Global Conservation Gap Analysis of Magnolia

Species profile: Magnolia stellata

Individual profiles for species where spatial analysis could be performed are listed below.

**Caribbean**
- Magnolia dodecapetala
- Magnolia portoricensis

**East Asia**
- Magnolia amoena
- Magnolia aromatica
- Magnolia cylindrica
- Magnolia dawsoniana
- Magnolia lacei
- Magnolia lucida
- Magnolia odora
- Magnolia officinalis
- Magnolia sargentiana
- Magnolia sinica
- **Magnolia stellata**
- Magnolia zenii

**Mexico & Central America**
- Magnolia ilitisiana
- Magnolia mexicana
- Magnolia oaxacensis
- Magnolia ofeliae
- Magnolia pacifica
- Magnolia pugana
- Magnolia rzedowskiana
- Magnolia sharpii
- Magnolia tamaulipana
- Magnolia vallartensis
- Magnolia vovidesii
- Magnolia yoroconte

**South & Southeast Asia**
- Magnolia rajaniana
- Magnolia sapaensis

This species profile is an appendix of the Global Conservation Gap Analysis of Magnolia. See the full report here: https://globalconservationconsortia.org/resources/global-conservation-gap-analysis-of-magnolia/
**Magnolia stellata** (Siebold & Zucc.) Maxim.

**Section:** Yulania  **Synonyms:** Magnolia kobus var. stellata (Siebold & Zucc.) Blackburn, Yulania stellata (Maxim.) N.H.Xia  **Common names:** Star Magnolia  **IUCN Red List Category and Criteria:** Endangered A2c

**Co-author:** Ichiro Tamaki, Gifu Academy of Forest Science and Culture


**Distribution and Ecology**

*Magnolia stellata* is endemic to Japan where it is restricted to a narrow area in Central Honshu around Nagoya in three regions: southeastern Gifu Prefecture to central Aichi Prefecture, Atsumi Peninsula in Aichi Prefecture; and northern Mie Prefecture (Tamaki et al. 2016). It is found in marshes of hilly areas below 600 m asl., which characterizes this area. It is assessed as Endangered on the IUCN Red List due to severe population declines in recent decades (Harvey-Brown 2019).

![Figure 1](image1.png)

**Figure 1.** Documented in situ occurrence points for *Magnolia stellata*. Protected areas are from Protected Planet (UNEP-WCMC 2021).
Vulnerability of Wild populations

Table 1. Scoring matrix identifying the most severe demographic issues affecting Magnolia stellata. Cells are highlighted when the species meets the respective vulnerability threshold for each demographic indicator. Average vulnerability score is calculated using only those demographic indicators with sufficient data (i.e., excluding unknown indicators).

<table>
<thead>
<tr>
<th>Demographic indicators</th>
<th>Level of vulnerability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Emergency&lt;br&gt;Score = 40</td>
</tr>
<tr>
<td>Population size</td>
<td>&lt; 50</td>
</tr>
<tr>
<td>Range/endemism</td>
<td>Extremely small range or 1 location</td>
</tr>
<tr>
<td>Population decline</td>
<td>Extreme</td>
</tr>
<tr>
<td>Fragmentation</td>
<td>Severe fragmentation</td>
</tr>
<tr>
<td>Regeneration/recruitment</td>
<td>No regeneration or recruitment</td>
</tr>
<tr>
<td>Genetic variation/integrity</td>
<td>Extremely low</td>
</tr>
</tbody>
</table>

Average vulnerability score 12

Threats to Wild populations

Residential and urban development and forest succession due to the abandonment of forest use are threatening the habitat of this species. A study on the pollination dynamics in various population sizes of M. stellata showed that pollen shortage, selfing and genetic deterioration in adults was potentially leading to limited seed production in small populations of the species (Hirayama et al. 2007). Climate change is also identified as a threat to this species.

Figure 2. Responses from the Magnolia conservation action questionnaire for M. stellata for ‘Select what you see as the most significant threats to wild populations of each species’. The number of respondents participating in each question is listed in parentheses after the species’ name.
Conservation Activities:

In 2019 and 2020, Magnolia taxon and accession level data were gathered from PlantSearch as well as a survey of ex situ collections. A total of 522 institutions from 65 countries submitted data for Magnolia species. Current and needed conservation activities for Magnolia species were also gathered through literature review, expert consultation and a conservation actions questionnaire. A total of 90 respondents from 77 institutions in 25 countries responded to the Magnolia Conservation Actions Questionnaire including 64 respondents from 56 institutions providing information on 145 threatened species and additional species of concern.

Results of ex situ survey

| Number of ex situ collections reporting this species: | 271 |
| Number of plants in ex situ collections: | 1,857 |
| Average number of plants per institution: | 7 |
| Percent of ex situ plants of wild origin: | 21% |
| Percent of wild origin plants with known locality: | 69% |

Estimated ex situ representation

<table>
<thead>
<tr>
<th>Provenance type</th>
<th>Number of plants</th>
<th>Average number of plants per institution</th>
<th>Percent of wild origin plants with known locality</th>
</tr>
</thead>
<tbody>
<tr>
<td>W/Z</td>
<td>1,308</td>
<td>7.5</td>
<td>93%</td>
</tr>
<tr>
<td>H</td>
<td>532</td>
<td>7.2</td>
<td>69%</td>
</tr>
<tr>
<td>U</td>
<td>417</td>
<td>3.7</td>
<td>69%</td>
</tr>
</tbody>
</table>

A spatial analysis was conducted to estimate the geographic and ecological coverage of ex situ collections (Figure 4). Twenty, 50 and 100 kilometer buffers were placed around each in situ occurrence point and the source locality of each plant living in ex situ collections. Collectively, the in situ buffer area serves as the inferred native range of the species, or “combined area in situ” (CAI20, CAI50, CAI100 respectively). The ex situ buffer area represents the native range “captured” in ex situ collections, or “combined area ex situ” (CAE20, CAE50, CAE100). Geographic coverage of ex situ collections was estimated by dividing CAE by CAI and is presented here in km² and percentage of area covered. Ecological coverage was estimated by dividing the number of Terrestrial Ecoregions of the World present in the CAE by the number of ecoregions in the CAI. The average percentage of coverage of all three buffer sizes is also presented for the species.
Research: Genetics
Studies on the genetics of the species show isolation between subpopulations. Recommendations for assisted reproduction between populations and restoration of suitable habitats are made for this species. Subpopulations in Mie prefecture are unique and should be given high priority in conservation. Further fragmentation of populations in Mie prefecture should be avoided to ensure there is adequate gene flow (Tamaki et al. 2016). The Gifu Academy of Forest Science and Culture reports carrying out genetic research.

Research: Climate change
One institution reports carrying out climate change research for *M. stellata*.

Public awareness or education
Gifu Academy of Forest Science and Culture, Lewis Ginter Botanical Garden, Shenzhen Fairy Lake Botanical Garden and one other institution report this activity for *M. stellata*.

Protect and manage habitat
Gifu Academy of Forest Science and Culture reports this activity for *M. stellata*.

Population reinforcement or introduction
Gifu Academy of Forest Science and Culture and one other institution report this activity for *M. stellata*.

Pollen and/or seed banking
Shenzhen Fairy Lake Botanical Garden and University of British Columbia Botanical Garden report pollen and/or seed banking of *M. stellata*.

Occurrence surveys or population monitoring
Gifu Academy of Forest Science and Culture and Shenzhen Fairy Lake Botanical Garden report this activity for *M. stellata*.

Implement protection policies or regulations
Shenzhen Fairy Lake Botanical Garden reports this activity for *M. stellata*.

---

**Figure 4.** *Magnolia stellata* in situ occurrence points and ex situ collection source localities. Terrestrial Ecoregions of the world (Olson 2001) are coloured; the recorded distribution is included in the Taiheiyo montane deciduous forests and Taiheiyo evergreen forests ecoregions.
Habitat restoration
The establishment of an in situ conservation programme by clearcutting of its habitat is now ongoing in Tajimi City, Gifu Prefecture, Japan (Tamaki et al. 2015; Tamaki et al. 2018; Tamaki et al. 2021). This project is managed by the local government, local people and researchers. The other groups also have interests about this project and a similar clearcutting conservation programme has started in Seto City, Aichi Prefecture, Japan. Thinning increased growth and survival as well as flower and seed production in M. stellata (Matsushita et al. 2016). Gifu Academy of Forest Science and Culture reports habitat restoration for M. stellata.

Cryopreservation and/or micropropagation
Zhejiang A&F University reports cryopreservation or micropropagation of M. stellata.

Conservation horticulture
The Filoli Center, Lewis Ginter Botanical Garden, Shenzhen Fairy Lake Botanical Garden, University of British Columbia Botanical Garden and one other institution report conservation horticulture activities for M. stellata.

Collection and distribution of germplasm
Lewis Ginter Botanical Garden and Shenzhen Fairy Lake Botanical Garden report this activity for M. stellata. Ex situ collections are reported from both the Taiheiyo montane deciduous forests and Taiheiyo evergreen forests ecoregions (Figure 4).

Figure 5. Number of institutions reporting conservation activities for Magnolia stellata grouped by organization type. Eight of 56 institutions reported activities focused on M. stellata (see Appendix F for a list of all responding institutions).
Conservation Actions Needed

Many activities are recommended for *M. stellata* with further habitat restoration, public awareness, population monitoring, and cryopreservation being suggested most.

![Conservation Actions Needed](image)

**Figure 6.** Responses from the Magnolia conservation action questionnaire for *M. stellata* for ‘Select what you see as the most urgent conservation activities for each species’. The number of respondents participating in each question is listed in parentheses after the species’ name.
References

GBIF.org (04 March 2021) GBIF Occurrence Download https://doi.org/10.15468/dl.4gst9r


Philippe de Spoelberch