

# Frontiers in Urban Bird Research



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*speaker notes in italics*

# Habitat Loss



Habitat

Non-habitat

Urban development = greatest threat

Partners In Flight State of the Birds Report (2016)

*Habitat transformation from forests, grasslands, deserts. Unfortunately, a familiar sight to all. Urban development is largely responsible for habitat loss, and we can dichotomize these two pictures as habitat and non-habitat.*

# Habitat *and* Alteration



Habitat

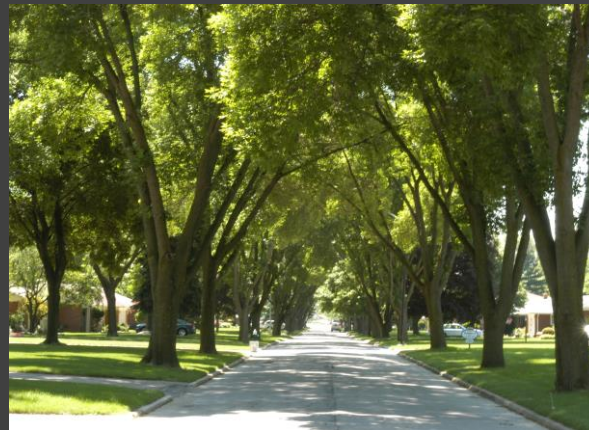
Novel-habitat

## Conservation Value

Management dependent ♦ Actionable science

*However, when the bulldozers leave after the initial development phase, novel habitats replace the 'non-habitat'. These urban green spaces have potential to provide habitat, and current research is teasing apart how different management practices can improve these spaces for birds.*

# Novel Habitat



# Urban Matrix

*Examples of novel habitats. From large city parks like Central Park in NYC to small pocket parks, yards, zoos, street trees and schoolyards. They all have habitat potential, and they all are part of the urban matrix.*

# Homogenization



McKinney 2006 *Biological Conservation*  
Goffman et al. 2014 *Frontiers Ecol and Env*

*These changes to the landscape are replicated across the country and we have documented a homogenizing effect. From a birds eye view, we see similar form and patterns. We also have seen the homogenization of biodiversity. Every city has rock pigeon, European starling and house sparrow.*

# Landscaping Choices

**Miami? Phoenix?**

**← Phoenix →**



**Exotic and Generalist Birds**



**Desert Birds**



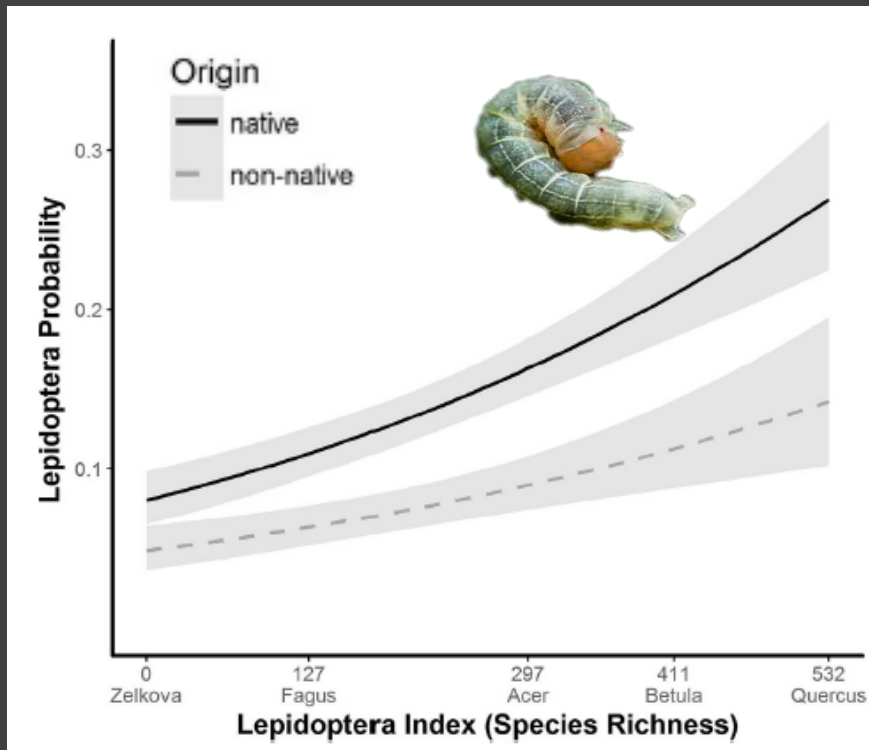
Lerman & Warren. 2011. *Ecological Applications*. Warren, Lerman et al. In revision *Ecosphere*



## Desert landscaping matters

*When we take on a worms eye view, we notice that cities also display a tremendous amount of heterogeneity. From our research in Phoenix, AZ, yards landscaped with desert plants have higher abundances of desert birds. Yards with exotic vegetation have junk species. One of the first studies to document the efficacy of native plants for native birds.*

# Urban Food Webs

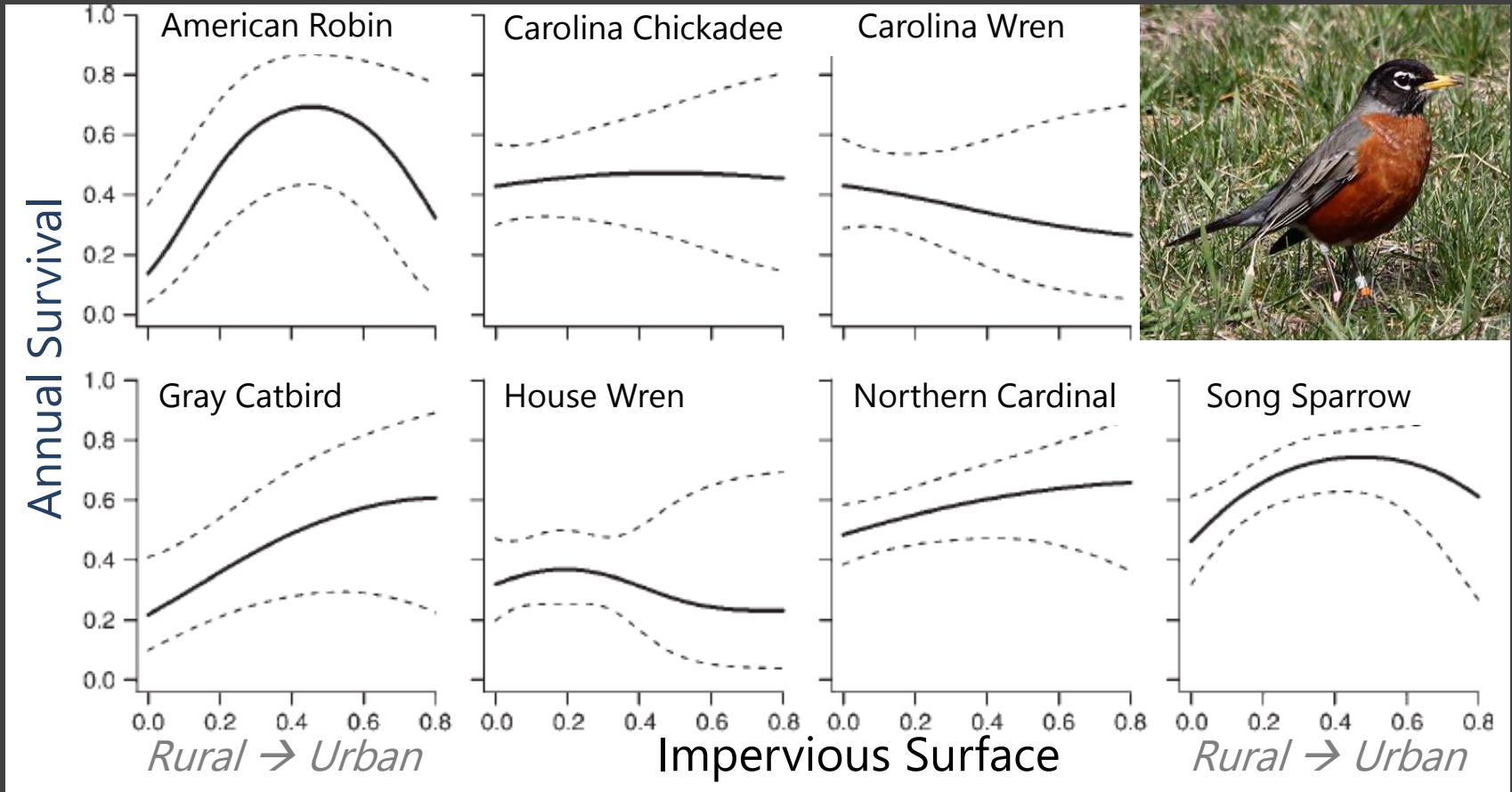


Narango et al. 2017 *Biological Conservation*

## Native trees matter

*A more recent study from Desiree Narango and colleagues explored how lepidoptera richness and abundance responded to different types of trees. The bottom line, more native trees = more leps. Why is this important for birds? Chickadees require 6,000-9,000 leps for each clutch. Thus, native trees matter.*

# Population Dynamics



Backyard habitats matter



*Because of the greenery scattered through urban and suburban areas, it's not as doom and gloom... for some species. For example, in research from DC neighborhoods, Brian Evans and colleagues calculated annual survival for a number of relatively common backyard species. AMROs, a species we see everywhere, actually has its stronghold in suburbia whereas GRCAs are doing just fine in more built up areas. Research conducted in backyard habitats as part of the Smithsonian Migratory Bird Center's Neighborhood Nestwatch citizen science project.*

# Movement in the Matrix



Fragmentation



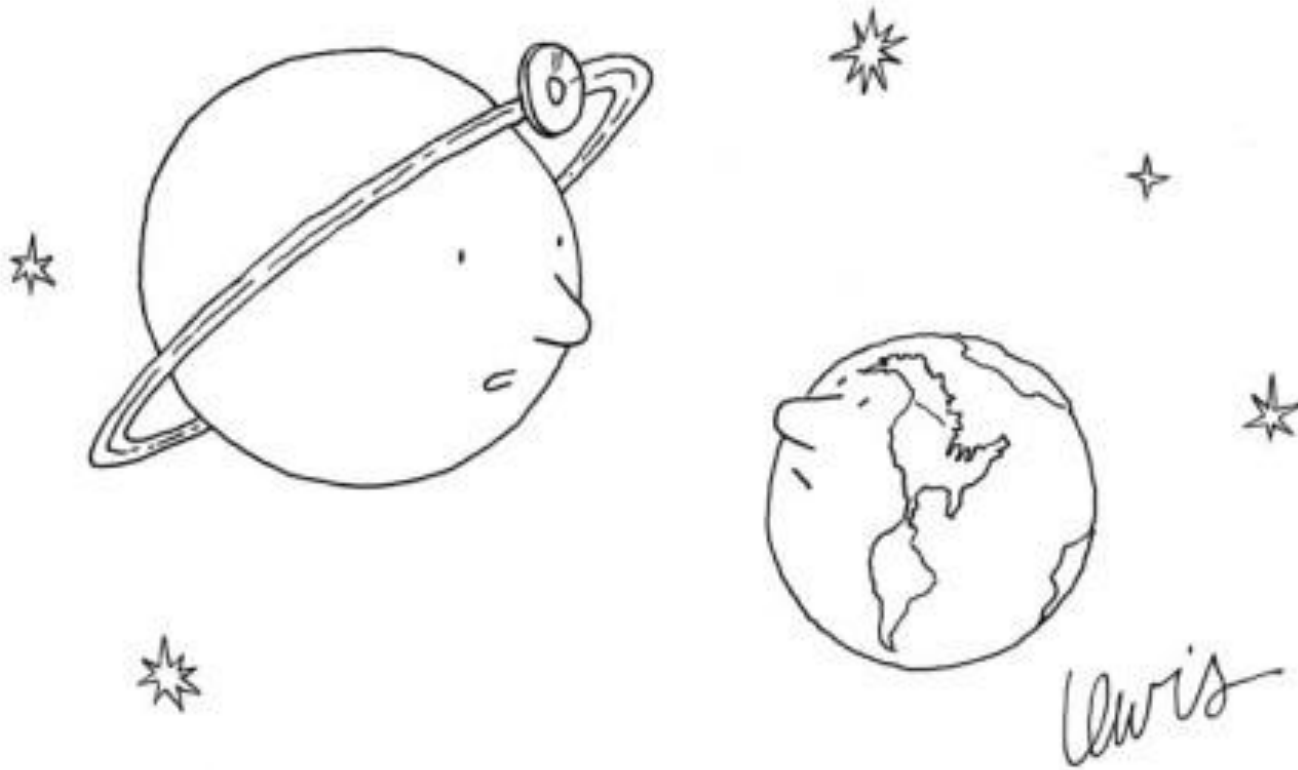
RFID Bird Feeder Reader



Connectivity

Urban green spaces matter

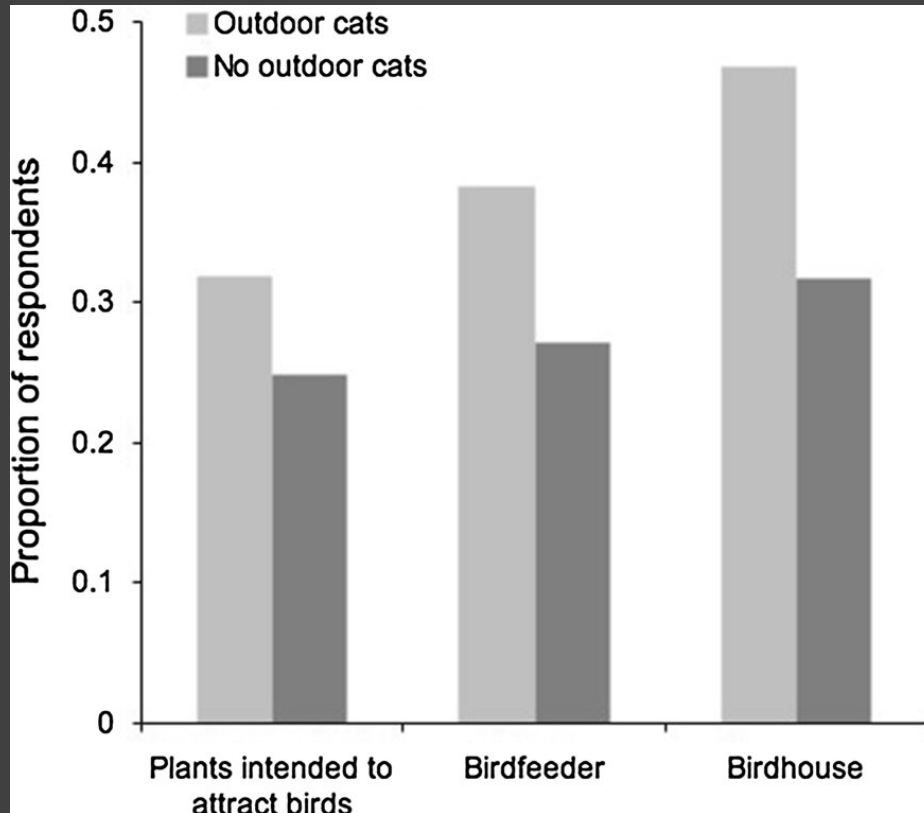
*In a study from southern UK, Cox and colleagues tracked how great tits and blue tits moved through urban neighborhoods using radio frequency identification technology. Birds were fitted with tags and the red dots represent bird feeder reader locations. In the top panel, neighborhoods get more fragmented moving from left to right. The bottom panel reports how the birds moved through the neighborhood, with larger dots having more visits and more lines equating to more connectivity. Thus, the trees and other greenery serve as a conduit for movement.*



***“I’m afraid you have humans.”***

*OK, the elephant in the room...humans. Research has taken on a socio-ecological approach to better understand some of the key drivers responsible for bird communities and population trends.*

# So What?



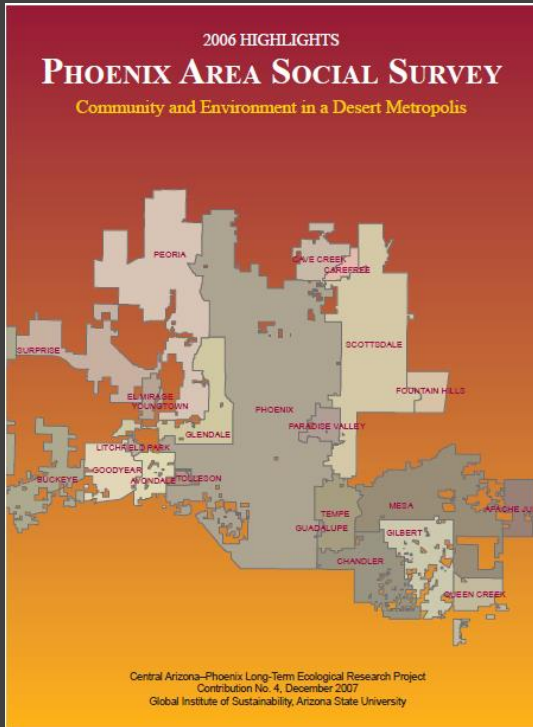
2.4 BILLION birds per year

Belaire et al. 2016 *Landscape Ecology*  
Loss et al. 2013 *Nature Communications*

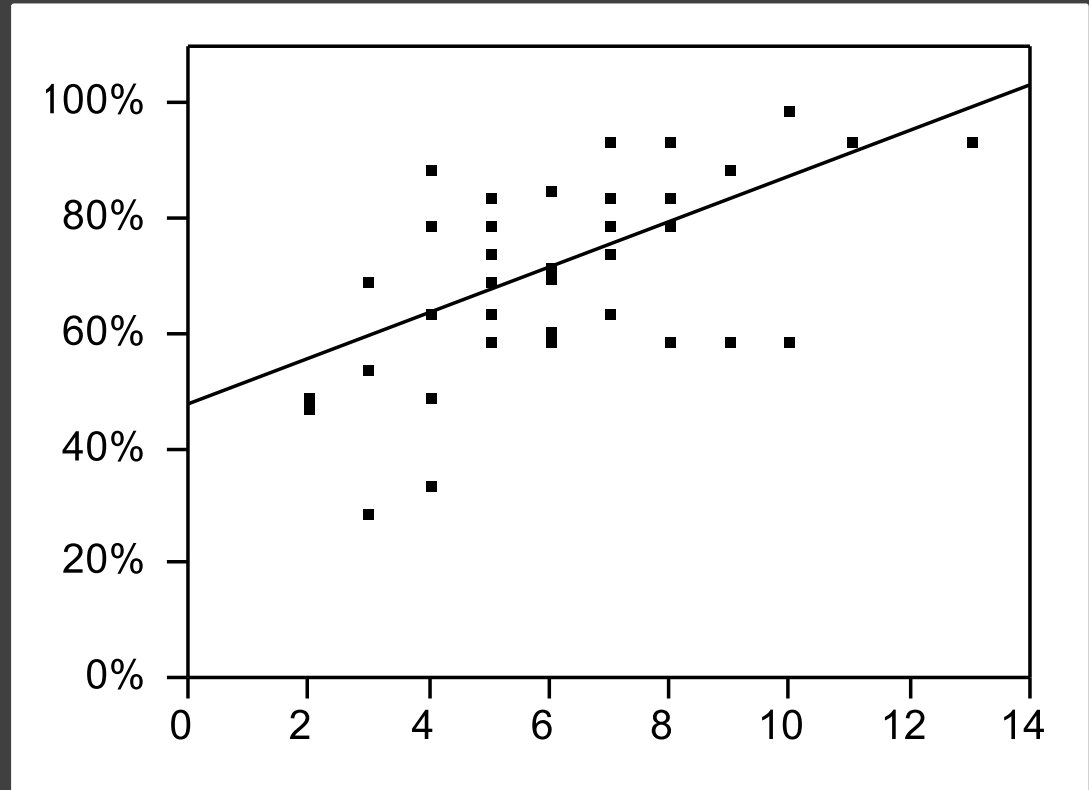
## People matter to birds

*So why do we care about people? In Amy Belaire's Landscape Ecology study, she conducted a survey of Chicago householders and found that there was a strong relationship between respondents who participated in bird-friendly landscaping and outdoor cats. And remember, outdoor cats pose a gigantic threat to bird populations. So we matter (specifically our behaviors) to birds.*

# So What?



Respondents  
satisfied



Native Bird Richness

Birds matter to people

*Does anyone really notice the birds in our neighborhoods other than birders / ornithologists? Again, using surveys, we asked Phoenix residents whether they were satisfied with the bird variety in their neighborhood. We then compared that with actual native bird richness from point count surveys. Both components were conducted in the same 40 neighborhoods scattered throughout Phoenix. We found a strong relationship in that people who had the opportunity to observe cactus wrens, Gambell's quail, curve-billed thrasher and other desert specialists, were more satisfied with the birds in their neighborhood. So it seems that birds matter to people too.*

# Actionable Science for Zoo Visitors



## Your yard and neighborhood matter

- Primary interaction with nature
- Plant native plants
- Cats indoors

*Based on current research, here are a few key messages zoos can promote to their visitors. Similar to zoos, yards are the places where the majority of Americans interact with nature.*



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*The following additional slides did not appear in the original presentation but will provide additional information and context.*

# Urban and Urbanizing Lands



Biodiversity declines

©New England Magazine

©Laurie Sostrom Solutions

©A. Sullivan

## Habitat loss

Shochat et al. 2010 BioScience

*Drastic changes have occurred to land use and land cover, from pristine to rural to suburbs to city. These contribute disproportionately to atmospheric CO<sub>2</sub>, urban heat islands. BGC becomes altered, cities are markedly warmer, as much as 3°C, primarily from the loss of forest cover and the increased impervious surfaces.*

# A Bird in the Hand...

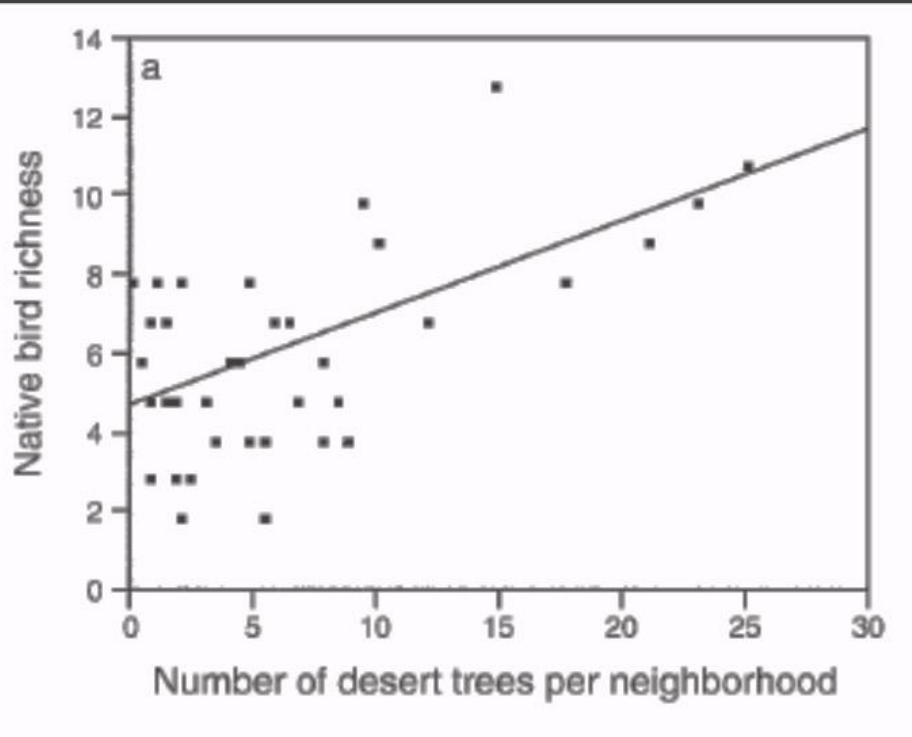


## Citizen Science and Outreach



*Excellent opportunity for outreach and science delivery. To date, we've visited 130 yards in the Springfield area, interacting with close to 300 citizen scientists. We also bring the program to inner city schools and camps and have interacted with roughly 2,000 children in underserved communities. Environmental literacy.*

# Urban Bird Habitat Studies



Lerman and Warren 2011 *Ecological Applications*

## Trees (and shrubs) matter

*Integrates i-tree field data with habitat relationship models to calculate the suitability of the urban forest for different bird species.*

# Why Yards Matter

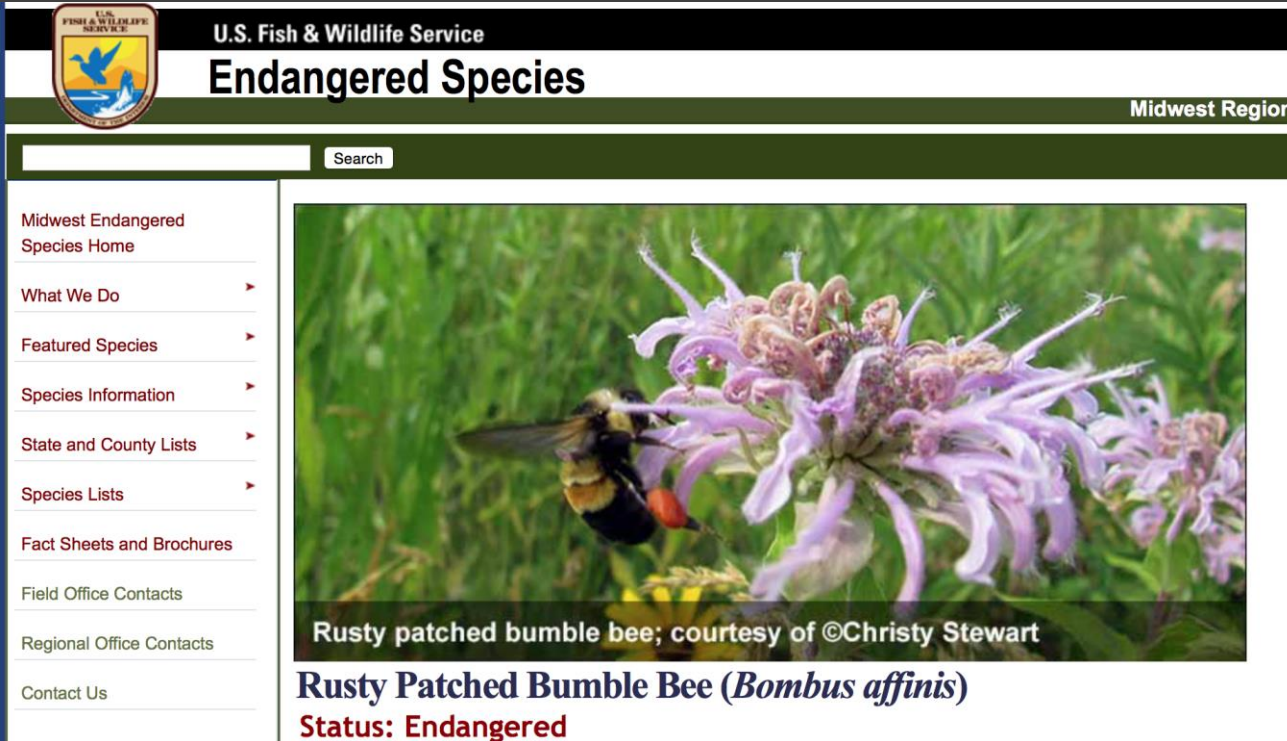


## Primary interaction with nature

DeStefano and DeGraaf 2005 *Frontiers Ecol Env*  
Dunn et al. 2006 *Conservation Biology*

*It is here where we can learn about the natural world. We can witness predator prey dynamics, plant insect interactions. This is the location where many of us first got excited about nature. Portray to the public the important role yards play in urban conservation. This is what science looks like.*

# Why Cities Matter



The image is a screenshot of a web page from the U.S. Fish & Wildlife Service. At the top left is the agency's logo, and next to it is the text "U.S. Fish & Wildlife Service" and "Endangered Species". On the right side of the header, it says "Midwest Region". Below the header is a search bar with the word "Search" inside. On the left side of the page is a vertical navigation menu with the following items: "Midwest Endangered Species Home", "What We Do", "Featured Species", "Species Information", "State and County Lists", "Species Lists", "Fact Sheets and Brochures", "Field Office Contacts", "Regional Office Contacts", and "Contact Us". The main content area features a photograph of a rusty patched bumble bee on a purple flower. Below the photo is the text "Rusty patched bumble bee; courtesy of ©Christy Stewart". Underneath that is the species name "Rusty Patched Bumble Bee (*Bombus affinis*)" and its status "Status: Endangered".

U.S. Fish & Wildlife Service  
Endangered Species  
Midwest Region

Search

Midwest Endangered Species Home

What We Do

Featured Species

Species Information

State and County Lists

Species Lists

Fact Sheets and Brochures

Field Office Contacts

Regional Office Contacts

Contact Us

Rusty patched bumble bee; courtesy of ©Christy Stewart

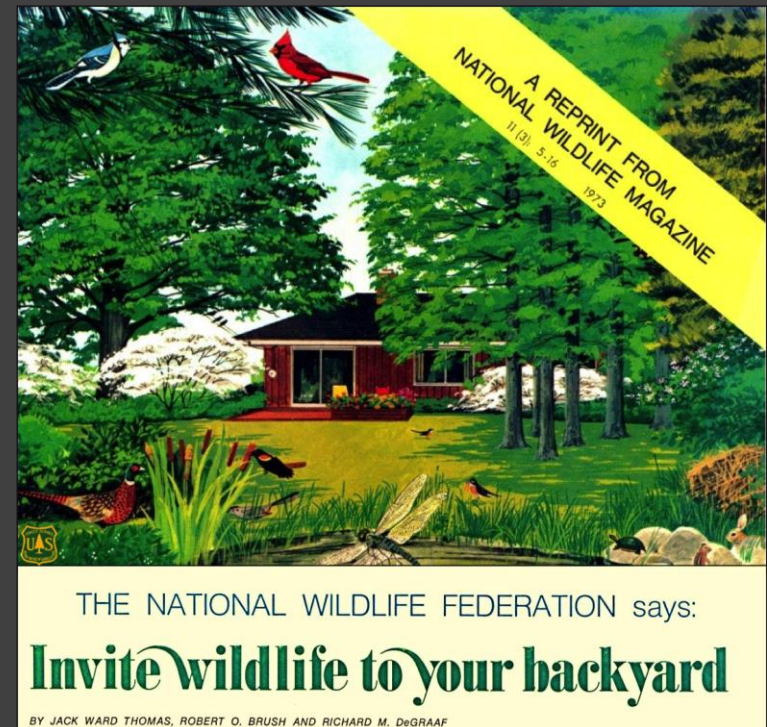
**Rusty Patched Bumble Bee (*Bombus affinis*)**  
**Status: Endangered**

"Rusty patched bumble bees are also found in urban areas in the Twin Cities for example, so people have rusty patched bumble bees visiting their back yard so that's kind of unusual for an endangered species."

*Sarina Jepsen, Xerces Society*

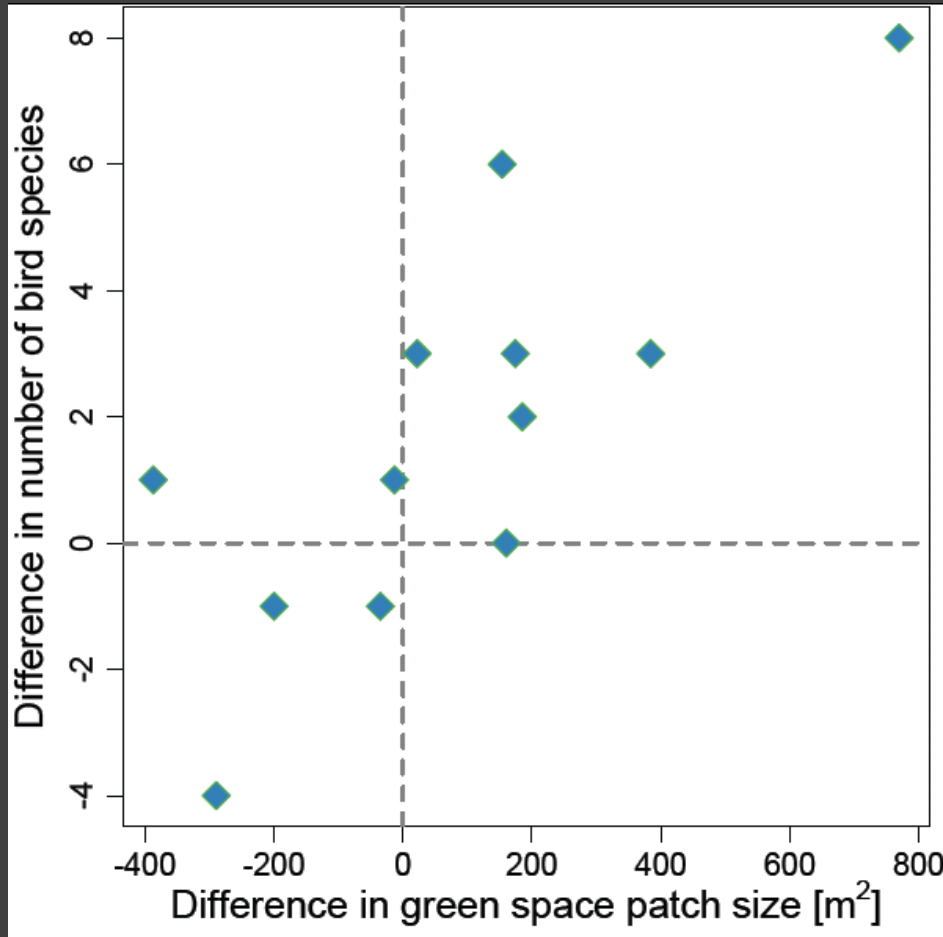
# What Householders Want

- **Social-ecological system approach**
  1. Aesthetics (beauty)
  2. Low maintenance
  3. Floral biodiversity
  4. Neat aesthetics (orderly and 'natural')
  - 5. Nature provisioning**
  6. Low cost
  7. Environmental services
  8. Local cultural values





# Habitat and Urban Greening



Strohbach et al. 2013 *Landscape and Urban Planning*

Add 150 m<sup>2</sup> → 1 new species

*Community greening – random = difference in size*

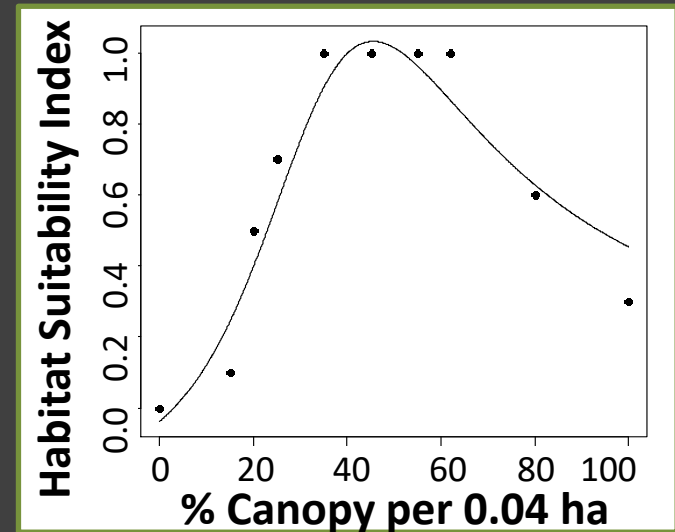
*Our model suggests that an additional 150 m<sup>2</sup> in green space patch size accounts for one additional species being observed.*



# Management Tools

## i-Tree Wildlife

- Provides detailed information on habitat requirements
- Evaluates the bird habitat potential at ecoregional scales
- Guides habitat improvement plans



CITY	Canopy % (0.04 ha)	Lg Tree Density (0.04 ha)	Basal Area (m <sup>2</sup> / ha)	Deadwood Density (0.04 ha)
PHL (0.7)	✓ 75.5%	5.11	✓ 10.91	✓ 9.06
NYC (0.3)	36.0%	2.12	4.57	0.85
<b>OPTIMAL</b>	<b>35-62%</b>	<b>&gt;6</b>	<b>8-14</b>	<b>1-3</b>