

## **Uplands for Juniper Survey Method (2011 – 2014)**

### **1. Site Reference Code:**

This was determined by using a four figure grid reference to identify a 1 km grid square. A two digit suffix was then added according to whether this was the first second or third population within that square. The two populations within NY3914 therefore become Jun-NY3914-01 (Aiken Crag) and Jun-NY3914-02 (Arnison Crag).

### **2. Site Name**

The Site Name was chosen according to the most suitable nearby areas labelled on Ordnance Survey Maps, and tended to align with Crag, Valleys, Becks, Summits or Commons. This did not always match the name chosen for the site in the Lena Ward Survey.

### **3. Equivalent L. Ward Site:**

This was added to aid comparisons between the two surveys. The Lena Ward survey took place 1969 – 1979 and the names chosen did not always match area names on the most recent O.S. maps, hence the sometimes different Site Name chosen in this survey.

### **4. Recorder(s):**

Surveyors were encouraged to go out in pairs due to the remote and hazardous terrain which is often encountered around juniper stands. At least one surveyor had to have received training before carrying out surveys independently.

### **5. Survey Date:**

Date the survey was carried out. Surveys were completed throughout the year between April 2011 and February 2014.

### **6. Centroid Eastings and Northings:**

These two fields give a purely numerical code, which is convenient for use with GIS Software but is easily converted to O.S. codes with the two letter prefix. For locations within the SD Prefix 300000 is added to the eastings and 400000 to the northings. Hence the ten figure grid reference of SD34567 98234 becomes 334567 (Eastings) and 498234 (Northings). For locations within the NY area 300000 is added to the eastings and 500000 to the northings, so that NY37654 01234 becomes 337654 (Eastings) and 501234 (Northings).

### **7. Location:**

This is given to aid quick identification of the area in which the juniper population is found, and usually refers to a well-known valley or summit.

## **8. Altitude Lower and higher:**

This is given in Metres A.O.D. and was determined in most cases on Mapinfo GIS, after GPS data identifying the lower and upper boundaries of the juniper stand was transferred to the software.

## **9. Aspect:**

This is given for stands where a dominant aspect was identified. It was measured either in the field or in the office (Using Mapinfo GIS) using a compass to take a bearing at 90 degrees to the line of the contours. Where varied aspects or a lack of sloping ground made it impossible to give an aspect, 0 (zero) was inputted to the GIS attributes table. This figure was not therefore used for stands with a northerly aspect. Figures either side of zero (359 or 1) were used in its place.

## **10. Area:**

This is given in hectares to two decimal places. In most cases this was calculated by Mapinfo GIS after polygons had been drawn. Figures were not adjusted for slope.

## **11. Boundary:**

The ideal for this survey was to walk around each juniper population, recording a GPS track at the same time, which could then be transferred to mapping software to give very accurate measure the boundary illustrated by a polygon on the map. Individual bushes or small numbers of bushes could be illustrated with a point on the map arising from an accurate ten figure grid reference, recorded in the centre of the stand using GPS.

Although the ideal was achieved in many places, there were a number of site characteristics which made this difficult or impossible. Access was often a problem, sometimes preventing GPS mapping of either part, or the whole of the boundary. Sometimes the mapping could be completed in the office using aerial photographs but this depended on photograph quality and in the extent of the contrast between juniper and neighbouring vegetation or substrate.

Another problem was the difficulty of identifying where boundaries lay, when a population feature was to have many outliers of individual bushes or small patches of bushes. While some attempt was made in training sessions to standardise surveyors approach to this problem it was decided that the addition of confidence ratings to the mapped boundary would help, aiding future comparisons with Uplands for Juniper mapped stands. The following guidelines were given to surveyors:

Please score boundaries and area totals using the following 1 – 5 scale:

- 5** All of the boundary accurately mapped using GPS, or stand boundary clearly marked by physical or man-made features which can be seen on the survey map.

- 4 Most of the boundary mapped using GPS or easily mapped due to features marked on the survey map. Accuracy reduced due to potential errors in hand drawn sections of boundary.
- 3 Boundary roughly accurate, but much of the boundary hand drawn using less well-defined features on the ground and on the survey map.
- 2 Boundary hand drawn with poor guidance from survey map and features on the ground. Poor access and boundaries which disappear from view mean that the drawn boundary may not include all juniper or that juniper free areas are mapped.
- 1 Boundary estimated but poor access and poor vantage points result in very low accuracy.

## **12. Bush Numbers:**

In some cases exact bush numbers could be gained by walking through a juniper population or by counting each individual bush from a nearby vantage point. Such accuracy is only likely with scattered populations where juniper does not form thickets. In most cases estimates of bush numbers had to be taken from the most suitable vantage point in the vicinity. Accuracy varied according to the density and size variation of the juniper and due to the quality of the vantage point(s). Training days aimed to standardise the way in which estimates were done and encouraged further quality control where opportunities presented themselves for vantage point estimates of a sample of the population, which could then be checked by approaching the sample and counting stems.

The following rule was used to counter potential inaccuracies due to the variability of juniper growth (including its ability to layer) within thickets:

‘Where it is impossible to prove that different stems arise from the same point or are the same genetic individual, count them as different trees.’

The following confidence rating system was also used:

**High Confidence** figure is within 10% of the true number.

**Medium Confidence** figure is within 30% of the true number.

**Low Confidence** figure is not within 30% of the true figure.

At some of the larger populations, the combination of high juniper density over a large area of slope and a lack of features on the ground meant that it was easier to estimate numbers from a photograph in the office, which could then be over-lain with a grid to aid partitioning and avoid double counting.

## **13. Sub species:**

This was entered where identification of defining features was possible. Surveyors were made aware that intermediate characteristics between common or tree juniper, *Juniperus communis ssp communis*, and dwarf juniper, *Juniperus communis ssp. nana* were possible.

#### **14. Dominant substrates / vegetation and others present:**

The following descriptions were used to define vegetation type:

**Acid grassland:** Mat grass, sweet vernal grass, tormentil, heath bedstraw, heath rush, field wood-rush, heath milkwort, with occasional ling and bilberry coming up through the sward. Be aware that you may find species more associated with lime rich areas such as thyme.

**Wet grassland:** Dominated by tussocks of various grasses, rushes and sedges, particularly purple moor grass, soft rush and compact rush.

**Wet heath / mire:** Still with purple moor grass and rushes, but these dominating less and not always present. Look out for Sphagnum mosses, bog asphodel, ling, cross-leaved heath, bog myrtle, various sedges, devil's bit scabious.

**Dry heath:** Combinations of ling, bell heather and bilberry, with more crowberry and cowberry at higher altitudes. Areas may be interspersed with grasses or patches of bracken.

**Limestone grassland:** Blue moor grass, crested dogs tail grass, salad burnet, ladies bedstraw, thyme, birds-foot trefoil, wild strawberry.

**Bracken:** This category refers to stands of thick bracken, which exclude other vegetation types.

**Woodland:** Tall trees (>6m) forming a closed canopy.

#### **15. Grazing animals present:**

This was filled in only when animals were known to be present or when signs such as dung, wool, fur or prints were seen.

#### **16. Grazing Impact Assessment:**

The aim of this assessment was to evaluate both the impact on established juniper bushes and to judge the likelihood of successful regeneration and establishment of young trees through the use of other indicator plants in the ground flora.

**Established bushes:** Impacts were judged by looking at proportion of accessible shoots browsed at the end of the winter period, with more than two-thirds illustrating high impacts, one-third to two third illustrating medium impacts and less than one third suggesting low impacts.

**Ground flora:** A list of relatively unpalatable indicator species (see below) was issued to surveyors. Grazing of one or a combination of these species to varying extents would indicate whether impacts were medium or high. An assessment of ericoid species (heathers) used proportions of shoots browsed to indicate impacts (same scale as for established juniper). Evaluation of long term effects of grazing and browsing, and whether impacts were increasing or decreasing, was possible by looking at juniper and heather growth forms, as well as the growth of *Juncus squarrosus* relative to its neighbours.

**Species illustrating high impacts when grazed / browsed.**

Species	Grazing		Not grazed	Not present
	Easy to find	Diff. to find		
Cowberry, <i>Vaccinium vitis-idaea</i>				
Crowberry, <i>Empetrum nigrum</i>				
Heath Rush, <i>Juncus squarrosus</i>				
Cross-leaved heath, <i>Erica tetralix</i>				
Mat grass, <i>Nardus stricta</i>				
Alpine ladies mantle, <i>Alchemilla alpina</i>				

**Species illustrating medium - high impacts when grazed / browsed:**

Species	Grazing		Not grazed	Not present
	Easy to find	Diff. to find		
Bell heather, <i>Erica cinerea</i>				
Bog myrtle, <i>Myrica gale</i>				
Heath Rush, <i>Juncus squarrosus</i>				
Wavy hair grass, <i>Deschampsia flexuosa</i>				
Tufted hair grass, <i>Deschampsia cespitosa</i>				
Tormentill, <i>Potentilla erecta</i>				
Heath bedstraw, <i>Galium saxatile</i>				

Survey adapted from those given in MacDonald et al. (1998) with help from Ptixis Ecology.

The majority of surveyors attended a grazing impact assessment training day with Ptixis Ecology before re-visiting stands in the appropriate season to carry out the assessment.

Where stands were heavily grazed there was a well-defined difference between sheep and red deer impacts, with a maximum upper browse height of approximately 1 metre for sheep but of more than 1.6m. (5 foot) for red deer. The latter also tended to browse juniper more throughout the year, rather than just the winter period, and browsing was more extensive, extending into thicker woody material. Heavy red deer browsing was often accompanied by thrashing and freying damage.

### **17. Other Threats:**

These could include succession to tall trees, tree planting and the spread of shade bearing trees such as beech and sycamore, as well as harvesting and development.

### **18. Age Classes and sexing:**

The following definitions, arrived at after a number of site visits and reference to the L. Ward data, were issued to surveyors to promote standardised estimates during our survey:

Seedling (1 – 5 yrs): Up to 30 cm tall but usually much shorter. Ranging from a small, un-branched stem to a many-branched individual, but maximum stem diameter at base of 0.5 cm.

Young (6 – 30 years): From 20cm to 1 metre tall, stem diameter of 0.5 cm to 2.5 cm.

Mature (31 – 60 years): Usually over 1 metre tall unless showing prostrate growth form, with stem diameter of 2.5cm to 6cm.

Old (> 60 years): Stem diameter more than 6 cm. Usually more than 1.5 metres in height, unless showing prostrate growth form.

Sex: As juniper are dioecious (having separate male and female bushes), both sexes need to be present in a stand if it is to produce fertile seed. Please indicate if berry-bearing trees are present. As berries take two to three years to ripen, they should be present within a stand at all times.

Proportions of each of the above were usually estimated after the mapping of the population boundary, but more exhaustive assessments were made on some sites.

### **19. Fixed point photographs:**

These aimed to capture the extent of the population alongside other dominant characteristics such as browsing levels

### **20. Comments:**

Surveyors were asked to include information on anything that might affect the accuracy of collected data, or any additional information they may have picked up about the management of the area. Additional species records were also inputted in here including other tree species present within the juniper stand.

### **References:**

MacDonald, A., Stevens, P., Armstrong, H., Immirzi, P. & Reynolds, P. 1998. A Guide to Upland Habitats Surveying Land Management Impacts. 2 Volumes. Battleby, Perth, SNH Publications.