

Woodland impact survey of the West Lochaber Deer Management Group area

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Executive Summary

A plot based approach was used to assess large herbivore pressure in woodland, previously assigned to the High and Very High impact categories, in the West Lochaber Deer Management Group area. A total of 45,191 seedlings/saplings were recorded from 487 x c.530m² plots (which represented > 1% of the total woodland area available to be surveyed). There was no evidence of deer damage on 31,154 of these seedlings/saplings but the other 14,037 young trees had been browsed in some way. Most of the undamaged seedlings/saplings were recently germinated shoots and are likely to be browsed once they attain a certain height. There were 7,980 trees (with diameter > 7 cm and height > 1.3 m) within sample plots of which only 100 had evidence of bark stripping by deer. This suggests that there is a good chance of survival if seedlings/saplings can elude browsing in the early part of their lives. A combination of exclosure and deer culling/sheep removal might be used to achieve this depending on local factors and the objectives for management.

1.0 Introduction

The remit of this survey was to return to semi-natural native woodland, within the West Lochaber Deer Management Group area, that had previously been designated as experiencing High or Very High herbivore impact, in order to assess its current condition. We were initially required to survey a minimum of 1% of all semi-natural native woodland in the West Lochaber area (4231 ha according to the Native Woodland Survey of Scotland) using the plot based approach. The best practice guidance (Habitat Impact Assessment: Woodland) dictated that plots should be circular with an area up to c.500 m² and suggested using a radius of up to 12 m. This would have generated a plot area of c.452 m² and required c.936 plots to sample 42.31 ha of woodland. To reduce the number of plots required we decided to make the radius of our plots 13 m which generated an area of c.530 m². Therefore, the number of plots required was around 796 and an extra 10 plots were added to make sure we were over the minimum required area to be surveyed. Grid references from those woodland areas deemed to be in the High and Very High herbivore pressure categories were randomly assigned to plot numbers.

The 806 plots we initially set out to survey was revised when permission was granted to only survey 1% of woodland that had previously been designated the High or Very High herbivore pressure category. The proportion of West Lochaber semi-natural native woodland within this category was 65% of the total. Hence, we reduced the number of plots we had originally set out to sample by the same amount leaving us with 524 plots to survey. Since work had already begun the original plot numbers (ranging from 1 to 806) were retained. However, the appropriate number of plots were removed at random from those originally allocated. When contact was made with the new owners of what was formerly FCS Kinlocheil Estates, we were told that the Woodland Trust had already carried out the relevant surveys and had passed on the information to Scottish Natural Heritage (SNH). Consequently, it was decided to drop the plots allocated to former FCS Kinlocheil Estates land and the reduction in area meant that we now only had to sample c.441 plots to represent 1% from the remainder. We were quite advanced with our sampling by the time this action was decided and finished on 487 plots which represented 1.11% of the total c.2324.49 ha of woodland available for us to survey.

Since Red Deer are wide-ranging and oblivious to who owns what land, it was decided to consider the woodland in West Lochaber as one big area. Plots were randomly assigned across the whole area and not stratified according to land ownership. Some properties had none or very few sample plots allocated to their land whilst other properties had numerous sample plots. Nonetheless, larger Estates with lots of the relevant woodland had a greater chance of having more random sample plots. The most meaningful interpretation of the results presented here apply to the whole woodland previously categorised as undergoing High or Very High herbivore impact in the West Lochaber Deer Management Group area. However, analysis by Estate has also been carried out because it may be of interest to the relevant landowners but these are only really meaningful when there are several plots on a property.

In some instances, sample plots were randomly located on property for which land ownership was unknown. Sampling proceeded in these cases because it is the overall impact of the deer on woodland that will help dictate whether culling needs to be increased or reduced across the West Lochaber Deer Management Group area. The West Lochaber Deer Management Group will have to act as a whole if deer numbers need to be addressed across the area. Randomness was adopted so that repeat surveys may be statistically compared from one time period to the next (providing future surveys also randomly allocate sample plots).

2.0 Method

Sample plots were assigned random numbers using QGIS software to specifically target woodland that had previously been designated High and Very High herbivore pressure categories, in the West Lochaber Deer Management Group area. Field workers entered these coordinates into their GPS devices and navigated their way to the sample plots. It was deemed acceptable to get within ± 5 m of the original grid reference in accordance with the accuracy of the GPS device. There were occasions when plots had to be relocated such as the presence of a dangerous cliff within the sample plot (Plate 29 in

Appendix), windblown trees completely smothering the survey area (Plate 28 in Appendix), impenetrable rhododendron preventing access to the original destination and respecting resident's privacy by not surveying in their garden. Surveyor's used their judgement to relocate plots when the need arose. The agreed method was to identify three or four alternative locations in the vicinity of the original plot and randomly select one of these. Sometimes the plot was merely moved a few metres in a randomly selected compass direction (such as away from a cliff edge) and on a few occasions (due to impenetrable *Rhododendron* for example), the plot was relocated to an entirely new set of random coordinates within the same woodland.

Field work was conducted from the last week of June to mid-September 2017. The actual grid reference was recorded on arrival from the centre of a sample plot along with date, plot number and name of surveyor. Four pieces of yellow rope were tied to a central cane and then uncoiled a distance of 13 m in each compass direction and tied to another cane or a natural object in order to mark out the radius of the circular sample plot. A fifth piece of rope was used to divide each quarter into half so that the seedlings/saplings (in particular) could be surveyed one eighth at a time. This also helped with visualising the plot as a circle. Recording could then begin within the sample plot.

Seedlings/saplings were defined in the Best Practice Guidance as those tree species less than 1.3 m tall and/or less than 7 cm in diameter at breast height. Each one was assessed to establish whether a large herbivore had frayed the shoot (rubbed part of their body against the sapling), browsed the leader only, browsed one or more side shoots only, browsed both leader and side shoots or if there was no damage to the shoot. A single tally mark was scored in the relevant column for each seedling/sapling of each tree species. Trees were defined as being greater than 1.3 m tall and/or greater than 7 cm diameter in accordance with the Best Practice Guidance. Each individual of each tree species was tallied according to age class. The terms pole, mature and veteran were adopted for the age class of trees and assigned using the following criteria: Poles were those trees with diameter greater than 7 cm but generally less than 15 cm at breast height for short-lived species and up to 30 cm diameter at breast height for longer-lived species. In other words the term 'pole' was useful for those mature trees in the first third of their lives. The mature age class used here applied to those trees with diameter larger than for poles but not massive. Mature trees were those deemed to be in the last two thirds of their lives. Veterans are rare and of great age. These are trees which capture your attention because of their size. They have lived longer than what you might otherwise expect for trees of that species. It is worth noting here that different tree species have different life expectancies. For example, a veteran Hazel (*Corylus avellana*) could be one that is over 80 years old, with diameter at breast height more than 50 cm and tree height over 5 m, whereas a veteran Pedunculate Oak (*Quercus robur*) is likely to be more than 400 years old and have diameter at breast height exceeding 1.5 m with massive branches stemming from the main bole. Of these trees, the number for which there was evidence of bark having been stripped by large herbivores was also recorded. The number of standing dead, fallen dead and tree stumps was also recorded from each sample plot.

Downy Birch (*Betula pubescens*) and Silver Birch (*Betula pendula*) were distinguished as far as possible on the basis of field characters described in Streeter et al. (2016). However, the combined tallies have also been included in the Results which is consistent with the Best Practice Guidance as distinguishing between these two species can be difficult – especially at the seedling stage. Oak trees have been recorded as *Quercus* spp. (in keeping with best practice guidance) owing to the presence of the hybrid between *Quercus robur* and *Quercus petraea* and both parents. It was better to spend time assessing the deer impact rather than agonise over the exact species of a seedling. For the same reason willow and larch species were recorded to the level of genus only. Nomenclature follows Stace (2010) and vernacular names of all species recorded in this survey are listed in Appendix B.

The total number of seedlings/saplings for each species was calculated using the data from all 487 sample plots. In addition, the total number of shoots for which: i) there was no deer damage; ii) the leader was browsed only; iii) the side shoots were browsed only; iv) both the leader and sides showed evidence of browsing; and v) the shoot had been frayed has been reported for each species of seedling/sapling. The age profile of all mature trees present within the 487 plots has been presented in the form of a column chart and this also indicates how many of these trees had evidence of bark stripping. The total frequency of deadwood within the 487 plots has also been presented in a column chart that distinguishes between standing dead, fallen dead and tree stumps. The data has also been summarised for each named estate in case this information may prove useful. All plots which fell within property for which ownership was unknown have been grouped

together. Averages of the number seedling/saplings frayed and the number of trees that have been bark-stripped per species per named Estate may be calculated from the data summarised here, if required.

3.0 Results

3.1 All sites combined

There were 45,191 seedling/saplings recorded from 487 x c.530m² plots in semi-natural native woodland (that had previously been designated as experiencing High or Very High herbivore pressure) in the West Lochaber Deer Management Group area. Almost 69% of these seedling/saplings showed no sign of deer impact at time of our fieldwork. Birch (*Betula pendula* and *B. pubescens* combined) and Rowan (*Sorbus aucuparia*) trees were the most numerous seedlings/saplings with c.67% showing no sign of deer damage in each case. It is worth noting here that the majority of these individuals were this year's seedlings and they may yet succumb to deer browse later in the season. Of the 14,037 seedling/saplings of all tree species that showed evidence of deer damage; 7,437 had their leaders and at least one of their side-shoots eaten, 2,931 had only their leaders nibbled and 3,342 saplings had side-shoots only that were browsed. Fraying of saplings was observed on 327 occasions and Birch was most frequently frayed. However, this reflects the abundance of this tree genus and actually only 0.78% of all birch seedling/saplings were frayed within the sample plots. This contrasts with 4.27% of saplings frayed among those tree species belonging to the phylum Coniferophyta, such as *Picea sitchensis* (Sitka Spruce) and *Pinus sylvestris* (Scots Pine). Coniferous saplings were much less frequent in sample plots so there seems to be a positive selection for these needle-leaved species for the purposes of deer rubbing against them. Table 1 summarises the seedling/sapling information for each tree species using the whole data set for West Lochaber.

There were more birch trees recorded as being stripped of their bark than any other species in sample plots in the West Lochaber Deer Management Group area but this only represents 0.63% of all birch trees tallied. Willow trees were most frequently found with evidence of bark-stripping by large herbivores at 7.48% even though they were not common in sample plots (Table 2). Only 1.25% of all trees were found with evidence of bark-stripping by deer. Approximately 68% of trees were deemed to be in the first third of their lives (pole stage), just over 30% of trees were categorised as mature and <2% were considered to be veterans (having lived beyond the age when they might have otherwise died) (Figure 1). Tree stumps were the most numerous form of dead wood in the West Lochaber Deer Management Group area (Figure 2). This reflects the number of sample plots that were located on former forestry plantation land that had been allowed to regenerate into semi-natural native woodland after the last clear-felling operation.

The results have also been broken down according to the property name within the data base (Tables 3 to 48 and Figures 3 to 48). The data is obviously more meaningful for those properties with more sample plots randomly allocated to them. The reader is urged to take this into account (see the relevant Table and Figure legends) in order to better understand the data. Consequently, axis scales of graphs are likely to be different for each Estate. Selected photographs have been included in Appendix A to supplement the data presented here.

Table 1. Deer impact on seedlings/saplings within plots sampled from previously designated High and Very High Impact categories of native semi-natural woodland throughout the whole West Lochaber Deer Management Group area for each tree species. Units represent number of seedling/saplings within each category. (Data collected from 487 plots of c.530 m² area)

| Species | No damage | Leader | Sides | Both leader and | Frayed | TOTAL |
|-----------------------------------|-----------|--------|-------|-----------------|--------|-------|
| <i>Acer pseudoplatanus</i> | 21 | 3 | 0 | 7 | 0 | 31 |
| <i>Alnus glutinosa</i> | 297 | 18 | 122 | 264 | 8 | 709 |
| <i>Betula pendula</i> | 3904 | 750 | 595 | 1529 | 101 | 6879 |
| <i>Betula pubescens</i> | 9431 | 481 | 1169 | 1739 | 53 | 12873 |
| Combined <i>Betula</i> spp. | 13335 | 1231 | 1764 | 3268 | 154 | 19752 |
| <i>Chamaecyparis lawsoniana</i> | 99 | 0 | 0 | 0 | 0 | 99 |
| <i>Corylus avellana</i> | 307 | 17 | 74 | 119 | 3 | 520 |
| <i>Crataegus monogyna</i> | 5 | 1 | 6 | 16 | 2 | 30 |
| <i>Fagus sylvatica</i> | 611 | 72 | 59 | 133 | 3 | 878 |
| <i>Fraxinus excelsior</i> | 541 | 20 | 18 | 142 | 0 | 721 |
| <i>Ilex aquifolium</i> | 273 | 30 | 50 | 165 | 6 | 524 |
| <i>Juniper communis</i> | 0 | 0 | 1 | 0 | 0 | 1 |
| <i>Larix</i> spp. | 154 | 7 | 26 | 20 | 19 | 226 |
| <i>Picea abies</i> | 345 | 1 | 3 | 5 | 20 | 374 |
| <i>Picea sitchensis</i> | 1447 | 89 | 253 | 96 | 57 | 1942 |
| <i>Pinus sylvestris</i> | 222 | 1 | 12 | 9 | 9 | 253 |
| <i>Populus tremula</i> | 1 | 1 | 1 | 2 | 0 | 5 |
| <i>Prunus avium</i> | 56 | 1 | 2 | 0 | 0 | 59 |
| <i>Prunus padus</i> | 19 | 4 | 0 | 1 | 0 | 24 |
| <i>Pseudotsuga menziesii</i> | 31 | 1 | 2 | 26 | 5 | 65 |
| <i>Quercus</i> spp. | 1527 | 222 | 139 | 436 | 3 | 2327 |
| <i>Rhododendron ponticum</i> | 3114 | 0 | 0 | 1 | 0 | 3115 |
| <i>Salix</i> spp. | 1112 | 56 | 254 | 828 | 9 | 2259 |
| <i>Sambucus nigra</i> | 1 | 0 | 0 | 0 | 0 | 1 |
| <i>Sorbus aucuparia</i> | 7625 | 1154 | 554 | 1895 | 29 | 11257 |
| <i>Tsuga heterophylla</i> | 7 | 2 | 1 | 0 | 0 | 10 |
| OTHERS (<i>Cotoneaster</i> spp.) | 4 | 0 | 1 | 4 | 0 | 9 |

Table 2. Age class/frequency data for each mature tree species and deer impact within plots sampled from previously designated High and Very High Impact categories of native semi-natural woodland throughout the whole West Lochaber Deer Management Group area for each tree species. (Data collected from 487 plots of c.530 m² area)

| Species | Pole | Mature | Veteran | TOTAL | Bark |
|---------------------------------|------|--------|---------|-------|------|
| <i>Acer pseudoplatanus</i> | 7 | 0 | 0 | 7 | 0 |
| <i>Alnus glutinosa</i> | 289 | 202 | 16 | 507 | 4 |
| <i>Betula pendula</i> | 1176 | 416 | 25 | 1617 | 22 |
| <i>Betula pubescens</i> | 1838 | 470 | 34 | 2342 | 3 |
| <i>Castanea sativa</i> | 0 | 0 | 1 | 1 | 0 |
| <i>Chamaecyparis lawsoniana</i> | 1 | 0 | 0 | 1 | 0 |
| <i>Corylus avellana</i> | 86 | 76 | 20 | 182 | 1 |
| <i>Crataegus monogyna</i> | 15 | 12 | 2 | 29 | 0 |
| <i>Fagus sylvatica</i> | 60 | 23 | 0 | 83 | 2 |
| <i>Fraxinus excelsior</i> | 48 | 25 | 0 | 73 | 0 |
| <i>Ilex aquifolium</i> | 37 | 16 | 4 | 57 | 0 |
| <i>Larix</i> spp. | 8 | 14 | 1 | 23 | 0 |
| <i>Picea abies</i> | 182 | 151 | 0 | 333 | 18 |
| <i>Picea sitchensis</i> | 459 | 260 | 0 | 719 | 3 |
| <i>Pinus sylvestris</i> | 387 | 177 | 9 | 573 | 0 |
| <i>Populus tremula</i> | 3 | 0 | 0 | 3 | 0 |
| <i>Prunus padus</i> | 5 | 1 | 0 | 6 | 0 |
| <i>Pseudotsuga menziesii</i> | 75 | 58 | 0 | 133 | 6 |
| <i>Quercus</i> spp. | 337 | 340 | 11 | 688 | 19 |
| <i>Rhododendron ponticum</i> | 45 | 30 | 0 | 75 | 0 |
| <i>Salix</i> spp. | 91 | 54 | 2 | 147 | 11 |
| <i>Sequoiadendron giganteum</i> | 0 | 2 | 0 | 2 | 0 |
| <i>Sorbus aucuparia</i> | 265 | 97 | 2 | 364 | 11 |
| <i>Taxus baccata</i> | 0 | 1 | 0 | 1 | 0 |
| <i>Tilia x europaea</i> | 2 | 2 | 0 | 4 | 0 |
| <i>Tsuga heterophylla</i> | 4 | 0 | 0 | 4 | 0 |
| <i>Ulmus glabra</i> | 2 | 3 | 1 | 6 | 0 |
| Total trees | 5422 | 2430 | 128 | 7980 | 100 |

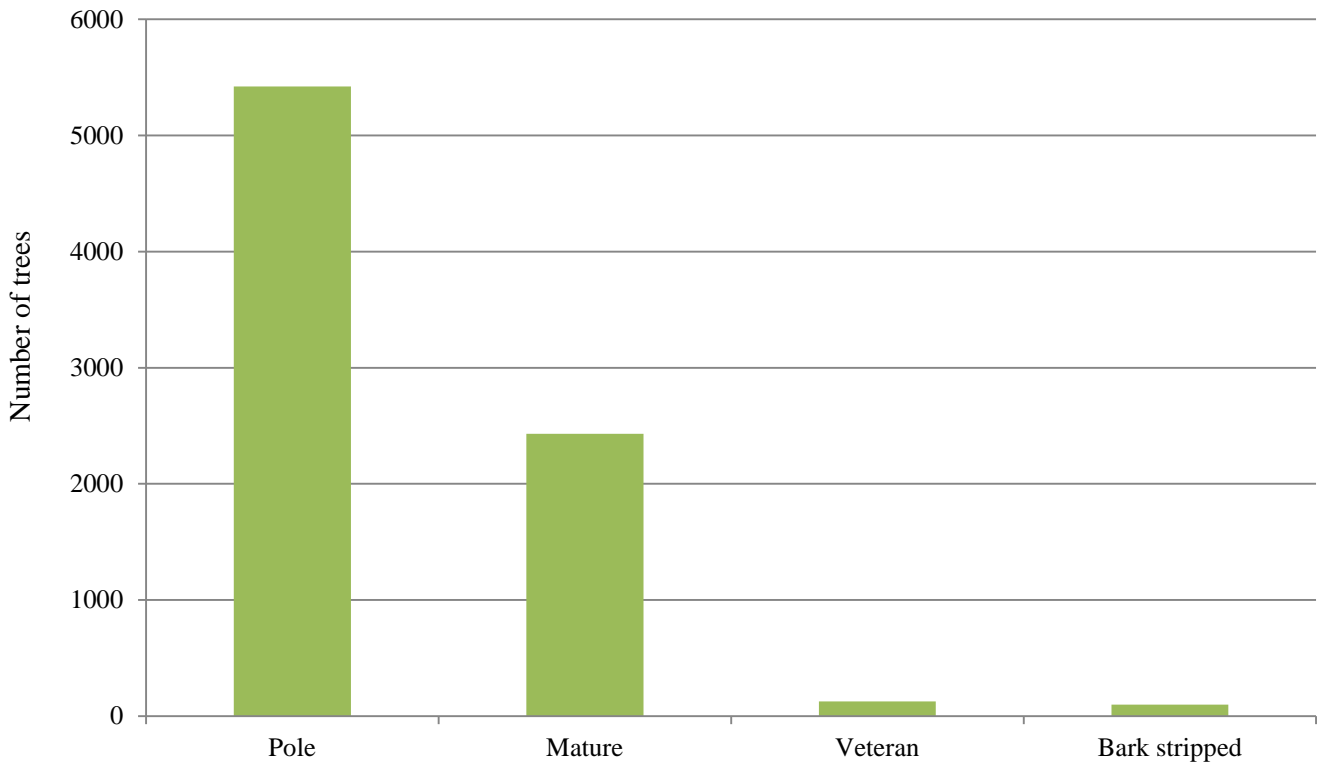


Figure 1. Number of all mature trees categorised according to age class, and those which have had bark stripped, from all plots within the West Lochaber Deer Management Group area. (Data collected from 487 plots of c.530 m² area).

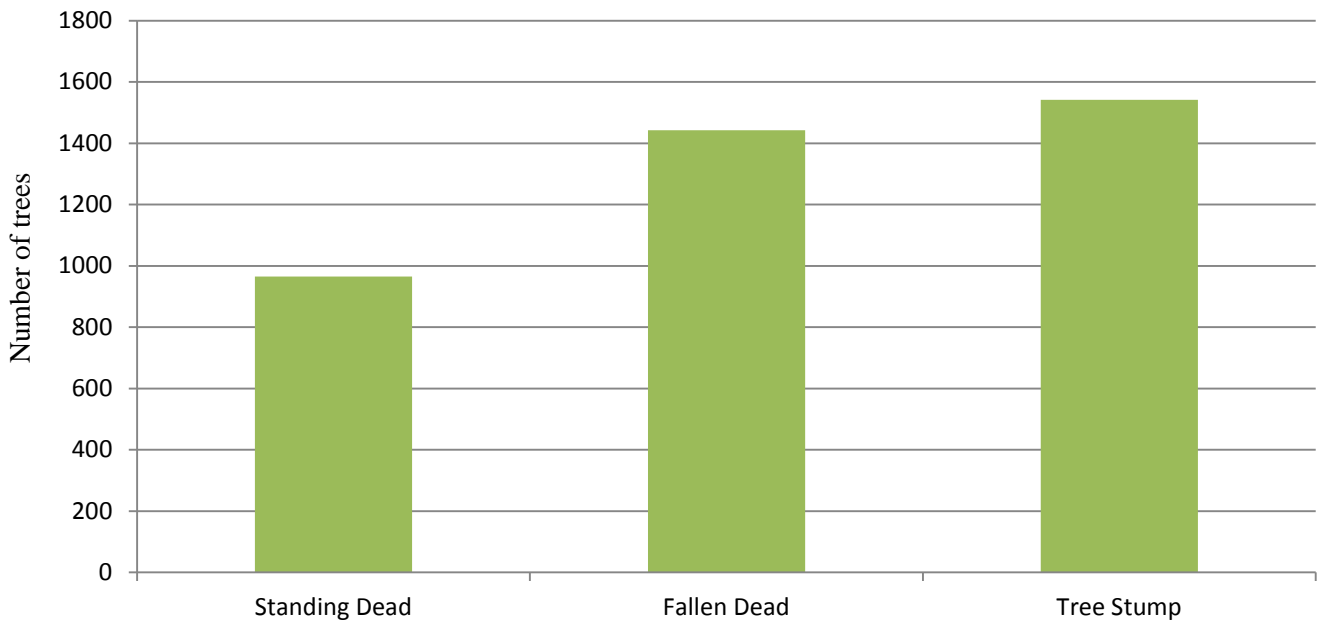


Figure 2. Number of standing dead, fallen dead and tree stumps from all plots within the West Lochaber Deer Management Group area. (Data collected from 487 plots of c.530 m² area).

3.2 Achnacarry North

Table 3. Deer impact on seedlings/saplings within plots at **Achnacarry North** for each tree species. Units represent number of seedling/saplings within each category. (Data collected from 5 plots of c.530 m² area).

| Species | No damage | Leader only | Sides only | Both leader and sides | Frayed | TOTAL |
|------------------------------|-----------|-------------|------------|-----------------------|--------|-------|
| <i>Alnus glutinosa</i> | 0 | 3 | 10 | 9 | 5 | 27 |
| <i>Betula pendula</i> | 15 | 22 | 18 | 55 | 4 | 114 |
| <i>Betula pubescens</i> | 7 | 3 | 0 | 2 | 0 | 12 |
| Combined <i>Betula</i> spp. | 22 | 25 | 18 | 57 | 4 | 126 |
| <i>Corylus avellana</i> | 0 | 0 | 2 | 14 | 2 | 18 |
| <i>Crataegus monogyna</i> | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>Fagus sylvatica</i> | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>Fraxinus excelsior</i> | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>Ilex aquifolium</i> | 1 | 1 | 0 | 3 | 1 | 6 |
| <i>Picea sitchensis</i> | 1 | 0 | 0 | 1 | 0 | 2 |
| <i>Pseudotsuga menziesii</i> | 0 | 0 | 1 | 0 | 0 | 1 |
| <i>Quercus</i> spp. | 58 | 33 | 13 | 64 | 0 | 168 |
| <i>Salix</i> spp. | 0 | 0 | 1 | 0 | 0 | 1 |
| <i>Sorbus aucuparia</i> | 26 | 89 | 15 | 104 | 0 | 234 |
| <i>Tsuga heterophylla</i> | 2 | 2 | 0 | 0 | 0 | 4 |

Table 4. Age class/frequency data for each mature tree species and deer impact within plots at **Achnacarry North**. (Data collected from 5 plots of c.530 m² area).

| Species | Pole | Mature | Veteran | TOTAL | Bark |
|---------------------------|------|--------|---------|-------|------|
| <i>Alnus glutinosa</i> | 18 | 15 | 1 | 34 | 0 |
| <i>Betula pendula</i> | 28 | 12 | 0 | 40 | 3 |
| <i>Corylus avellana</i> | 2 | 0 | 0 | 2 | 0 |
| <i>Fraxinus excelsior</i> | 0 | 1 | 0 | 1 | 0 |
| <i>Quercus</i> spp. | 1 | 8 | 2 | 11 | 0 |
| <i>Salix</i> spp. | 2 | 0 | 0 | 2 | 0 |
| <i>Sorbus aucuparia</i> | 7 | 2 | 0 | 9 | 0 |
| Total trees | 58 | 38 | 3 | 99 | 3 |

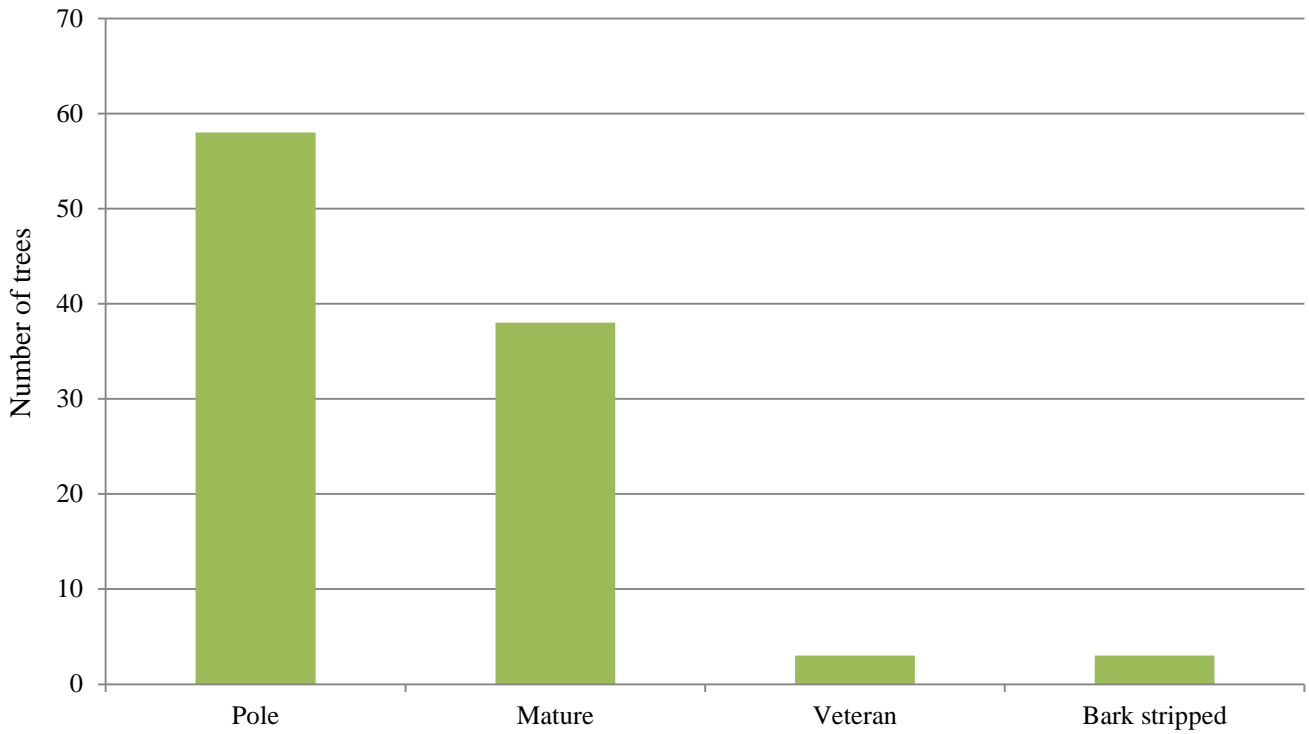


Figure 3. Number of all mature trees, categorised according to age class, within plots at **Achnacarry North** and those which have had bark stripped. (Data collected from 5 plots of c.530 m² area).

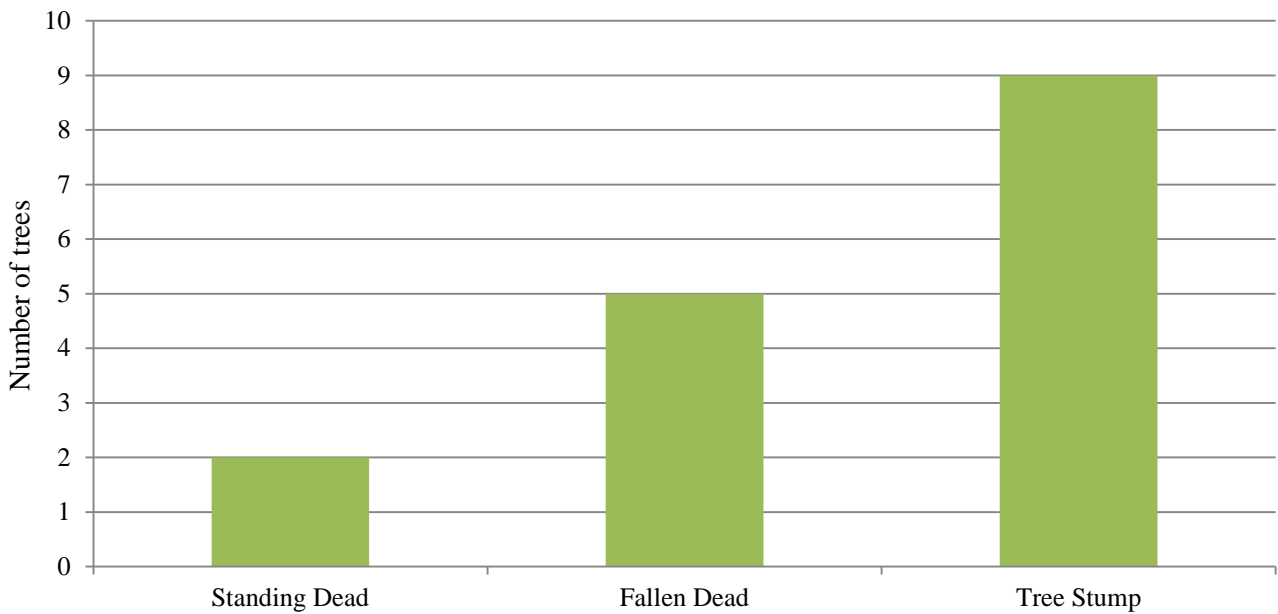


Figure 4. Number of standing dead, fallen dead and tree stumps within plots at **Achnacarry North**. (Data collected from 5 plots of c.530 m² area).

3.3 Achnacarry South

Table 5. Deer impact on seedlings/saplings within plots at **Achnacarry South** for each tree species. Units represent number of seedling/saplings within each category. (Data collected from 131 plots of c.530 m² area).

| Species | No damage | Leader only | Sides only | Both leader and sides | Frayed | TOTAL |
|-----------------------------------|-----------|-------------|------------|-----------------------|--------|-------|
| <i>Acer pseudoplatanus</i> | 14 | 0 | 0 | 0 | 0 | 14 |
| <i>Aesculus hippocastanum</i> | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>Alnus glutinosa</i> | 56 | 1 | 24 | 13 | 0 | 94 |
| <i>Alnus incana</i> | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>Betula pendula</i> | 1446 | 164 | 110 | 362 | 32 | 2114 |
| <i>Betula pubescens</i> | 846 | 53 | 249 | 478 | 2 | 1628 |
| Combined <i>Betula</i> spp. | 2292 | 217 | 359 | 840 | 34 | 3742 |
| <i>Chamaecyparis lawsoniana</i> | 99 | 0 | 0 | 0 | 0 | 99 |
| <i>Corylus avellana</i> | 131 | 6 | 22 | 27 | 1 | 187 |
| <i>Crataegus monogyna</i> | 2 | 0 | 0 | 0 | 2 | 4 |
| <i>Fagus sylvatica</i> | 493 | 39 | 36 | 64 | 3 | 635 |
| <i>Fraxinus excelsior</i> | 262 | 4 | 4 | 15 | 0 | 285 |
| <i>Ilex aquifolium</i> | 72 | 12 | 18 | 69 | 2 | 173 |
| <i>Juniper communis</i> | 0 | 0 | 1 | 0 | 0 | 1 |
| <i>Larix</i> spp. | 66 | 5 | 2 | 1 | 0 | 74 |
| <i>Picea abies</i> | 322 | 0 | 0 | 0 | 6 | 328 |
| <i>Picea sitchensis</i> | 286 | 3 | 8 | 6 | 6 | 309 |
| <i>Pinus sylvestris</i> | 22 | 1 | 3 | 4 | 3 | 33 |
| <i>Populus tremula</i> | 1 | 1 | 1 | 2 | 0 | 5 |
| <i>Prunus avium</i> | 2 | 0 | 0 | 0 | 0 | 2 |
| <i>Prunus padus</i> | 3 | 0 | 0 | 0 | 0 | 3 |
| <i>Pseudotsuga menziesii</i> | 30 | 1 | 1 | 25 | 5 | 62 |
| <i>Quercus</i> spp. | 458 | 18 | 17 | 26 | 2 | 521 |
| <i>Rhododendron ponticum</i> | 1597 | 0 | 0 | 0 | 0 | 1597 |
| <i>Salix</i> spp. | 295 | 2 | 23 | 82 | 1 | 403 |
| <i>Sorbus aucuparia</i> | 1459 | 305 | 112 | 292 | 0 | 2168 |
| <i>Tsuga heterophylla</i> | 5 | 0 | 1 | 0 | 0 | 6 |
| OTHERS (<i>Cotoneaster</i> spp.) | 4 | 0 | 1 | 2 | 0 | 7 |

Table 6. Age class/frequency data for each mature tree species and deer impact within plots at **Achnacarry South**.
(Data collected from 131 plots of c.530 m² area).

| Species | Pole | Mature | Veteran | TOTAL | Bark |
|---------------------------------|------|--------|---------|-------|------|
| <i>Acer pseudoplatanus</i> | 4 | 0 | 0 | 4 | 0 |
| <i>Alnus glutinosa</i> | 70 | 56 | 6 | 132 | 0 |
| <i>Betula pendula</i> | 447 | 134 | 8 | 589 | 1 |
| <i>Betula pubescens</i> | 242 | 63 | 4 | 309 | 0 |
| <i>Corylus avellana</i> | 25 | 24 | 3 | 52 | 0 |
| <i>Chamaecyparis lawsoniana</i> | 1 | 0 | 0 | 1 | 0 |
| <i>Crataegus monogyna</i> | 3 | 2 | 2 | 7 | 0 |
| <i>Fagus sylvatica</i> | 33 | 13 | 0 | 46 | 0 |
| <i>Fraxinus excelsior</i> | 20 | 5 | 0 | 25 | 0 |
| <i>Ilex aquifolium</i> | 21 | 3 | 0 | 24 | 0 |
| <i>Larix</i> spp. | 4 | 5 | 1 | 10 | 0 |
| <i>Picea abies</i> | 82 | 137 | 0 | 219 | 18 |
| <i>Picea sitchensis</i> | 14 | 8 | 0 | 22 | 1 |
| <i>Pinus sylvestris</i> | 40 | 44 | 2 | 86 | 0 |
| <i>Populus tremula</i> | 3 | 0 | 0 | 3 | 0 |
| <i>Prunus padus</i> | 2 | 0 | 0 | 2 | 0 |
| <i>Prunus spinosa</i> | 0 | 0 | 0 | 0 | 0 |
| <i>Pseudotsuga menziesii</i> | 64 | 48 | 0 | 112 | 6 |
| <i>Quercus</i> spp. | 33 | 42 | 4 | 79 | 0 |
| <i>Rhododendron ponticum</i> | 28 | 26 | 0 | 54 | 0 |
| <i>Salix</i> spp. | 33 | 16 | 0 | 49 | 2 |
| <i>Sequoiadendron giganteum</i> | 0 | 2 | 0 | 2 | 0 |
| <i>Sorbus aucuparia</i> | 104 | 28 | 0 | 132 | 0 |
| <i>Taxus baccata</i> | 0 | 1 | 0 | 1 | 0 |
| <i>Tilia x europaea</i> | 2 | 2 | 0 | 4 | 0 |
| <i>Ulmus glabra</i> | 2 | 1 | 1 | 4 | 0 |
| Total trees | 1277 | 660 | 31 | 1968 | 28 |

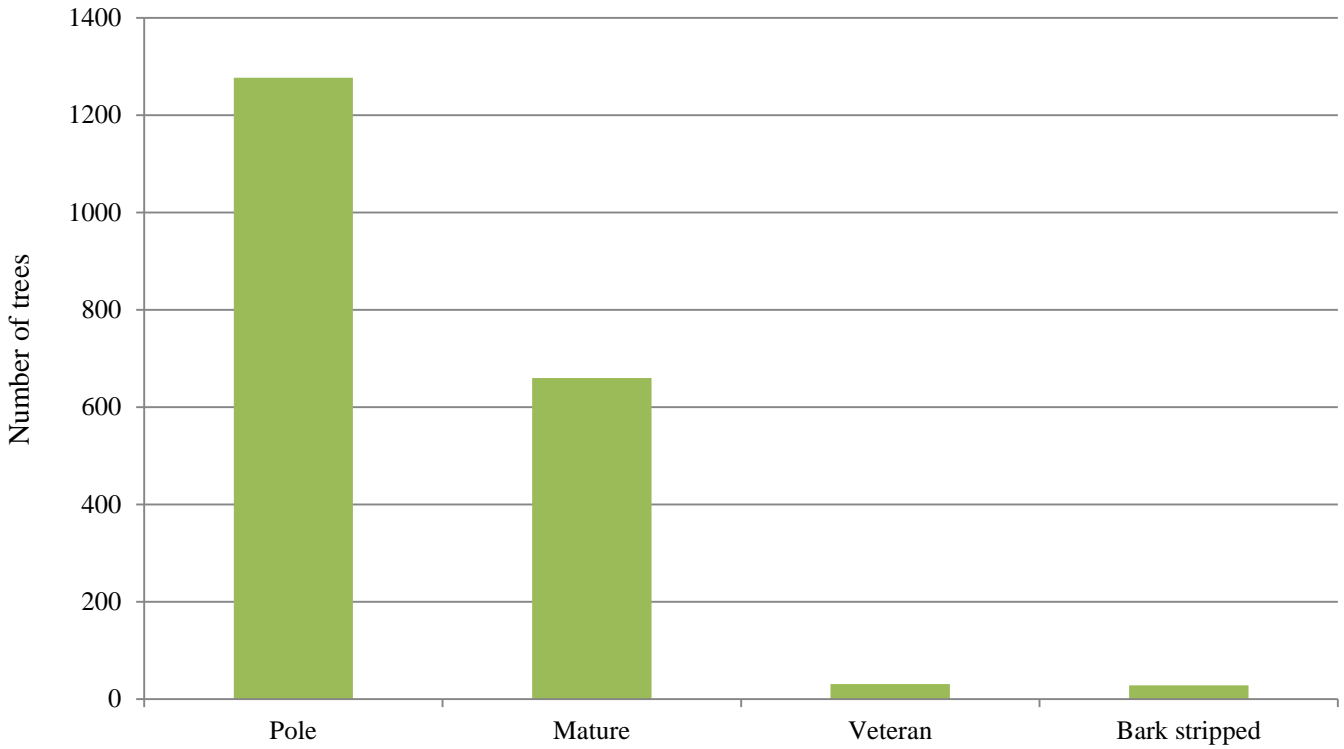


Figure 5. Number of all mature trees, categorised according to age class, within plots at **Achnacarry South** and those which have had bark stripped. (Data collected from 131 plots of c.530 m² area).

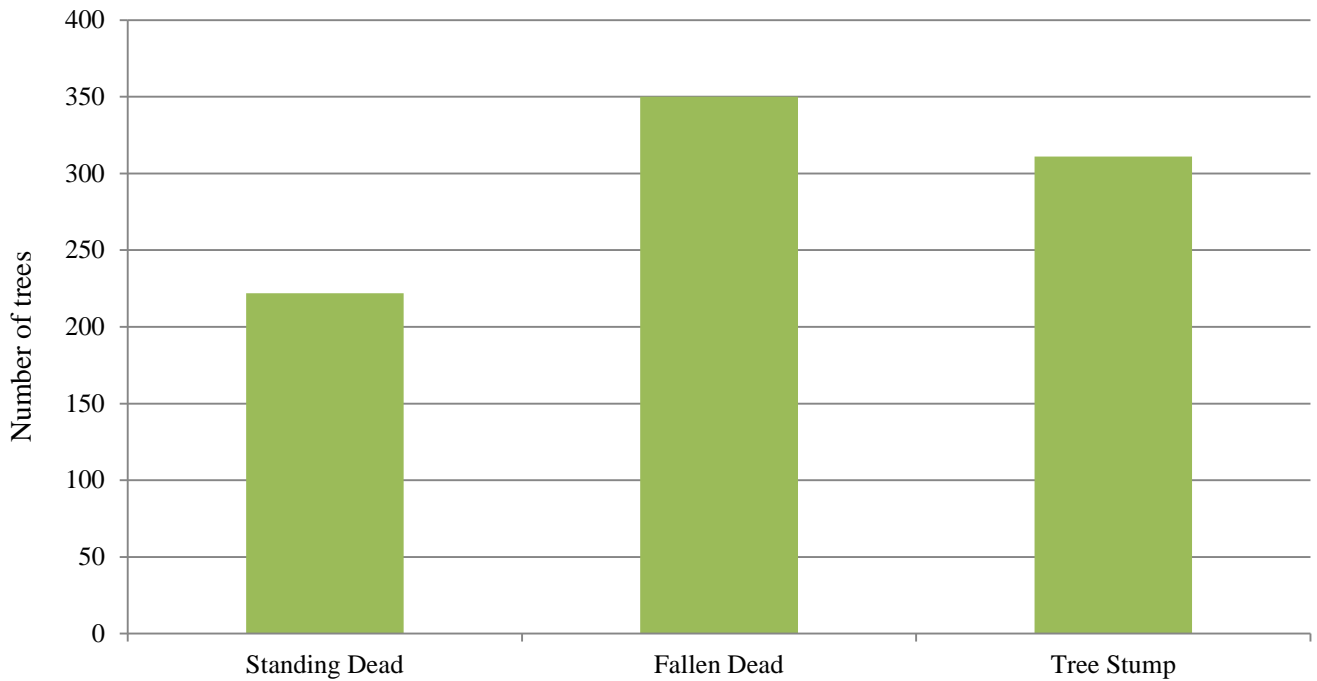


Figure 6. Number of standing dead, fallen dead and tree stumps within plots at **Achnacarry South**. (Data collected from 131 plots of c.530 m² area).

3.4 Aird Nam Buth

Table 7. Deer impact on seedlings/saplings within plots at **Aird Nam Buth** for each tree species. Units represent number of seedling/saplings within each category. (Data collected from 1 plot of c.530 m² area).

| Species | No damage | Leader only | Sides only | Both leader and sides | Frayed | TOTAL |
|------------------------------|-----------|-------------|------------|-----------------------|--------|-------|
| <i>Betula pendula</i> | 2 | 0 | 0 | 0 | 1 | 3 |
| <i>Betula pubescens</i> | 51 | 0 | 10 | 0 | 0 | 61 |
| Combined <i>Betula</i> spp. | 53 | 0 | 10 | 0 | 1 | 64 |
| <i>Rhododendron ponticum</i> | 2 | 0 | 0 | 0 | 0 | 2 |
| <i>Salix</i> spp. | 0 | 0 | 2 | 0 | 0 | 2 |
| <i>Sorbus aucuparia</i> | 0 | 0 | 0 | 1 | 0 | 1 |

Table 8. Age class/frequency data for each mature tree species and deer impact within plots at **Aird Nam Buth**. (Data collected from 1 plot of c.530 m² area).

| Species | Pole | Mature | Veteran | TOTAL | Bark |
|-------------------------|------|--------|---------|-------|------|
| <i>Betula pendula</i> | 2 | 0 | 0 | 2 | 0 |
| <i>Betula pubescens</i> | 17 | 3 | 0 | 20 | 0 |
| <i>Quercus</i> spp. | 0 | 3 | 0 | 3 | 0 |
| <i>Salix</i> spp. | 0 | 1 | 0 | 1 | 0 |
| Total trees | 19 | 7 | 0 | 26 | 0 |

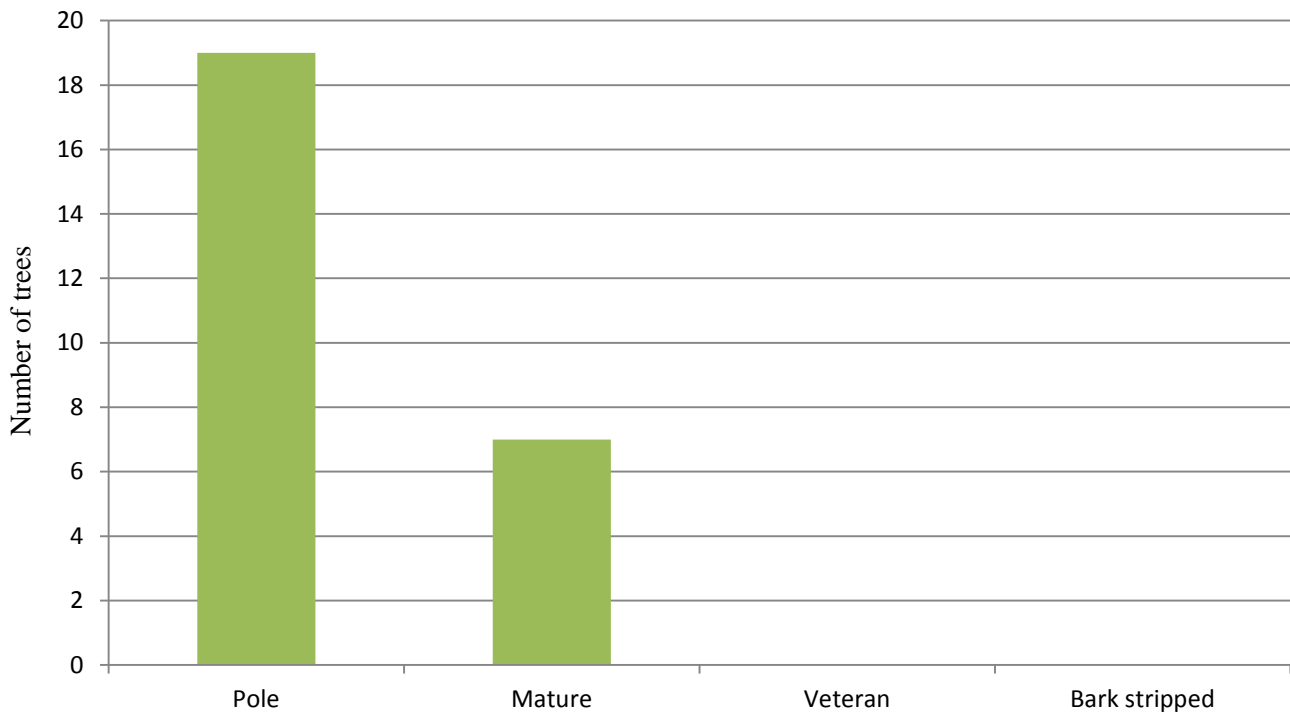


Figure 7. Number of all mature trees, categorised according to age class, within plots at **Aird Nam Buth** and those which have had bark stripped. (Data collected from 1 plot of c.530 m² area).

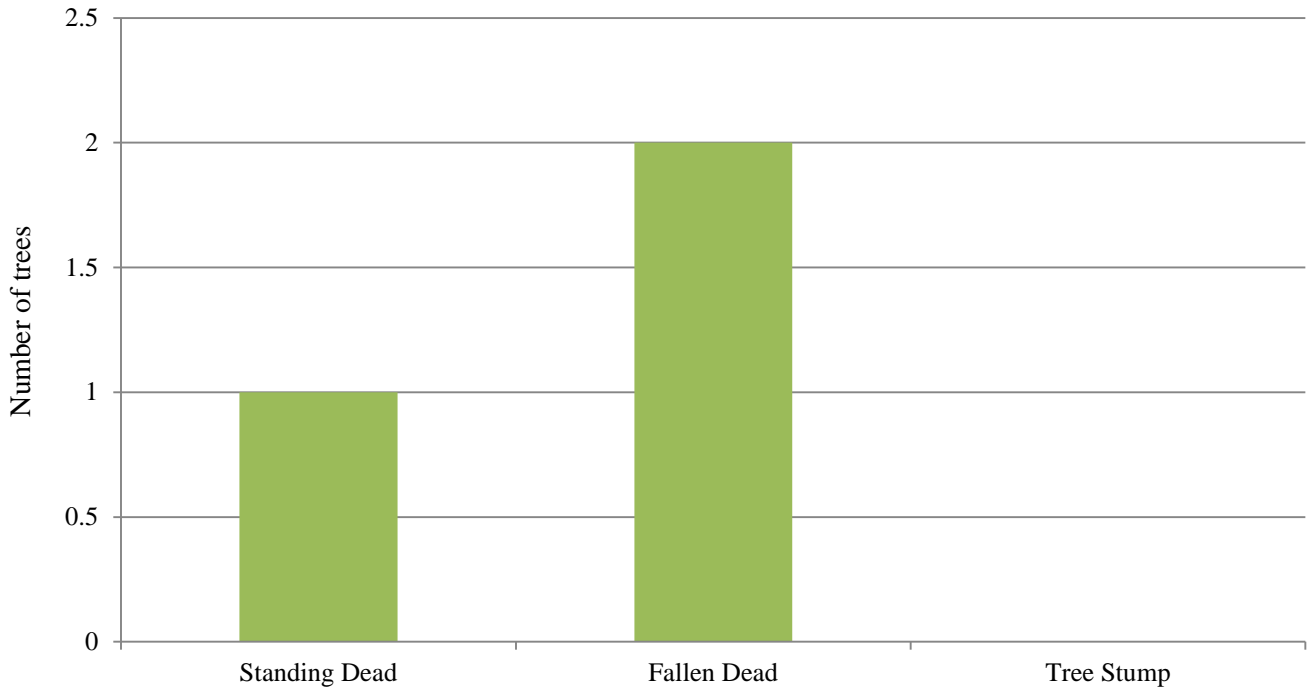


Figure 8. Number of standing dead, fallen dead and tree stumps within plots at **Aird Nam Buth**. (Data collected from 1 plot of c.530 m² area).

3.5 Ardnish

Table 9. Deer impact on seedlings/saplings within plots at **Ardnish** for each tree species. Units represent number of seedling/saplings within each category. (Data collected from 10 plots of c.530 m² area).

| Species | No damage | Leader only | Sides only | Both leader and sides | Frayed | TOTAL |
|------------------------------|-----------|-------------|------------|-----------------------|--------|-------|
| <i>Alnus glutinosa</i> | 0 | 0 | 0 | 0 | 1 | 1 |
| <i>Betula pendula</i> | 15 | 27 | 5 | 33 | 1 | 81 |
| <i>Betula pubescens</i> | 54 | 0 | 43 | 34 | 3 | 134 |
| Combined <i>Betula</i> spp. | 69 | 27 | 48 | 67 | 4 | 215 |
| <i>Corylus avellana</i> | 9 | 0 | 3 | 4 | 0 | 16 |
| <i>Crataegus monogyna</i> | 0 | 0 | 1 | 1 | 0 | 2 |
| <i>Fraxinus excelsior</i> | 23 | 1 | 2 | 106 | 0 | 132 |
| <i>Ilex aquifolium</i> | 1 | 0 | 1 | 6 | 0 | 8 |
| <i>Quercus</i> spp. | 67 | 7 | 15 | 31 | 0 | 120 |
| <i>Rhododendron ponticum</i> | 27 | 0 | 0 | 0 | 0 | 27 |
| <i>Sorbus aucuparia</i> | 48 | 61 | 8 | 107 | 0 | 224 |

Table 10. Age class/frequency data for each mature tree species and deer impact within plots at **Ardnish**. (Data collected from 10 plots of c.530 m² area)

| Species | Pole | Mature | Veteran | TOTAL | Bark |
|------------------------------|------|--------|---------|-------|------|
| <i>Alnus glutinosa</i> | 25 | 5 | 0 | 30 | 1 |
| <i>Betula pendula</i> | 56 | 46 | 2 | 104 | 0 |
| <i>Betula pubescens</i> | 94 | 15 | 0 | 109 | 0 |
| <i>Corylus avellana</i> | 0 | 1 | 0 | 1 | 0 |
| <i>Fraxinus excelsior</i> | 2 | 0 | 0 | 2 | 0 |
| <i>Ilex aquifolium</i> | 2 | 1 | 0 | 3 | 0 |
| <i>Quercus</i> spp. | 21 | 4 | 0 | 25 | 0 |
| <i>Rhododendron ponticum</i> | 1 | 0 | 0 | 1 | 0 |
| <i>Salix</i> spp. | 0 | 1 | 0 | 1 | 1 |
| <i>Sorbus aucuparia</i> | 3 | 5 | 0 | 8 | 0 |
| Total trees | 204 | 78 | 2 | 284 | 2 |

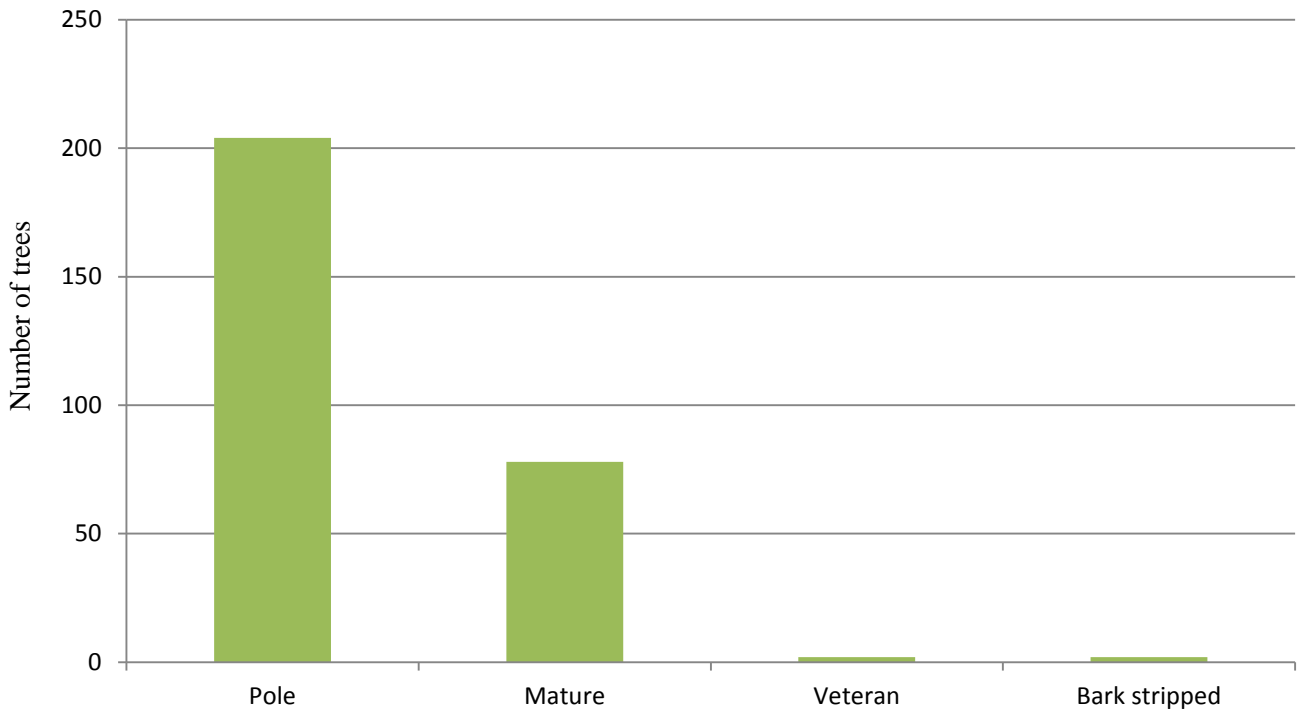


Figure 9. Number of all mature trees, categorised according to age class, within plots at **Ardnish** and those which have had bark stripped. (Data collected from 10 plots of c.530 m² area).

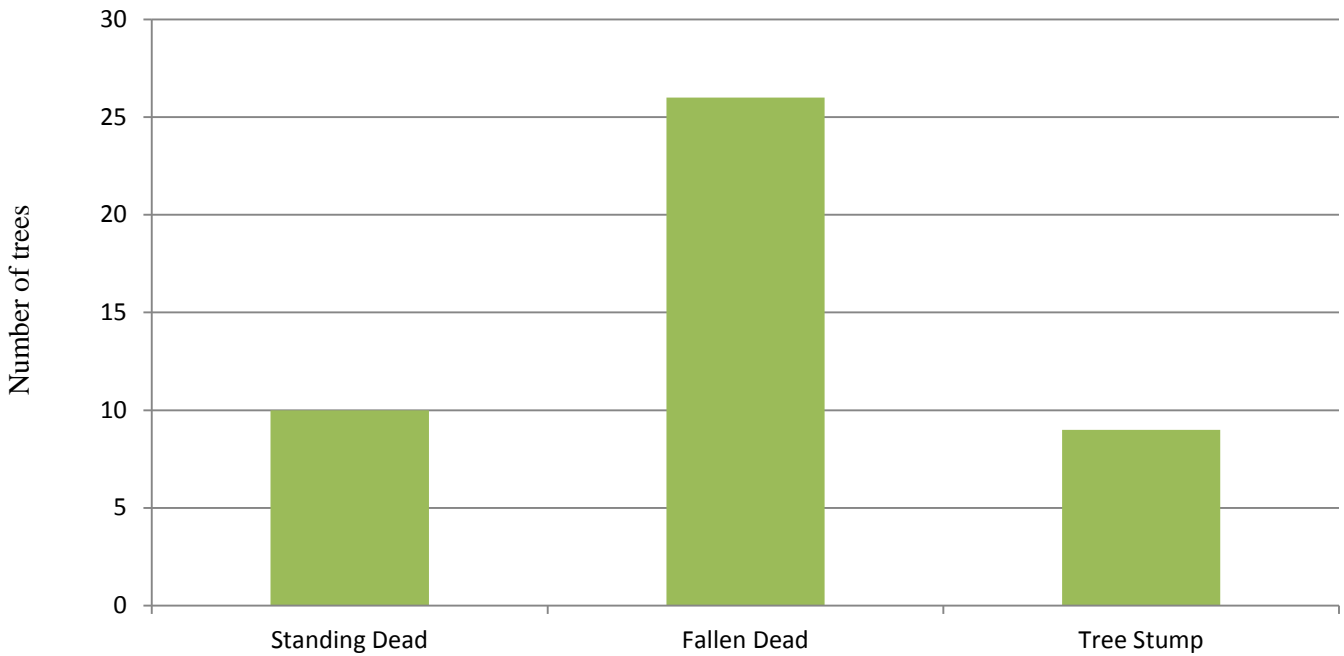


Figure 10. Number of standing dead, fallen dead and tree stumps within plots at **Ardnish**. (Data collected from 10 plots of c.530 m² area).

3.6 Arisaig

Table 11 Deer impact on seedlings/saplings within plots at **Arisaig** for each tree species. Units represent number of seedling/saplings within each category. (Data collected from 75 plots of c.530 m² area).

| Species | No damage | Leader only | Sides only | Both leader and sides | Frayed | TOTAL |
|------------------------------|-----------|-------------|------------|-----------------------|--------|-------|
| <i>Acer pseudoplatanus</i> | 6 | 3 | 0 | 7 | 0 | 16 |
| <i>Alnus glutinosa</i> | 3 | 3 | 1 | 163 | 0 | 170 |
| <i>Betula pendula</i> | 365 | 365 | 189 | 654 | 47 | 1620 |
| <i>Betula pubescens</i> | 1403 | 102 | 207 | 260 | 24 | 1996 |
| Combined <i>Betula</i> spp. | 1768 | 467 | 396 | 914 | 71 | 3616 |
| <i>Corylus avellana</i> | 2 | 0 | 0 | 2 | 0 | 4 |
| <i>Crataegus monogyna</i> | 0 | 0 | 4 | 13 | 0 | 17 |
| <i>Fagus sylvatica</i> | 101 | 33 | 20 | 65 | 0 | 219 |
| <i>Fraxinus excelsior</i> | 26 | 9 | 8 | 11 | 0 | 54 |
| <i>Ilex aquifolium</i> | 107 | 11 | 14 | 54 | 3 | 189 |
| <i>Larix</i> spp. | 53 | 0 | 0 | 0 | 2 | 55 |
| <i>Picea sitchensis</i> | 72 | 0 | 0 | 0 | 0 | 72 |
| <i>Pinus sylvestris</i> | 62 | 0 | 0 | 0 | 4 | 66 |
| <i>Prunus avium</i> | 0 | 1 | 0 | 0 | 0 | 1 |
| <i>Prunus padus</i> | 11 | 2 | 0 | 0 | 0 | 13 |
| <i>Pseudotsuga menziesii</i> | 0 | 0 | 0 | 1 | 0 | 1 |
| <i>Quercus</i> spp. | 263 | 65 | 26 | 111 | 1 | 466 |
| <i>Rhododendron ponticum</i> | 517 | 0 | 0 | 1 | 0 | 518 |
| <i>Salix</i> spp. | 49 | 2 | 14 | 40 | 4 | 109 |
| <i>Sorbus aucuparia</i> | 334 | 156 | 73 | 497 | 21 | 1081 |

Table 12. Age class/frequency data for each mature tree species and deer impact within plots at **Arisaig**. (Data collected from 75 plots of c.530 m² area).

| Species | Pole | Mature | Veteran | TOTAL | Bark |
|---------------------------------|------|--------|---------|-------|------|
| <i>Acer pseudoplatanus</i> | 3 | 0 | 0 | 3 | 0 |
| <i>Alnus glutinosa</i> | 2 | 2 | 0 | 4 | 0 |
| <i>Betula pendula</i> | 244 | 54 | 2 | 300 | 18 |
| <i>Betula pubescens</i> | 436 | 31 | 2 | 469 | 0 |
| <i>Castanea sativa</i> | 0 | 0 | 1 | 1 | 0 |
| <i>Chamaecyparis lawsoniana</i> | 0 | 0 | 0 | 0 | 0 |
| <i>Corylus avellana</i> | 1 | 7 | 0 | 8 | 1 |
| <i>Crataegus monogyna</i> | 9 | 0 | 0 | 9 | 0 |
| <i>Fagus sylvatica</i> | 18 | 9 | 0 | 27 | 2 |
| <i>Fraxinus excelsior</i> | 11 | 4 | 0 | 15 | 0 |
| <i>Ilex aquifolium</i> | 7 | 1 | 0 | 8 | 0 |
| <i>Larix</i> spp. | 0 | 4 | 0 | 4 | 0 |
| <i>Picea sitchensis</i> | 1 | 0 | 0 | 1 | 0 |
| <i>Pinus sylvestris</i> | 7 | 10 | 0 | 17 | 0 |
| <i>Quercus</i> spp. | 102 | 128 | 0 | 230 | 17 |
| <i>Rhododendron ponticum</i> | 1 | 0 | 0 | 1 | 0 |
| <i>Salix</i> spp. | 5 | 4 | 0 | 9 | 2 |
| <i>Sorbus aucuparia</i> | 37 | 16 | 0 | 53 | 3 |
| Total trees | 884 | 270 | 5 | 1159 | 43 |

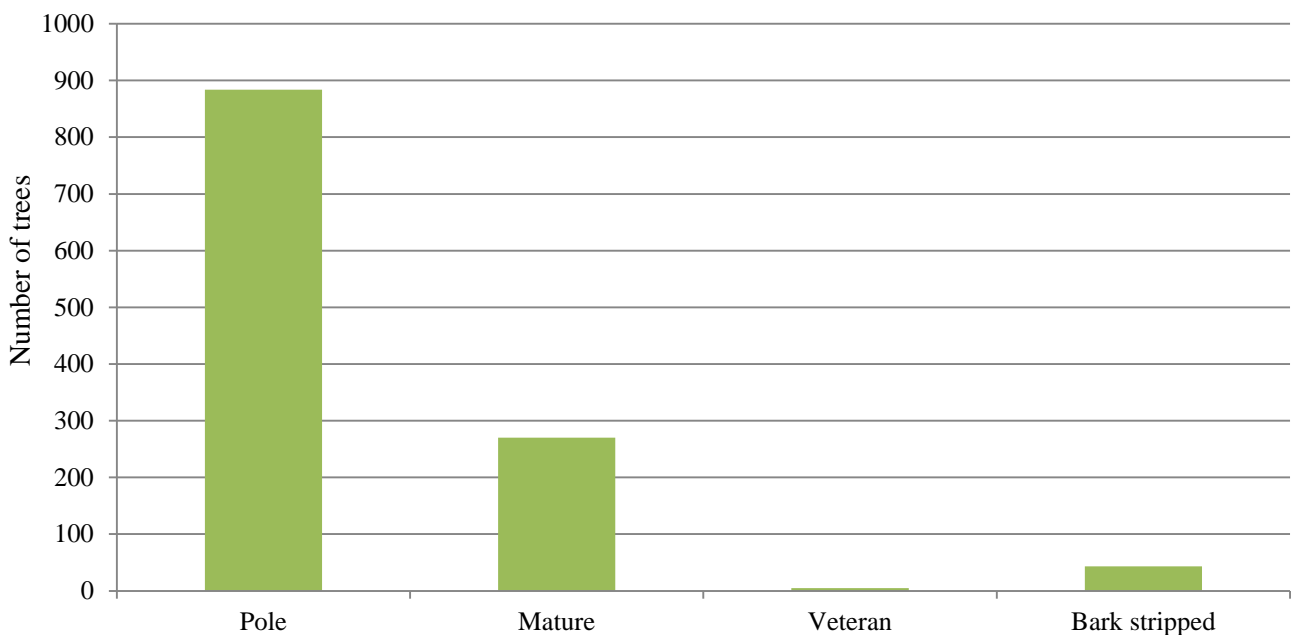


Figure 11. Number of all mature trees, categorised according to age class, within plots at **Arisaig** and those which have had bark stripped. (Data collected from 75 plots of c.530 m² area).

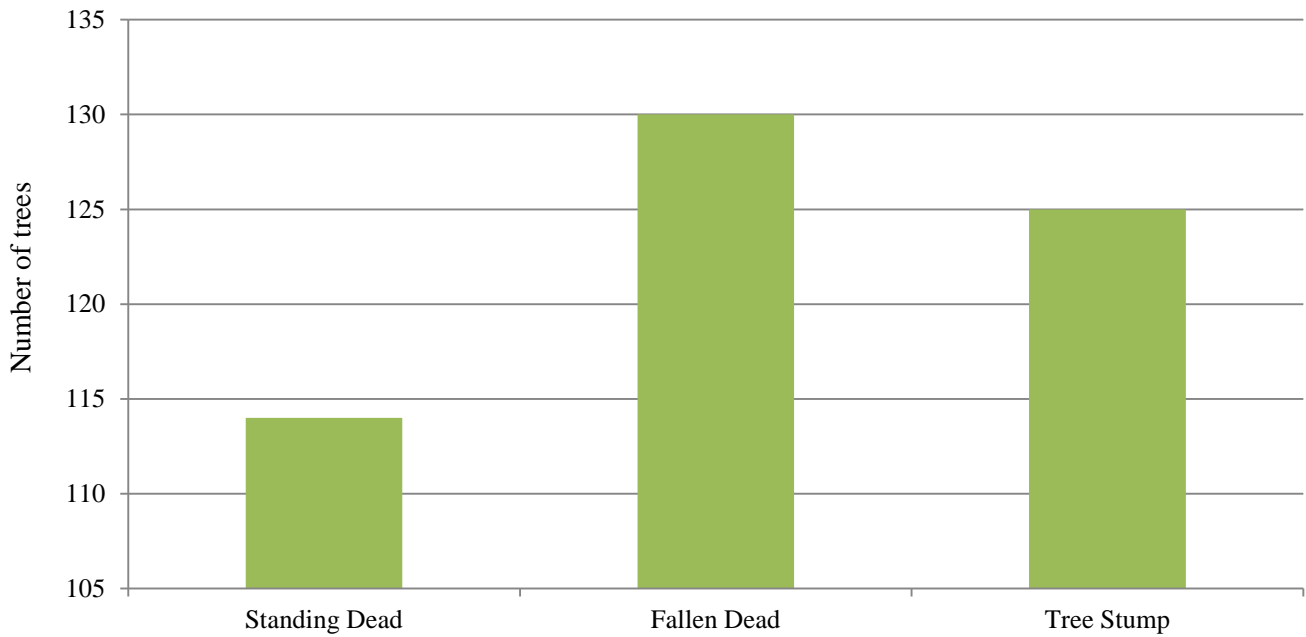


Figure 12. Number of standing dead, fallen dead and tree stumps within plots at **Arisaig**. (Data collected from 75 plots of c.530 m² area)

3.7 Borrodale

Table 13. Deer impact on seedlings/saplings within plots at **Borrodale Farm** for each tree species. Units represent number of seedling/saplings within each category. (Data collected from 18 plots of c.530 m² area).

| Species | No damage | Leader only | Sides only | Both leader and sides | Frayed | TOTAL |
|------------------------------|-----------|-------------|------------|-----------------------|--------|-------|
| <i>Alnus glutinosa</i> | 14 | 2 | 12 | 0 | 0 | 28 |
| <i>Alnus incana</i> | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>Betula pendula</i> | 90 | 94 | 13 | 104 | 2 | 303 |
| <i>Betula pubescens</i> | 181 | 18 | 39 | 50 | 0 | 288 |
| Combined <i>Betula</i> spp. | 271 | 112 | 52 | 154 | 2 | 591 |
| <i>Fagus sylvatica</i> | 14 | 0 | 2 | 4 | 0 | 20 |
| <i>Ilex aquifolium</i> | 1 | 0 | 0 | 5 | 0 | 6 |
| <i>Larix</i> spp. | 1 | 0 | 0 | 1 | 0 | 2 |
| <i>Picea sitchensis</i> | 0 | 0 | 0 | 0 | 1 | 1 |
| <i>Quercus</i> spp. | 67 | 40 | 1 | 43 | 0 | 151 |
| <i>Rhododendron ponticum</i> | 384 | 0 | 0 | 0 | 0 | 384 |
| <i>Salix</i> spp. | 0 | 0 | 0 | 3 | 0 | 3 |
| <i>Sorbus aucuparia</i> | 78 | 32 | 1 | 95 | 0 | 206 |

Table 14. Age class/frequency data for each mature tree species and deer impact within plots at **Borrodale Farm**. (Data collected from 18 plots of c.530 m² area).

| Species | Pole | Mature | Veteran | TOTAL | Bark stripped |
|-------------------------|------|--------|---------|-------|---------------|
| <i>Alnus glutinosa</i> | 2 | 1 | 0 | 3 | 0 |
| <i>Betula pendula</i> | 4 | 5 | 1 | 10 | 0 |
| <i>Betula pubescens</i> | 6 | 5 | 0 | 11 | 0 |
| <i>Fagus sylvatica</i> | 0 | 1 | 0 | 1 | 0 |
| <i>Ilex aquifolium</i> | 2 | 0 | 0 | 2 | 0 |
| <i>Larix</i> spp. | 0 | 4 | 0 | 4 | 0 |
| <i>Pinus sylvestris</i> | 0 | 8 | 0 | 8 | 0 |
| <i>Quercus</i> spp. | 88 | 60 | 0 | 148 | 0 |
| <i>Salix</i> spp. | 0 | 1 | 0 | 1 | 0 |
| <i>Sorbus aucuparia</i> | 13 | 1 | 0 | 14 | 1 |
| Total trees | 115 | 86 | 1 | 202 | 1 |

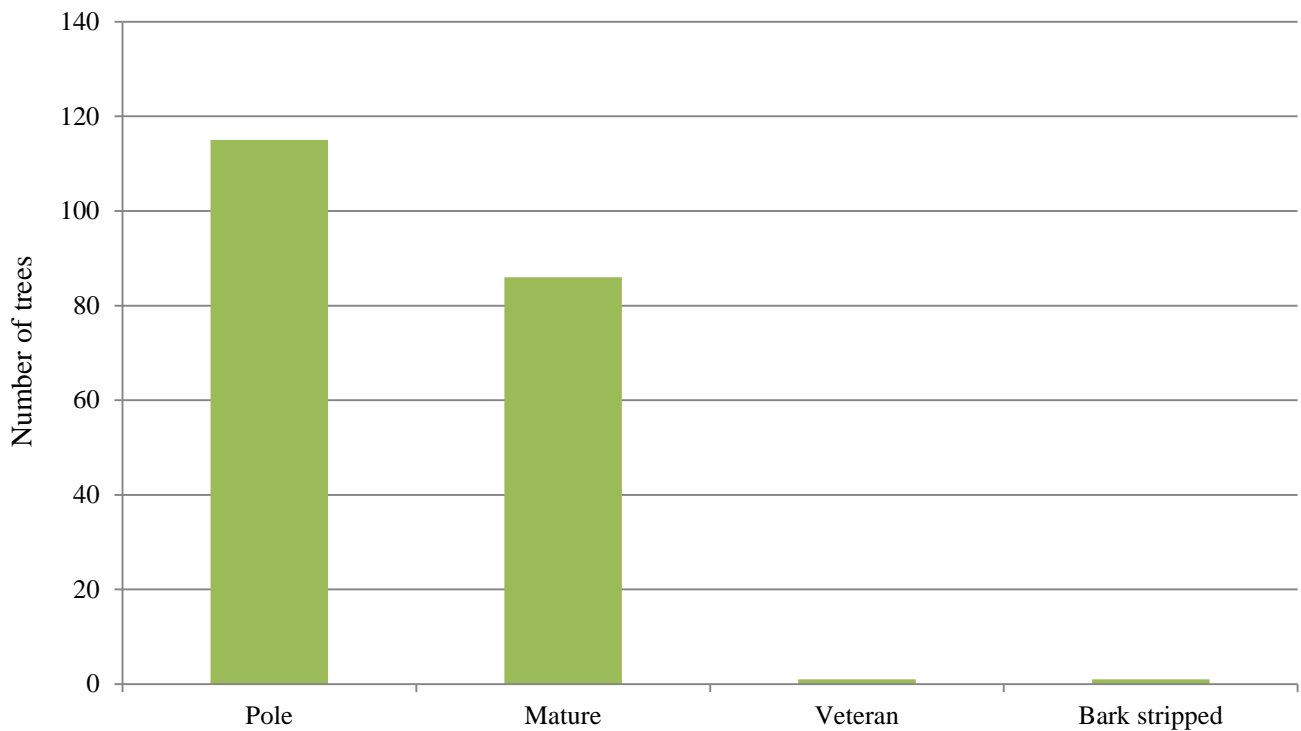


Figure 13. Number of all mature trees, categorised according to age class, within plots at **Borrodale Farm** and those which have had bark stripped. (Data collected from 18 plots of c.530 m² area).

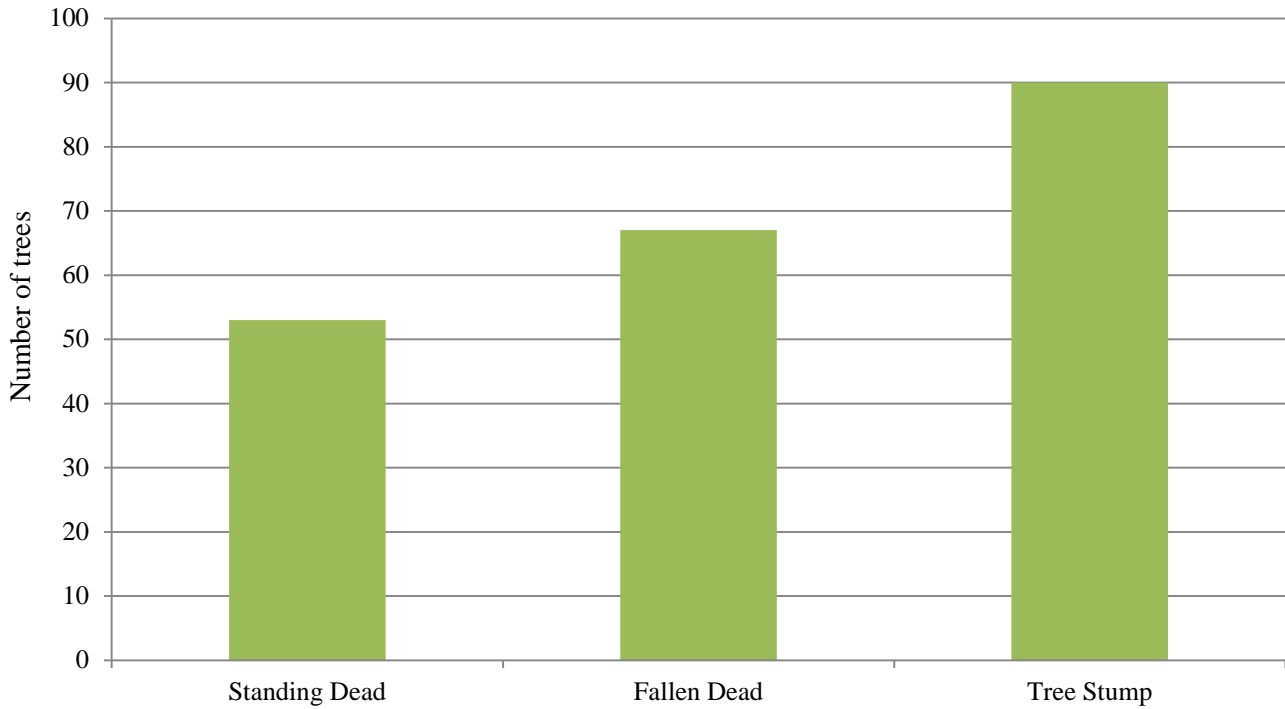


Figure 14. Number of standing dead, fallen dead and tree stumps within plots at **Borrodale Farm**. (Data collected from 18 plots of c.530 m² area)

3.8 Druimindarroch House

Table 15. Deer impact on seedlings/saplings within plots at **Druimindarroch House** for each tree species. Units represent number of seedling/saplings within each category. (Data collected from 2 plots of c.530 m² area).

| Species | No damage | Leader only | Sides only | Both leader and sides | Frayed | TOTAL |
|---------------------------|-----------|-------------|------------|-----------------------|--------|-------|
| <i>Alnus glutinosa</i> | 7 | 6 | 0 | 1 | 0 | 14 |
| <i>Alnus incana</i> | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>Betula</i> spp. | 2 | 0 | 0 | 0 | 0 | 2 |
| <i>Corylus avellana</i> | 0 | 6 | 0 | 1 | 0 | 7 |
| <i>Fraxinus excelsior</i> | 15 | 6 | 0 | 7 | 0 | 28 |
| <i>Ilex aquifolium</i> | 1 | 0 | 0 | 0 | 0 | 1 |
| <i>Quercus robur</i> | 74 | 20 | 1 | 5 | 0 | 100 |
| <i>Sorbus aucuparia</i> | 49 | 23 | 2 | 0 | 0 | 74 |

Table 16. Age class/frequency data for each mature tree species and deer impact within plots at **Druimindarroch House**. (Data collected from 2 plots of c.530 m² area).

| Species | Pole | Mature | Veteran | TOTAL | Bark |
|---------------------------|------|--------|---------|-------|------|
| <i>Alnus glutinosa</i> | 3 | 0 | 0 | 3 | 0 |
| <i>Betula pubescens</i> | 1 | 4 | 0 | 5 | 0 |
| <i>Corylus avellana</i> | 0 | 1 | 0 | 1 | 0 |
| <i>Fraxinus excelsior</i> | 1 | 1 | 0 | 2 | 0 |
| <i>Quercus</i> spp. | 1 | 5 | 0 | 6 | 0 |
| <i>Sorbus aucuparia</i> | 0 | 1 | 0 | 1 | 0 |
| Total trees | 6 | 12 | 0 | 18 | 0 |

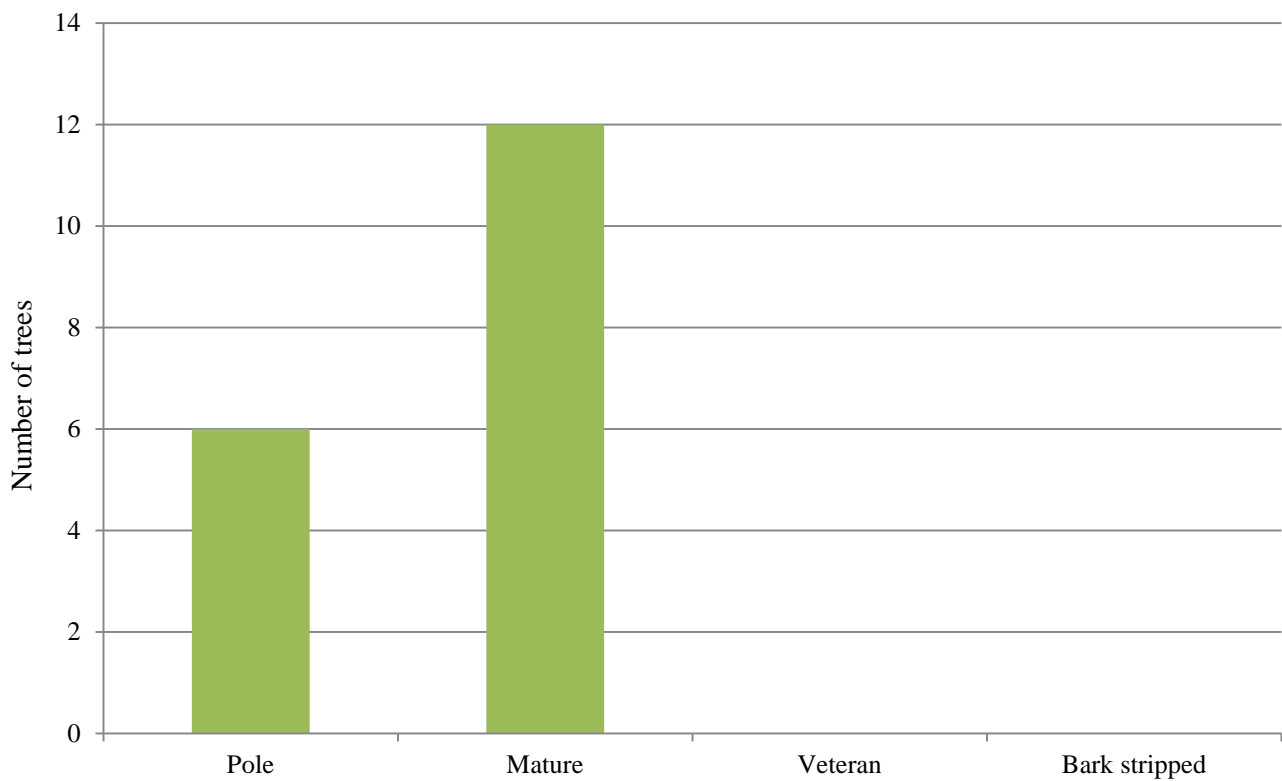


Figure 15. Number of all mature trees, categorised according to age class, within plots at **Druimindarroch House** and those which have had bark stripped. (Data collected from 2 plots of c.530 m² area).

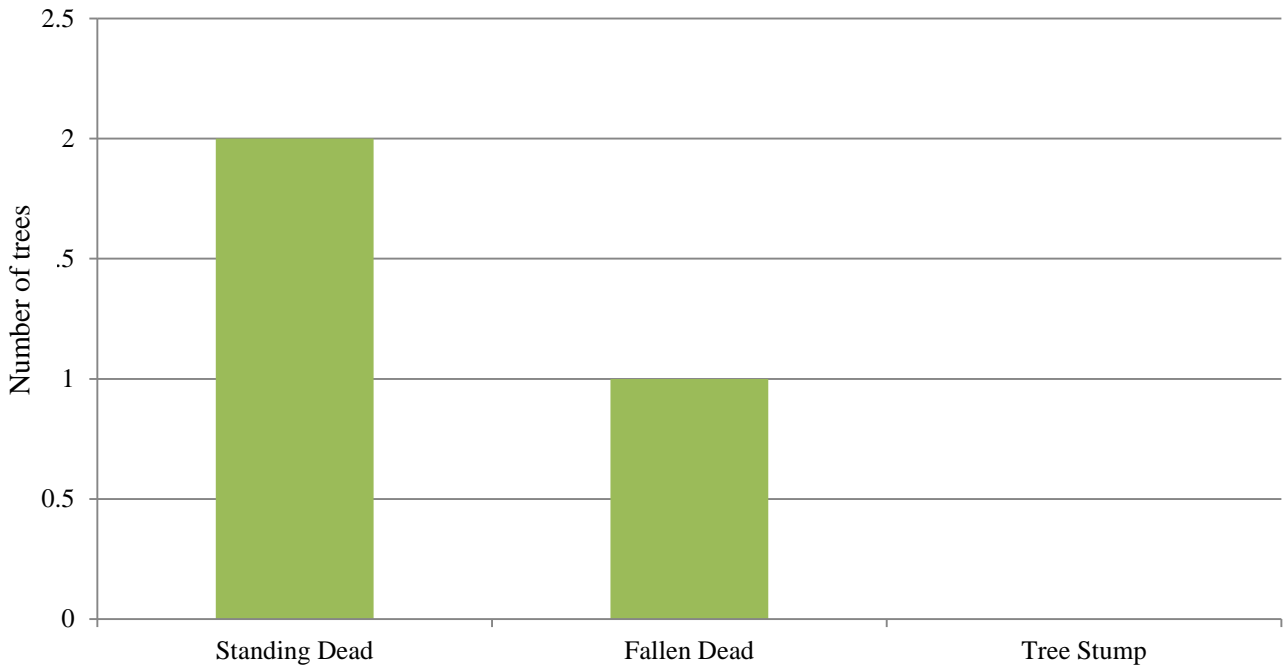


Figure 16. Number of standing dead, fallen dead and tree stumps within plots at **Druimindarroch House**. (Data collected from 2 plots of c.530 m² area).

3.9 Drumsaillie

Table 17. Deer impact on seedlings/saplings within plots at **Drumsaillie** for each tree species. Units represent number of seedling/saplings within each category. (Data collected from 62 plots of c.530 m² area)

| Species | No damage | Leader only | Sides only | Both leader and sides | Frayed | TOTAL |
|------------------------------|-----------|-------------|------------|-----------------------|--------|-------|
| <i>Alnus glutinosa</i> | 103 | 2 | 19 | 62 | 0 | 186 |
| <i>Betula pendula</i> | 1309 | 27 | 129 | 221 | 4 | 1690 |
| <i>Betula pubescens</i> | 1200 | 56 | 230 | 359 | 3 | 1848 |
| Combined <i>Betula</i> spp. | 2509 | 83 | 359 | 580 | 7 | 3538 |
| <i>Corylus avellana</i> | 41 | 2 | 12 | 43 | 0 | 98 |
| <i>Crataegus monogyna</i> | 0 | 0 | 0 | 2 | 0 | 2 |
| <i>Ilex aquifolium</i> | 37 | 2 | 0 | 2 | 0 | 41 |
| <i>Larix</i> spp. | 27 | 2 | 20 | 16 | 16 | 81 |
| <i>Picea abies</i> | 8 | 1 | 3 | 5 | 0 | 17 |
| <i>Picea sitchensis</i> | 799 | 76 | 220 | 80 | 41 | 1216 |
| <i>Pinus sylvestris</i> | 21 | 0 | 0 | 1 | 2 | 24 |
| <i>Prunus avium</i> | 1 | 0 | 1 | 0 | 0 | 2 |
| <i>Prunus padus</i> | 1 | 0 | 0 | 0 | 0 | 1 |
| <i>Pseudotsuga menziesii</i> | 1 | 0 | 0 | 0 | 0 | 1 |
| <i>Quercus</i> spp. | 95 | 13 | 26 | 56 | 0 | 190 |
| <i>Rhododendron ponticum</i> | 1 | 0 | 0 | 0 | 0 | 1 |
| <i>Salix</i> spp. | 482 | 21 | 70 | 374 | 4 | 951 |
| <i>Sorbus aucuparia</i> | 660 | 96 | 65 | 243 | 1 | 1065 |

Table 18. Age class/frequency data for each mature tree species and deer impact within plots at **Drumsaillie**. (Data collected from 62 plots of c.530 m² area).

| Species | Pole | Mature | Veteran | TOTAL | Bark stripped |
|---------------------------|------|--------|---------|-------|---------------|
| <i>Alnus glutinosa</i> | 7 | 4 | 0 | 11 | 0 |
| <i>Betula pendula</i> | 127 | 49 | 1 | 177 | 0 |
| <i>Betula pubescens</i> | 299 | 76 | 1 | 376 | 1 |
| <i>Corylus avellana</i> | 0 | 1 | 1 | 2 | 0 |
| <i>Fraxinus excelsior</i> | 2 | 1 | 0 | 3 | 0 |
| <i>Ilex aquifolium</i> | 1 | 1 | 4 | 6 | 0 |
| <i>Larix</i> spp. | 3 | 0 | 0 | 3 | 0 |
| <i>Picea sitchensis</i> | 328 | 170 | 0 | 498 | 2 |
| <i>Pinus sylvestris</i> | 272 | 79 | 0 | 351 | 0 |
| <i>Quercus</i> spp. | 12 | 5 | 0 | 17 | 0 |
| <i>Salix</i> spp. | 8 | 11 | 0 | 19 | 3 |
| <i>Sorbus aucuparia</i> | 36 | 9 | 0 | 45 | 0 |
| Total trees | 1095 | 406 | 7 | 1508 | 6 |

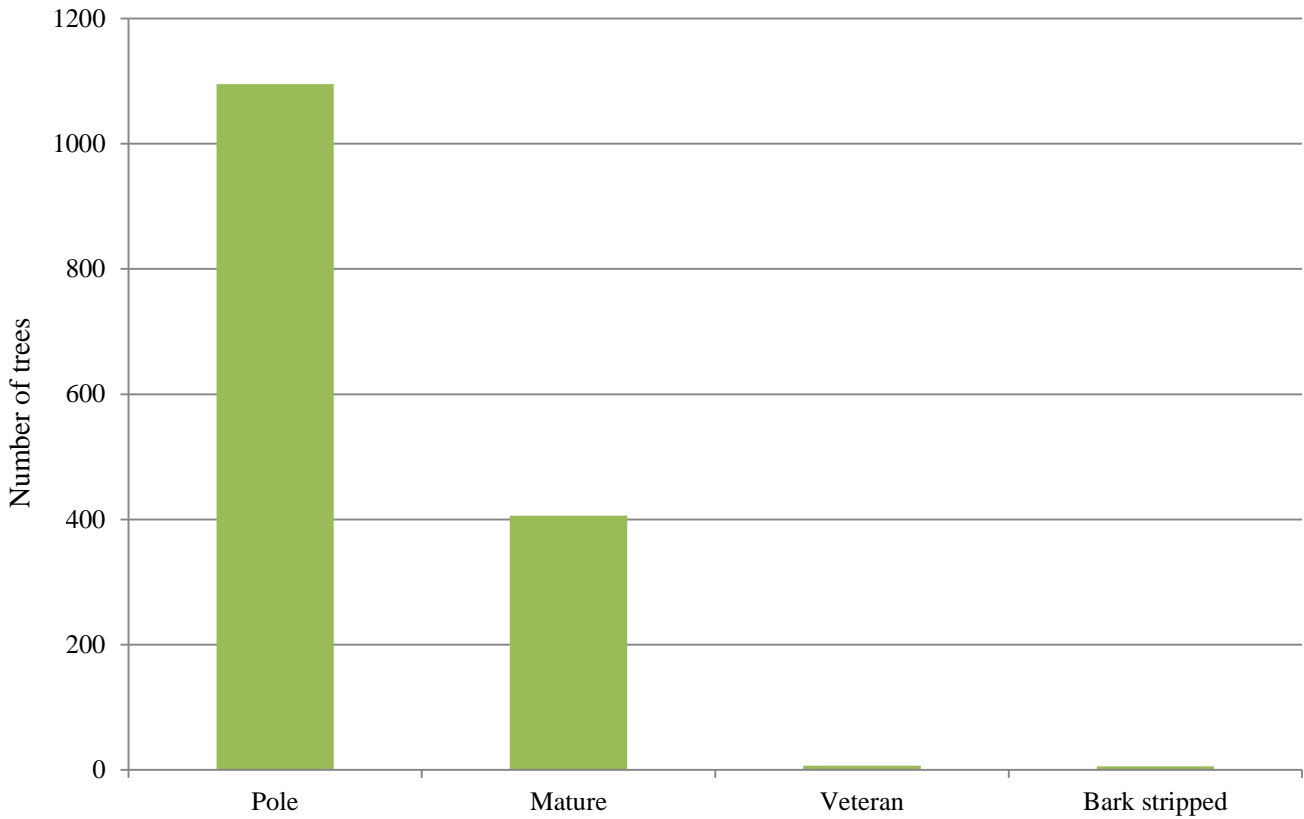


Figure 17. Number of all mature trees, categorised according to age class, within plots at **Drumsaillie** and those which have had bark stripped. (Data collected from 62 plots of c.530 m² area)

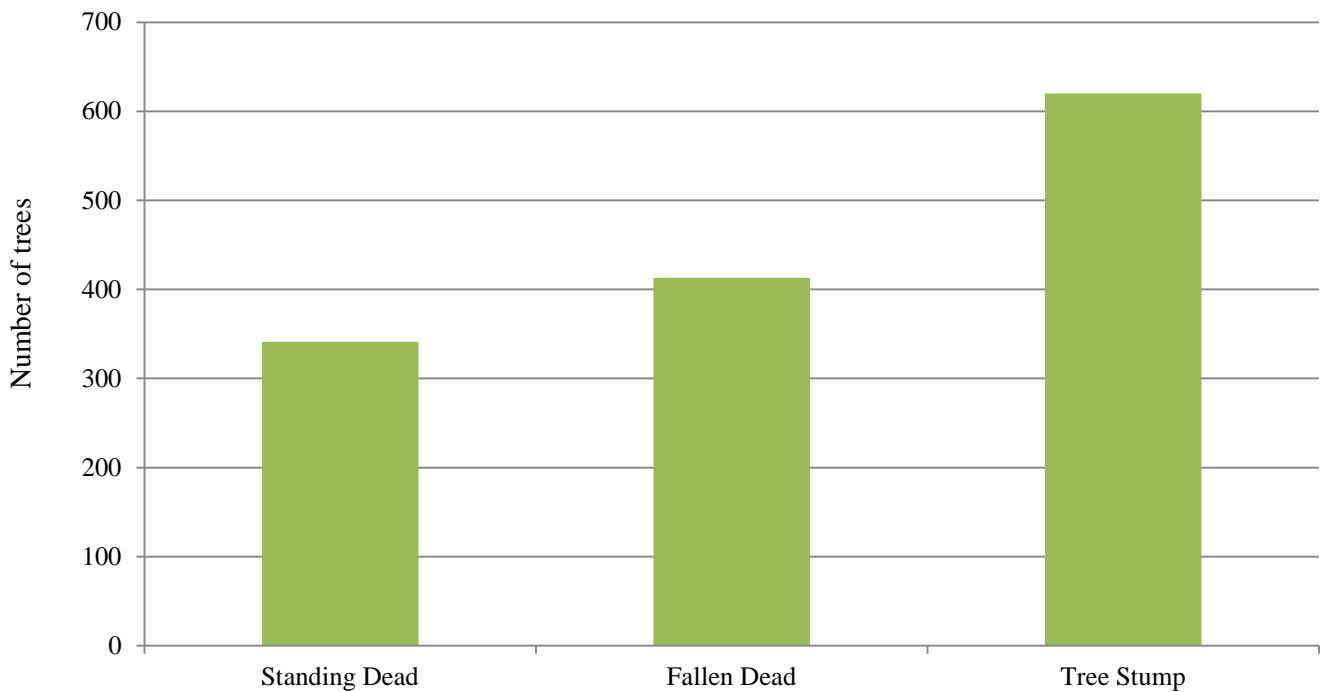


Figure 18. Number of standing dead, fallen dead and tree stumps within plots at **Drumsaillie**. (Data collected from 62 plots of c.530 m² area).

3.10 Fassfern

Table 19. Deer impact on seedlings/saplings within plots at **Fassfern** for each tree species. Units represent number of seedling/saplings within each category. (Data collected from 28 plots of c.530 m² area).

| Species | No damage | Leader only | Sides only | Both leader and sides | Frayed | TOTAL |
|-----------------------------|-----------|-------------|------------|-----------------------|--------|-------|
| <i>Alnus glutinosa</i> | 13 | 0 | 0 | 0 | 0 | 13 |
| <i>Betula pendula</i> | 111 | 6 | 27 | 27 | 1 | 172 |
| <i>Betula pubescens</i> | 865 | 113 | 53 | 148 | 2 | 1181 |
| Combined <i>Betula</i> spp. | 976 | 119 | 80 | 175 | 3 | 1353 |
| <i>Corylus avellana</i> | 0 | 0 | 0 | 1 | 0 | 1 |
| <i>Fraxinus excelsior</i> | 1 | 0 | 0 | 0 | 0 | 1 |
| <i>Ilex aquifolium</i> | 6 | 1 | 0 | 1 | 0 | 8 |
| <i>Picea sitchensis</i> | 3 | 1 | 2 | 2 | 0 | 8 |
| <i>Pinus sylvestris</i> | 2 | 0 | 0 | 0 | 0 | 2 |
| <i>Quercus</i> spp. | 24 | 5 | 1 | 2 | 0 | 32 |
| <i>Salix</i> spp. | 47 | 10 | 22 | 121 | 0 | 200 |
| <i>Sorbus aucuparia</i> | 2026 | 149 | 27 | 125 | 2 | 2329 |

Table 20. Age class/frequency data for each mature tree species and deer impact within plots at **Fassfern**. (Data collected from 28 plots of c.530 m² area).

| Species | Pole | Mature | Veteran | TOTAL | Bark stripped |
|-------------------------|------|--------|---------|-------|---------------|
| <i>Alnus glutinosa</i> | 0 | 3 | 2 | 5 | 1 |
| <i>Betula pendula</i> | 10 | 38 | 0 | 48 | 0 |
| <i>Betula pubescens</i> | 15 | 46 | 11 | 72 | 0 |
| <i>Ilex aquifolium</i> | 0 | 1 | 0 | 1 | 0 |
| <i>Pinus sylvestris</i> | 0 | 1 | 0 | 1 | 0 |
| <i>Quercus</i> spp. | 1 | 0 | 0 | 1 | 0 |
| <i>Salix</i> spp. | 4 | 1 | 0 | 5 | 0 |
| <i>Sorbus aucuparia</i> | 2 | 1 | 1 | 4 | 0 |
| Total trees | 32 | 91 | 14 | 137 | 1 |

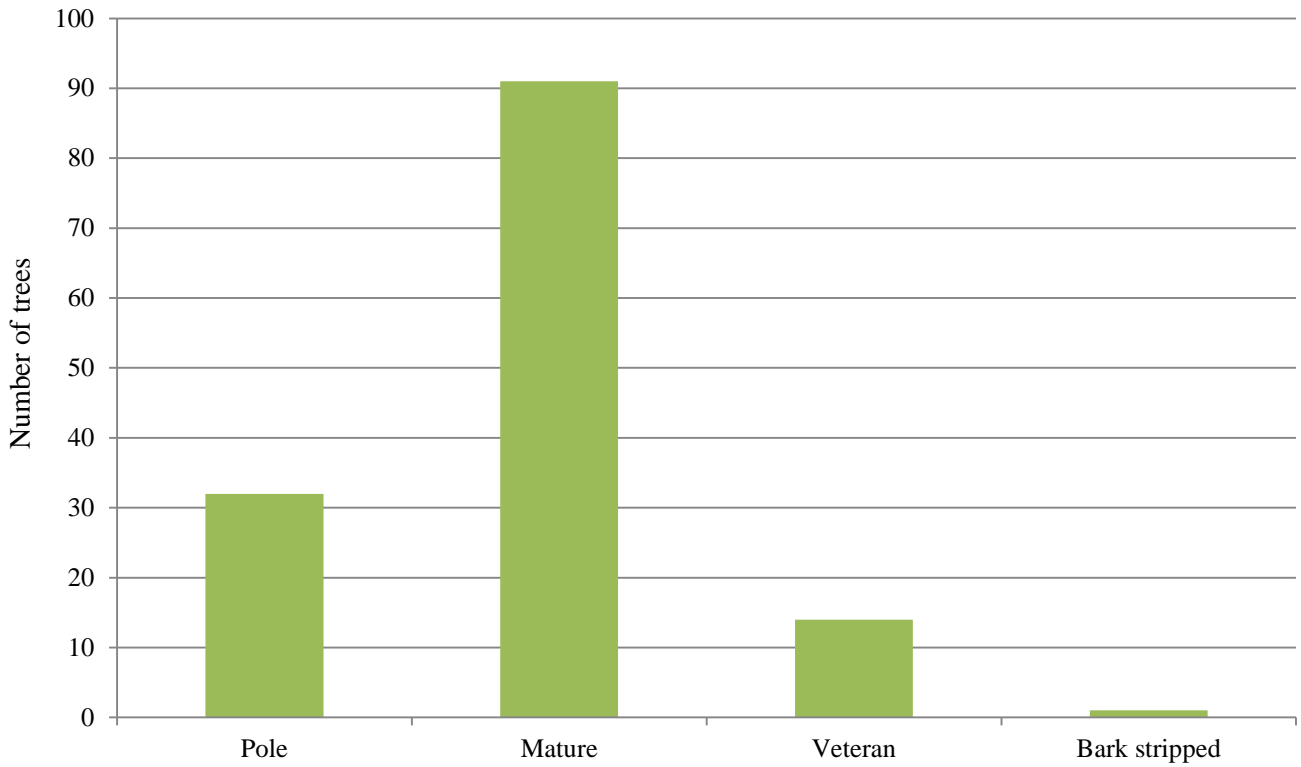


Figure 19. Number of all mature trees, categorised according to age class, within plots at **Fassfern** and those which have had bark stripped. (Data collected from 28 plots of c.530 m² area)

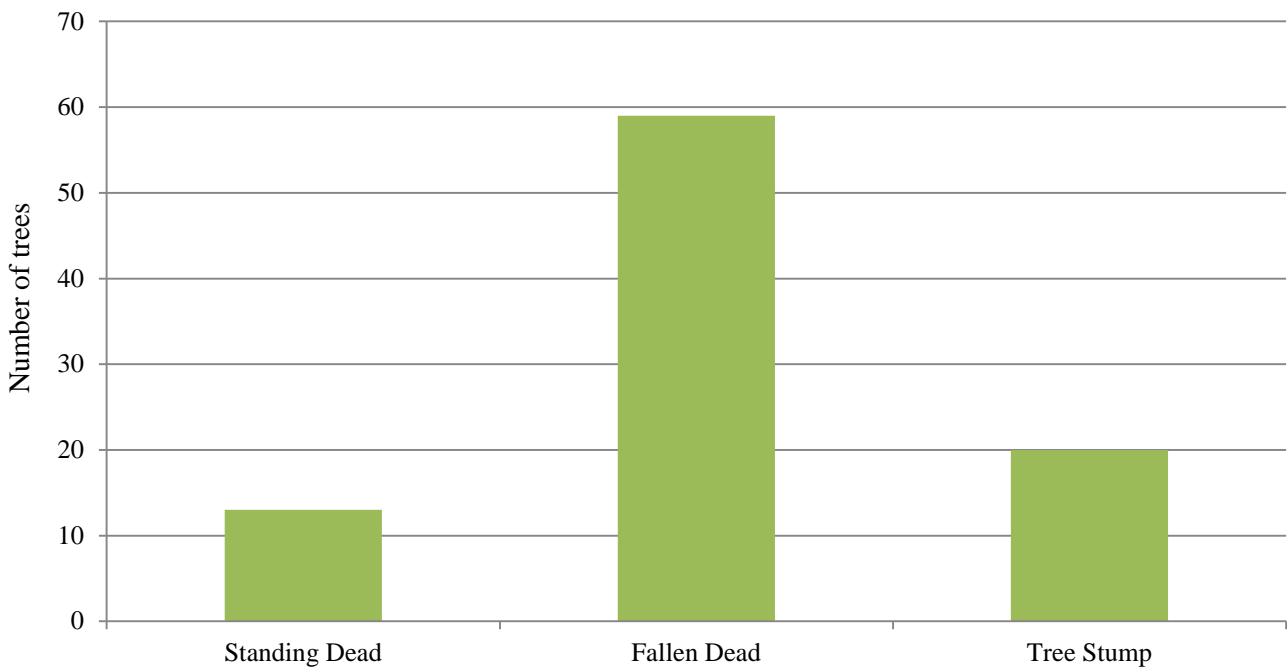


Figure 20. Number of standing dead, fallen dead and tree stumps within plots at **Fassfern**. (Data collected from 28 plots of c.530 m² area)

3.11 FCS Achnacarry Excambium Achnasaul

Table 21. Deer impact on seedlings/saplings within plots at **FCS Achnacarry Excambium Achnasaul** for each tree species. Units represent number of seedling/saplings within each category. (Data collected from 1 plot of c.530 m² area).

| Species | No damage | Leader only | Sides only | Both leader and sides | Frayed | TOTAL |
|-------------------------|-----------|-------------|------------|-----------------------|--------|-------|
| <i>Alnus glutinosa</i> | 0 | 0 | 0 | 2 | 0 | 2 |
| <i>Betula</i> spp. | 11 | 21 | 33 | 22 | 4 | 91 |
| <i>Ilex aquifolium</i> | 0 | 0 | 0 | 3 | 0 | 3 |
| <i>Picea sitchensis</i> | 5 | 0 | 0 | 0 | 0 | 5 |
| <i>Quercus</i> spp. | 3 | 5 | 0 | 3 | 0 | 11 |
| <i>Salix</i> spp. | 0 | 0 | 4 | 15 | 0 | 19 |
| <i>Sorbus aucuparia</i> | 2 | 6 | 0 | 8 | 0 | 16 |

Table 22. Age class/frequency data for each mature tree species and deer impact within plots at **FCS Achnacarry Excambium Achnasaul**. (Data collected from 1 plot of c.530 m² area)

| Species | Pole | Mature | Veteran | TOTAL | Bark stripped |
|------------------------|------|--------|---------|-------|---------------|
| <i>Alnus glutinosa</i> | 1 | 0 | 0 | 1 | 0 |
| <i>Alnus incana</i> | 0 | 0 | 0 | 0 | 0 |
| <i>Betula pendula</i> | 2 | 2 | 1 | 5 | 0 |
| <i>Ilex aquifolium</i> | 0 | 1 | 0 | 1 | 0 |
| <i>Quercus</i> spp. | 0 | 1 | 0 | 1 | 0 |
| <i>Salix</i> spp. | 1 | 0 | 0 | 1 | 0 |
| Total trees | 4 | 4 | 1 | 9 | 0 |

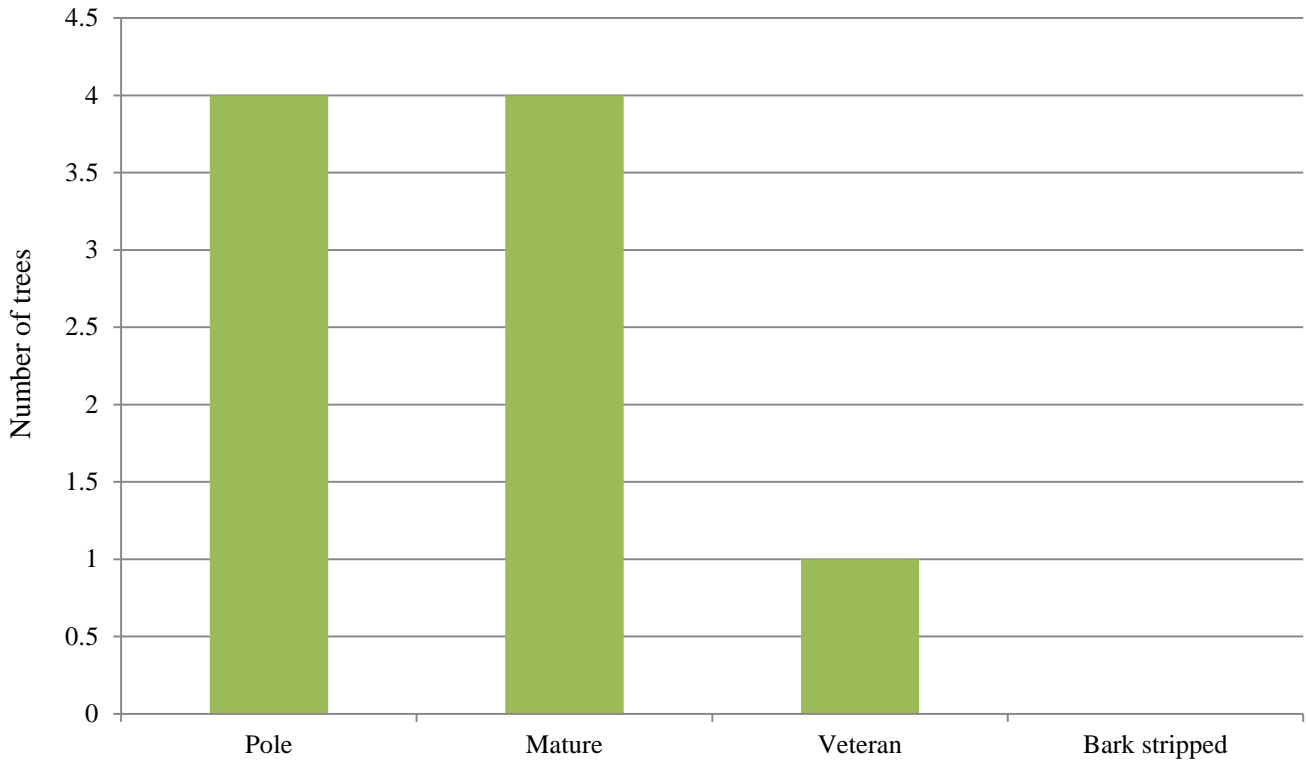


Figure 21. Number of all mature trees, categorised according to age class, within plots at **FCS Achnacarry Excambium Achnasaul** and those which have had bark stripped. (Data collected from 1 plot of c.530 m² area)

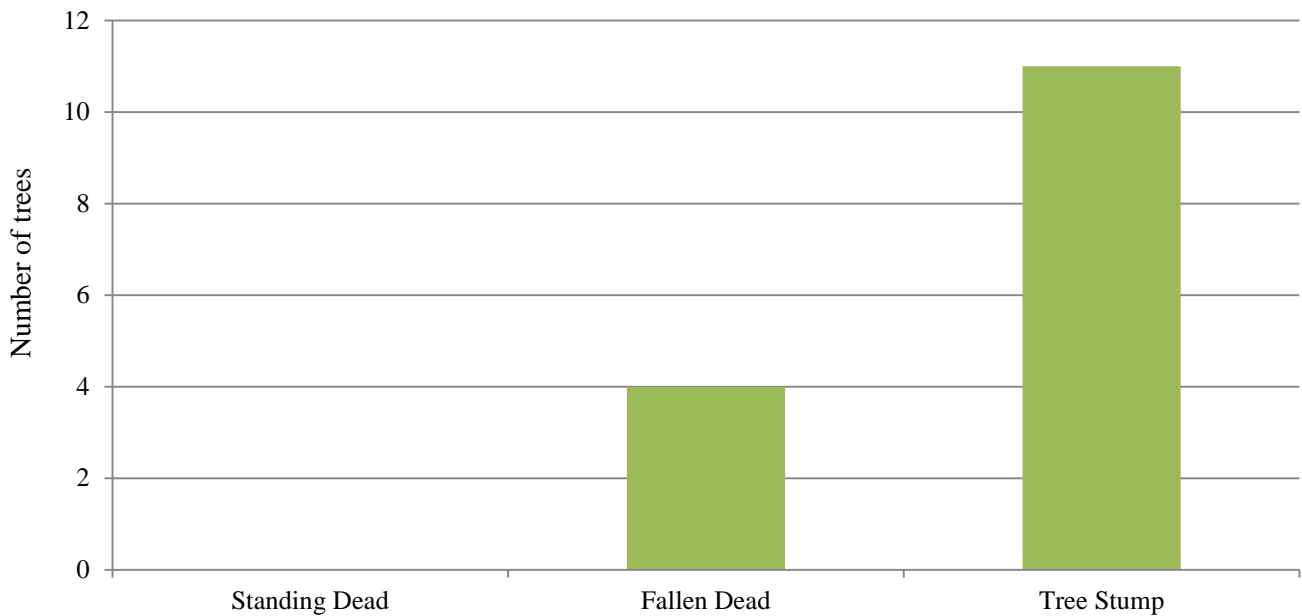


Figure 22. Number of standing dead, fallen dead and tree stumps within plots at **FCS Achnacarry Excambium Achnasaul**. (Data collected from 28 plots of c.530 m² area).

3.12 FCS Glenloy

Table 23. Deer impact on seedlings/saplings within plots at **FCS Glenloy (Stone Erracht & Inver)** for each tree species. Units represent number of seedling/saplings within each category. (Data collected from 23 plots of c.530 m² area).

| Species | No damage | Leader only | Sides only | Both leader and sides | Frayed | TOTAL |
|-----------------------------|-----------|-------------|------------|-----------------------|--------|-------|
| <i>Alnus glutinosa</i> | 24 | 0 | 7 | 1 | 0 | 32 |
| <i>Betula pendula</i> | 401 | 7 | 19 | 14 | 0 | 441 |
| <i>Betula pubescens</i> | 538 | 6 | 8 | 68 | 1 | 621 |
| Combined <i>Betula</i> spp. | 939 | 13 | 27 | 82 | 1 | 1062 |
| <i>Corylus avellana</i> | 70 | 0 | 8 | 8 | 0 | 86 |
| <i>Crataegus monogyna</i> | 1 | 0 | 0 | 0 | 0 | 1 |
| <i>Fagus sylvatica</i> | 3 | 0 | 0 | 0 | 0 | 3 |
| <i>Fraxinus excelsior</i> | 33 | 0 | 1 | 0 | 0 | 34 |
| <i>Ilex aquifolium</i> | 29 | 1 | 3 | 10 | 0 | 43 |
| <i>Picea sitchensis</i> | 189 | 4 | 0 | 0 | 0 | 193 |
| <i>Pinus sylvestris</i> | 6 | 0 | 4 | 0 | 0 | 10 |
| <i>Prunus padus</i> | 0 | 0 | 0 | 1 | 0 | 1 |
| <i>Quercus</i> spp. | 104 | 0 | 11 | 12 | 0 | 127 |
| <i>Salix</i> spp. | 19 | 0 | 6 | 22 | 0 | 47 |
| <i>Sorbus aucuparia</i> | 228 | 15 | 20 | 123 | 2 | 388 |

Table 24. Age class/frequency data for each mature tree species and deer impact within plots at **FCS Glenloy (Stone Erracht & Inver)**. (Data collected from 23 plots of c.530 m² area).

| Species | Pole | Mature | Veteran | TOTAL | Bark stripped |
|---------------------------|------|--------|---------|-------|---------------|
| <i>Alnus glutinosa</i> | 51 | 25 | 2 | 78 | 2 |
| <i>Betula pendula</i> | 52 | 10 | 1 | 63 | 0 |
| <i>Betula pubescens</i> | 72 | 41 | 3 | 116 | 0 |
| <i>Corylus avellana</i> | 21 | 9 | 1 | 31 | 0 |
| <i>Fagus sylvatica</i> | 1 | 0 | 0 | 1 | 0 |
| <i>Fraxinus excelsior</i> | 0 | 1 | 0 | 1 | 0 |
| <i>Ilex aquifolium</i> | 1 | 1 | 0 | 2 | 0 |
| <i>Larix</i> spp. | 0 | 1 | 0 | 1 | 0 |
| <i>Picea abies</i> | 0 | 1 | 0 | 1 | 0 |
| <i>Picea sitchensis</i> | 90 | 35 | 0 | 125 | 0 |
| <i>Pinus sylvestris</i> | 7 | 4 | 4 | 15 | 0 |
| <i>Prunus padus</i> | 2 | 0 | 0 | 2 | 0 |
| <i>Quercus</i> spp. | 15 | 16 | 1 | 32 | 0 |
| <i>Salix</i> spp. | 14 | 2 | 0 | 16 | 0 |
| <i>Sorbus aucuparia</i> | 24 | 10 | 0 | 34 | 0 |
| <i>Tsuga heterophylla</i> | 4 | 0 | 0 | 4 | 0 |
| Total trees | 354 | 156 | 12 | 522 | 2 |

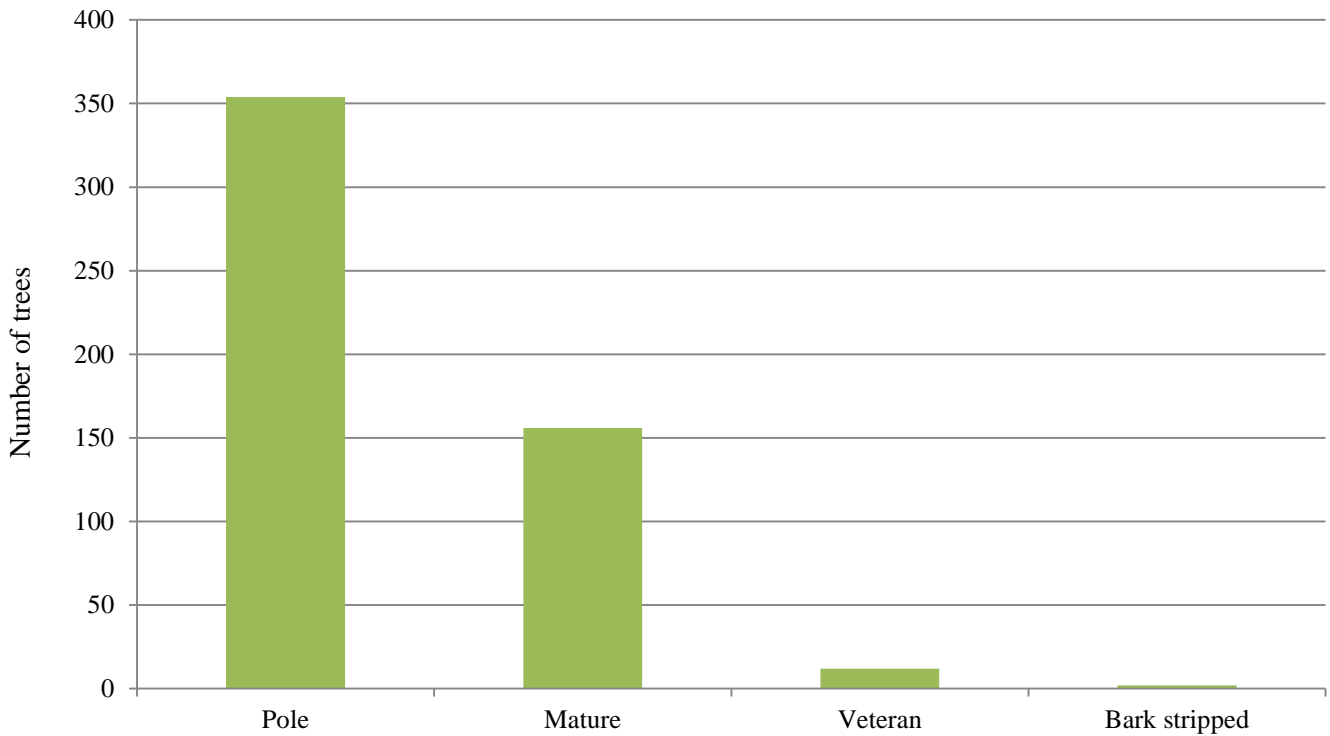


Figure 23. Number of all mature trees, categorised according to age class, within plots at **FCS Glenloy (Stone Erracht & Inver)** and those which have had bark stripped. (Data collected from 23 plots of c.530 m² area).

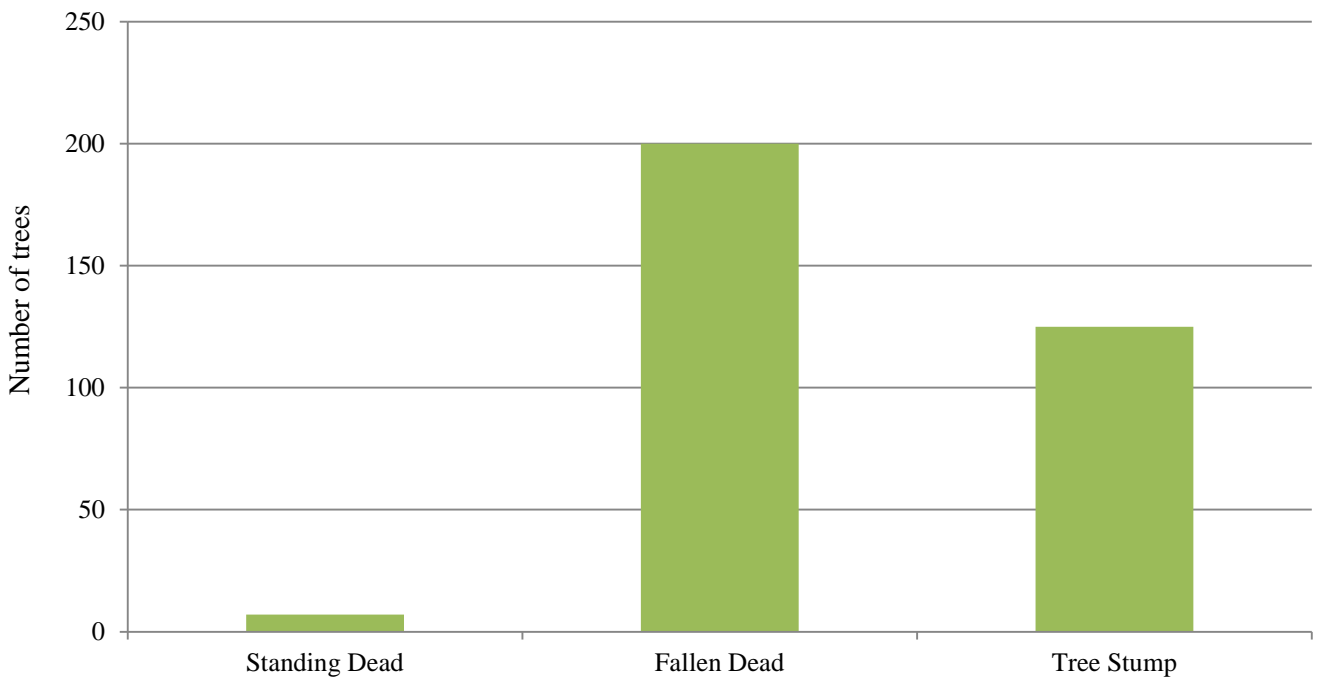


Figure 24. Number of standing dead, fallen dead and tree stumps within plots at **FCS Glenloy (Stone Erracht & Inver)**. (Data collected from 28 plots of c.530 m² area).

Table 25. Deer impact on seedlings/saplings within plots at **FCS Glenloy pinewoods and adjacent land** for each tree species. Units represent number of seedling/saplings within each category. (Data collected from 4 plots of c.530 m² area).

| Species | No damage | Leader only | Sides only | Both leader and sides | Frayed | TOTAL |
|-------------------------|-----------|-------------|------------|-----------------------|--------|-------|
| <i>Betula</i> spp. | 10 | 2 | 0 | 0 | 0 | 12 |
| <i>Ilex aquifolium</i> | 0 | 0 | 1 | 0 | 0 | 1 |
| <i>Pinus sylvestris</i> | 1 | 0 | 0 | 1 | 0 | 2 |
| <i>Salix</i> spp. | 0 | 0 | 0 | 2 | 0 | 2 |
| <i>Sorbus aucuparia</i> | 256 | 14 | 3 | 4 | 0 | 277 |

Table 26. Age class/frequency data for each mature tree species and deer impact within plots at **FCS Glenloy pinewoods and adjacent land**. (Data collected from 4 plots of c.530 m² area).

| Species | Pole | Mature | Veteran | TOTAL | Bark stripped |
|-------------------------|------|--------|---------|-------|---------------|
| <i>Betula pendula</i> | 0 | 1 | 1 | 2 | 0 |
| <i>Betula pubescens</i> | 6 | 7 | 0 | 13 | 0 |
| <i>Ilex aquifolium</i> | 0 | 1 | 0 | 1 | 0 |
| <i>Pinus sylvestris</i> | 0 | 5 | 3 | 8 | 0 |
| <i>Sorbus aucuparia</i> | 0 | 1 | 1 | 2 | 0 |
| Total trees | 6 | 15 | 5 | 26 | 0 |

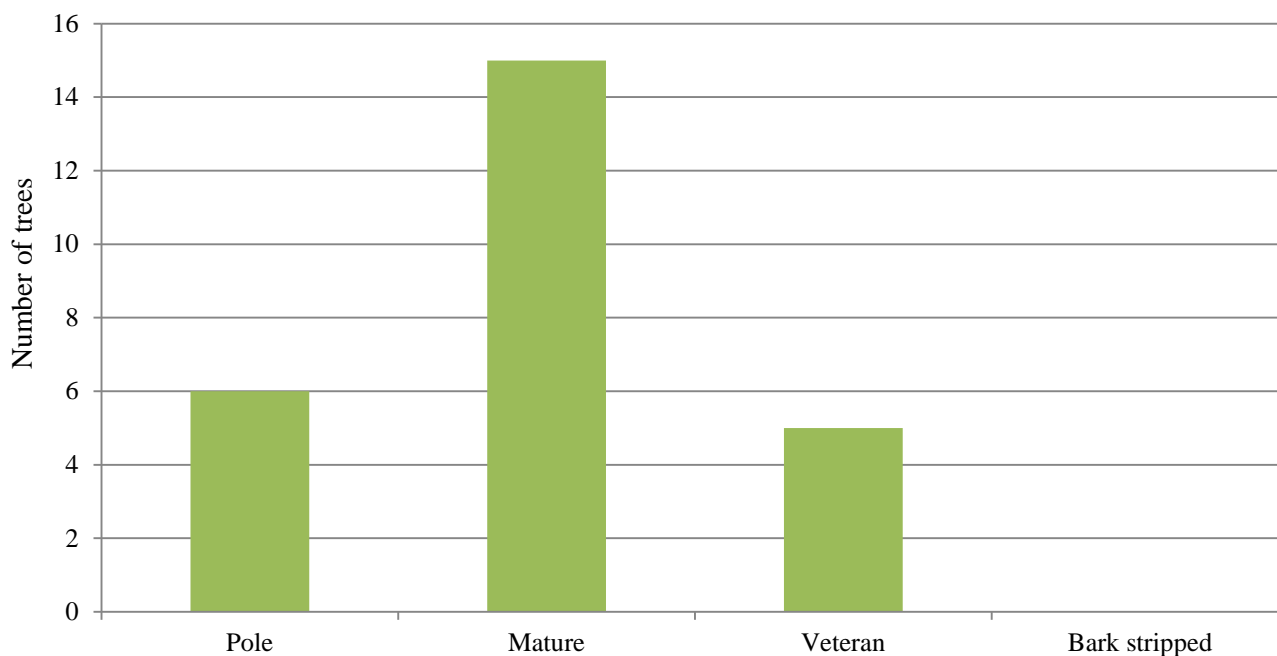


Figure 25. Number of all mature trees, categorised according to age class, within plots at **FCS Glenloy pinewoods and adjacent land** and those which have had bark stripped. (Data collected from 4 plots of c.530 m² area).

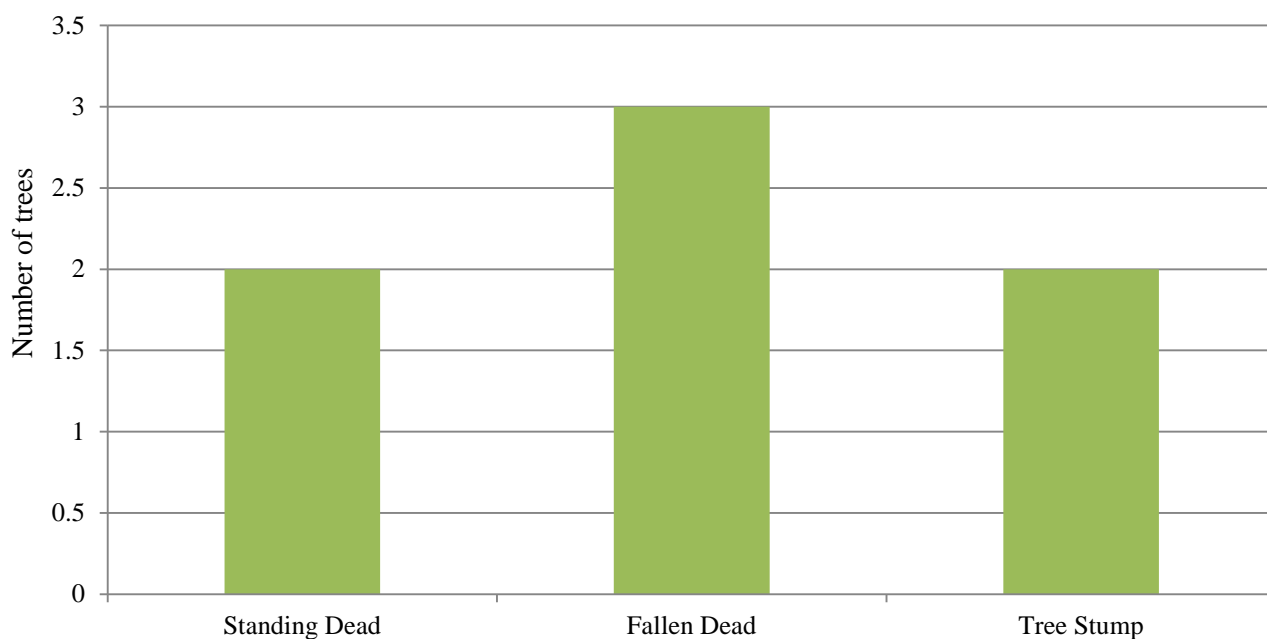


Figure 26. Number of standing dead, fallen dead and tree stumps within plots at **FCS Glenloy pinewoods and adjacent land**. (Data collected from 4 plots of c.530 m² area).

3.13 Glen Fionnlighe

Table 27. Deer impact on seedlings/saplings within plots at **Glen Fionnlighe** for each tree species. Units represent number of seedling/saplings within each category. (Data collected from 16 plots of c.530 m² area).

| Species | No damage | Leader only | Sides only | Both leader and sides | Frayed | TOTAL |
|-----------------------------|-----------|-------------|------------|-----------------------|--------|-------|
| <i>Alnus glutinosa</i> | 4 | 0 | 1 | 0 | 0 | 5 |
| <i>Betula pendula</i> | 54 | 7 | 35 | 8 | 3 | 107 |
| <i>Betula pubescens</i> | 381 | 7 | 31 | 104 | 4 | 527 |
| Combined <i>Betula</i> spp. | 435 | 14 | 66 | 112 | 7 | 634 |
| <i>Corylus avellana</i> | 8 | 3 | 3 | 2 | 0 | 16 |
| <i>Crataegus monogyna</i> | 0 | 0 | 1 | 0 | 0 | 1 |
| <i>Ilex aquifolium</i> | 0 | 0 | 0 | 1 | 0 | 1 |
| <i>Larix</i> spp. | 6 | 0 | 4 | 2 | 1 | 13 |
| <i>Picea sitchensis</i> | 38 | 0 | 7 | 1 | 8 | 54 |
| <i>Pinus sylvestris</i> | 0 | 0 | 1 | 0 | 0 | 1 |
| <i>Prunus padus</i> | 3 | 0 | 0 | 0 | 0 | 3 |
| <i>Salix</i> spp. | 8 | 3 | 2 | 20 | 0 | 33 |
| <i>Sorbus aucuparia</i> | 497 | 23 | 63 | 65 | 0 | 648 |

Table 28. Age class/frequency data for each mature tree species and deer impact within plots at **Glenn Fionnlighe**. (Data collected from 16 plots of c.530 m² area).

| Species | Pole | Mature | Veteran | TOTAL | Bark stripped |
|---------------------------|------|--------|---------|-------|---------------|
| <i>Alnus glutinosa</i> | 5 | 6 | 0 | 11 | 0 |
| <i>Betula pendula</i> | 120 | 51 | 4 | 175 | 0 |
| <i>Betula pubescens</i> | 63 | 24 | 7 | 94 | 0 |
| <i>Corylus avellana</i> | 1 | 2 | 3 | 6 | 0 |
| <i>Crataegus monogyna</i> | 1 | 2 | 0 | 3 | 0 |
| <i>Larix</i> spp. | 1 | 0 | 0 | 1 | 0 |
| <i>Picea sitchensis</i> | 26 | 45 | 0 | 71 | 0 |
| <i>Pinus sylvestris</i> | 7 | 25 | 0 | 32 | 0 |
| <i>Sorbus aucuparia</i> | 4 | 8 | 0 | 12 | 3 |
| Total trees | 228 | 163 | 14 | 405 | 3 |

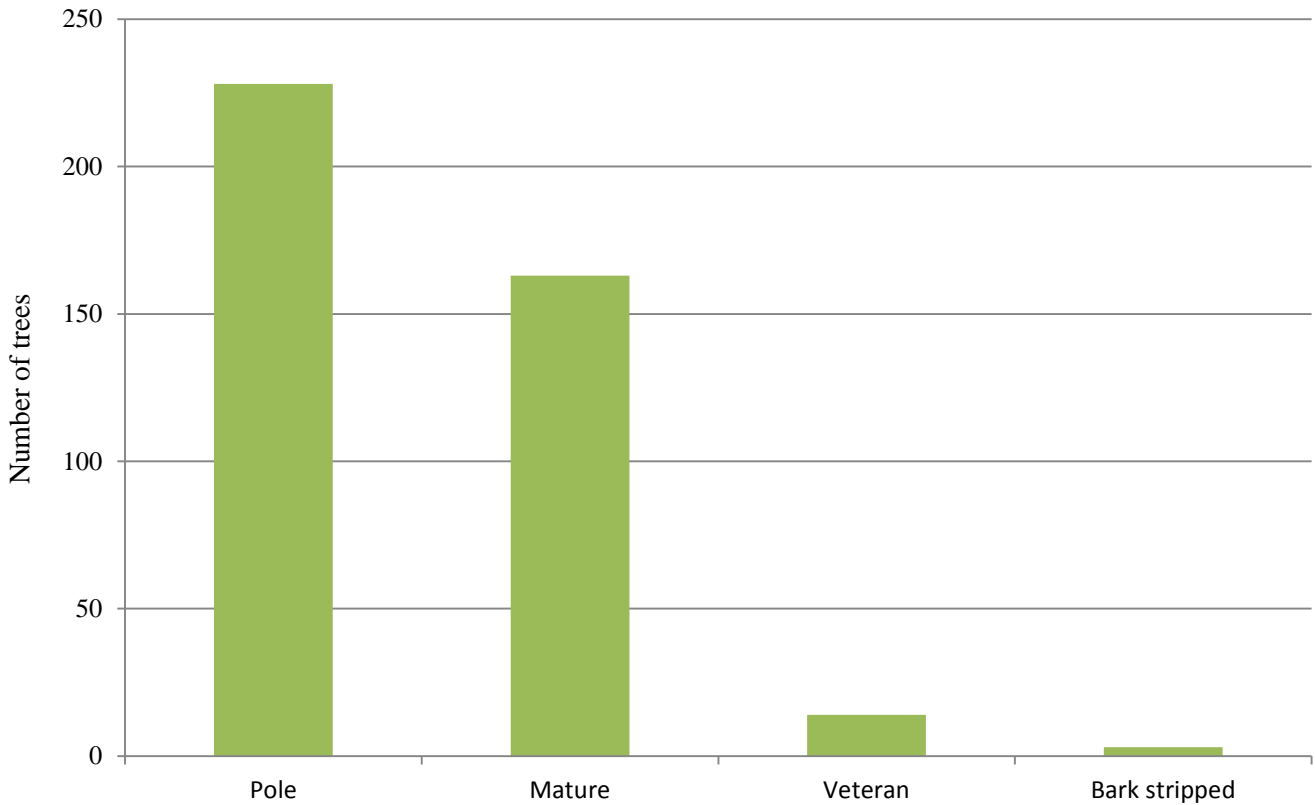


Figure 27. Number of all mature trees, categorised according to age class, within plots at **Glen Fionnlighe** and those which have had bark stripped. (Data collected from 16 plots of c.530 m² area).

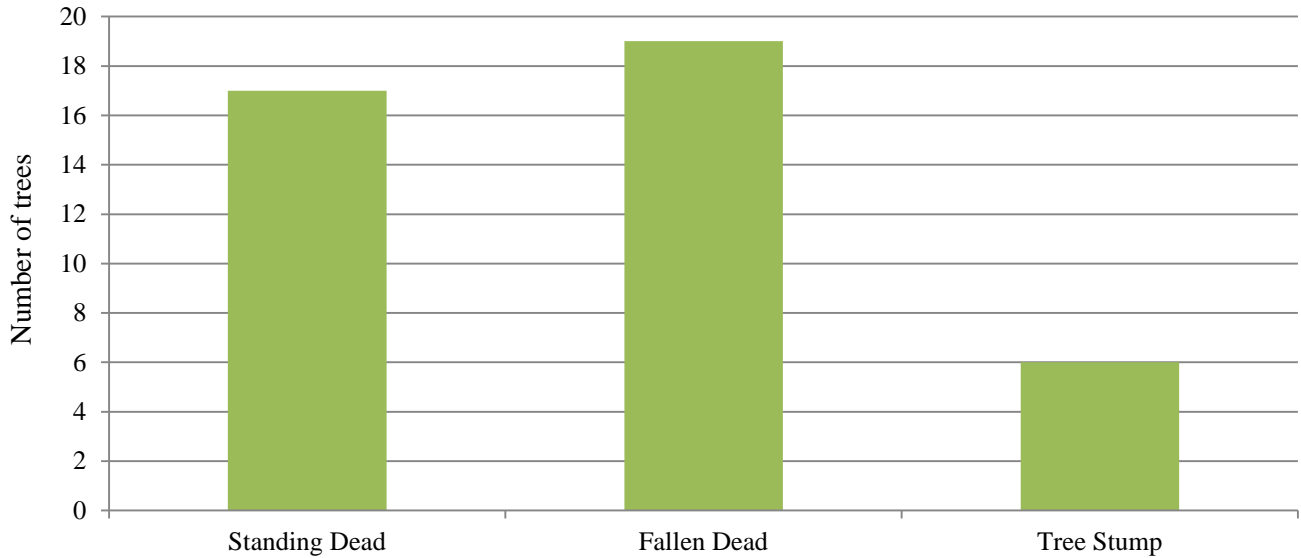


Figure 28. Number of standing dead, fallen dead and tree stumps within plots at **Glen Fionnlighe**. (Data collected from 16 plots of c.530 m² area).

3.14 Glenancross

Table 29. Deer impact on seedlings/saplings within plots at **Glenancross 3** for each tree species. Units represent number of seedling/saplings within each category. (Data collected from 4 plots of c.530 m² area)

| Species | No damage | Leader only | Sides only | Both leader and sides | Frayed | TOTAL |
|---------------------------|-----------|-------------|------------|-----------------------|--------|-------|
| <i>Betula pubescens</i> | 276 | 4 | 12 | 9 | 6 | 307 |
| <i>Corylus avellana</i> | 2 | 0 | 0 | 0 | 0 | 2 |
| <i>Crataegus monogyna</i> | 0 | 1 | 0 | 0 | 0 | 1 |
| <i>Fraxinus excelsior</i> | 1 | 0 | 0 | 0 | 0 | 1 |
| <i>Ilex aquifolium</i> | 4 | 0 | 7 | 2 | 0 | 13 |
| <i>Quercus</i> spp. | 32 | 0 | 0 | 0 | 0 | 32 |
| <i>Salix</i> spp. | 11 | 2 | 4 | 1 | 0 | 18 |
| <i>Sorbus aucuparia</i> | 154 | 4 | 0 | 0 | 0 | 158 |

Table 30. Age class/frequency data for each mature tree species and deer impact within plots at **Glenancross 3**. (Data collected from 4 plots of c.530 m² area).

| Species | Pole | Mature | Veteran | TOTAL | Bark stripped |
|-------------------------|------|--------|---------|-------|---------------|
| <i>Betula pubescens</i> | 16 | 11 | 0 | 27 | 0 |
| <i>Corylus avellana</i> | 0 | 1 | 0 | 1 | 0 |
| <i>Ilex aquifolium</i> | 0 | 1 | 0 | 1 | 0 |
| <i>Quercus</i> spp. | 3 | 5 | 0 | 8 | 0 |
| <i>Sorbus aucuparia</i> | 1 | 0 | 0 | 1 | 0 |
| Total trees | 20 | 18 | 0 | 38 | 0 |

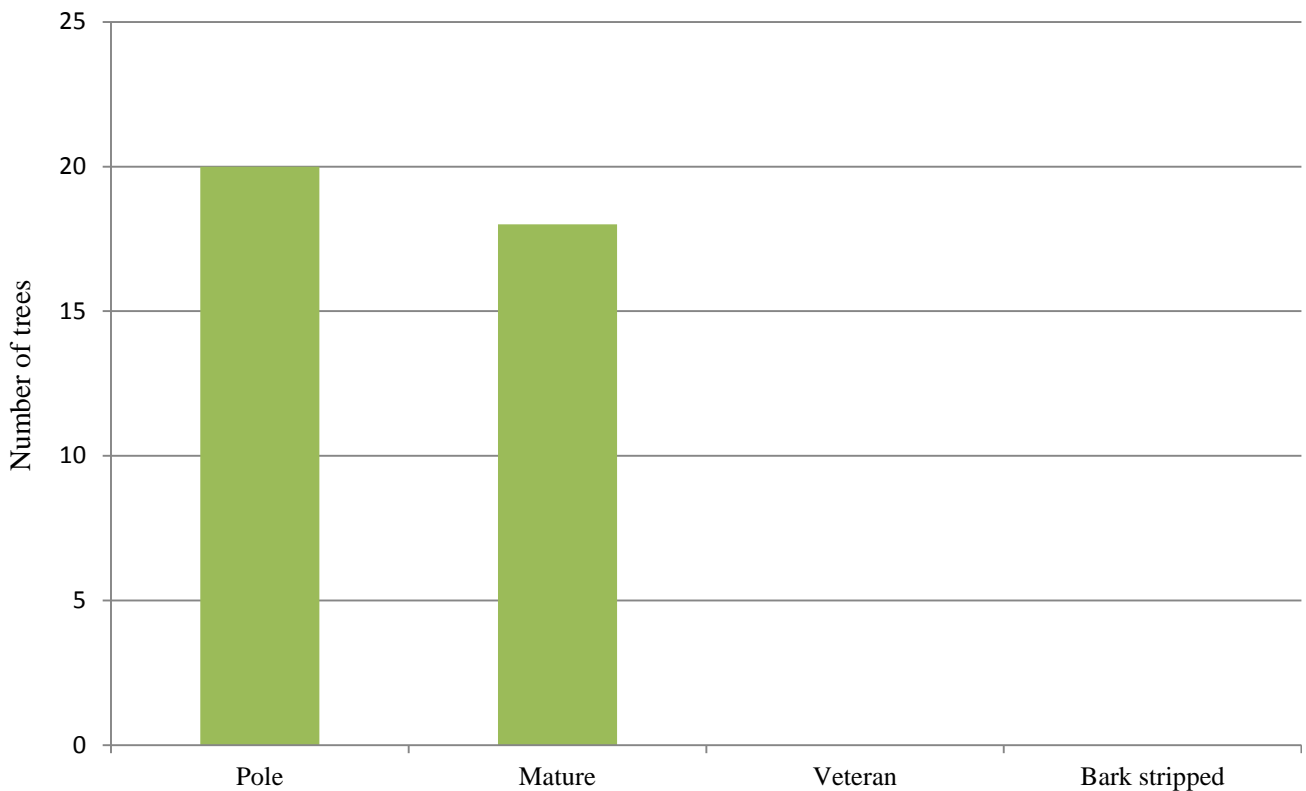


Figure 29. Number of all mature trees, categorised according to age class, within plots at **Glenancross 3** and those which have had bark stripped. (Data collected from 4 plots of c.530 m² area).

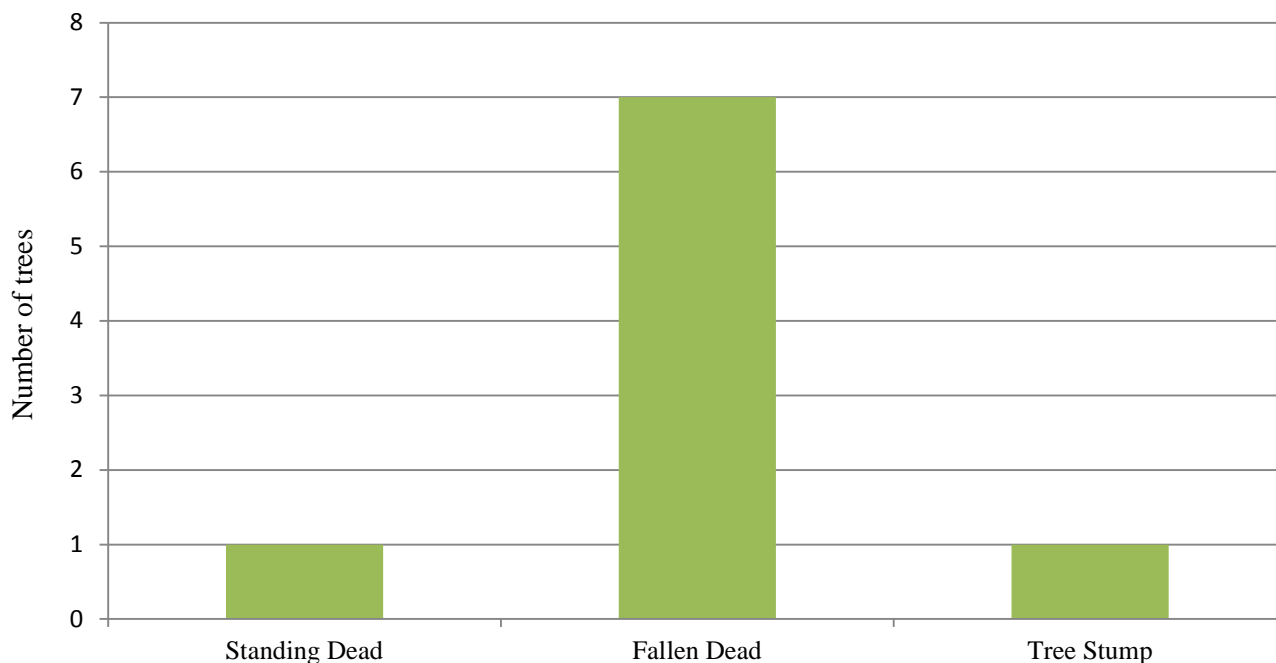


Figure 30. Number of standing dead, fallen dead and tree stumps within plots at **Glenancross 3**. (Data collected from 4 plots of c.530 m² area).

3.15 Glenfinnan

Table 31. Deer impact on seedlings/saplings within plots at **Glenfinnan** for each tree species. Units represent number of seedling/saplings within each category. (Data collected from 29 plots of c.530 m² area).

| Species | No damage | Leader only | Sides only | Both leader and sides | Frayed | TOTAL |
|------------------------------|-----------|-------------|------------|-----------------------|--------|-------|
| <i>Acer pseudoplatanus</i> | 1 | 0 | 0 | 0 | 0 | 1 |
| <i>Alnus glutinosa</i> | 23 | 1 | 23 | 1 | 2 | 50 |
| <i>Betula pendula</i> | 41 | 0 | 0 | 0 | 0 | 41 |
| <i>Betula pubescens</i> | 186 | 1 | 29 | 5 | 2 | 223 |
| Combined <i>Betula</i> spp. | 227 | 1 | 29 | 5 | 2 | 264 |
| <i>Fagus sylvatica</i> | 0 | 0 | 1 | 0 | 0 | 1 |
| <i>Ilex aquifolium</i> | 1 | 0 | 2 | 0 | 0 | 3 |
| <i>Picea sitchensis</i> | 10 | 0 | 1 | 0 | 0 | 11 |
| <i>Pinus sylvestris</i> | 105 | 0 | 3 | 3 | 0 | 111 |
| <i>Quercus</i> spp. | 19 | 0 | 0 | 0 | 0 | 19 |
| <i>Rhododendron ponticum</i> | 8 | 0 | 0 | 0 | 0 | 8 |
| <i>Salix</i> spp. | 58 | 0 | 11 | 7 | 0 | 76 |
| <i>Sambucus nigra</i> | 1 | 0 | 0 | 0 | 0 | 1 |
| <i>Sorbus aucuparia</i> | 216 | 16 | 33 | 45 | 1 | 311 |
| OTHERS | 0 | 0 | 0 | 1 | 0 | 1 |

Table 32. Age class/frequency data for each mature tree species and deer impact within plots at **Glenfinnan**. (Data collected from 29 plots of c.530 m² area)

| Species | Pole | Mature | Veteran | TOTAL | Bark stripped |
|---------------------------|------|--------|---------|-------|---------------|
| <i>Alnus glutinosa</i> | 2 | 0 | 0 | 2 | 0 |
| <i>Betula pendula</i> | 5 | 2 | 0 | 7 | 0 |
| <i>Betula pubescens</i> | 121 | 19 | 0 | 140 | 0 |
| <i>Fraxinus excelsior</i> | 0 | 1 | 0 | 1 | 0 |
| <i>Pinus sylvestris</i> | 51 | 0 | 0 | 51 | 0 |
| <i>Prunus padus</i> | 1 | 1 | 0 | 2 | 0 |
| <i>Salix</i> spp. | 5 | 1 | 0 | 6 | 2 |
| <i>Sorbus aucuparia</i> | 10 | 1 | 0 | 11 | 3 |
| Total trees | 195 | 25 | 0 | 220 | 5 |

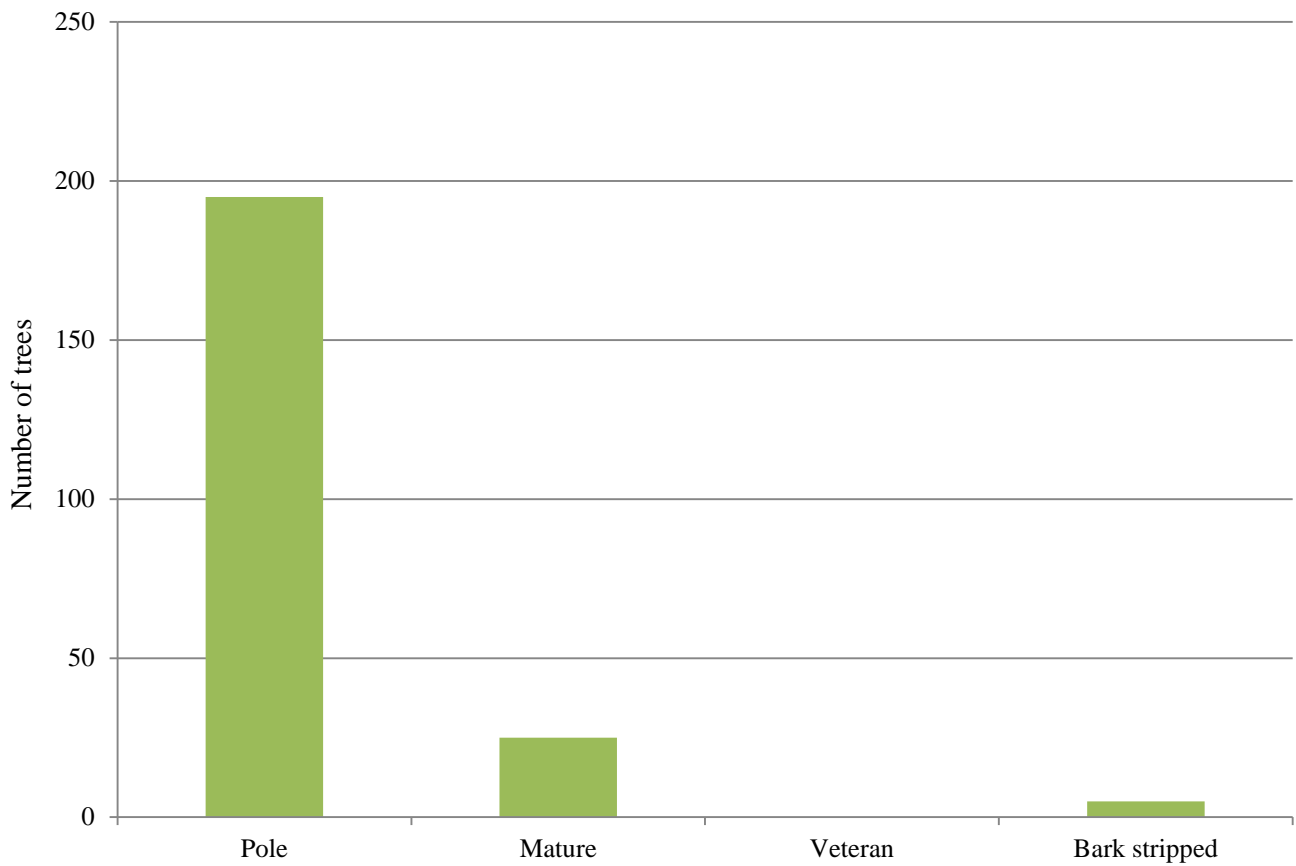


Figure 31. Number of all mature trees, categorised according to age class, within plots at **Glenfinnan** and those which have had bark stripped. (Data collected from 29 plots of c.530 m² area)

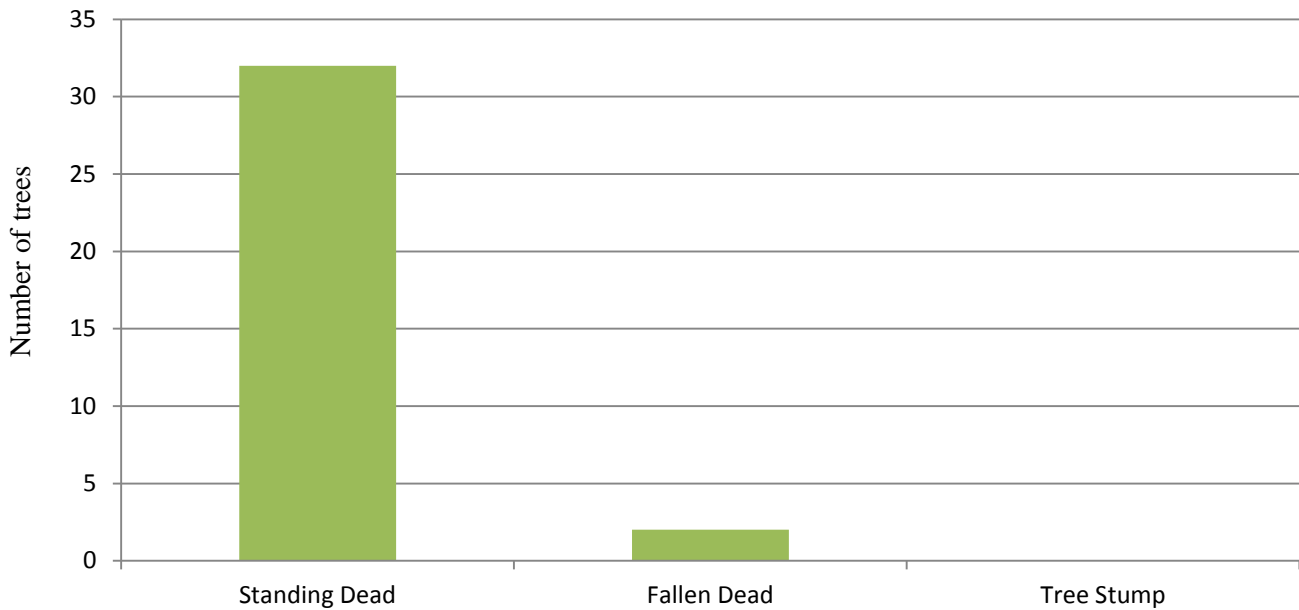


Figure 32. Number of standing dead, fallen dead and tree stumps within plots at **Glenfinnan**. (Data collected from 29 plots of c.530 m² area)

3.16 Glenloy

Table 33. Deer impact on seedlings/saplings within plots at **Glenloy** for each tree species. Units represent number of seedling/saplings within each category. (Data collected from 4 plots of c.530 m² area)

| Species | No damage | Leader only | Sides only | Both leader and sides | Frayed | TOTAL |
|---------------------------|-----------|-------------|------------|-----------------------|--------|-------|
| <i>Alnus glutinosa</i> | 4 | 0 | 1 | 1 | 0 | 6 |
| <i>Betula pubescens</i> | 3 | 0 | 0 | 0 | 0 | 3 |
| <i>Corylus avellana</i> | 2 | 0 | 0 | 0 | 0 | 2 |
| <i>Crataegus monogyna</i> | 1 | 0 | 0 | 0 | 0 | 1 |
| <i>Fraxinus excelsior</i> | 32 | 0 | 0 | 0 | 0 | 32 |
| <i>Picea sitchensis</i> | 2 | 0 | 0 | 0 | 0 | 2 |
| <i>Prunus avium</i> | 0 | 0 | 1 | 0 | 0 | 1 |
| <i>Quercus</i> spp. | 5 | 0 | 0 | 0 | 0 | 5 |
| <i>Salix</i> spp. | 5 | 0 | 2 | 0 | 0 | 7 |
| <i>Sorbus aucuparia</i> | 4 | 0 | 0 | 0 | 0 | 4 |

Table 34. Age class/frequency data for each mature tree species and deer impact within plots at **Glenloy**. (Data collected from 4 plots of c.530 m² area).

| Species | Pole | Mature | Veteran | TOTAL | Bark stripped |
|---------------------------|------|--------|---------|-------|---------------|
| <i>Alnus glutinosa</i> | 50 | 50 | 3 | 103 | 0 |
| <i>Corylus avellana</i> | 1 | 1 | 2 | 4 | 0 |
| <i>Fraxinus excelsior</i> | 10 | 9 | 0 | 19 | 0 |
| <i>Quercus</i> spp. | 1 | 0 | 0 | 1 | 0 |
| <i>Salix</i> spp. | 1 | 3 | 0 | 4 | 0 |
| <i>Sorbus aucuparia</i> | 0 | 2 | 0 | 2 | 0 |
| <i>Ulmus glabra</i> | 0 | 2 | 0 | 2 | 0 |
| Total trees | 63 | 67 | 5 | 135 | 0 |

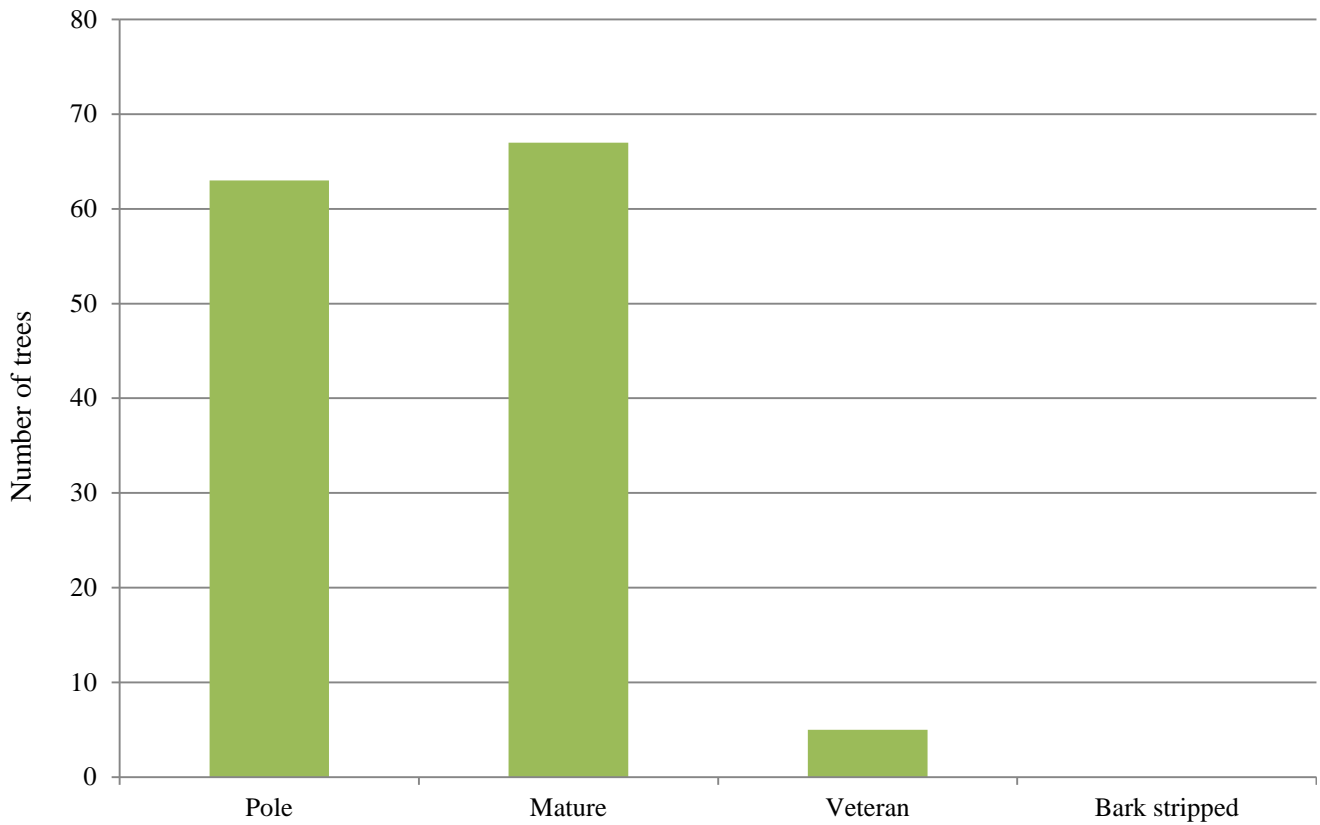


Figure 33. Number of all mature trees, categorised according to age class, within plots at **Glenloy** and those which have had bark stripped. (Data collected from 4 plots of c.530 m² area)

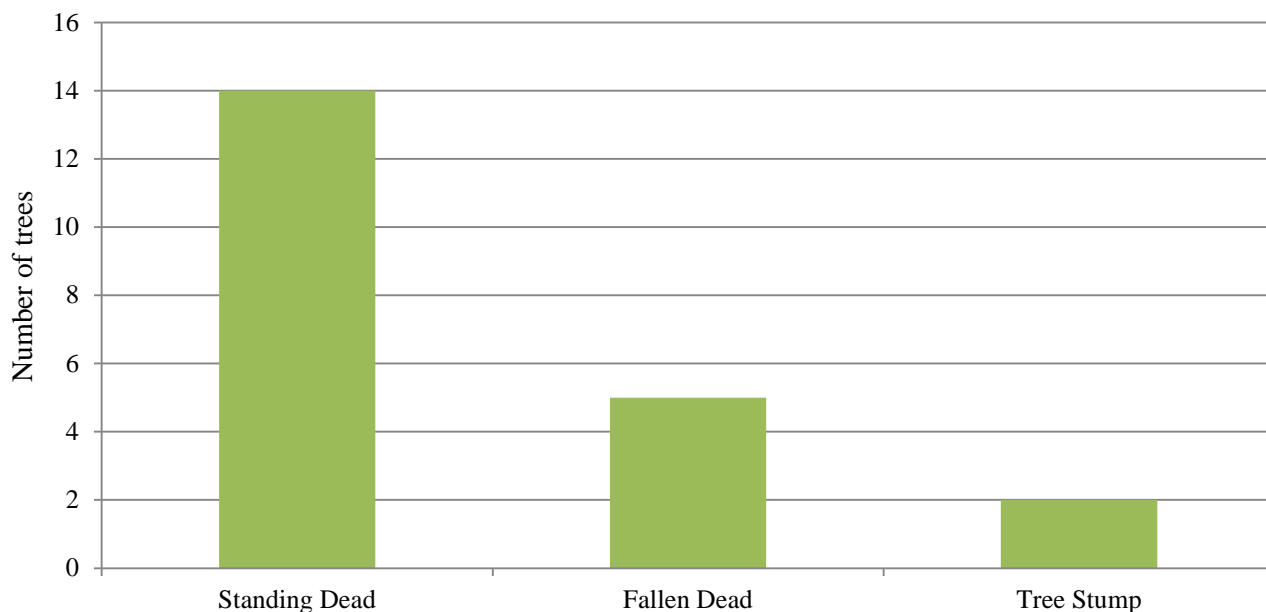


Figure 34. Number of standing dead, fallen dead and tree stumps within plots at **Glenloy**. (Data collected from 4 plots of c.530 m² area)

3.17 Glenmamie

Table 35. Deer impact on seedlings/saplings within plots at **Glenmamie Estate** for each tree species. Units represent number of seedling/saplings within each category. (Data collected from 13 plots of c.530 m² area).

| Species | No damage | Leader only | Sides only | Both leader and sides | Frayed | TOTAL |
|------------------------------|-----------|-------------|------------|-----------------------|--------|-------|
| <i>Alnus glutinosa</i> | 1 | 0 | 0 | 0 | 0 | 1 |
| <i>Betula pendula</i> | 3 | 0 | 0 | 0 | 0 | 3 |
| <i>Betula pubescens</i> | 187 | 3 | 22 | 17 | 2 | 231 |
| Combined <i>Betula</i> spp. | 190 | 3 | 22 | 17 | 2 | 234 |
| <i>Corylus avellana</i> | 6 | 0 | 0 | 1 | 0 | 7 |
| <i>Fraxinus excelsior</i> | 14 | 0 | 0 | 0 | 0 | 14 |
| <i>Ilex aquifolium</i> | 6 | 0 | 3 | 3 | 0 | 12 |
| <i>Quercus</i> spp. | 127 | 3 | 9 | 26 | 0 | 165 |
| <i>Rhododendron ponticum</i> | 44 | 0 | 0 | 0 | 0 | 44 |
| <i>Salix</i> spp. | 5 | 0 | 0 | 3 | 0 | 8 |
| <i>Sorbus aucuparia</i> | 340 | 46 | 75 | 98 | 2 | 561 |
| OTHERS | 0 | 0 | 0 | 1 | 0 | 1 |

Table 36. Age class/frequency data for each mature tree species and deer impact within plots at **Glenmamie Estate**. (Data collected from 13 plots of c.530 m² area).

| Species | Pole | Mature | Veteran | TOTAL | Bark |
|------------------------------|------|--------|---------|-------|------|
| <i>Alnus glutinosa</i> | 42 | 4 | 0 | 46 | 0 |
| <i>Betula pendula</i> | 14 | 2 | 0 | 16 | 0 |
| <i>Betula pubescens</i> | 90 | 19 | 0 | 109 | 1 |
| <i>Ilex aquifolium</i> | 1 | 2 | 0 | 3 | 0 |
| <i>Quercus</i> spp. | 45 | 22 | 0 | 67 | 2 |
| <i>Rhododendron ponticum</i> | 10 | 0 | 0 | 10 | 0 |
| <i>Salix</i> spp. | 2 | 1 | 0 | 3 | 1 |
| <i>Sorbus aucuparia</i> | 7 | 4 | 0 | 11 | 0 |
| Total trees | 211 | 54 | 0 | 265 | 4 |

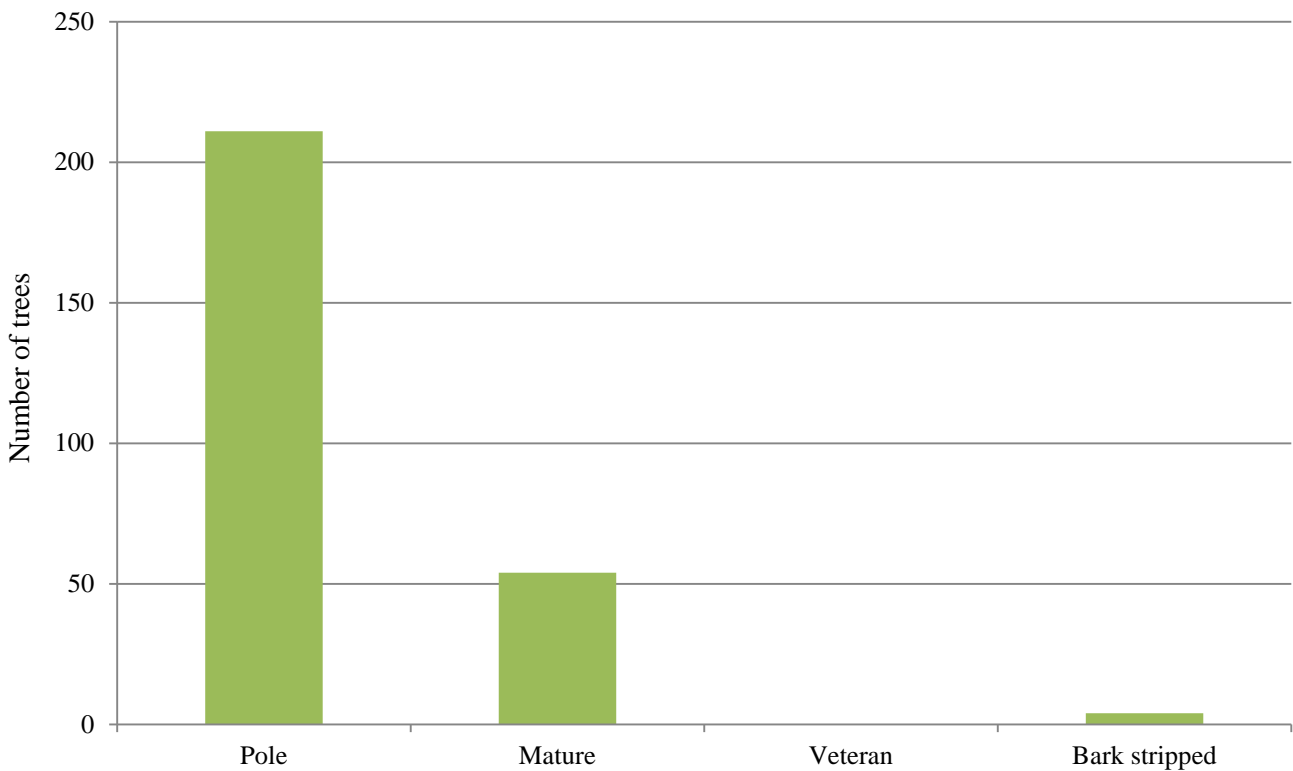


Figure 35. Number of all mature trees, categorised according to age class, within plots at **Glenmamie Estate** and those which have had bark stripped. (Data collected from 13 plots of c.530 m² area).

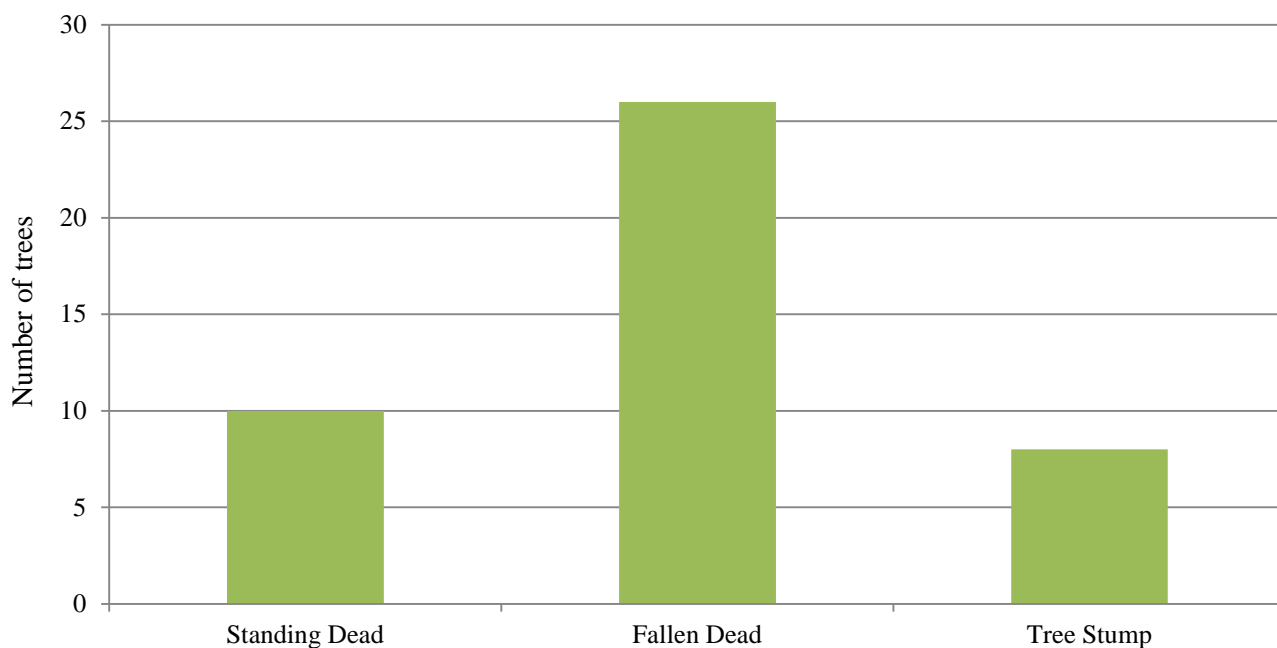


Figure 36. Number of standing dead, fallen dead and tree stumps within plots at **Glenmamie Estate**. (Data collected from 13 plots of c.530 m² area).

3.18 Gortenachaous

Table 37. Deer impact on seedlings/saplings within plots at **Gortenachaous** for each tree species. Units represent number of seedling/saplings within each category. (Data collected from 1 plot of c.530 m² area).

| Species | No damage | Leader only | Sides only | Both leader and sides | Frayed | TOTAL |
|-------------------------|-----------|-------------|------------|-----------------------|--------|-------|
| <i>Betula pubescens</i> | 8 | 0 | 8 | 2 | 0 | 18 |
| <i>Corylus avellana</i> | 11 | 0 | 15 | 11 | 0 | 37 |
| <i>Ilex aquifolium</i> | 0 | 0 | 0 | 1 | 0 | 1 |
| <i>Quercus</i> spp. | 2 | 0 | 0 | 1 | 0 | 3 |
| <i>Salix</i> spp. | 8 | 0 | 1 | 5 | 0 | 14 |
| <i>Sorbus aucuparia</i> | 4 | 0 | 1 | 0 | 0 | 5 |

Table 38. Age class/frequency data for each mature tree species and deer impact within plots at **Gortenachaous**. (Data collected from 1 plot of c.530 m² area).

| Species | Pole | Mature | Veteran | TOTAL | Bark stripped |
|-------------------------|------|--------|---------|-------|---------------|
| <i>Betula pubescens</i> | 20 | 7 | 0 | 27 | 0 |
| <i>Corylus avellana</i> | 8 | 1 | 0 | 9 | 0 |
| <i>Quercus</i> spp. | 3 | 4 | 0 | 7 | 0 |
| <i>Salix</i> spp. | 9 | 1 | 0 | 10 | 0 |
| <i>Sorbus aucuparia</i> | 1 | 0 | 0 | 1 | 0 |
| Total trees | 41 | 13 | 0 | 54 | 0 |

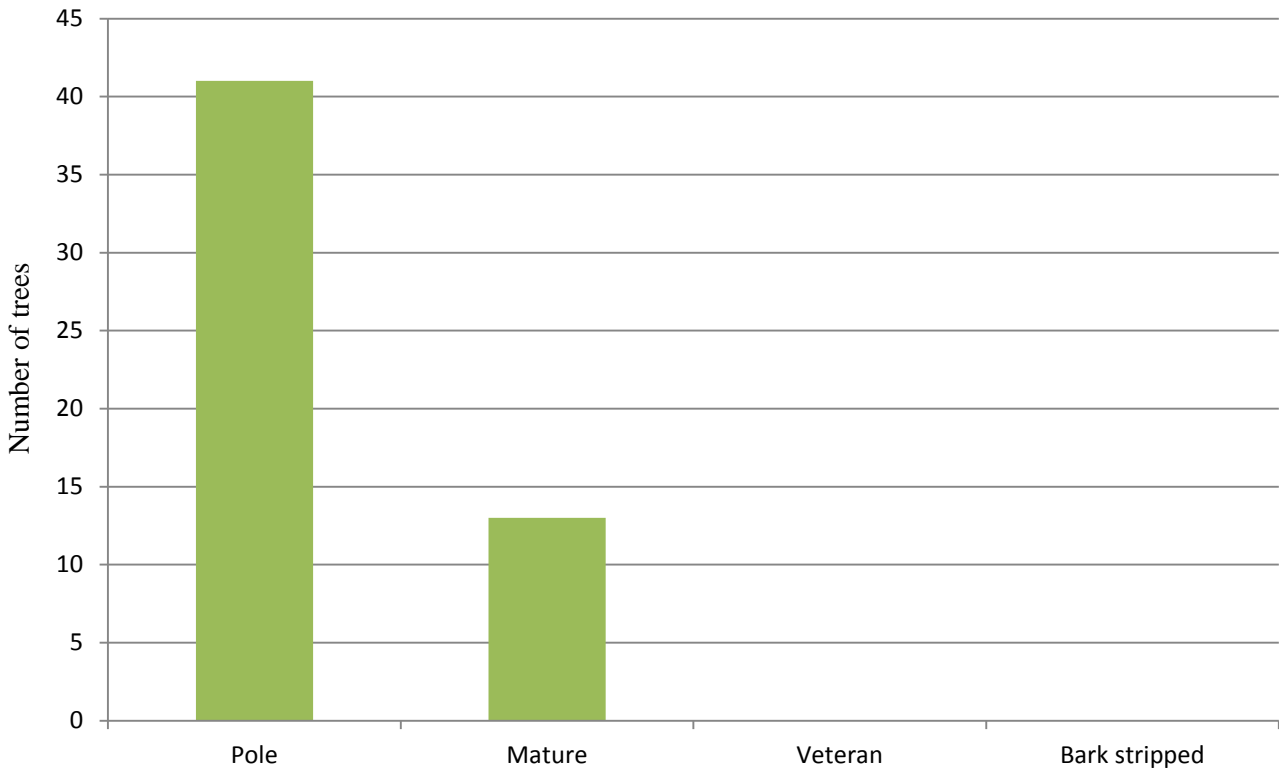


Figure 37. Number of all mature trees, categorised according to age class, within plots at **Gortenaous** and those which have had bark stripped. (Data collected from 1 plot of c.530 m² area).

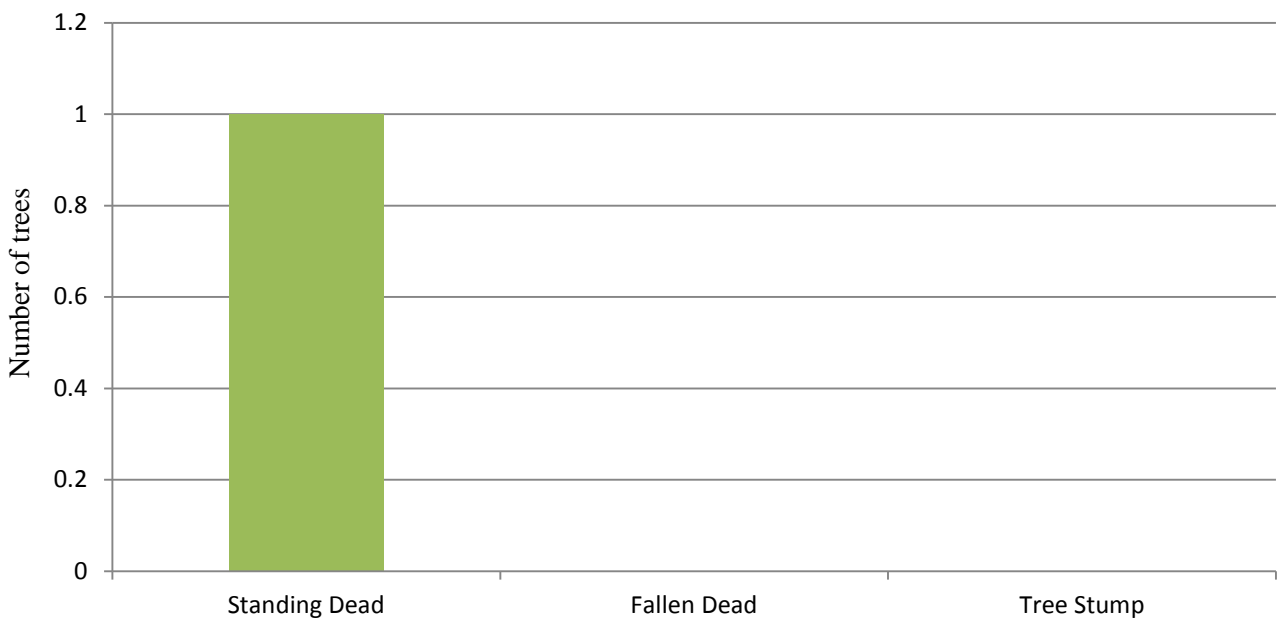


Figure 38. Number of standing dead, fallen dead and tree stumps within plots at **Gortenaous**. (Data collected from 1 plot of c.530 m² area).

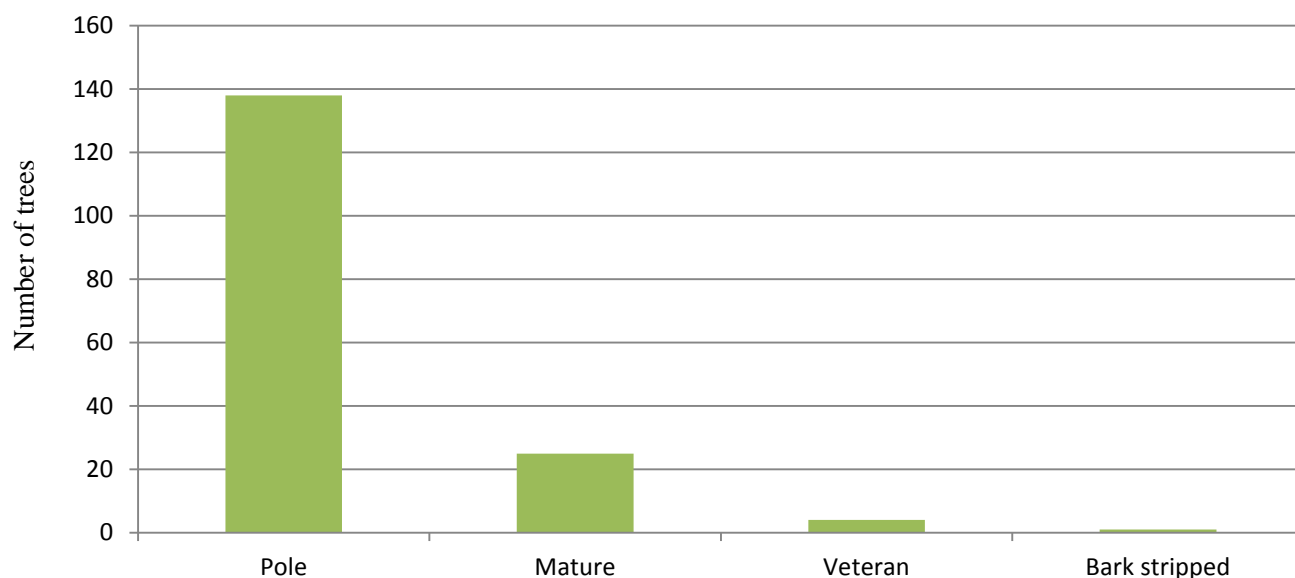
3.19 Kinloid

Table 39. Deer impact on seedlings/saplings within plots at **Kinloid Farm** for each tree species. Units represent number of seedling/saplings within each category. (Data collected from 4 plots of c.530 m² area).

| Species | No damage | Leader only | Sides only | Both leader and sides | Frayed | TOTAL |
|---------------------------|-----------|-------------|------------|-----------------------|--------|-------|
| <i>Betula pubescens</i> | 21 | 0 | 0 | 0 | 0 | 21 |
| <i>Corylus avellana</i> | 12 | 0 | 0 | 2 | 0 | 14 |
| <i>Fraxinus excelsior</i> | 124 | 0 | 3 | 3 | 0 | 130 |
| <i>Quercus</i> spp. | 75 | 0 | 6 | 31 | 0 | 112 |
| <i>Sorbus aucuparia</i> | 15 | 1 | 5 | 9 | 0 | 30 |

Table 40. Age class/frequency data for each mature tree species and deer impact within plots at **Kinloid Farm**. (Data collected from 4 plots of c.530 m² area).

| Species | Pole | Mature | Veteran | TOTAL | Bark stripped |
|---------------------------|------|--------|---------|-------|---------------|
| <i>Betula pubescens</i> | 108 | 2 | 0 | 110 | 1 |
| <i>Corylus avellana</i> | 17 | 15 | 2 | 34 | 0 |
| <i>Crataegus monogyna</i> | 2 | 2 | 0 | 4 | 0 |
| <i>Fraxinus excelsior</i> | 0 | 1 | 0 | 1 | 0 |
| <i>Quercus</i> spp. | 10 | 3 | 1 | 14 | 0 |
| <i>Salix</i> spp. | 1 | 2 | 1 | 4 | 0 |
| Total trees | 138 | 25 | 4 | 167 | 1 |

Figure 39. Number of all mature trees, categorised according to age class, within plots at **Kinloid Farm** and those which have had bark stripped. (Data collected from 4 plots of c.530 m² area)

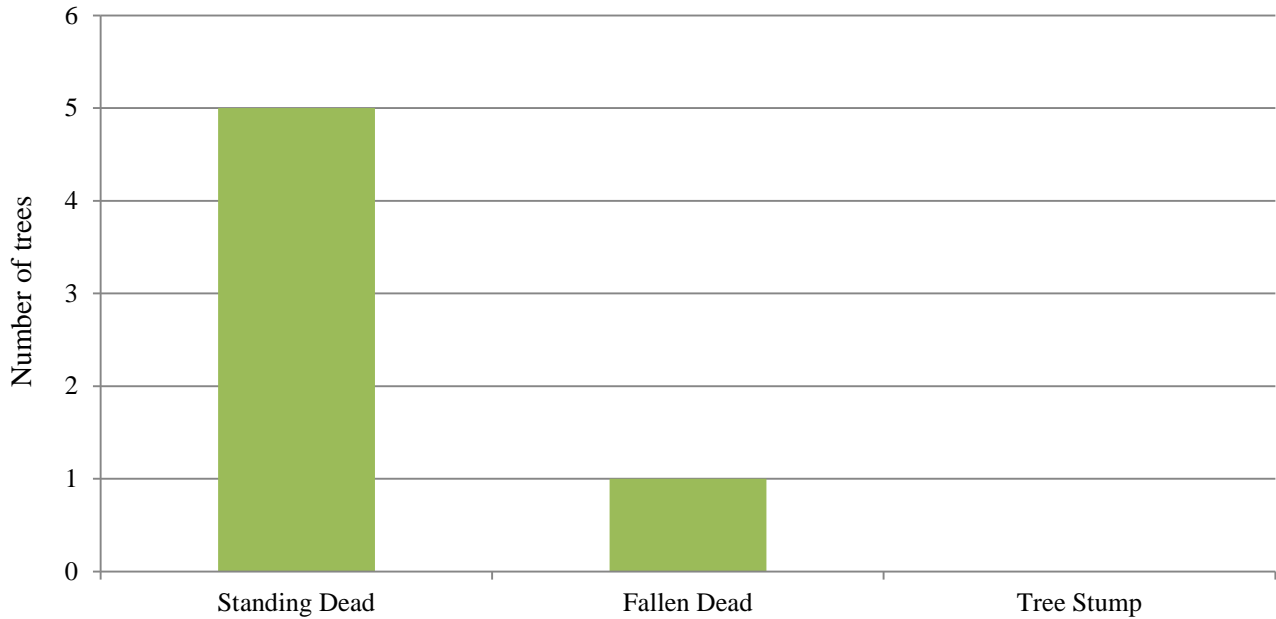


Figure 40. Number of standing dead, fallen dead and tree stumps within plots at **Kinloid Farm**. (Data collected from 4 plots of c.530 m² area)

3.20 Loch Arkaig

Table 41. Deer impact on seedlings/saplings within plots at **Loch Arkaig** for each tree species. Units represent number of seedling/saplings within each category. (Data collected from 1 plot of c.530 m² area).

| Species | No damage | Leader only | Sides only | Both leader and sides | Frayed | TOTAL |
|-----------------------------|-----------|-------------|------------|-----------------------|--------|-------|
| <i>Alnus glutinosa</i> | 0 | 0 | 9 | 11 | 0 | 20 |
| <i>Betula pendula</i> | 9 | 8 | 10 | 22 | 0 | 49 |
| <i>Betula pubescens</i> | 1 | 0 | 0 | 2 | 0 | 3 |
| Combined <i>Betula</i> spp. | 10 | 8 | 10 | 24 | 0 | 52 |
| <i>Ilex aquifolium</i> | 0 | 0 | 0 | 1 | 0 | 1 |
| <i>Quercus</i> spp. | 12 | 10 | 7 | 19 | 0 | 48 |
| <i>Salix</i> spp. | 0 | 1 | 2 | 18 | 0 | 21 |
| <i>Sorbus aucuparia</i> | 2 | 8 | 6 | 19 | 0 | 35 |

Table 42. Age class/frequency data for each mature tree species and deer impact within plots at **Kinloid Farm**. (Data collected from 1 plot of c.530 m² area).

| Species | Pole | Mature | Veteran | TOTAL | Bark stripped |
|---------------------|------|--------|---------|-------|---------------|
| <i>Quercus</i> spp. | 0 | 2 | 0 | 2 | 0 |

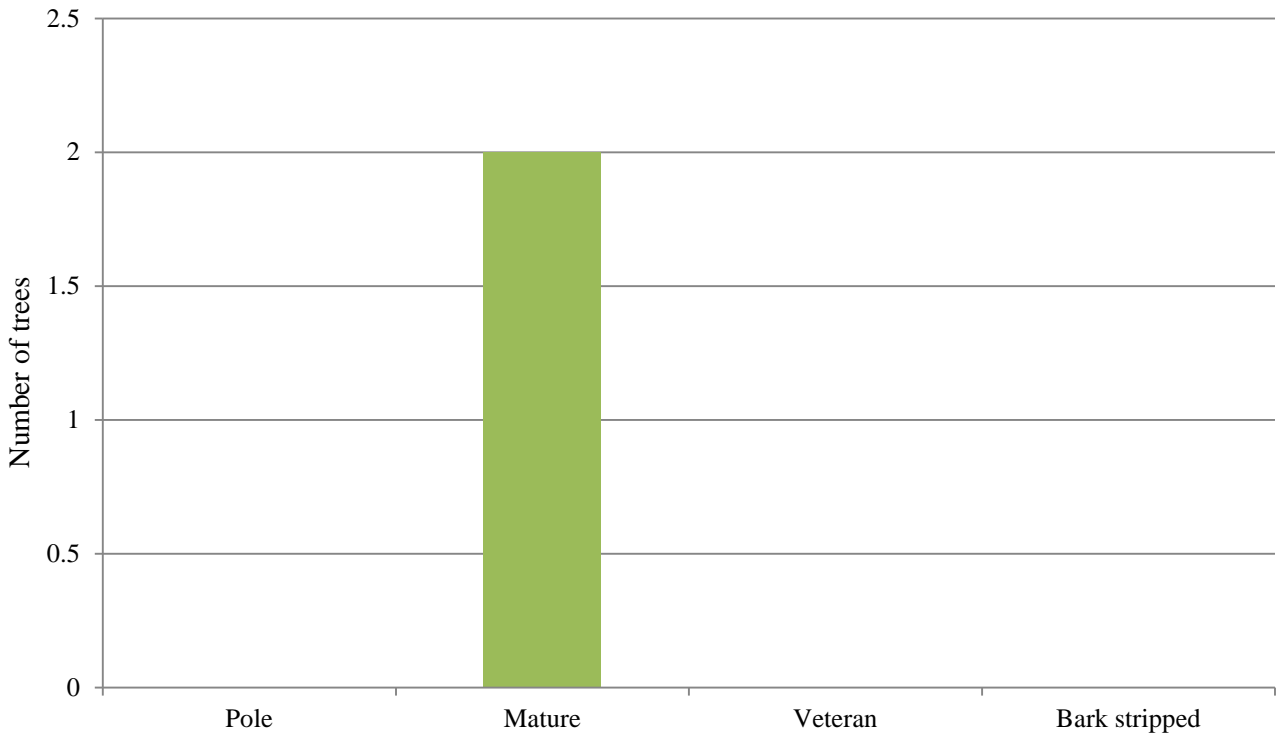


Figure 41. Number of all mature trees, categorised according to age class, within plots at **Loch Arkaig** and those which have had bark stripped. (Data collected from 1 plot of c.530 m² area)

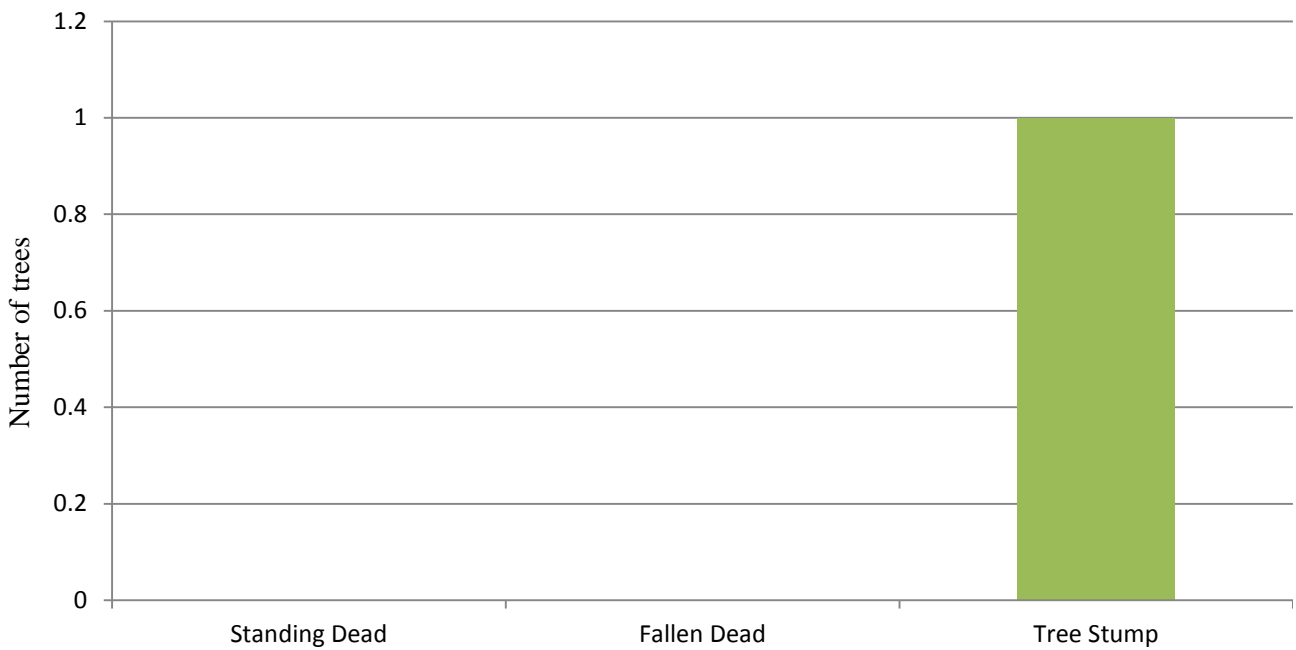


Figure 42. Number of standing dead, fallen dead and tree stumps within plots at **Loch Arkaig**. (Data collected from 1 plot of c.530 m² area).

3.21 Meoble

Table 43. Deer impact on seedlings/saplings within plots at **Meoble Estate** for each tree species. Units represent number of seedling/saplings within each category. (Data collected from 25 plots of c.530 m² area).

| Species | No damage | Leader only | Sides only | Both leader and sides | Frayed | TOTAL |
|------------------------------|-----------|-------------|------------|-----------------------|--------|-------|
| <i>Alnus glutinosa</i> | 40 | 0 | 13 | 0 | 0 | 53 |
| <i>Betula pubescens</i> | 1357 | 40 | 80 | 104 | 4 | 1585 |
| <i>Corylus avellana</i> | 6 | 0 | 3 | 1 | 0 | 10 |
| <i>Crataegus monogyna</i> | 1 | 0 | 0 | 0 | 0 | 1 |
| <i>Fraxinus excelsior</i> | 8 | 0 | 0 | 0 | 0 | 8 |
| <i>Ilex aquifolium</i> | 3 | 2 | 0 | 2 | 0 | 7 |
| <i>Prunus avium</i> | 53 | 0 | 0 | 0 | 0 | 53 |
| <i>Prunus padus</i> | 1 | 1 | 0 | 0 | 0 | 2 |
| <i>Quercus</i> spp. | 7 | 1 | 1 | 1 | 0 | 10 |
| <i>Rhododendron ponticum</i> | 97 | 0 | 0 | 0 | 0 | 97 |
| <i>Salix</i> spp. | 47 | 8 | 51 | 78 | 0 | 184 |
| <i>Sorbus aucuparia</i> | 973 | 89 | 35 | 44 | 0 | 1141 |

Table 44. Age class/frequency data for each mature tree species and deer impact within plots at **Meoble Estate**. (Data collected from 25 plots of c.530 m² area).

| Species | Pole | Mature | Veteran | TOTAL | Bark stripped |
|---------------------------|------|--------|---------|-------|---------------|
| <i>Alnus glutinosa</i> | 4 | 22 | 1 | 27 | 0 |
| <i>Betula pubescens</i> | 32 | 57 | 3 | 92 | 0 |
| <i>Corylus avellana</i> | 2 | 1 | 0 | 3 | 0 |
| <i>Fraxinus excelsior</i> | 1 | 1 | 0 | 2 | 0 |
| <i>Ilex aquifolium</i> | 2 | 3 | 0 | 5 | 0 |
| <i>Quercus</i> spp. | 0 | 8 | 0 | 8 | 0 |
| <i>Salix</i> spp. | 1 | 2 | 0 | 3 | 0 |
| <i>Sorbus aucuparia</i> | 8 | 4 | 0 | 12 | 0 |
| Total trees | 50 | 98 | 4 | 152 | 0 |

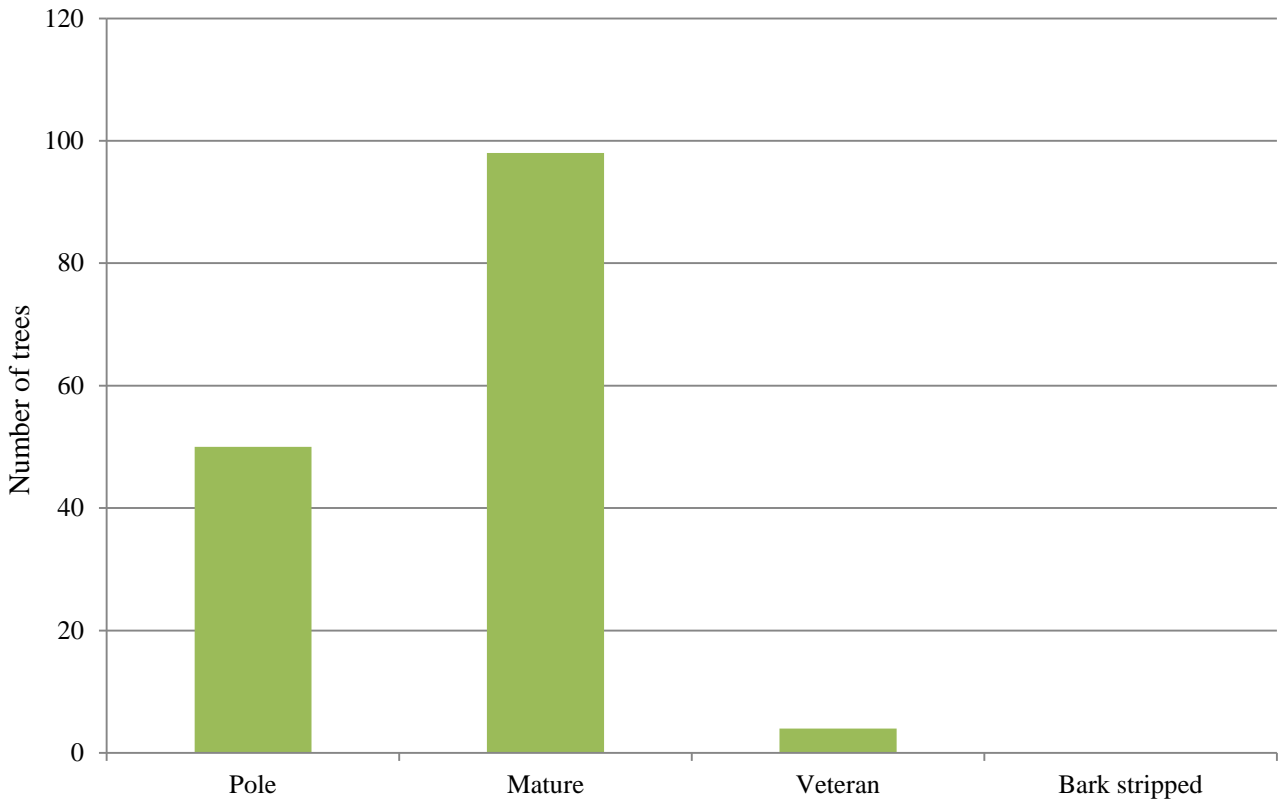


Figure 43. Number of all mature trees, categorised according to age class, within plots at **Meoble Estate** and those which have had bark stripped. (Data collected from 25 plots of c.530 m² area).

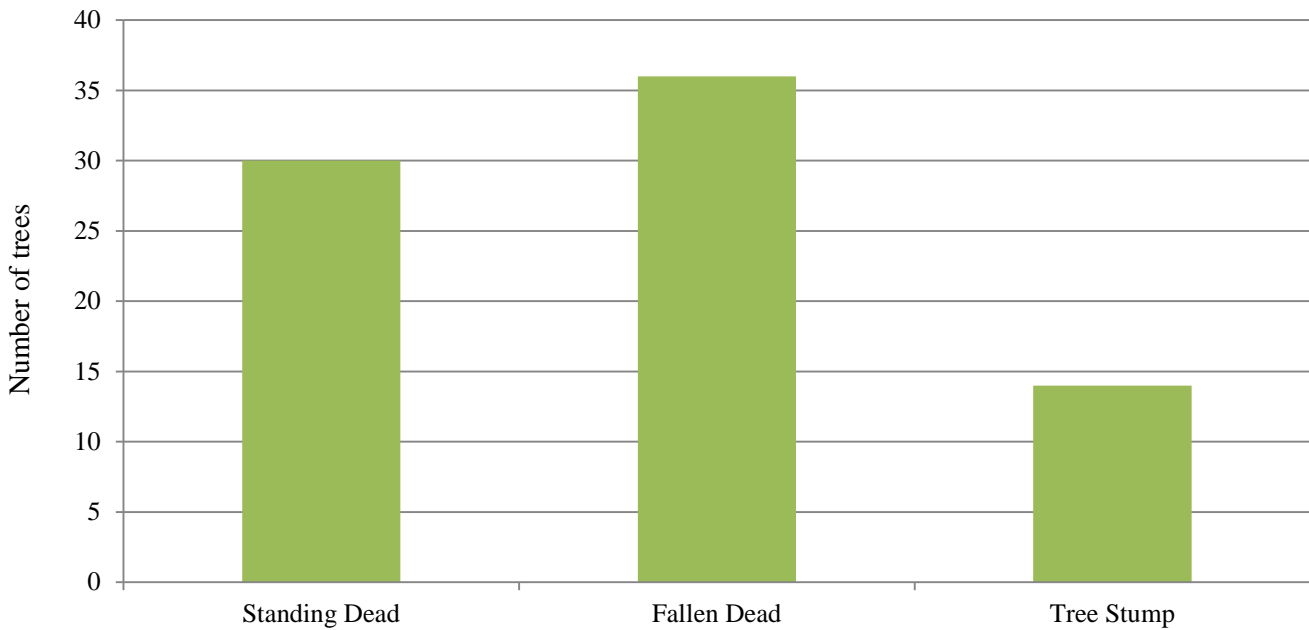


Figure 44. Number of standing dead, fallen dead and tree stumps within plots at **Meoble Estate**. (Data collected from 25 plots of c.530 m² area).

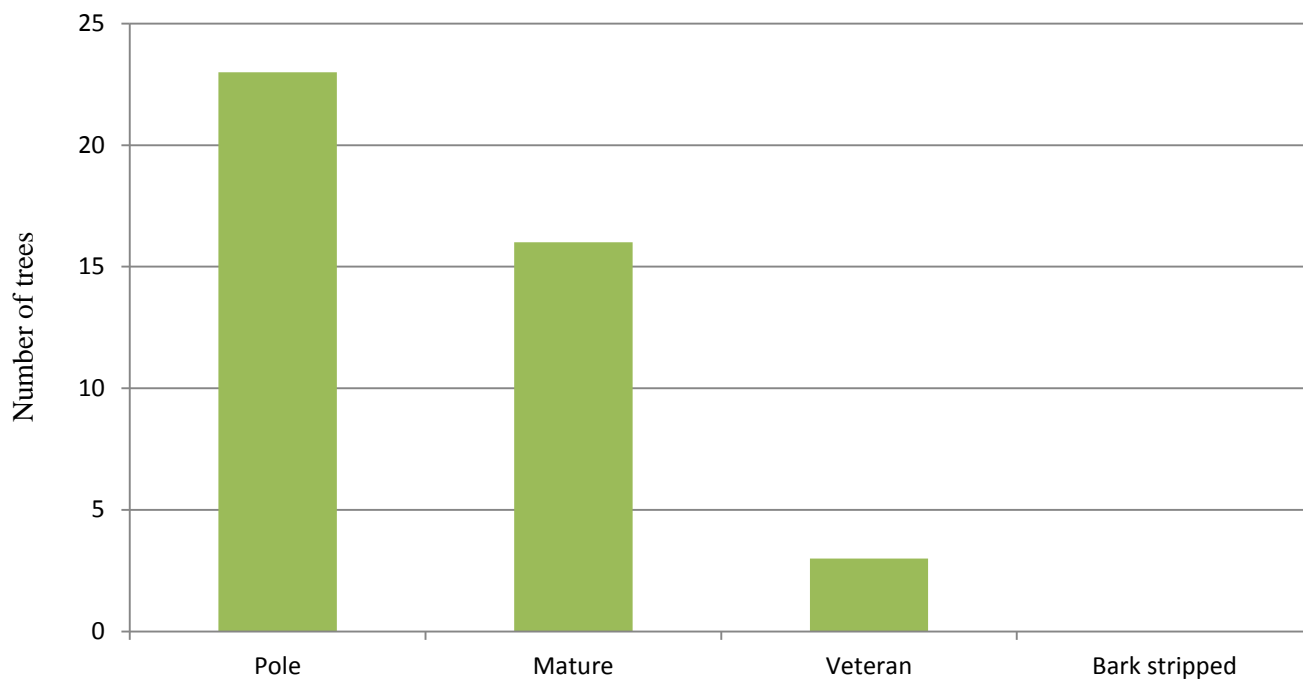
3.22 Moy Crofts

Table 45. Deer impact on seedlings/saplings within plots at **Moy Crofts** for each tree species. Units represent number of seedling/saplings within each category. (Data collected from 7 plots of c.530 m² area).

| Species | No damage | Leader only | Sides only | Both leader and sides | Frayed | TOTAL |
|-----------------------------|-----------|-------------|------------|-----------------------|--------|-------|
| <i>Betula pendula</i> | 14 | 2 | 0 | 7 | 1 | 24 |
| <i>Betula pubescens</i> | 22 | 0 | 0 | 1 | 0 | 23 |
| Combined <i>Betula</i> spp. | 36 | 2 | 0 | 8 | 0 | 46 |
| <i>Salix</i> spp. | 6 | 0 | 2 | 9 | 0 | 17 |
| <i>Sorbus aucuparia</i> | 12 | 0 | 0 | 5 | 0 | 17 |

Table 46. Age class/frequency data for each mature tree species and deer impact within plots at **Moy Crofts**. (Data collected from 7 plots of c.530 m² area).

| Species | Pole | Mature | Veteran | TOTAL | Bark stripped |
|-------------------------|------|--------|---------|-------|---------------|
| <i>Alnus glutinosa</i> | 2 | 0 | 0 | 2 | 0 |
| <i>Betula pendula</i> | 8 | 8 | 3 | 19 | 0 |
| <i>Betula pubescens</i> | 11 | 8 | 0 | 19 | 0 |
| <i>Salix</i> spp. | 1 | 0 | 0 | 1 | 0 |
| <i>Sorbus aucuparia</i> | 1 | 0 | 0 | 1 | 0 |
| Total trees | 23 | 16 | 3 | 42 | 0 |

Figure 45. Number of all mature trees, categorised according to age class, within plots at **Moy Crofts** and those which have had bark stripped. (Data collected from 7 plots of c.530 m² area).

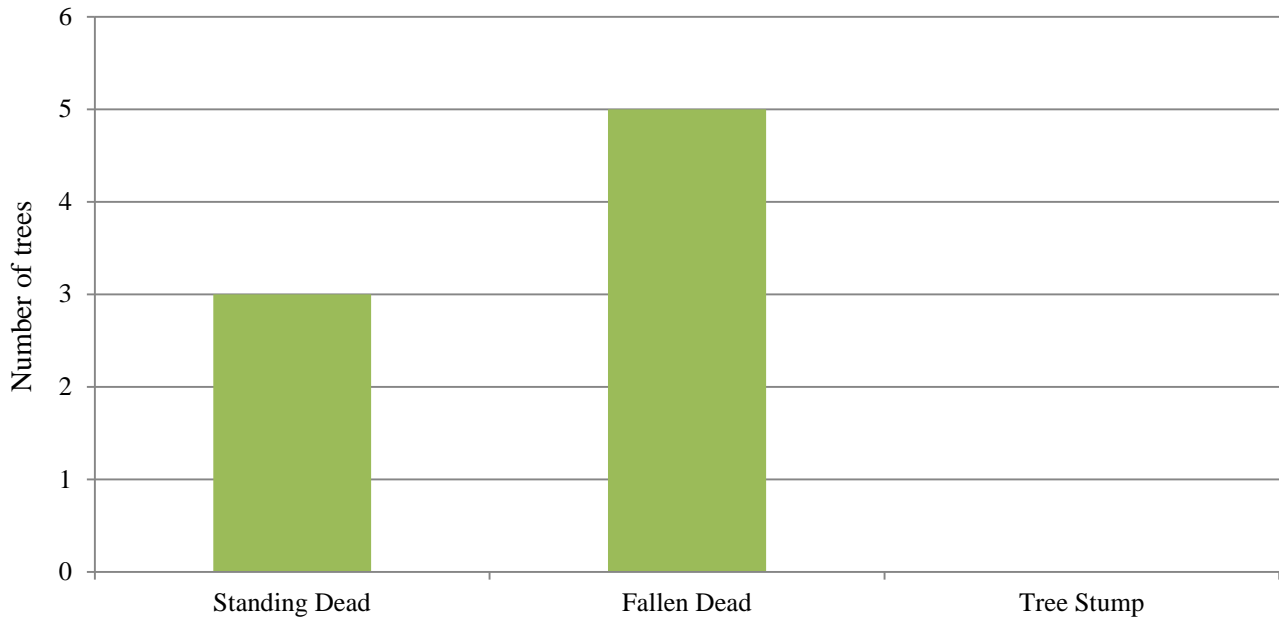


Figure 46. Number of standing dead, fallen dead and tree stumps within plots at **Moy Crofts**. (Data collected from 7 plots of c.530 m² area).

3.23 Unknown ownership

Table 47. Deer impact on seedlings/saplings within plots at various locations with **unknown ownership** for each tree species. Units represent number of seedling/saplings within each category. (Data collected from 23 plots of c.530 m² area).

| Species | No damage | Leader only | Sides only | Both leader and sides | Frayed | TOTAL |
|------------------------------|-----------|-------------|------------|-----------------------|--------|-------|
| <i>Alnus glutinosa</i> | 5 | 0 | 2 | 0 | 0 | 7 |
| <i>Betula pendula</i> | 18 | 0 | 7 | 0 | 1 | 26 |
| <i>Betula pubescens</i> | 1832 | 73 | 148 | 96 | 0 | 2149 |
| Combined <i>Betula</i> spp. | 1850 | 73 | 155 | 96 | 1 | 2175 |
| <i>Corylus avellana</i> | 7 | 0 | 6 | 2 | 0 | 15 |
| <i>Fraxinus excelsior</i> | 2 | 0 | 0 | 0 | 0 | 2 |
| <i>Ilex aquifolium</i> | 4 | 0 | 1 | 2 | 0 | 7 |
| <i>Larix</i> spp. | 1 | 0 | 0 | 0 | 0 | 1 |
| <i>Picea abies</i> | 15 | 0 | 0 | 0 | 14 | 29 |
| <i>Picea sitchensis</i> | 42 | 5 | 15 | 6 | 1 | 69 |
| <i>Pinus sylvestris</i> | 3 | 0 | 1 | 0 | 0 | 4 |
| <i>Prunus padus</i> | 0 | 1 | 0 | 0 | 0 | 1 |
| <i>Quercus</i> spp. | 35 | 2 | 5 | 5 | 0 | 47 |
| <i>Rhododendron ponticum</i> | 437 | 0 | 0 | 0 | 0 | 437 |
| <i>Salix</i> spp. | 72 | 7 | 37 | 28 | 0 | 144 |
| <i>Sorbus aucuparia</i> | 242 | 21 | 10 | 11 | 0 | 284 |

Table 48. Age class/frequency data for each mature tree species and deer impact within plots at various locations with **unknown ownership**. (Data collected from 23 plots of c.530 m² area).

| Species | Pole | Mature | Veteran | TOTAL | Bark stripped |
|------------------------------|------|--------|---------|-------|---------------|
| <i>Alnus glutinosa</i> | 5 | 9 | 1 | 15 | 0 |
| <i>Betula pendula</i> | 57 | 2 | 1 | 60 | 0 |
| <i>Betula pubescens</i> | 189 | 32 | 3 | 224 | 0 |
| <i>Corylus avellana</i> | 8 | 12 | 8 | 28 | 0 |
| <i>Crataegus monogyna</i> | 0 | 6 | 0 | 6 | 0 |
| <i>Fagus sylvatica</i> | 8 | 0 | 0 | 8 | 0 |
| <i>Fraxinus excelsior</i> | 1 | 0 | 0 | 1 | 0 |
| <i>Picea abies</i> | 100 | 13 | 0 | 113 | 0 |
| <i>Picea sitchensis</i> | 0 | 2 | 0 | 2 | 0 |
| <i>Pinus sylvestris</i> | 3 | 1 | 0 | 4 | 0 |
| <i>Pseudotsuga menziesii</i> | 11 | 10 | 0 | 21 | 0 |
| <i>Quercus</i> spp. | 1 | 21 | 3 | 25 | 0 |
| <i>Rhododendron ponticum</i> | 5 | 4 | 0 | 9 | 0 |
| <i>Salix</i> spp. | 4 | 8 | 1 | 13 | 0 |
| <i>Sorbus aucuparia</i> | 7 | 4 | 0 | 11 | 1 |
| Total trees | 399 | 124 | 17 | 540 | 1 |

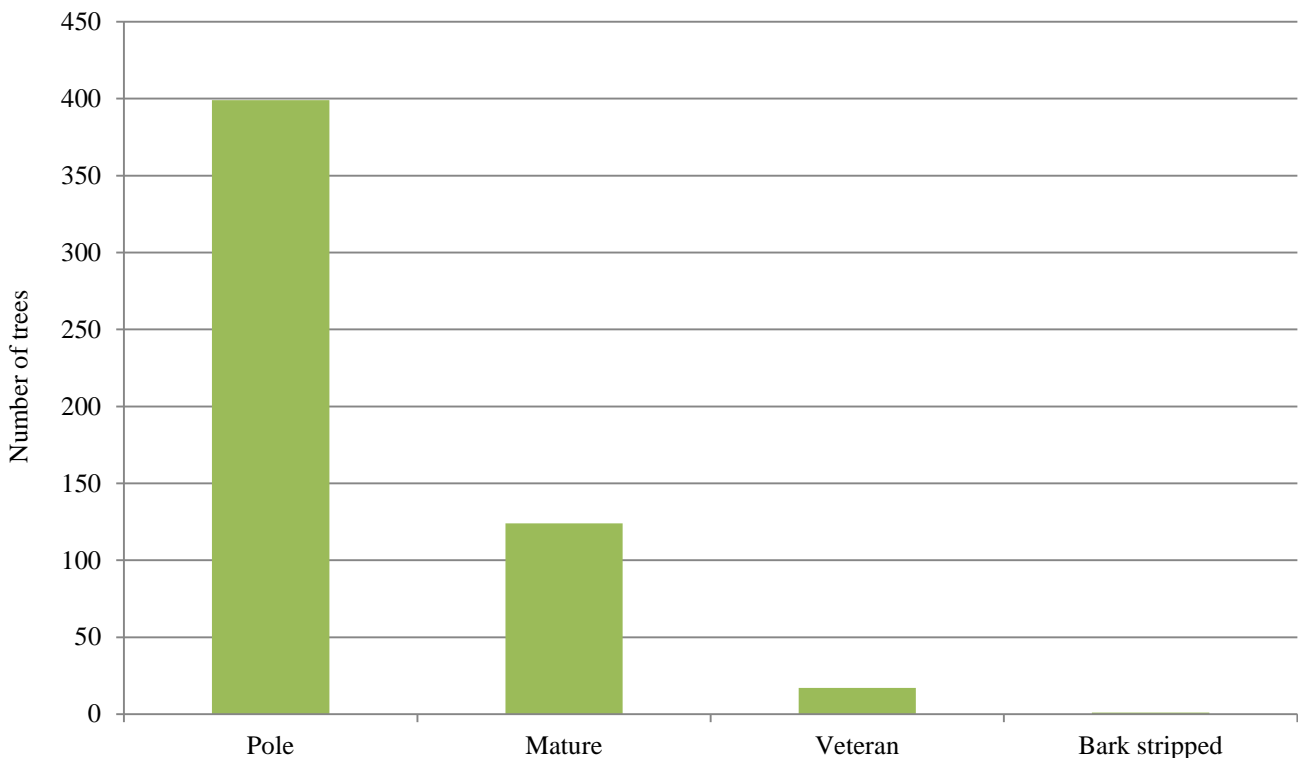


Figure 47. Number of all mature trees categorised according to age class, and those which have had bark stripped, within plots at various locations with **unknown ownership**. (Data collected from 23 plots of c.530 m² area).

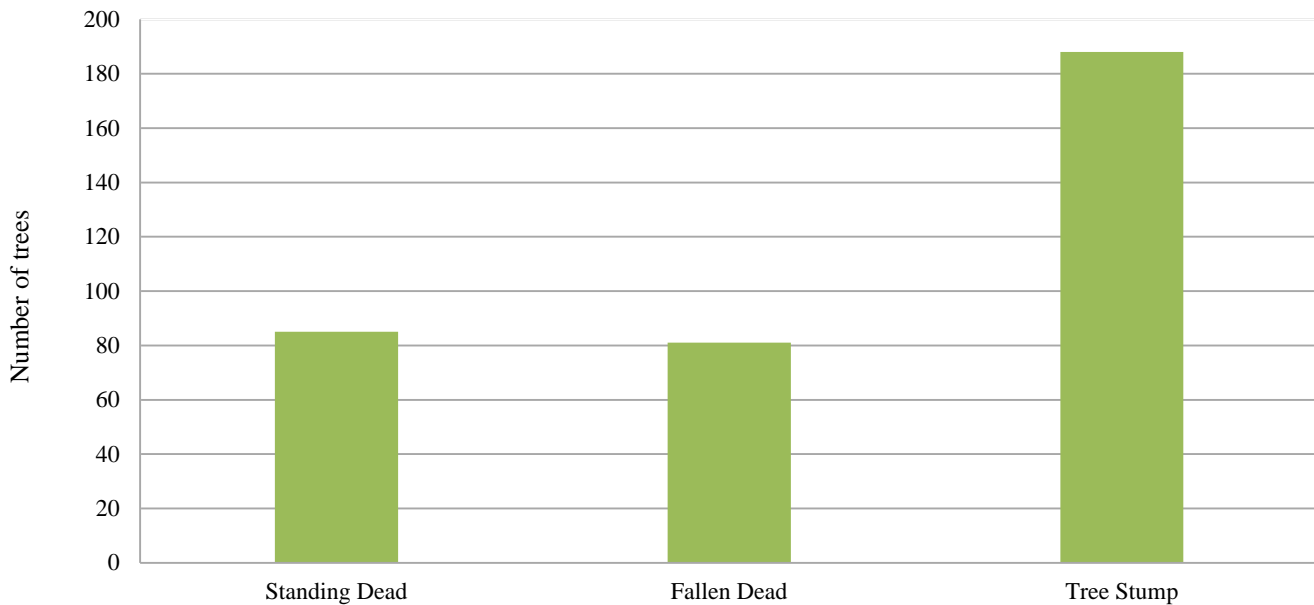


Figure 48. Number of standing dead, fallen dead and tree stumps within plots at various locations with **unknown ownership**. (Data collected from 23 plots of c.530 m² area).

4.0 Discussion

This is a big data set but still only represents just over 1% of the West Lochaber woodland area that had previously been categorised as experiencing High or Very High herbivore pressure. Nonetheless, the data can be extrapolated to describe the impact on the wider woodland in this category because of the randomised sampling design. Care is necessary when interpreting the results because the seedling/sapling data might be somewhat misleading as mentioned above. If a similar randomised approach is adopted for monitoring in the future then the data may be compared statistically in order to see if there has been a significant change.

The reader might think that more than two thirds of regenerating seedlings/saplings are surviving damage by large herbivores based on the information here. In reality, there were several areas of woodland on the hillside that have an open canopy mainly of Birch and hundreds of seedlings in the ground layer but nothing in between. These seedlings are likely to be browsed when they reach a certain height. As the adult trees gradually die-off and fall over there is nothing to replace them. These upland Birch woods are effectively moribund (see Plates 1, 2, 7, 11, 12, 13, 18, 19, 21 and 22 for example) in certain locations such as at Fassfern, Glean Laoigh, Glen Mama and Meoble. Exclosures might be the only option to facilitate woodland regeneration in these locations if there is no sustained heavy culling of deer, or removal of sheep, as appropriate. Warren (2009) discusses the advantages and disadvantages of culling versus fencing. The best results might be achieved by combining both approaches but ultimately, this will depend on local factors and management targets (Warren 2009). With such a small percentage of mature trees being bark-stripped by deer within sample plots, there is every reason to believe woodland would regenerate quickly once seedlings/saplings had grown beyond the stage when they are vulnerable to browsing.

Meoble Estate has moribund Birch woodland in areas easily accessible to deer, such as at Doire na h Achlaise, but where the ground is steeper, such as immediately above the southern shore of Loch Morar, there is good natural regeneration. Heather growth is also luxurious in these steeper locations. There is dense birch regeneration inside some of the exclosures at Arisaig where the small number of Highland Cattle that roam these areas, for part of the year, is likely to provide more

opportunities for saplings to establish and make the woodland feel more naturalistic. Highland Cattle, at low stocking density, were also encountered in the Glenancross woodland and appeared to be having a positive impact. Getting the balance right is important; few seedlings/saplings were recorded in the handful of plots in woodland pasture at Glen Loy where there was a relatively high stocking rate of cattle (but then woodland regeneration was probably not the main objective for this area of land). Elsewhere, dense thickets of *Rhododendron ponticum* are the main concern for woodland management, such as those seen in woodland belonging to Achnacarry South, east of the river that runs between Loch Arkaig and Loch Lochy. Efforts to control this aggressive invader were evident but it was already returning to areas that had only recently been cleared.

Outside of exclosures and away from steep ground, some of the best natural regeneration was seen in woodland adjacent to the main road or close to the railway. The frequent disturbance of cars and trains respectively is perhaps enough to keep the deer moving and permit the development of seedlings into saplings and young trees. The presence of top predators (such as lynx and wolf) might have performed a similar role, over a wider area, in a fully functional ecosystem.

5.0 References

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Streeter D, Hart-Davies C, Hardcastle A, Cole F, Harper L. 2016. *Collins wildflower guide*. London (UK): HarperCollins Publishers

Warren C. 2009. *Managing Scotland's environment 2nd Edition*. Edinburgh (UK): Edinburgh University Press

6.0 Acknowledgements

We wish to thank all those people who helped with arranging access on to their land. We are especially grateful to Alex MacDonald (Achnacarry) and Ed Hawan (Meoble) for their generous assistance with our survey work.

7.0 Appendix A

Selected photographs of semi-natural native woodland in the West Lochaber Deer Management Group area (taken during the survey work).



Plate 1. View from plot 39 (Achnacarry South) at NN0633284469 in Gleann Laoigh. Photograph taken 22nd August 2017.



Plate 2. View up-slope from plot 39 (Achnacarry South) at NN0633284469 in Gleann Laoigh. Photograph taken 22nd August 2017.



Plate 3. Juniper bush at NN0675384767 and elevation of 342m in plot 324 (Achnacarry South) in Gleann Laoigh. Photograph taken on 22nd August 2017.



Plate 4. View from plot 197 (Achnacarry South) at NN1743188372 showing dense *Rhododendron* shrub layer in woodland beyond. Photograph taken 23rd August 2017.



Plate 5. Vegetation at plot 689 (Ardnish) at NM7424483272 showing tall bracken field layer in places. Photograph taken 10th August 2017.



Plate 6. Rucksack marks the centre of plot 308 (Arisaig) at NM7321584315. Notice the lack of a shrub layer beneath the open canopy. Photograph taken 13th September 2017.



Plate 7. View up the slope from the centre of plot 517 (Arisaig) at NM7408884648. Lack of regenerating woodland is obvious. Photograph taken 12th September 2017.



Plate 8. View of plot 658 (Arisaig) at NM7247284864 showing abundant bracken cover. Centre of plot is marked by rucksack (towards the bottom left of the photograph). Photograph taken 13th September 2017.



Plate 9. Rucksack marks the centre of plot 254 (Borrodale Farm etc) at NM7003784484. Photograph taken 29th August 2017.



Plate 10. Rucksack marks the centre of plot 700 (Borrodale Farm etc) at NM6995884450. Photograph taken 29th August 2017.



Plate 11. Moribund birks at Fassfern on the hill beyond the forestry. Photograph taken 27th June 2017.



Plate 12. Remnant Scots Pine and Birch woodland at Fassfern. Photograph taken 27th June 2017.



Plate 13. Moribund woodland at plot 521 (Fassfern) at NM9665980840. Photograph taken 29th June 2017.



Plate 14. Semi-natural woodland has been re-planted at Glenfinnan and its development is apparent on the slopes either side of the viaduct in this photograph. Photograph taken 9th August 2017.



Plate 15. Developing semi-natural native woodland at Glenfinnan. Photograph taken 9th August 2017.



Plate 16. Plot 69 (Glenfinnan) at NM9039581278. Photograph taken 8th August 2017.



Plate 17. Rowan sapling with Leader and Sides both browsed in plot 69 (Glenfinnan) at NM9039581278. Photograph taken 8th August 2017.



Plate 18. View of remnant woodland from plot 67 (Glenmamie Estate) at NM7800885051. Photograph taken 27th August 2017.



Plate 19. View of moribund woodland from plot 218 (Glenmamie Estate) at NM7761984878. Photograph taken 27th August 2017.



Plate 20. Recently cleared woodland beneath overhead power cables with dense regeneration either side at plot 42 (Glenmamie Estate) at NM7528382961 in enclosed woodland. Rucksack marks the centre of the plot. Photograph taken 10th August 2017.



Plate 21. Moribund Birch woodland at Meoble. Photograph taken 25th July 2017.



Plate 22. Moribund Birch woodland at Doire na h Achlaise (Meoble). Photograph taken 27th July 2017.



Plate 23. View over plot 43 and beyond (Meoble) at NM8016489590. Photograph taken 26th July 2017.



Plate 24. Good heather growth with scattered willow bushes on slightly steeper ground in plot 540 (Meoble) at NM8195289772. Photograph taken 25th July 2017.



Plate 25. Good heather growth and Birch regeneration on steeper slopes, directly above the loch edge, in plot 583 (Meoble) at NM8374989965. Photograph taken 24th July 2017.



Plate 26. Rope about to be pulled in at plot 294 (UNKNOWN ownership) at NM9265679786. Photograph taken 9th July 2017.



Plate 27. Woodland regeneration around abandoned homestead close to the A830 in plot 58 (UNKNOWN ownership) at NM9336379589. Photograph taken 10th July 2017.



Plate 28. Plot 96 (Drumsaillie) at c NM939810 was completely covered by wind-throw and an alternative plot in the locality was randomly selected. Photograph taken 8th July 2017.



Plate 29. Plot 731 (Fassfern) at NM9516182013 was relocated to avoid cliff within the plot. Photograph taken 6th July 2017.



Plate 30. View of semi-natural woodland abutting the coast in the Arisaig area. Photograph taken 29th August 2017.

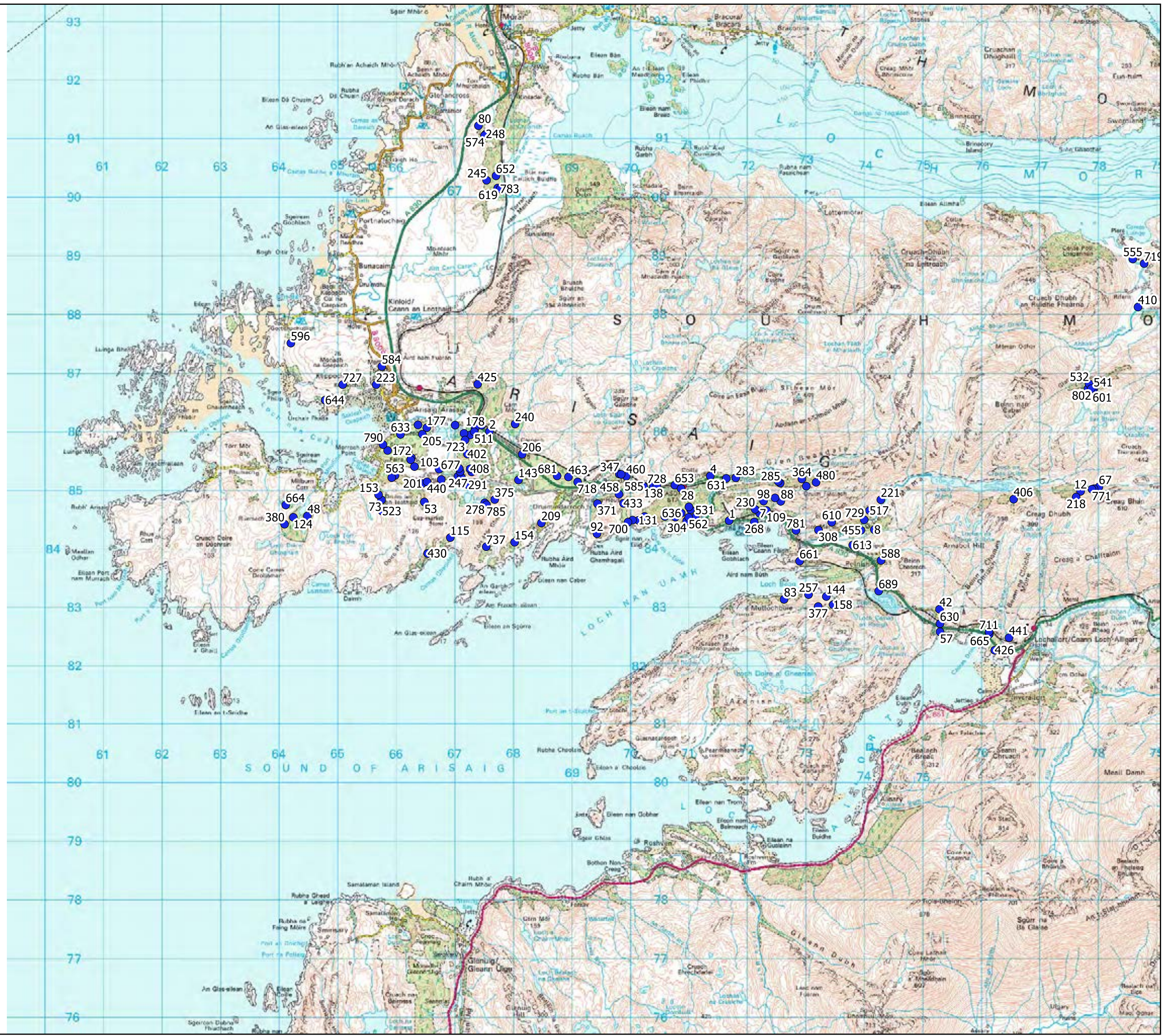
Appendix B

Vernacular names of trees recorded during survey work in West Lochaber

| Scientific name | Vernacular name |
|---------------------------------|---------------------|
| <i>Acer pseudoplatanus</i> | Sycamore |
| <i>Alnus glutinosa</i> | Alder |
| <i>Betula pendula</i> | Silver Birch |
| <i>Betula pubescens</i> | Downy Birch |
| Combined <i>Betula</i> spp. | Birch species |
| <i>Castanea sativa</i> | Sweet Chestnut |
| <i>Chamaecyparis lawsoniana</i> | Lawson Cypress |
| <i>Corylus avellana</i> | Hazel |
| <i>Cotoneaster</i> spp. | Cotoneaster species |
| <i>Crataegus monogyna</i> | Hawthorn |
| <i>Fagus sylvatica</i> | Beech |
| <i>Fraxinus excelsior</i> | Ash |
| <i>Ilex aquifolium</i> | Holly |
| <i>Juniper communis</i> | Juniper |
| <i>Larix</i> spp. | Larch species |
| <i>Picea abies</i> | Norway Spruce |
| <i>Picea sitchensis</i> | Sitka Spruce |
| <i>Pinus sylvestris</i> | Scots Pine |
| <i>Populus tremula</i> | Aspen |
| <i>Prunus avium</i> | Wild Cherry |
| <i>Prunus padus</i> | Bird Cherry |
| <i>Pseudotsuga menziesii</i> | Douglas Fir |
| <i>Quercus</i> spp. | Oak species |
| <i>Rhododendron ponticum</i> | Rhododendron |
| <i>Salix</i> spp. | Willow species |
| <i>Sambucus nigra</i> | Elder |
| <i>Sequoiadendron giganteum</i> | Giant Sequoia |
| <i>Sorbus aucuparia</i> | Rowan |
| <i>Taxus baccata</i> | Yew |
| <i>Tilia x europaea</i> | Common Lime |
| <i>Tsuga heterophylla</i> | Western Hemlock |
| <i>Ulmus glabra</i> | Wych Elm |

792500

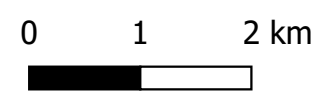
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Map showing the distribution of actual sample plots in the West Lochaber Deer Management Group Area

Key
 ● Actual_sample_plots

24/11/2017



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160000

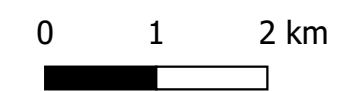
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Map showing the distribution of actual sample plots in the West Lochaber Deer Management Group Area

Key
● Actual_sample_plots

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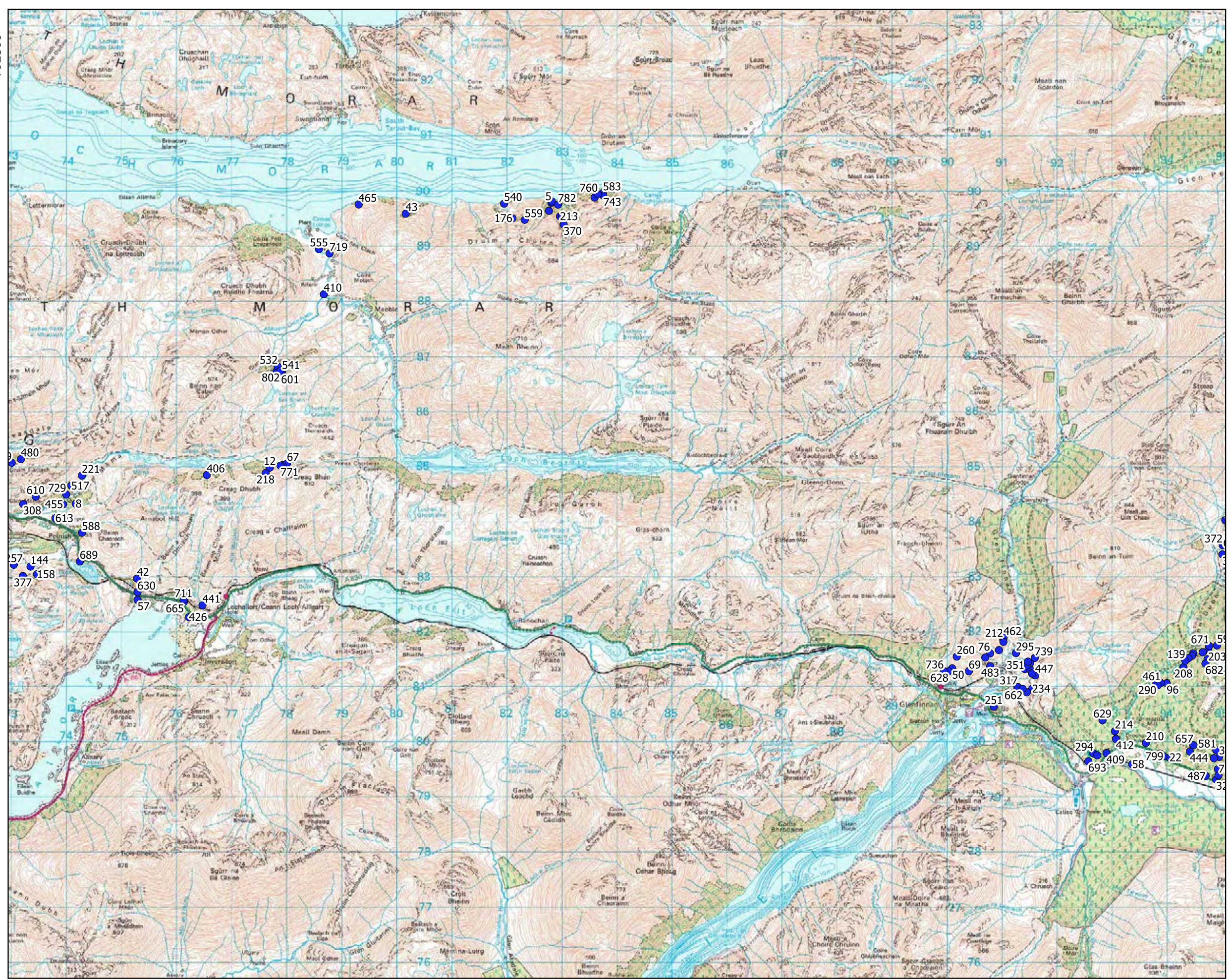
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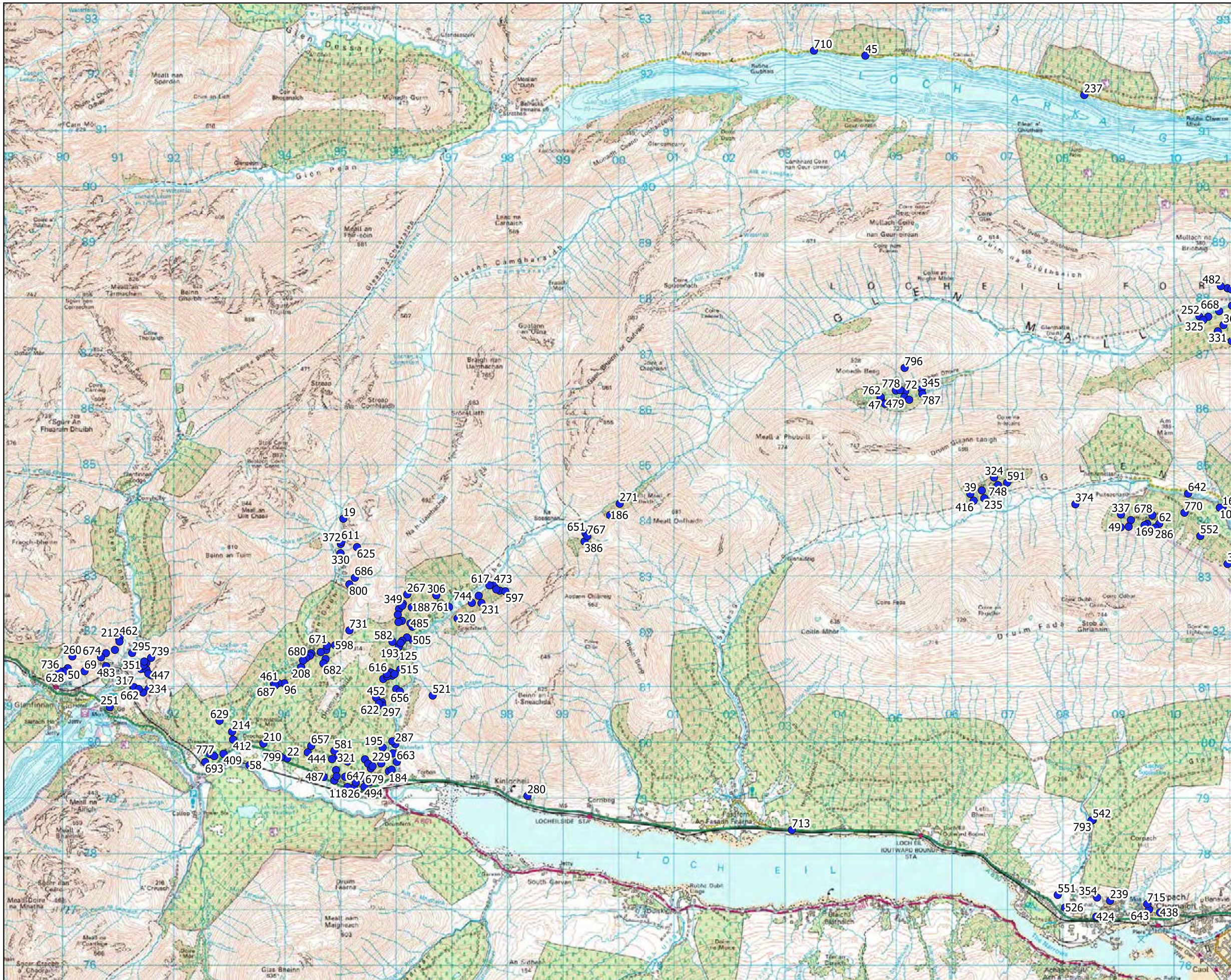
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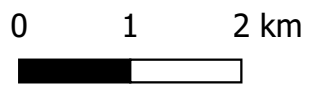


Map showing the distribution of actual sample plots in the West Lochaber Deer Management Group Area

Key

- Actual_sample_plots

24/11/2017



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 Built heritage designation information from Historic Scotland
<http://data.historic-scotland.gov.uk/pls/htrmidv/f?p=2100:10:0::NO::>

Map showing the distribution of actual sample plots in the West Lochaber Deer Management Group Area

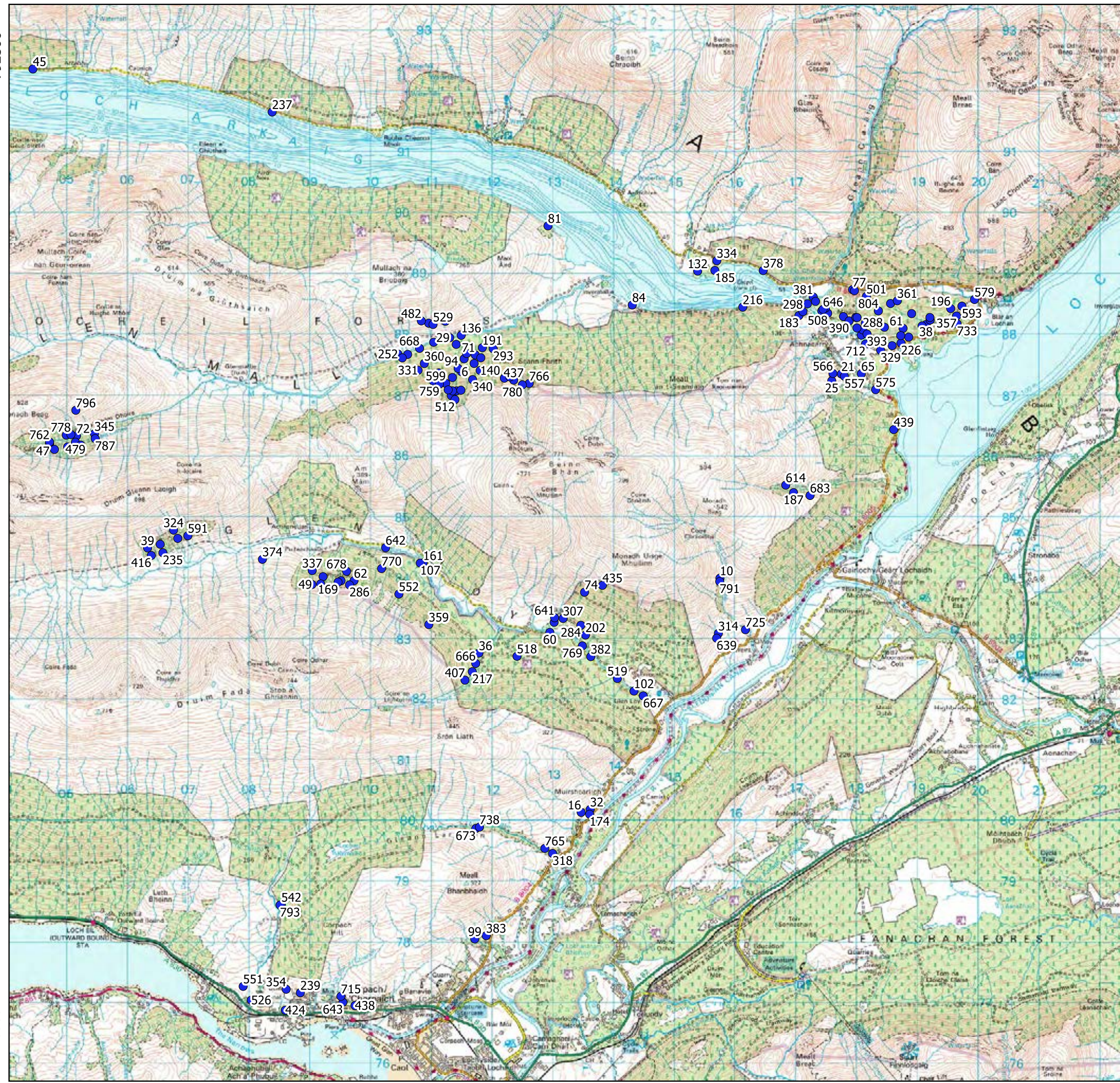
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