<Research Data>

Tree census data for a subalpine coniferous stand on a 1-ha permanent plot for the Monitoring Sites 1000 Project in Otanomosu-daira in the Core Area of the Shiga Highland Biosphere Reserve, central Japan

Hideyuki IDA

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Introduction

This paper presents tree census data collected in 2014 for a 1-ha permanent plot of subalpine coniferous forest in Shiga Highland, central Japan. The forest is dominated by two conifer species, Abies mariesii Mast. and Tsuga diversifolia (Maxim.) Mast., and a deciduous broad-leaved species, Betula ermanii Cham. The permanent plot was established in 2005 for the Monitoring Sites 1000 Project of the Japanese Ministry of the Environment for long-term monitoring of regeneration dynamics (Ishihara et al. 2011).

Tree census and litterfall data collected in this plot from 2007-2009 were published in Ishihara et al. (2011) and Suzuki et al. (2012), respectively. The 1-ha plot includes a previous 0.4096-ha (64×64m) plot established by Kuroiwa and Watanabe (1997). Unfortunately, most of the ID tags placed on tree trunks ≥1.3m in height by Kuroiwa and Watanabe (1997) in the previous plot have disappeared, making it difficult to accurately locate the same trunks now. Therefore, I established the 1-ha plot in 2005 over the same area as the 0.4096-ha plot. According to our preliminary report (Iked a et al. 2008), the diameter at breast height (DBH) frequency distribution pattern showed that A. mariesii regenerated continuously, although T. diversifolia and B. ermanii regenerated discontinuously. These findings are similar to Kuroiwa and Watanabe (1997).

Site description

Shiga Highland (known as Shigakogen) is located in Japan's central mountain district in Yamanouchi-machi in northeastern Nagano Prefecture. It ranges from 800-2,341m above sea level, is covered by subalpine coniferous forest and temperate deciduous forest, and includes some ponds, high moors, and raised bogs. Above 1,700m the forests are dominated by the evergreen species A. mariesii and T. diversifolia, with B. ermanii dominating in disturbed areas. The site was part of the Joshin'etsu-kogen National Park and is a UNESCO MAB (Man and the Biosphere Programme) Biosphere Reserve.

The mean annual temperature at the site is 3.9°C, with a maximum of 17.2°C in August and a minimum of -8.8°C in January, and annual precipitation was 1575.3mm between 1981 and 2010, according to Mesh Climate Data 2010 (Japan Meteorological Agency 2012). This region near the Japan Sea is characterized by abundant winter snowfall with snow cover typically lasting from November through the following June. Maximum snow depth reaches 2-3m annually.
This mountainous area was formed primarily by volcanic activity and is composed of Quaternary volcanic, hypabyssal, and plutonic rocks. The soil is wet humus podzolic soil, partly dry podzolic soil, and moderately moist brown forest soil with a pH of 3.8-4.5 (Takai et al. 1976).

Description of the permanent survey plot

1) Background
A 1-ha (100m×100m) permanent plot (36°42’19” N, 138°29’96”E, 1,705-m elevation; Photo 1) was established in Otanomosu-daira in 2005 as a core site (named “OT”) for the Monitoring Sites 1000 Project (Ishihara et al. 2011). The plot is on a moderate slope with uneven ground in an old-growth stand dominated by T. diversifolia and A. mariesii. The forest floor is characterized by dense stands of dwarf bamboo, *Sasa kurilensis* (Rupe. Makino et Shibata, with lichens covering rocks and fallen trees. There is no record of human disturbance. The maximum snow depth (measured using a 3-m wooden pole with aluminum pins at 10-cm intervals, modified from Taka-hashi (1968)) was 1.8-3m annually from 2003-2013 (Table 1).

As part of the monitoring project, a tree census is conducted each year. In addition, data are collected annually for fallen litter in litter traps, and ground insects collected in pitfall traps (see Appendix Map). The bird community in and around the plot is also surveyed annually (Kurosawa et al. 2013). Previous ecological studies were conducted in and around the plot from 1965 to the 1970s as part of the International Biological Program (IBP) (Kitazawa 1977). Aiba and Kurokawa (2013) measured the functional traits of tree species in the area.

2) Vegetation
*T. diversifolia* and *A. mariesii* are the dominant canopy species, but other species such as *B. ermanii* and *Picea jezoensis* (Siebold et Zucc.) Carrière var. *hondoensis* (Mayr) Rehder sometimes occur in the canopy (Table 2). *Acer tachonoskii* Maxim., *A. ukarinduense* Trautv. et C.A.Mey., *Sorbus commixta* Hedl., *Rhododendron albrechii* Maxim., and *R. pentandron* (Maxim.) Craven dominate the shrub layer. There are few herbaceous species, but *Cornus canadensis* L., *Sértoticus streptopoides* (Ledeb.) Frye et Rigg subsp. *japonicus* (Maxim.) Utech et Kawano, and *Arachi-niodes mutica* (Franch. et Sav.) Ohwi are most common. A dense undergrowth of the bamboo *Sasa kurilensis* covers part of the stand.

3) Tree census data
Since 2005, all living trunks in the plot with a girth at breast height (GBH; measured at 130cm high) ≥15cm have been tagged with aluminum ID tags (numbered B0001-B0710 in 2014), and the species and location shown as coordinates (x, y) recorded (see Appendix Map). During each autumn (September-November) since 2006 newly recruited trees were tagged and survival and GBH were recorded for existing trees. Species composition, basal area, density, and diameter at breast height (DBH; GBH/π) of all living trunks (≥5-cm DBH) in the 1-ha plot in 2014 are shown in Table 1 and the Appendix Table. Trunks <5-cm DBH are omitted here. In total, eight woody species were recorded in the plot.

Acknowledgments

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References


Japan Meteorological Agency (2012) Mesh Climate Data 2010

Kitazawa Y (1977) Ecosystem analysis of the subalpine coniferous forest of Shigayama IBP area, Central Japan. JIBP Synthesis No.15


Table 1. Species composition, basal area (BA), density, and summary of diameter at breast height (DBH) for all living trunks (≥5-cm DBH) in the 1-ha permanent plot for the Monitoring Sites 1000 Project in Otanomosu-daira in 2014.

<table>
<thead>
<tr>
<th>Species</th>
<th>Family</th>
<th>Basal area (BA)</th>
<th>Density</th>
<th>Diameter at breast height (DBH: cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>m²/ha</td>
<td>No./ha</td>
<td>mean ± SD</td>
</tr>
<tr>
<td>Tsuga diversifolia (Maxim.) Mast.</td>
<td>Pinaceae</td>
<td>35.17</td>
<td>233</td>
<td>45.14</td>
</tr>
<tr>
<td>Abies mariesii Mast.</td>
<td>Pinaceae</td>
<td>8.62</td>
<td>260</td>
<td>41.47</td>
</tr>
<tr>
<td>Betula ermanii Cham.</td>
<td>Betulaceae</td>
<td>8.52</td>
<td>66</td>
<td>10.53</td>
</tr>
<tr>
<td>Picea jezoensis (Siebold et Zucc.) Carrière var. hondoensis (Mayr) Rehder</td>
<td>Pinaceae</td>
<td>1.39</td>
<td>13</td>
<td>2.07</td>
</tr>
<tr>
<td>Betula coreyiifolia Regel et Maxim.</td>
<td>Betulaceae</td>
<td>0.09</td>
<td>1</td>
<td>0.16</td>
</tr>
<tr>
<td>Acer uhuruendoense Trautv. et C.A.Mey.</td>
<td>Sapindaceae</td>
<td>0.02</td>
<td>2</td>
<td>0.32</td>
</tr>
<tr>
<td>Acer tschonoskii Maxim.</td>
<td>Sapindaceae</td>
<td>0.02</td>
<td>1</td>
<td>0.16</td>
</tr>
<tr>
<td>Sorbus commixta Hedl.</td>
<td>Rosaceae</td>
<td>0.01</td>
<td>1</td>
<td>0.16</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>53.85</td>
<td>627</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Appendix Map. The 1-ha permanent plot for the Monitoring Sites 1000 Project in Otomomou-daira in 2014, showing the location of trees (*3* labeled trunk ID) of all living individuals with a trunk diameter at breast height (DBH) ≥ 5 cm. Size of circles (©) indicates the relative size of DBH. The raw data for girls at breast height (GBH) are shown in the appendix table on the back.
<table>
<thead>
<tr>
<th>Tag No</th>
<th>Date</th>
<th>Coordinates</th>
<th>Species</th>
<th>DBH (cm)</th>
<th>Height (m)</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>01/01/2014</td>
<td>45.2</td>
<td>Am</td>
<td>14.0</td>
<td>10.0</td>
<td>Site A</td>
</tr>
<tr>
<td>2</td>
<td>02/02/2014</td>
<td>46.0</td>
<td>Am</td>
<td>12.0</td>
<td>8.0</td>
<td>Site B</td>
</tr>
<tr>
<td>3</td>
<td>03/03/2014</td>
<td>47.0</td>
<td>Am</td>
<td>10.0</td>
<td>6.0</td>
<td>Site C</td>
</tr>
<tr>
<td>4</td>
<td>04/04/2014</td>
<td>48.0</td>
<td>Am</td>
<td>8.0</td>
<td>4.0</td>
<td>Site D</td>
</tr>
</tbody>
</table>

The location of each trunk is shown in the Appendix Map.