

Do Urban Greenways Provide Quality Wildlife Habitat?

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Urbanizing Landscapes

- By 2025, the world's *urban* population = today's *global* population of 6 billion
- In the Raleigh-Durham urbanized areas, between 1950-1990
 - The population increased by 260%
 - Urbanized land ↑ by 940%
 - Pop. density ↓ by 65%



Urban Adaptors vs. Sensitive Species

Urban Adaptors

- Residents
- Omnivores and Granivores
- Edge tolerant

Development-sensitive Species

- Neotropical migrants
- Insectivores
- Forest interior or area-sensitive



Greenways are...

- Forested patches in a mostly urban landscape
- Typically linear and of various widths
- Designed for multiple uses
 - Recreation and transportation
 - Floodplain protection
 - Aesthetic value
 - Development buffer
 - Wildlife habitat



Greenways for Birds?

How do ...

- 1) greenway forest corridor width
- 2) adjacent land use
- 3) greenway composition and plant structure

affect ...

- 1) development-sensitive bird abundance & richness (JM)
- 2) relative abundance of mammal nest predators (KS)
- 3) use of greenways by migrating birds (SK)



Land cover Categories:

- Canopy
- Building
- Pavement
- Lawn
- Water
- Earth
- Agriculture

Greenway Composition

- Canopy, vine, shrub, and ground covers
- Proportion of mature forest, young forest, managed area, and water
- Trail type, width, and placement
- Stream width



Breeding Birds

Breeding Bird Surveys

- Censused breeding birds at 34 greenway study sites from May-June, 2002-2003
 - Including several along Black Creek
- 50-m fixed radius, 8-minute point counts were conducted at the center of each study site



Jamie and Nathan at Black Creek site

Forested Corridor Width

- Forest-interior richness higher in wider greenways
- Many urban-adaptor species recorded in greenways of all widths



Ovenbird



Forested Corridor Width

- Many development-sensitive species appeared to be restricted by greenway width:
 - Ground nesting songbirds wider than 300m
 - Wood Thrush, Summer Tanager, Indigo Bunting, and Hairy Woodpecker wider than 100m
 - Acadian Flycatcher, Blue-gray Gnatcatcher, Pileated Woodpecker, Ruby-throated Hummingbird, Red-eyed Vireo wider than 50m



Hairy Woodpecker

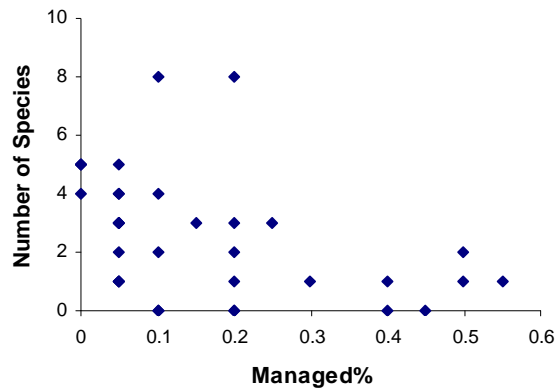
Landscape and Composition

Significant predictor variables for relative abundance of development-sensitive birds :

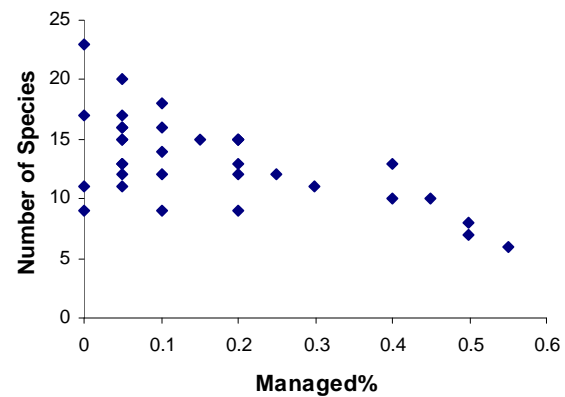
- Bare earth
 - Pavement
 - Building
- } Adjacent landscape
-
- Managed area
 - + Stream width
- } Composition

Effect of Managed Area

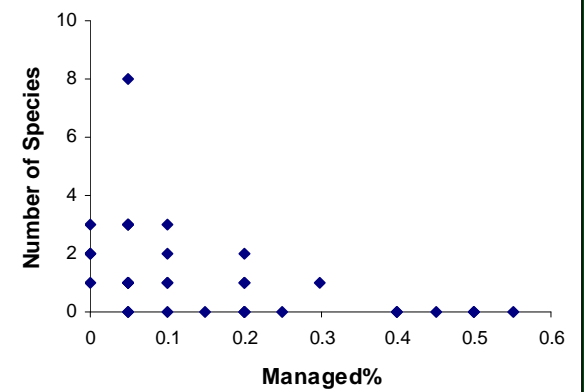
Neotropical Migrant Spp. Richness



Insectivore Species Richness



Forest-Interior Species Richness



Potential conflict in designing greenways for:

Humans...

Development-sensitive bird species...



Migrating Birds

Migrant Bird Surveys

- 47 greenway and 3 reference sites (5400-acre Umstead State Park) during spring (2004-05) and fall (2004) migration
- Transects along 200-m segments of greenway path
 - because path was often at corridor edge, counted birds only within 25 m of corridor on one side of path



Salina surveying birds on 1 side of Pirate's Cove



Interesting Migrants



Kentucky Warbler

Worm-eating Warbler

Black-thr. Blue Warbler

Blackburnian Warbler

Canada Warbler

American Redstart

Baltimore Oriole

Rose-breasted Grosbeak

Veery

Blue-winged Warbler

Yellow Warbler

Black-thr. Green Warbler

Blackpoll Warbler

Hooded Warbler

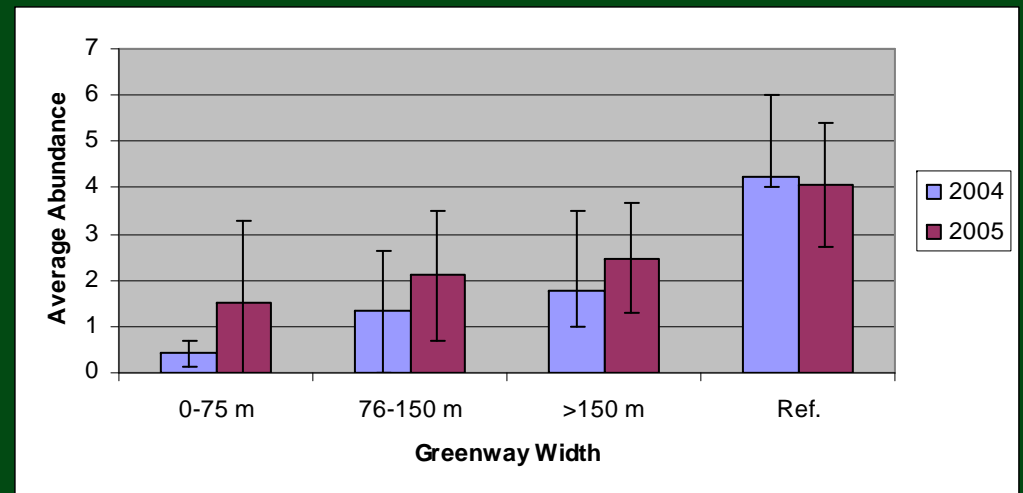
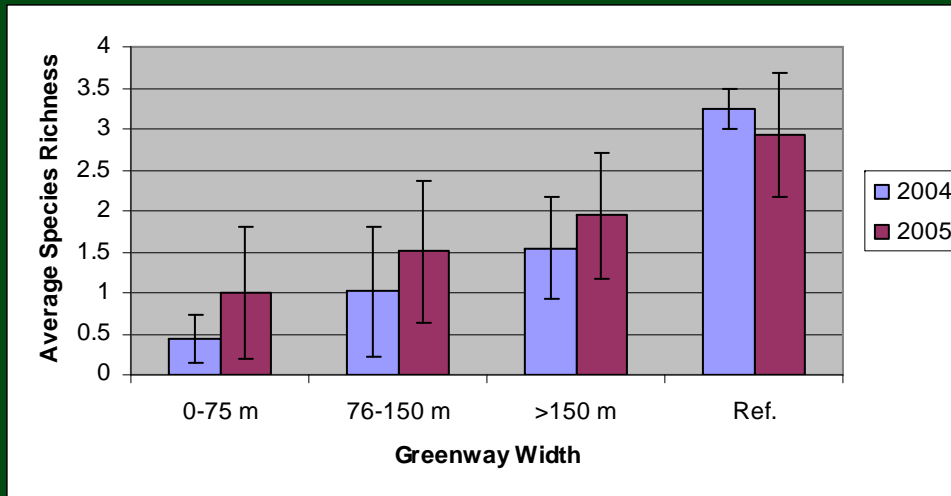
Northern Waterthrush

Orchard Oriole

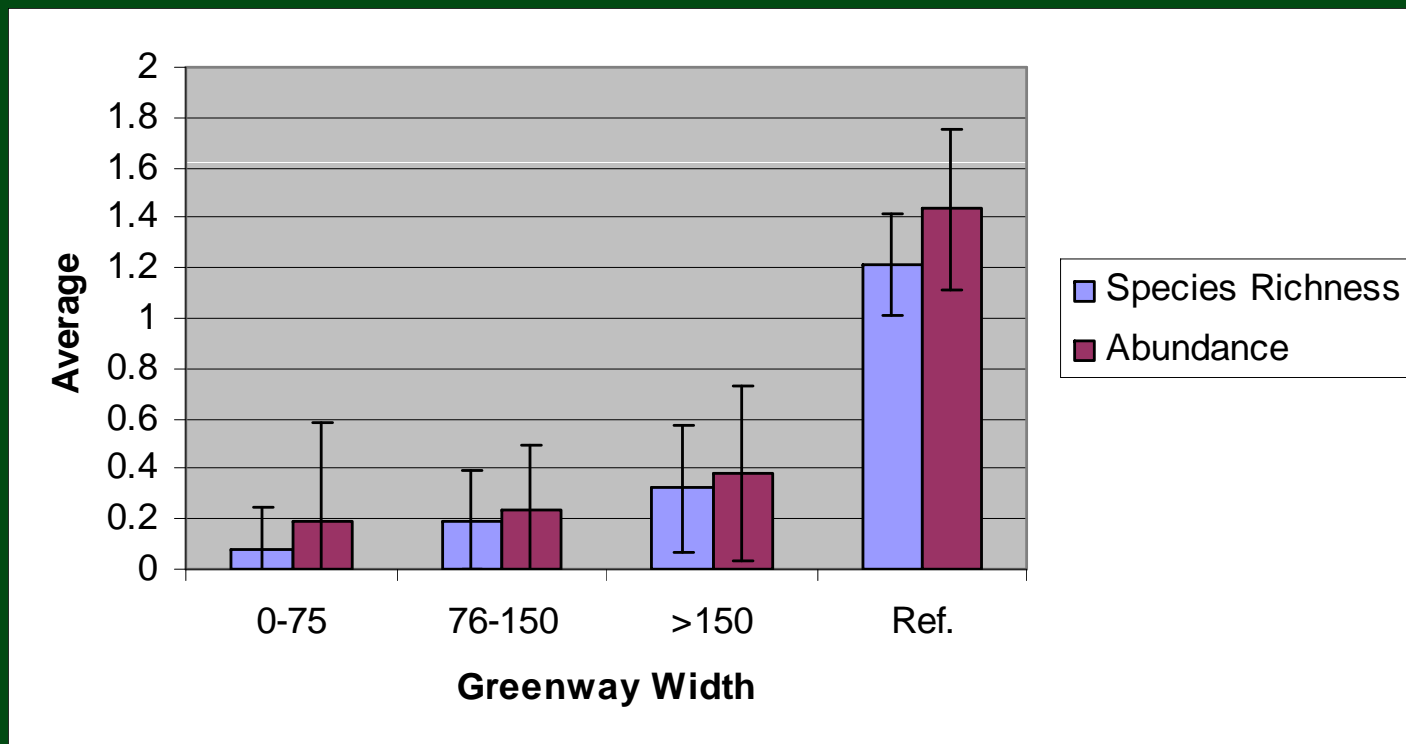
Blue Grosbeak

Swainson's Thrush

Spring – Neotropical Migrants



Fall – Neotropical Migrants



Landscape and Composition

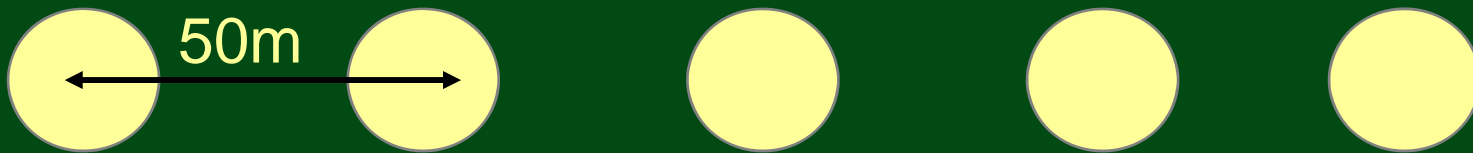
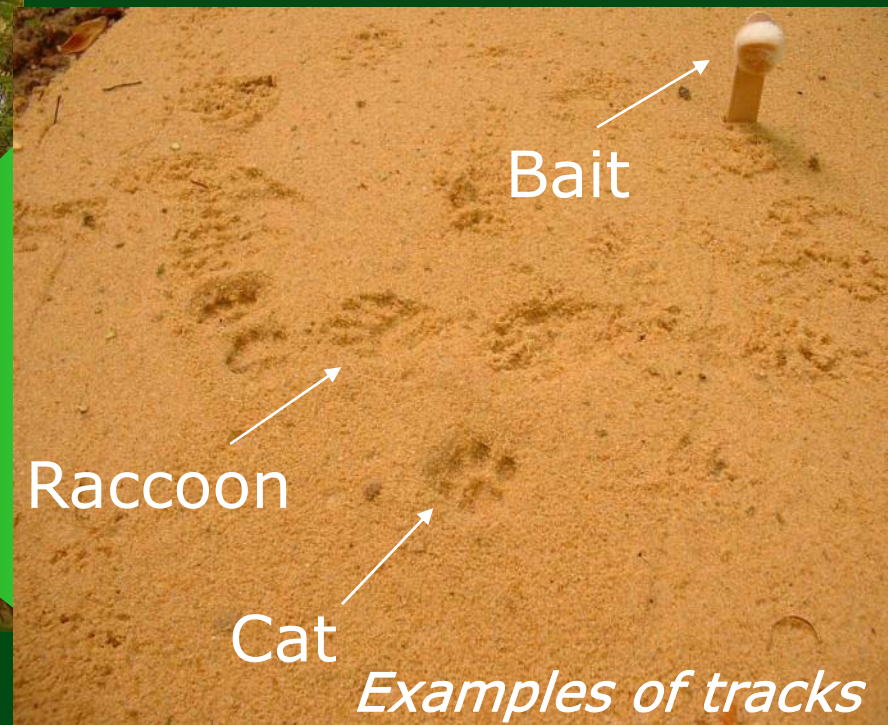
Significant predictor variables for relative abundance of migrants :

- Pavement
- Bare earth
+/- Building } Adjacent landscape

- Canopy cover
+ Tree height
+ % Hardwoods
+ Shrub cover } Composition

Mammalian Nest Predators

Mammals Surveys (2002)



Most Common Mammals

- Domestic Cat
- Raccoon
- Gray Squirrel
- Opossum
- Rats and Mice



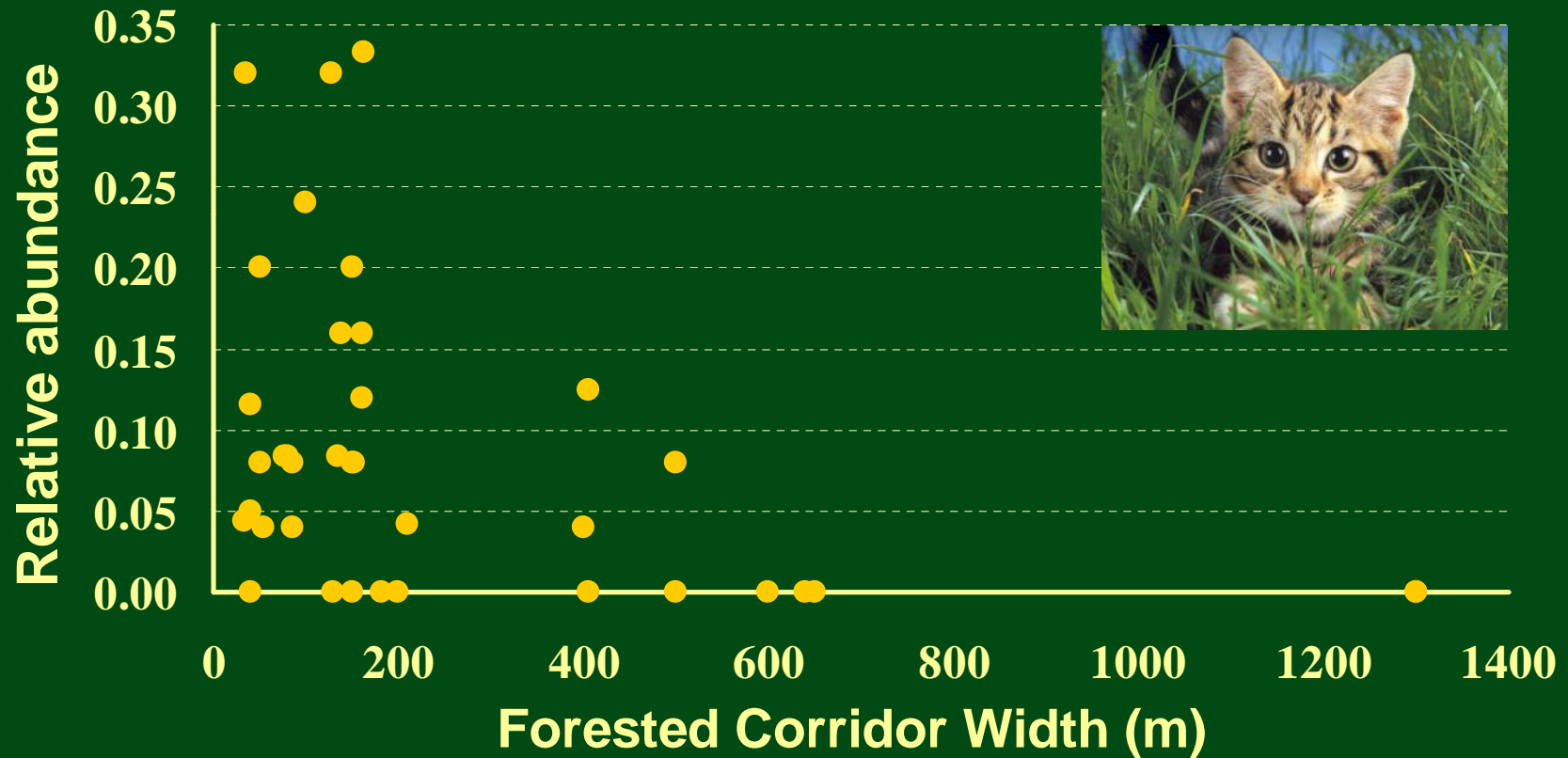
Total predator community

(= raccoon, opossum, squirrel, rats, mice, cats, skunk, & fox)

Significant predictor variables:

- Greenway corridor width
- Building density
- + Trail width
- + Trail in the microhabitat
- + Mature forest in the microhabitat
- + Ground cover in the microhabitat
- Vine cover in the microhabitat

Cats abundant in narrow greenways



Summary for Birds

- Development-sensitive breeders:
 - Absent from greenway corridors <50 m (150 ft.)
 - Less abundant adjacent to developed areas
 - Less abundant where managed areas were wide
- Migrants:
 - More abundant in wide corridors & reference site
 - More abundant in greenways with:
 - Tall hardwood trees during spring migration
 - Low canopy cover and high shrub cover during fall migration

Summary for Mammals

- Mammalian nest predators:
 - Less common in center of wider forest corridors
 - More common near wide trails
 - Other variables varied among species

Raccoon



Management Recommendations

To provide high quality breeding and stopover habitat for birds, forested greenways should:

- Lie within forest corridors > 50 m (150 ft.)
- Contain narrow trails that don't break the canopy
- Lie adjacent to development with high canopy retention
- Be managed for complex native vegetation structure

Stream Salamanders

Changing Hydrology

- Impervious surface:
 - Decreases infiltration
 - Carries sediments, nutrients, and toxins
- High peak flows in streams
 - Stream bank erosion
 - Animals and substrates washed downstream
- Low base flows



Eroded urban stream

Objectives

How do ...

- 1) greenway forest corridor width
- 2) Percent impervious surface upstream

affect ...

- 1) Salamander richness and abundance (JMiller)

Stream Salamander Surveys

- Captured salamanders in 39 50-m stream reaches in greenways and 4 reference sites
- Reaches sampled in April, May, November 2004
- Using GIS, measured:
 - Impervious surface cover in watershed containing reach
 - Width of forested corridor at reach



Stream Salamanders

- Only 1 of 5 historical species present in numbers
 - 2-lined salamanders somewhat tolerant
- Decline with increases in impervious surface
 - Thresholds at 10 - 20% i.s. in watershed?
- Buffer width didn't matter
 - Compromised locally
 - Upstream not buffered



Two-lined salamander

Conservation Implications

- Efforts must be coordinated across entire watershed
- Large parks or reserves should be conserved
 - Greenways not sufficient to conserve all wildlife
 - Parks should be managed to provide diversity of habitats

Forest openings important to many birds



What Else?

- Nest Success??
 - Pilot study
 - Future study with real nests
- Snake ecology in suburban greenways
- Web Address
 - <http://www4.ncsu.edu/~grhess/GreenwaysForWildlife/>

