Biodiversity Distributions in NY State Parks

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Measures of biological diversity
• $\alpha$ (alpha) = per sample unit
  • in a defined area
• mean $R$ over a set of defined areas
• $\gamma$ (gamma) = regional species pool
  • $\alpha \leq \gamma$
  • region must be defined
• $\beta$ (beta) = how $\alpha$ values are drawn from $\gamma$
  • requires details on:
    • species composition
    • degrees of overlap

Composition turnover

Elements of biological conservation
1. Resilience
   • maintain $\alpha$ at stable levels
   • communities built on stable populations
2. Representation
   • fraction of $\gamma$ that is protected
   • goal = incorporate maximum $\gamma$
3. Redundancy
   • inversely related to $\beta$
   • hedge against declining $\alpha$
   • key role for management

NHP State Lands Assessment
• Contract with OPRHP
• Funded by NYS BRI
• Six year project plus continuing surveys
• Unique dataset
  • comprehensive (details from 150 parks)
  • standardized
  • reviewed
  • current

NY State Parks Regions
**Distributions of rare species in NY State**

<table>
<thead>
<tr>
<th>Management category</th>
<th>Records</th>
<th>Species</th>
<th>Unique</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Parks</td>
<td>799 (222)*</td>
<td>312 (113)</td>
<td>30 (11)</td>
</tr>
<tr>
<td>Unidentified</td>
<td>2991 (878)</td>
<td>533 (202)</td>
<td>110 (52)</td>
</tr>
<tr>
<td>Other preserves</td>
<td>2079 (453)</td>
<td>454 (168)</td>
<td>65 (31)</td>
</tr>
<tr>
<td>Catskill Park</td>
<td>76 (12)</td>
<td>20 (6)</td>
<td>2 (0)</td>
</tr>
<tr>
<td>Adirondack Park</td>
<td>850 (223)</td>
<td>154 (69)</td>
<td>50 (35)</td>
</tr>
<tr>
<td>Total statewide</td>
<td>6785 (1788)</td>
<td>723 (303)</td>
<td>247 (129)</td>
</tr>
</tbody>
</table>

*Endangered species subsets in parentheses

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**Patterns within NYS Parks (312 rare species)**

**Null accumulation model**

![Null accumulation model](image)

**Rank accumulation model**

![Rank accumulation model](image)

149 species unique to one park each

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**Accumulation along park size gradient**

![Accumulation along park size gradient](image)

NY NHP 2009
### Key attributes of NY State Parks
- 44% of NY rare species found in one or more State Park
- 30 NY rare species fully or primarily dependent on State Parks
- Many parks contain some of the highest quality significant ecological communities in NY

### Beta diversity at the “coarse filter” level
- NY NHP ecological Community Classification system
- Subset of “Significant” communities:
  - rare in NYS, or exceptional example
  - mapped as Element Occurrences

http://www.dec.state.ny.us/website/dfwmr/heritage/ecology.htm

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**High Beta Diversity of natural communities:**
- 128 different natural community types
- 36 unique to one park each

http://www.dec.state.ny.us/website/dfwmr/heritage/ecology.htm

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**89 different Significant Community types**
- 34 unique to one park each

http://www.dec.state.ny.us/website/dfwmr/heritage/ecology.htm
Why such high diversity?
1. **State Parks are widely distributed**
   - <1% of state land cover, but:
     - all major ecozones
     - all major drainage basins
2. **They protect many unique habitats**
   - escarpments, gorges, falls
   - freshwater and marine shorelines
3. **Many parks occupy rare remnants**
   - hedged in by modified landscapes
   - demand high levels of stewardship

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