Neohygrocybe nitrata, Nitrous Waxcap

Assessment by: Jordal, J.
Taxonomy

<table>
<thead>
<tr>
<th>Kingdom</th>
<th>Phylum</th>
<th>Class</th>
<th>Order</th>
<th>Family</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fungi</td>
<td>Basidiomycota</td>
<td>Agaricomycetes</td>
<td>Agaricales</td>
<td>Hygrophoraceae</td>
</tr>
</tbody>
</table>

**Taxon Name:** *Neohygrocybe nitrata* (Pers.) Wünsche

**Synonym(s):**
- *Agaricus nitratus* Pers.
- *Hygrocybe nitrata* (Pers.) Wünsche
- *Hygrophorus nitratus* (Pers.) Fr.

**Common Name(s):**
- English: Nitrous Waxcap
- French: Hygrophore à Odeur Nitreuse

**Taxonomic Source(s):**

**Taxonomic Notes:**
The species is moved from *Hygrocybe s. lat.* to *Neohygrocybe*, as *N. nitrata* (Pers.) Kovalenko, based on molecular methods (Lodge et al. 2013). The type is from England. The taxonomic status of a few GBIF occurrences in N America is uncertain; one sequenced was *H. ingrata* (Lodge et al. 2013) and these will therefore not be further treated here. One specimen sequenced from Russia was another species (Lodge et al. 2013). Synonyms: *Hygrophorus nitratus* (Pers.) Fr., *Hygrocybe nitrata* (Pers.) Wünsche, *Hygrocybe murinacea* ss. auct.

**Assessment Information**

**Red List Category & Criteria:** Vulnerable A2c+3c+4c ver 3.1

**Year Published:** 2019

**Date Assessed:** March 26, 2019

**Justification:**
*Neohygrocybe nitrata* is a species strongly confined to seminatural grasslands in Europe, up to alpine areas. The species is not rare everywhere, but the habitat is sharply declining due to changing agricultural practices, development projects and pollution. Over the distribution range we assume a total habitat loss of 30-50% over the last 50 years (approximately three generations: one generation is assumed to be about 17 years). Habitat quality has also become impaired and the decline in population size over this time could be even higher. This decline in habitat is ongoing and expected to continue over the next 50 years. GBIF lists more than 3500 occurrences. The species is assumed to have a population of more than 20,000 mature individuals. At a global scale (i.e. Europe) the decline is assumed to be on average 30-50% in 50 years (past, present and future). The species meets the threshold for VU (A2c+3c+4c).
Geographic Range

Range Description:
This species is known from most countries of western Europe, but records eastwards seem to be lacking. The eastern boundary is unclear due to lack of data. One sequenced specimen from Russia was another species (Lodge et al. 2013). It occurs regularly up to the forest limit and also sometimes up into the alpine zone in mountainous regions (2400 m a.s.l. in the Alps, Boertmann 2010). In Norway the frequency of this species in its habitats increases from sea level up to the forest limit (Jordal 1997).

Country Occurrence:
Native: Austria; Bulgaria; Croatia; Czechia; Denmark; Estonia; Finland; France; Germany; Iceland; Ireland; Italy; Latvia; Netherlands; Norway; Poland; Slovakia; Slovenia; Sweden; Switzerland; United Kingdom
Distribution Map

Neohygrocybe nitrata

Range
- Extant (resident)

Compiled by:
IUCN

http://dx.doi.org/10.2305/IUCN.UK.2019-3.RLTS.T147321554A147971081.en
Population

GBIF (2019) lists more than 3500 occurrences. *Neohygrocybe nitrata* is a species strongly confined to seminatural grassland. Griffith et al. (2013) estimated a habitat loss of 90% over the last 75 years for the CHEG-fungi (grassland fungi of Clavariaceae, *Hygrocybe* s.l., *Entoloma* and Geoglossaceae) as a whole in Western Europe (i.e. loss in seminatural grasslands, based on available information). According to the Food and Agriculture Organization of the United Nations (FAO), the area of grasslands in the EU declined by 12.8% over 13 years (1990-2003). Also other sources point to a habitat loss of roughly 1% per year in Europe over a longer time, although the data quality is not always very good. We assume a total habitat loss of at least 30% over the last 50 years. As the habitat quality is also declining, population decline is suspected to be more than 30% in the last 50 years, probably closer to 50%. This trend is ongoing and expected to continue in the future.

**Current Population Trend:** Decreasing

Habitat and Ecology (see Appendix for additional information)

*Neohygrocybe nitrata* is an indicator of mycologically rich but nutrient-poor, semi-natural grassland (a member of the waxcap grassland assemblage). This habitat, which may be of low conservation concern for its plant and animal diversity, is rapidly disappearing due to changes in land use (see Threats). It is found from the sea up to alpine grasslands and snowbeds in low alpine zone, like in Scandinavia and in the Alps. In Norway, most localities of the species are in seminatural grasslands (N=905; 92.6% in seminatural grasslands, only 3.5% in forests; Jordal et al. 2016), and similar patterns are found in other countries. Halbwachs et al. (2018) suggested that waxcaps are biotrophic endophytes or possibly mycorrhizal, but the details remain unclear. The fruit bodies are short-lived (weeks), but the mycelium is suspected to be longlived; >50-100 years.

**Systems:** Terrestrial

Use and Trade

The species is not known to be used.

Threats (see Appendix for additional information)

Habitat destruction and abandonment are the main threats to seminatural grasslands. The most important process is probably overgrowing due to ceased grazing/mowing of old seminatural grasslands as part of intensification of agriculture. Further modern cultivation methods like use of fertilizers, pesticides and ploughing. Also in some places changed land use with the construction of roads, industrial areas, settlements etc. Decline is expected to continue, as the areas of seminatural grasslands are of little economic importance in modern agriculture. Most waxcap grasslands are among types assessed as VU, EN or CR in the EU Red List of habitats (Janssen et al. 2016).

Conservation Actions (see Appendix for additional information)

The habitats should be protected against destruction due to intensification of agriculture or development plans. The maintaining of seminatural grasslands demands yearly grazing or mowing. If grazing by heavy animals destroys part of the soil, light animals like sheep should be recommended. Habitat conservation by governmental support to traditional agricultural practices is most important,
this exists in many countries to maintain extensive areas of agricultural areas, and should be extended to larger areas than today.

Further ecological research is needed to clarify the nutrient strategy of waxcaps. Management plans are needed. Habitat trends should be monitored.

Credits
Assessor(s): Jordal, J.
Reviewer(s): Ainsworth, A.M. & Mešić, A.
Bibliography


Appendix

Habitats
(http://www.iucnredlist.org/technical-documents/classification-schemes)

<table>
<thead>
<tr>
<th>Habitat</th>
<th>Season</th>
<th>Suitability</th>
<th>Major Importance?</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Grassland -&gt; 4.2. Grassland - Subarctic</td>
<td>-</td>
<td>Suitable</td>
<td>-</td>
</tr>
<tr>
<td>4. Grassland -&gt; 4.4. Grassland - Temperate</td>
<td>-</td>
<td>Suitable</td>
<td>-</td>
</tr>
</tbody>
</table>

Plant Growth Forms
(http://www.iucnredlist.org/technical-documents/classification-schemes)

<table>
<thead>
<tr>
<th>Plant Growth Forms</th>
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</thead>
<tbody>
<tr>
<td>Fungus</td>
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Threats
(http://www.iucnredlist.org/technical-documents/classification-schemes)

<table>
<thead>
<tr>
<th>Threat</th>
<th>Timing</th>
<th>Scope</th>
<th>Severity</th>
<th>Impact Score</th>
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</thead>
<tbody>
<tr>
<td>1. Residential &amp; commercial development -&gt; 1.1. Housing &amp; urban areas</td>
<td>Ongoing</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1. Residential &amp; commercial development -&gt; 1.2. Commercial &amp; industrial areas</td>
<td>Ongoing</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2. Agriculture &amp; aquaculture -&gt; 2.1. Annual &amp; perennial non-timber crops -&gt; 2.1.3. Agro-industry farming</td>
<td>Ongoing</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>4. Transportation &amp; service corridors -&gt; 4.1. Roads &amp; railroads</td>
<td>Ongoing</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>9. Pollution -&gt; 9.3. Agricultural &amp; forestry effluents -&gt; 9.3.3. Herbicides and pesticides</td>
<td>Ongoing</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>9. Pollution -&gt; 9.5. Air-borne pollutants -&gt; 9.5.1. Acid rain</td>
<td>Ongoing</td>
<td>-</td>
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Conservation Actions Needed
(http://www.iucnredlist.org/technical-documents/classification-schemes)

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<tr>
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<tbody>
<tr>
<td>1. Land/water protection -&gt; 1.1. Site/area protection</td>
</tr>
<tr>
<td>2. Land/water management -&gt; 2.3. Habitat &amp; natural process restoration</td>
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</table>
### Conservation Actions Needed

<table>
<thead>
<tr>
<th>4. Education &amp; awareness</th>
<th>4.3. Awareness &amp; communications</th>
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### Research Needed

(http://www.iucnredlist.org/technical-documents/classification-schemes)

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<tbody>
<tr>
<td>1. Research</td>
</tr>
<tr>
<td>1. Research</td>
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<tr>
<td>2. Conservation Planning</td>
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<tr>
<td>3. Monitoring</td>
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### Additional Data Fields

<table>
<thead>
<tr>
<th>Habits and Ecology</th>
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<td>Generation Length (years): 17</td>
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