Biodiversity Distributions in NY State Parks

George Robinson
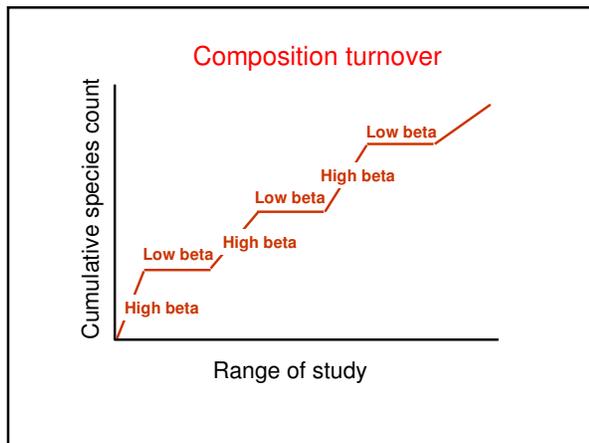
Biological Sciences
University at Albany

Measures of biological diversity

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

Composition turnover

Cumulative species count (y-axis) vs Range of study (x-axis)

Low beta / High beta / Low beta / High beta / Low beta / High beta

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Elements of biological conservation

1. **Resilience**
   - maintain α at stable levels
   - communities built on stable populations
2. **Representation**
   - fraction of γ that is protected
   - goal = incorporate maximum γ
3. **Redundancy**
   - inversely related to β
   - hedge against declining α
   - 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

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

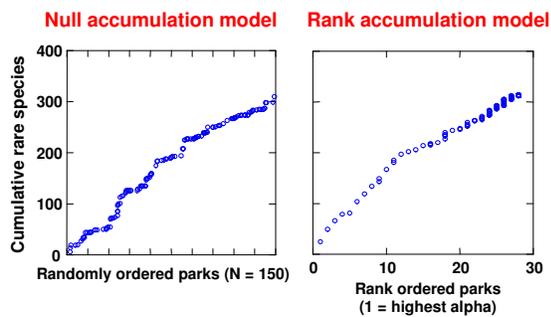*Endangered species subsets in parentheses

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Accumulation along park size gradient

Smallest to largest park curve

Largest to smallest park curve
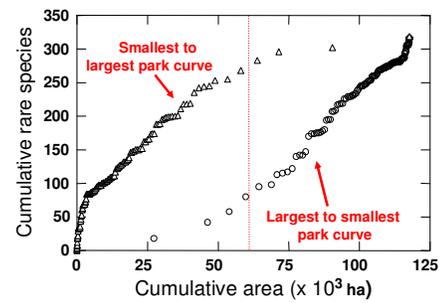
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Patterns within NYS Parks (312 rare species)

Null accumulation model   Rank accumulation model

Randomly ordered parks (N = 150)
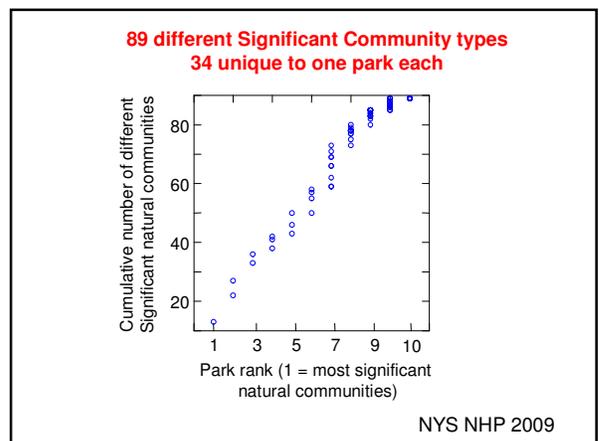
Rank ordered parks (1 = highest alpha)
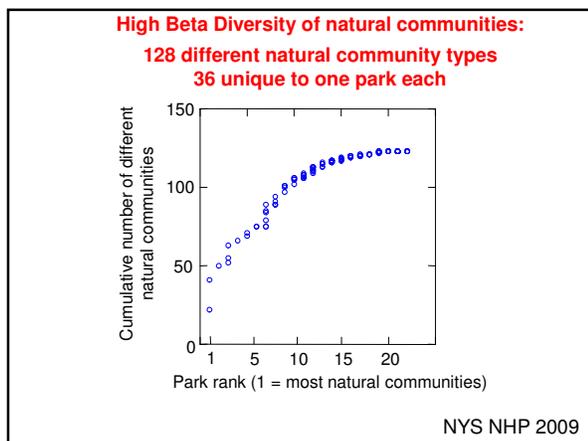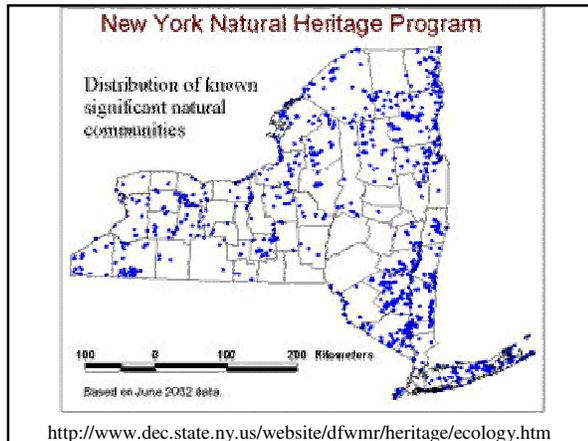
149 species unique to one park each
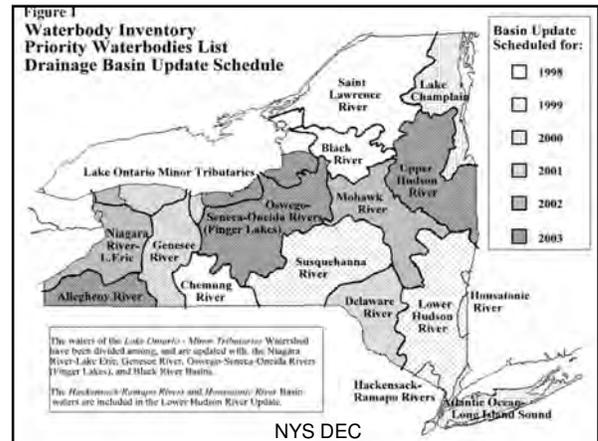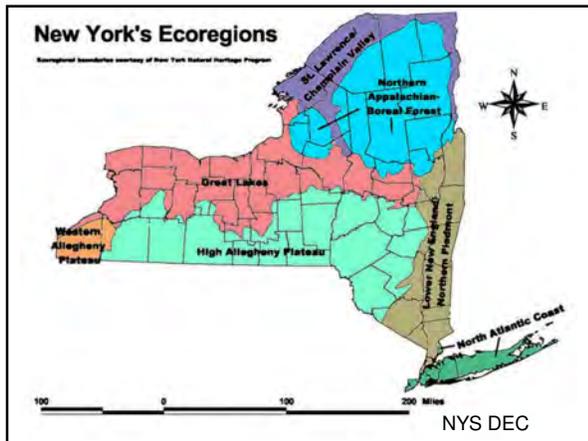
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Key attributes of NY State Parks

• 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
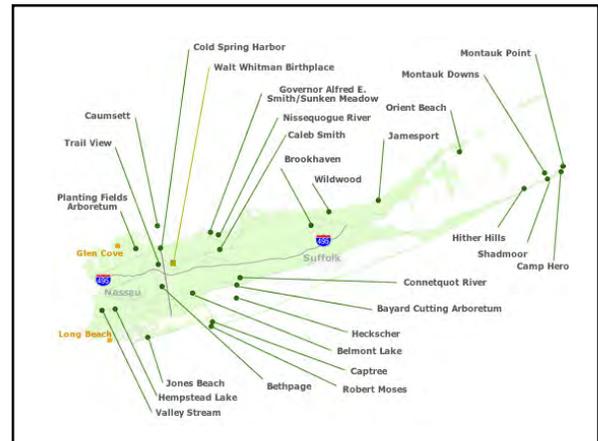
Beta diversity at the "coarse filter" level

• 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

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89 different Significant Community types
34 unique to one park each

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NYS DEC

NYS DEC

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