Michigan Tech, Environmental Citizen Science Project

Lichen-AQ Mobile App
Intermediate Mobile App Usage

January 06, 2016

Definitions and Species List
A. User Instructions

As you find each new lichen, you can make a little collection and write down an abundance rating:

<table>
<thead>
<tr>
<th>In-App Abundance Ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real World Quantity: 1</td>
</tr>
<tr>
<td>Real World Quantity: 2</td>
</tr>
<tr>
<td>Real World Quantity: 3</td>
</tr>
<tr>
<td>Real World Quantity: 4</td>
</tr>
</tbody>
</table>

It's not necessary to know the name of the lichen, just to distinguish them.

Next, use the app to see if your collection includes any of the indicator species by searching the index of species by color and form.

Enter the abundance of each indicator lichen that you found. The app will assume a zero rating for any indicator species that you do not enter.

When you finished entering the data, the app will calculate the air-quality of your tree set, and return a rating.

If you have made collections, you may want to build your identification skills by taking some time to identify your specific lichens.

The lichen Land website at Oregon State University provides on-line keys to identify lichens and more information about their biology. To see more visit: [http://ocid.nacse.org/lichenland](http://ocid.nacse.org/lichenland)
The book, Macrolichens of the Pacific Northwest, 2007 by Bruce McCune and Linda Geiser published by OSU Press, is the most comprehensive regional guide. The US Forest Service Lichens and Air Quality Database can be found at [http://gis.nacse.org/lichenair](http://gis.nacse.org/lichenair).


### B. App Definitions

<table>
<thead>
<tr>
<th>Forest Density</th>
<th>Canopy Cover</th>
<th>Visual Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open woodland or park</td>
<td>0-50%</td>
<td>Trees are open-grown and widely spaced</td>
</tr>
<tr>
<td>Well lit forest</td>
<td>51-80%</td>
<td>Tree canopies are overlapping but forest floor is well lit, supporting understory forbs, grasses and/or shrubs</td>
</tr>
<tr>
<td>Dense forest</td>
<td>80-100%</td>
<td>Trees are closely spaced with little light on the forest floor, which is mostly devoid of vegetation</td>
</tr>
<tr>
<td>Environment</td>
<td>Definition</td>
<td></td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Major urban or industrial</td>
<td>Large cities over 100,000 population, and/or sites near major industry</td>
<td></td>
</tr>
<tr>
<td>Suburban, small city, town</td>
<td>Population centers under 100,000 without major industry</td>
<td></td>
</tr>
<tr>
<td>Agricultural</td>
<td>Rural lands within or surrounded by areas used for farming or grazing</td>
<td></td>
</tr>
<tr>
<td>Remote forests and wildlands</td>
<td>Forested areas at least 40 miles from major urban or industrial lands and &gt; 5 miles from smaller towns and cities, used primarily for forestry and/or recreation.</td>
<td></td>
</tr>
</tbody>
</table>
### C. Species List

<table>
<thead>
<tr>
<th>Common Name in App</th>
<th>Scientific Name in App</th>
<th>N Rating</th>
<th>N Dep at Peak Freq</th>
<th>How to Recognize</th>
</tr>
</thead>
<tbody>
<tr>
<td>witch's hair lichen</td>
<td>Alectoria</td>
<td>oligotroph</td>
<td>2.4</td>
<td>Pale yellow-green pendant, filamentous lichen. A. sarmentosa and A. vancouverensis are distinguishable only by chemical tests. 40-80 cm long.</td>
</tr>
<tr>
<td>horsehair lichens</td>
<td>sorediate Bryoria</td>
<td>oligotroph</td>
<td>2.3</td>
<td>Brown pendant, filamentous lichens with powdery white soralia. 15-30 cm long.</td>
</tr>
<tr>
<td>lemon lichen</td>
<td>Candelaria</td>
<td>eutroph</td>
<td>6.1</td>
<td>Bright yellow, small foliose lichen. To 1 cm diameter.</td>
</tr>
<tr>
<td>antler lichen</td>
<td>Evernia prunastri</td>
<td>eutroph</td>
<td>6.1</td>
<td>Medium sized, yellow-green, foliose lichen (appears fruticose in macroview) branching in V's. To 7-13 cm long.</td>
</tr>
</tbody>
</table>
Table 4: Species List (Cont.)

<table>
<thead>
<tr>
<th>Common Name in App</th>
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<th>N Rating</th>
<th>N Dep at Peak Freq</th>
<th>How to Recognize</th>
</tr>
</thead>
<tbody>
<tr>
<td>tube lichens, gray to black inside</td>
<td>Hypogymnia, gray-black interior</td>
<td>oligotroph</td>
<td>2.3</td>
<td>Hollow, puffy, uneven diameter, b&amp;w tube-shapped thallus with partly dark interiors; no rhizines. From 5-15 cm long.</td>
</tr>
<tr>
<td>tube lichens, white inside</td>
<td>Hypogymnia, white interior</td>
<td>oligotroph</td>
<td>2.4</td>
<td>Hollow, even diameter b&amp;w tube-shaped thallus, all white inside; no rhizines. From 2-10 cm long.</td>
</tr>
<tr>
<td>sinuous hypotrachyna lichen</td>
<td>Hypotrachyna</td>
<td>oligotroph</td>
<td>1.1</td>
<td>Small pale yellow-green foliose lichen with squarrose rhizines and soralia. From 1-4, up to 10, cm wide.</td>
</tr>
<tr>
<td>Oregon lung lichen</td>
<td>Lobaria oregana</td>
<td>oligotroph</td>
<td>1.1</td>
<td>Large foliose lichen, grass green (wet) to pale green (dry), rounded patches of fuzzy tomentum below, dimpled like lung tissue, lobulate margins. 5-30 cm broad.</td>
</tr>
</tbody>
</table>
### Table 5: Species List (Cont.)

<table>
<thead>
<tr>
<th>Common Name in App</th>
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</thead>
<tbody>
<tr>
<td>lung lichen</td>
<td>Lobaria pulmonaria</td>
<td>oligotroph</td>
<td>2.2</td>
<td>Large foliose lichen, grass green (wet) to brown (dry), rounded patches of fuzzy tomentum below, dimpled like lung tissue, with marginal soralia. 5-15 cm broad.</td>
</tr>
<tr>
<td>camouflage lichen</td>
<td>Melanelixia and Melanohalea</td>
<td>eutroph</td>
<td>6.1</td>
<td>Small, appressed, brownish to olive foliose lichens with cylindrical branched (fuliginosa) or unbranched (subelegantula) isidia breaking down into granular soredia (subaurifera). Less than 10 cm broad.</td>
</tr>
<tr>
<td>camouflage lichen</td>
<td>Melanohalea</td>
<td>mesotroph</td>
<td>3.2</td>
<td>Small, appressed, brownish to olive foliose lichens with bulbous greasy, bulbous isidia (exasperatula) or with disc shaped fruiting bodies (subolivacea/multispora). Less than 6 cm broad.</td>
</tr>
<tr>
<td>magic flute lichen</td>
<td>Menegazzia</td>
<td>oligotroph</td>
<td>1.1</td>
<td>Perforate thallus, b&amp;w flattened lichen with hollow lobes and a circular thallus, favors alder. 2-6 cm broad.</td>
</tr>
<tr>
<td>Common Name in App</td>
<td>Scientific Name in App</td>
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<td>----------------------------------------</td>
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<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>pendant beard lichens</td>
<td>pendant Usnea</td>
<td>oligotroph</td>
<td>2.2</td>
<td>Pale green to yellow, filamentous lichen with an elastic central axil. 15 cm to 70 cm long.</td>
</tr>
<tr>
<td>rosette lichen</td>
<td>Physcia</td>
<td>eutroph</td>
<td>6.1</td>
<td>Small grey rosette lichens with simple rhizines, with white frosted fruiting bodies (aipolia), or longish marginal rhizines and soralia on the undersurface of margin tips, some of which may look hooded. 0.5 to 2 cm broad.</td>
</tr>
<tr>
<td>frosted lichen</td>
<td>Physconia</td>
<td>eutroph</td>
<td>6.1</td>
<td>Small grey rosette on bed of rhizines, frosted upper surface. Mostly &lt; 6 cm broad.</td>
</tr>
<tr>
<td>white dotted specklebelly lichen</td>
<td>Pseudocyphellaria anomola</td>
<td>oligotroph</td>
<td>2.3</td>
<td>Large foliose brown lichen with distinct white soralia on ridges and margins, dot-like white pseudocyphellae below. To 20-40 cm broad.</td>
</tr>
</tbody>
</table>
### Table 6: Species List (Cont.)

<table>
<thead>
<tr>
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<th>N Rating</th>
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<th>How to Recognize</th>
</tr>
</thead>
<tbody>
<tr>
<td>fruiting specklebelly lichen</td>
<td>Pseudocyphellaria anthraspis</td>
<td>oligotroph</td>
<td>1.4</td>
<td>Large foliose, ridged, brown lichen with fruiting bodies and no soralia, and white dot-like pseudocypellae on lower surface. To 20-40 cm broad.</td>
</tr>
<tr>
<td>cartilage lichen</td>
<td>Ramalina dilacerata</td>
<td>eutroph</td>
<td>4.8</td>
<td>Perforated yellow shrubby lichen with disc shaped fruiting bodies. To 3 cm long.</td>
</tr>
<tr>
<td>shrubby beard lichens</td>
<td>shrubby Usnea</td>
<td>oligotroph</td>
<td>1.1</td>
<td>Shrubby pale green to yellow lichen with cigar-shaped branches and 1) a yellow, elastic, central axil and often red to purplish spots (U. wirthii) or 2) with papillae, small soralia &lt; half the branch diameter, and usually isidia. 5-15 cm long.</td>
</tr>
<tr>
<td>globe ball lichen</td>
<td>Sphaerophorus</td>
<td>oligotroph</td>
<td>1.1</td>
<td>Medium to large variously colored shrubby lichen with globose fruiting bodies, black powdery spores, looks like a miniature tree. To 10 cm diameter.</td>
</tr>
<tr>
<td>Common Name in App</td>
<td>Scientific Name in App</td>
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<td>How to Recognize</td>
</tr>
<tr>
<td>--------------------</td>
<td>------------------------</td>
<td>----------</td>
<td>--------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>tuckermannopsis lichen</td>
<td>Tuckermannopsis oligotroph 2.4</td>
<td>Medium foliose lichen pale green to brown, sparse rhizines, smooth to warty upper surface, not sorediate. Up to 5-10 cm broad.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>old man's beard lichen</td>
<td>Usnea longissima oligotroph 1.1</td>
<td>Large pendant lichen with long, elastic, central axis and short side branches. To 2 m or more.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>other orange lichens</td>
<td>non-fruiting Xanthomendoza and Xanthoria eutroph 6.1</td>
<td>Small orange colored lichens without disc-shaped fruiting bodies that are minutely leafy (Xm. fallax) or minutely shrubby (X. candelaria), usually &lt; 1 cm diameter.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>fruiting orange lichens</td>
<td>fruiting Xanthoria eutroph 6.1</td>
<td>Small foliose orange colored lichens with disc-shaped orange fruiting bodies. Usually &lt; 1 cm diameter.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>