A3.2			Probable
	Wood Pasture and Parkland	Wood Pasture and Parkland	A3.3			Probable
	Inland Rock Outcrop and Scree Habitat	Inland and Coastal	I1.1			Very probable
	Inland Rock Outcrop and Scree Habitat	Inland and Coastal	I1.2			Very probable
	Inland Rock Outcrop and Scree Habitat	Inland and Coastal	I2.1			Very probable
	Inland Rock Outcrop and Scree Habitat	Inland and Coastal	I2.2			Very probable
Improved grassland		Not LHAP - Improved Pasture	B4			Very probable
Arable and horticultural		Not LHAP - Arable field	J1.1			Very probable
Bracken		Not LHAP - Bracken	C1.1			Very probable
		Not LHAP - Scattered Bracken	C1.2			Very probable
Built up areas and gardens		Not LHAP - Built Environment, Urban	J3.6			Very probable
Mixed woodland		Not LHAP - Mixed Woodland	A1.3.1			Very probable
Mixed woodland		Not LHAP - Mixed Woodland	A1.3.2			Very probable
Broad-leaved plantation		Not LHAP - Broadleaved plantation	A1.1.2			Very probable
		Not LHAP - Scrub	A2.1 A2.2			

Boundary and linear features	Arable Field Margin	Arable Field Margin	B2.2 orJ1.3 or B6 or B4 adjacent to an area of J1.1 Use field margin target note		This has been analysed and QA checked. So use target note column saying field margin.	Possible
Fen, marsh and swamp	Lowland fen	Fens, marsh, swamp and reedbed SUB-Class marsh and Swamp	F1	S5,S6,S7, S10,S12,S 14,S22,S2 3,S26,S28	Too many overlaps with swamp and Marsh in terms of species similarity. Therefore classify together.	Very probable
Fen, marsh and swamp	Lowland fen	Fens, marsh, swamp and reedbed SUB-Class Reedbed	F1	S4	Only identifiable when NVC survey has been done, not readily picked up form the air.	Very probable
Montane habitats	Montane	Montane		NVC U7	All land above 600m with U7 or H13-15 17 -20	Possible
Broadleaved, mixed and yew woodland	Wet woodlands	Native Woodland/Wet woodlands	Wet woodlands	NVC W7 or noted by attributer as wet woodland	Where noted as wet woodland in Notes column or already known as wet from ground survey	Probable
	Mountain Heaths and Willow Scrub	Upland cleuch and scrub woodland	A2.1 or A1.1. in very steep valleys in upland		Use target note to classify.	Probable
Standing Open water and canal	Ponds	Standing Open Water	G1		Use wetland strategy to code each type of lake	Probable
Standing Open water and canal	Eutrophic standing waters	Standing Open Water				
Standing	Mesotrophic lakes	Standing Open Water				

Open water and canal						
Standing Open water and canal	Oligotrophic and Dystrophic Lakes	Standing Open Water				
	Purple moor grass and rush pasture	Grassland and enclosed farmland and grassland **Purple Moor Grass and Rush Pasture**	B5	M23, M25	Where B5 also has NVC code target as Probable otherwise target as Possible	
		Upland heathland (only 25% likely to be LHAP class)	D5		Heath grassland mosaics will have some patches of heath and may well recover to heath but may not be BAP class at the moment.	Possible
		Upland heathland (only 25% likely to be LHAP class)	D6		Heath grassland mosaics will have some patches of heath and may well recover to heath but may not be BAP class at the moment.	Possible
Acid grassland	Lowland dry acid grassland	Grassland and enclosed farmland and grassland SUB_Class Acid grassland	B1.1			Very probable
Acid grassland	Lowland dry acid grassland	Grassland and enclosed farmland and grassland SUB_Class Acid grassland	B1.2		Grazing has altered much of acid grassland in the SBC Region, however, much could still be considered at least semi-natural.	Probable
Calcareous grassland	Calcareous grassland	Calcareous grassland	B3.1			Very probable

Calcareous grassland	Calcareous grassland	Calcareous grassland	B3.2		Grazing has altered much of calcareous grassland in the SBC Region, however, much could still be considered at least semi-natural.	Probable
Neutral grassland	Upland hay meadow / Lowland meadow	Grassland and enclosed farmland and grassland	B2.1		Very little neutral grassland can be considered unimproved, this is not Possible to tell from the air therefore all natural grassland has been recorded as semi-improved.	Very probable
Neutral grassland	Upland hay meadows Lowland meadows	Grassland and enclosed farmland and grassland	B2.2		Grazing has altered much of neutral grassland in the SBC Region, however, much could still be considered at least semi-natural.	Probable
		Grassland and enclosed farmland and grassland	B5		No NVC class target as Possible as it is not known how species rich this wet pasture may be.	

Appendix 5 Look-up for BAP Broad, Priority, LBAP and Phase 1 Habitat Classes (Northumberland)

BAP Broad Category	Priority BAP	LBAP Class	Phase 1 class	NVC Class	Rational	Probability
Bog	Blanket bog	Blanket Bog	E1.6.1		All good quality blanket bog is likely to be the LBAP category	Very probable
Bog	Blanket bog	Blanket Bog	E1.7		Wet modified bog especially where it has a secondary code of in tacked blanket bog is likely to contain small areas of blanket bog and / or be most easily converted back to bog	Probable
Bog	Blanket bog	Blanket Bog	E1.8		Dry modified bog, may contain areas of in tacked bog but this is less likely than wet modified bog, as the soil hydrology will have begun to change significantly.	Possible
Fen, marsh and swamp	Lowland fen	Lowland fen	E3.1			Probable
Fen, marsh and swamp	Lowland fen	Lowland fen	E3.2			Probable
Fen, marsh and swamp	Lowland fen	Lowland fen	E3.3			Probable
Boundary and linear features	Hedgerow	Hedgerows	J2			Probable
	Maritime Cliff and Slope	Maritime Cliff and Slope	H8.1			Probable
	Maritime Cliff and Slope	Maritime Cliff and Slope	H8.2			Probable
	Maritime Cliff and Slope	Maritime Cliff and Slope	H8.3			Probable
	Maritime Cliff and Slope	Maritime Cliff and Slope	H8.4			Probable
	Maritime Cliff and Slope	Maritime Cliff and Slope	H8.5			Probable

	Sandunes	Coastal Sea and Shore	H6.4			Very probable
	Sandunes	Coastal Sea and Shore	H6.5			Very probable
	Sandunes	Coastal Sea and Shore	H6.6			Very probable
	Sandunes	Coastal Sea and Shore	H6.7			Very probable
	Sandunes	Coastal Sea and Shore	H6.8			Very probable
	Saltmarsh	Coastal Sea and Shore	H2.3			Very probable
	Saltmarsh	Coastal Sea and Shore	H2.4			Very probable
	Saltmarsh	Coastal Sea and Shore	H2.6			Very probable
Broadleaved, mixed and yew woodland	Upland oakwoods	Native Woodland	A1.1.1		Where A1.1.1 and intersects with SAWI then can be very Possible	Probable
Rivers and streams	Rivers	Rivers and Burns	G2			Very probable
	Upland cleuch and scrub woodland	Gorse Scrub	A2.1		Use species code 'Ue' to note only in the uplands	Possible
	Upland Cleuch and Scrub Woodland	Gorse Scrub	A2.2			Possible
Dwarf shrub heath	Upland heath	Upland Heath	D1.1			Very probable
Dwarf shrub heath	Upland heath	Upland Heath	D1.2			Very probable
Dwarf shrub heath	Upland heath	Upland Heath	D2			Very probable
	Wood Pasture and Parkland	Wood Pasture and Parkland	A3.1			Probable
	Wood Pasture and Parkland	Wood Pasture and Parkland	A3.2			Probable
	Wood Pasture and Parkland	Wood Pasture and Parkland	A3.3			Probable
	Inland Rock Outcrop and Scree Habitat	Inland and Coastal	I1.1			Very probable
	Inland Rock Outcrop and Scree Habitat	Inland and Coastal	I1.2			Very probable

	Inland Rock Outcrop and Scree Habitat	Inland and Coastal	I2.1			Very probable
	Inland Rock Outcrop and Scree Habitat	Inland and Coastal	I2.2			Very probable
Improved grassland		Not LHAP - Improved Pasture	B4			Very probable
Arable and horticultural		Not LHAP - Arable field	J1.1			Very probable
Bracken		Not LHAP - Bracken	C1.1			Very probable
		Not LHAP - Scattered Bracken	C1.2			Very probable
Built up areas and gardens		Not LHAP - Built Environment, Urban	J3.6			Very probable
Mixed woodland		Not LHAP - Mixed Woodland	A1.3.1			Very probable
Mixed woodland		Not LHAP - Mixed Woodland	A1.3.2			Very probable
Broad-leaved plantation		Not LHAP - Broadleaved plantation	A1.1.2			Very probable
		Not LHAP - Scrub	A2.1 A2.2			
Boundary and linear features	Arable Field Margin	Arable Field Margin	B2.2 orJ1.3 or B6 or B4 adjacent to an area of J1.1 Use field margin target note		This has been analysed and QA checked. So use target note column saying field margin.	Possible
Fen, marsh and swamp	Lowland fen	Fens, marsh, swamp and reedbed SUB-Class marsh and Swamp	F1	S5,S6,S7,S10,S12, S14,S22,S23,S26,S 28	Too many overlaps with swamp and Marsh in terms of species similarity. Therefore classify together.	Very probable
Fen, marsh and swamp	Lowland fen	Fens, marsh, swamp and reedbed SUB-Class Reedbed	F1	S4	Only identifiable when NVC survey has been done, not readily picked up form the air.	Very probable
Montane habitats	Montane	Montane		NVC U7	All land above 600m with U7 or H13-15 17 -20	Possible
Broadleaved, mixed and	Wet woodlands	Native Woodland/Wet woodlands	Wet woodlands	NVC W7 or noted by attributer as wet	Where noted as wet woodland in Notes column	Probable

yew woodland				woodland	or already known as wet from ground survey	
	Mountain Heaths and Willow Scrub	Upland cleuch and scrub woodland	A2.1 or A1.1. in very steep vallys in upland		Use target note to classify.	Probable
Standing Open water and canal	Ponds	Standing Open Water	G1		Use wetland stragey to code each type of lake	Probable
Standing Open water and canal	Eutrophic standing waters	Standing Open Water				
Standing Open water and canal	Mesotrophic lakes	Standing Open Water				
Standing Open water and canal	Oligotrophic and Dystrophic Lakes	Standing Open Water				
	Purple moor grass and rush pasture	Grassland and enclosed farmland and grassland **Purple Moor Grass and Rush Pasture**	B5	M23, M25	Where B5 also has NVC code target as Probable otherwise target as Possible	
		Upland heathland (only 25% likely to be LHAP class)	D5		Heath grassland mosaics will have some patches of heath and may well recover to heath but may not be BAP class at the moment.	Possible
		Upland heathland (only 25% likely to be LHAP class)	D6		Heath grassland mosaics will have some patches of heath and may well recover to heath but may not be BAP class at the moment.	Possible
Acid grassland	Lowland dry acid grassland	Grassland and enclosed farmland and grassland SUB_Class Acid grassland	B1.1			Very probable
Acid grassland	Lowland dry acid grassland	Grassland and enclosed farmland and grassland SUB_Class Acid grassland	B1.2		Grazing has altered much of acid grassland in the SBC Region, however, much could still be considered at least semi-natural.	Probable

Calcareous grassland	Calcareous grassland	Calcareous grassland	B3.1			Very probable
Calcareous grassland	Calcareous grassland	Calcareous grassland	B3.2		Grazing has altered much of calcareous grassland in the SBC Region, however, much could still be considered at least semi-natural.	Probable
Neutral grassland	Upland hay meadow / Lowland meadow	Grassland and enclosed farmland and grassland	B2.1		Very little neutral grassland can be considered unimproved, this is not Possible to tell from the air therefore all natural grassland has been recorded as semi-improved.	Very probable
Neutral grassland	Upland hay meadows Lowland meadows	Grassland and enclosed farmland and grassland	B2.2		Grazing has altered much of neutral grassland in the SBC Region, however, much could still be considered at least semi-natural.	Probable
		Grassland and enclosed farmland and grassland	B5		No NVC class target as Possible as it is not known how species rich this wet pasture may be.	