<table>
<thead>
<tr>
<th><strong>Title</strong></th>
<th>The contribution of rare species to a community's resilience</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Authors(s)</strong></td>
<td>Yearsley, Jonathan M.; Säterberg, Torbjörn; Ebenman, Bo; et al.</td>
</tr>
<tr>
<td><strong>Publication date</strong></td>
<td>2018-07-09</td>
</tr>
<tr>
<td><strong>Conference details</strong></td>
<td>The BES Quantitative Ecology SIG, St Andrews, Scotland, 9 July 2018</td>
</tr>
<tr>
<td><strong>Publisher</strong></td>
<td>British Ecological Society</td>
</tr>
<tr>
<td><strong>Link to online version</strong></td>
<td><a href="https://www.britishecologicalsociety.org/event/quantitative-ecology/">https://www.britishecologicalsociety.org/event/quantitative-ecology/</a></td>
</tr>
<tr>
<td><strong>Item record/more information</strong></td>
<td><a href="http://hdl.handle.net/10197/10057">http://hdl.handle.net/10197/10057</a></td>
</tr>
</tbody>
</table>
The contribution of rare species to community resilience

@JonYearsley (University College Dublin)

Torbjörn Säterberg, Bo Ebenman,
(Linköping University)
Tomas Jonsson, Sofia Berg,
(Skövde University)

www.ucd.ie/ecomodel
Resilience dynamics:

\[
\frac{dN_i}{dt} = N_i \left( r + \sum_{j} A_{ij} N_j \right)
\]

Food web dynamics:

- Resistance
- Reactivity
- Recovery (return time)
How do rare species affect the return time? 

\[ T \sim \frac{w_i}{N_i} \]

is equilibrium abundance of species \( i \)

\[ \sum_i \frac{w_i}{N_i} \]

\( w_i \) are weights given by species interaction strengths

Saterberg, Yearsley et al (in review)
A Real Community

\[
\frac{dN}{dt} = N_i r + \sum_{ij} A_{ij} N_j
\]
A Real Community

\[
\frac{dN_i}{dt} = N_i r + \sum_{j} A_{ij} N_j
\]
Resilience to Perturbations

\[ \frac{\alpha N}{dt} = N_i r + \sum_{j} A_{ij} N_j \]

LAKE VÄTTERN

\[ N_\ast = -A_{-1} r \]

Equilibrium Density

Dark colours are rare species
Lake Vättern

Rarer species give longer return times
Approximation improves as species become rarer

Saterberg, Yearsley et al (in review)
Measures of resilience

- Resistance
- Reactivity
- Recovery (return time)

Time

Unknown
Commonest species
Rarest species