**Supplementary Material**

Table S1: Change in mean stem count number between 1971 and the 2020s by species, for each pinewood site and as a mean across all sites – native woody species

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Group** | **Site no.** | **Site** | *Pinus sylvestris* | *Betula spp.* | *Alnus glutinosa* | *Fraxinus excelsior* | *Populus tremula* | *Salix spp.* | *Ilex aquifolium* | *Juniperus* | *Sambucus nigra* | *Quercus sp.* | *Sorbus spp.* | *Total change by site - natives* |
| ***Deeside Group*** | 1 | **Glen Tanar** | 87 |  |  |  |  | 0 |  |  |  |  | 0 | 87 |
| 2 | **Ballochbuie** | 69 | 20 |  |  |  | 0 |  | 8 |  |  | 0 | 97 |
| 3 | **Mar Lodge** | 31 | 2 |  |  |  | 0 |  |  |  |  | 0 | 33 |
| ***Speyside Group*** | 4 | **Abernethy** | 58 | -12 |  |  |  | 0 |  |  |  |  | -5 | 41 |
| 5 | **Rothiemurchus** | 44 | 18 | 1 |  | -8 | -42 |  | 1 | 1 |  | 0 | 15 |
| 6 | **Glenmore** | 121 | -3 |  |  |  | 0 |  | 5 |  |  | 0 | 123 |
| 7 | **Glen Feshie** | -28 | 19 |  |  |  | 3 |  | 5 |  |  | 0 | -1 |
| 27 | **Dulnain** | 33 |  |  |  |  | 0 |  | 4 |  |  | 0 | 37 |
| ***Rannoch Group*** | 8 | **Black Wood of Rannoch** | 24 | -13 |  |  |  | -55 |  |  |  |  | 1 | -43 |
| 9 | **Meggernie** | 12 | 86 | 5 |  |  | 5 |  |  |  |  | -2 | 106 |
| ***Great Glen Group*** | 10 | **Glen Moriston** | 114 | -190 |  |  | -1 | -52 |  | 1 |  |  | -21 | -149 |
| 11 | **Glengarry** | -43 | 171 |  |  |  | 0 |  |  |  |  | 0 | 128 |
| 12 | **Barisdale** | -4 | 11 |  |  |  | 0 | 6 | 3 |  |  | -30 | -14 |
| 13 | **Loch Arkaig & Glen Mallie** | -3 | -6 |  |  |  | 0 |  |  |  |  | -4 | -13 |
| 14 | **Ardgour** | 15 | 54 |  | 1 |  | 3 |  |  |  |  | 0 | 73 |
| ***Strath Glass Group*** | 15 | **Glen Affric** | -18 | 46 |  |  |  | 6 |  |  |  | 1 | -6 | 29 |
| 16 | **Glen Cannich** | 50 | -18 |  |  |  | -16 |  |  |  |  | 4 | 20 |
| 17 | **Glen Strathfarrar** | 18 | 33 | 1 |  |  | 0 |  |  |  |  | -1 | 51 |
| 18 | **Guisachan & Cougie** | 11 | 147 | 3 |  |  | -212 |  |  |  |  | -52 | -103 |
| ***Wester Ross Group*** | 19 | **Coulin** | 34 | 145 | 1 |  |  | 0 |  |  |  |  | 24 | 204 |
| 20 | **Achnashellach** | 12 | -125 |  |  |  | 0 |  |  |  |  | -14 | -127 |
| 21 | **Shieldaig** | 19 | -41 |  |  |  | 0 |  |  |  |  | -16 | -38 |
| 23 | **Loch Maree** | 16 | -46 |  |  |  | 0 | 5 | 2 |  |  | 7 | -16 |
| ***Northern Group*** | 22 | **Amat** | 38 | 22 | 1 |  |  | 0 |  | 1 |  |  | -1 | 61 |
| ***Southern Group*** | 24 | **Black Mount** | -61 | 18 | 1 |  |  | 1 |  |  |  |  | -123 | -164 |
| 25 | **Glen Orchy** | 1 | 147 |  |  |  | 1 |  |  |  | 2 | 5 | 156 |
| 26 | **Tyndrum** | 5 | 30 |  | 1 |  | 0 |  |  |  |  | -4 | 32 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Mean |  | 24.3 | 19.1 | 0.5 | 0.1 | -0.3 | -13.3 | 0.4 | 2.8 | 0 | 0.1 | -8.8 | 24.9 |
|  | S.D. |  | 41.8 | 77.5 | 1.1 | 0.3 | 1.5 | 48 | 1.5 | 8.9 | 0.2 | 0.4 | 31.5 | 212.7 |

Table S2. Change in non-native woody species

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Group*** | **Site no.** | **Site** | *Larix sp.* | *P. contorta* | *Picea albies* | *P. nigra* | *Pseudotsuga menziesii* | *P. sitchensis* | *Total change by site - non-natives:* |
| ***Deeside Group*** | 1 | **Glen Tanar** |  |  |  |  | -3 |  | -3 |
| 2 | **Ballochbuie** |  |  | 14 |  |  |  | 14 |
| 3 | **Mar Lodge** |  |  |  |  |  |  | 0 |
| ***Speyside Group*** | 4 | **Abernethy** | 46 |  | -7 |  |  | -7 | 32 |
| 5 | **Rothiemurchus** |  |  |  |  |  |  | 0 |
| 6 | **Glenmore** |  |  |  |  |  | -46 | -46 |
| 7 | **Glen Feshie** | -32 |  |  |  |  |  | -32 |
| 27 | **Dulnain** |  |  |  |  |  |  | 0 |
| ***Rannoch Group*** | 8 | **Black Wood of Rannoch** | -31 |  | 5 |  |  | -1 | -27 |
| 9 | **Meggernie** | 2 |  |  |  |  |  | 2 |
| ***Great Glen Group*** | 10 | **Glen Moriston** |  | 2 | 11 | 14 |  | -24 | 3 |
| 11 | **Glengarry** |  | -62 | -192 |  |  | -74 | -328 |
| 12 | **Barisdale** |  |  |  |  |  |  | 0 |
| 13 | **Loch Arkaig and Glen Mallie** | -50 |  |  |  |  | 29 | -21 |
| 14 | **Ardgour** |  |  | 38 |  |  |  | 38 |
| ***Strath Glass Group*** | 15 | **Glen Affric** | -4 |  | -6 |  |  |  | -10 |
| 16 | **Glen Cannich** | -11 | -42 | -10 |  |  |  | -63 |
| 17 | **Glen Strathfarrar** |  |  |  |  |  |  | 0 |
| 18 | **Guisachan and Cougie** | 7 | 13 | -124 |  | -59 | 4 | -159 |
| ***Wester Ross Group*** | 19 | **Coulin** |  |  |  |  |  |  | 0 |
| 20 | **Achnashellach** | 1 |  |  | -3 |  | -9 | -11 |
| 21 | **Shieldaig** |  |  |  |  |  |  | 0 |
| 23 | **Loch Maree** |  |  |  |  |  |  | 0 |
| ***Northern Group*** | 22 | **Amat** |  |  |  |  |  |  | 0 |
| ***Southern Group*** | 24 | **Black Mount** |  |  |  |  |  |  | 0 |
| 25 | **Glen Orchy** |  |  | 94 |  |  |  | 94 |
| 26 | **Tyndrum** |  |  |  |  |  |  | 0 |
|  |  |  |  |  |  |  |  |  |  |
|  | Mean |  | -4.4 | -3.3 | -6.3 | 0.4 | -2.3 | -4.7 | -20.6 |
|  | S.D. |  | 17.8 | 14.5 | 48.8 | 2.8 | 11.3 | 18.1 | 113.3 |

Table S3. Mean number of species per site and relative and absolute change between surveys.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Group** | **Site no.** | **Site** | **Mean number of species** | | **Change** | |
| 1971 | 2020s | Absolute | Percentage |
| ***Deeside Group*** | 1 | Glen Tanar | 12.8 | 10.3 | -2.5 | -19.6 |
| 2 | Ballochbuie | 21.2 | 15.4 | -5.8 | -27.4 |
| 3 | Mar Lodge | 15.5 | 14.7 | -0.8 | -5.2 |
| ***Speyside Group*** | 4 | Abernethy | 13.6 | 12.9 | -0.7 | -4.9 |
| 5 | Rothiemurchus | 16.4 | 16.2 | -0.3 | -1.5 |
| 6 | Glenmore | 19.8 | 12.9 | -6.8 | -34.5 |
| 7 | Glen Feshie | 18.9 | 16.4 | -2.5 | -13.2 |
| 27 | Dulnain | 11.6 | 11 | -0.6 | -5.2 |
| ***Rannoch Group*** | 8 | Black Wood | 18.1 | 17.1 | -1.0 | -5.5 |
| 9 | Old Wood of Meggernie | 19.7 | 15.6 | -4.1 | -21 |
| ***Great Glen Group*** | 10 | Glen Moriston | 21.6 | 17.7 | -3.9 | -18.2 |
| 11 | Glengarry | 13.6 | 21.7 | 8.1 | 59.9 |
| 12 | Barisdale | 25.4 | 21.1 | -4.3 | -16.7 |
| 13 | Loch Arkaig & Glen Mallie | 20.3 | 24.6 | 4.3 | 21.3 |
| 14 | Ardgour | 22.3 | 18.3 | -4 | -18 |
| ***Strath Glass Group*** | 15 | Glen Affric | 20.6 | 17.8 | -2.8 | -13.4 |
| 16 | Glen Cannich | 19 | 16.8 | -2.2 | -11.3 |
| 17 | Glen Strathfarrar | 17.2 | 18.8 | 1.6 | 9.5 |
| 18 | Guisachan & Cougie | 20.7 | 15.6 | -5.1 | -24.8 |
| ***Wester Ross Group*** | 19 | Coulin | 22.7 | 22.9 | 0.2 | 0.8 |
| 20 | Achnashellach | 17.7 | 21.3 | 3.6 | 20.5 |
| 21 | Shieldaig | 19.9 | 18.1 | -1.8 | -8.8 |
| 23 | Loch Maree | 13.6 | 16.6 | 2.9 | 21.6 |
| ***Northern Group*** | 22 | Amat | 20.1 | 22.1 | 2 | 10 |
| ***Southern Group*** | 24 | Black Mount | 18.1 | 17.1 | -1 | -5.5 |
| 25 | Glen Orchy | 19.7 | 14.2 | -5.5 | -27.9 |
| 26 | Tyndrum | 21.4 | 25 | 3.6 | 17 |
|  |  | *Mean* | *18.6* | *17.5* | *-1.1* | *-4.5* |

Table S4. List of top 25 ground flora species recorded, 2018-2022

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Species | Common name | No. of records | Change in position on list |
| 1 | *Calluna vulgaris* | Heather | 392 | = |
| 2 | *Vaccinium myrtillus* | Bilberry/Blaeberry | 374 | = |
| 3 | *Molinia caerulea* | Purple moor-grass | 314 | 🡹 |
| 4 | *Deschampsia flexuosa* | Wavy hair grass | 306 | = |
| 5 | *Potentilla erecta* | Tormentil | 289 | 🡻 |
| 6 | *Blechnum spicant* | Hard fern | 278 | 🡹 |
| 7 | *Sorbus aucuparia* | Rowan | 242 | 🡹 |
| 8 | *Erica tetralix* | Cross-leaved heather | 190 | 🡹 |
| 9 | *Vaccinium vitis-idaea* | Cowberry | 190 | 🡻 |
| 10 | *Pteridium aquilinum* | Bracken | 189 | = |
| 11 | *Carex echinata* | Star sedge | 183 | 🡹 |
| 12 | *Betula seedling/sp* | Birch | 181 | 🡻 |
| 13 | *Galium saxatile* | Heath bedstraw | 170 | 🡹 |
| 14 | *Narthecium ossifragum* | Bog asphodel | 150 | 🡹 |
| 15 | *Erica cinerea* | Bell heather | 133 | 🡹 |
| 16 | *Juncus effusus* | Soft rush | 123 | 🡹 |
| 17 | *Trichophorum cespitosum* | Deergrass | 123 | 🡹 |
| 18 | *Eriophorum vaginatum* | Hare's Tail Cottongrass | 106 | 🡹 |
| 19 | *Juncus squarrosus* | Heath rush | 89 | 🡹 |
| 20 | *Succisa pratensis* | Devil’s bit scabious | 89 | 🡹 |
| 21 | *Oxalis acetosella* | Wood-sorrel | 88 | 🡹 |
| 22 | *Drosera rotundifolia* | Round-leaved sundew | 86 | 🡹 |
| 23 | *Agrostis canina sens.lat.* | Brown bent | 82 | 🡻 |
| 24 | *Eriophorum angustifolium* | Hare’s-tail cottongrass | 81 | 🡹 |
| 25 | *Anthoxanthum odoratum* | Sweet vernal grass | 73 | 🡹 |

Figure S1. Change in native and non-native woody species, by site ownership