Juvenile Survival of Spotted Towhees (*Pipilo maculatus*) and Vegetation Composition in an Urban Park

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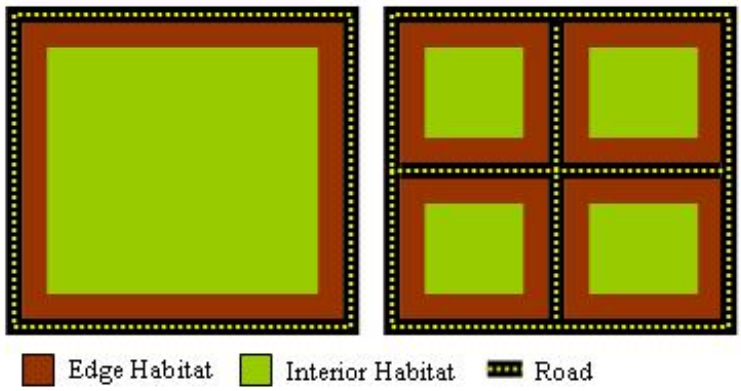
Geog 592 Winter 2009

Faculty Advisor: Dr. Michael T. Murphy

Urbanization

Habitat Fragmentation



http://www.ci.austin.tx.us/water/fragmentation.htm

Spotted Towhee (*Pipilo maculatus*)

- Common resident of urban parks
- Forages and nests on the ground
- Parents feed young ≈30 days after fledging

(Greenlaw 1996)

Urban Park Edges and Towhees

- Study by Sarah Bartos Smith et al. in Portland parks

  -reproductive success of Spotted Towhees

- Nests near park edges fledged significantly more young
- Nests near edges were less likely to incur partial brood losses
- Earliest breeding females nested near trails/edges

(Smith et al., *in press*)

Research Questions

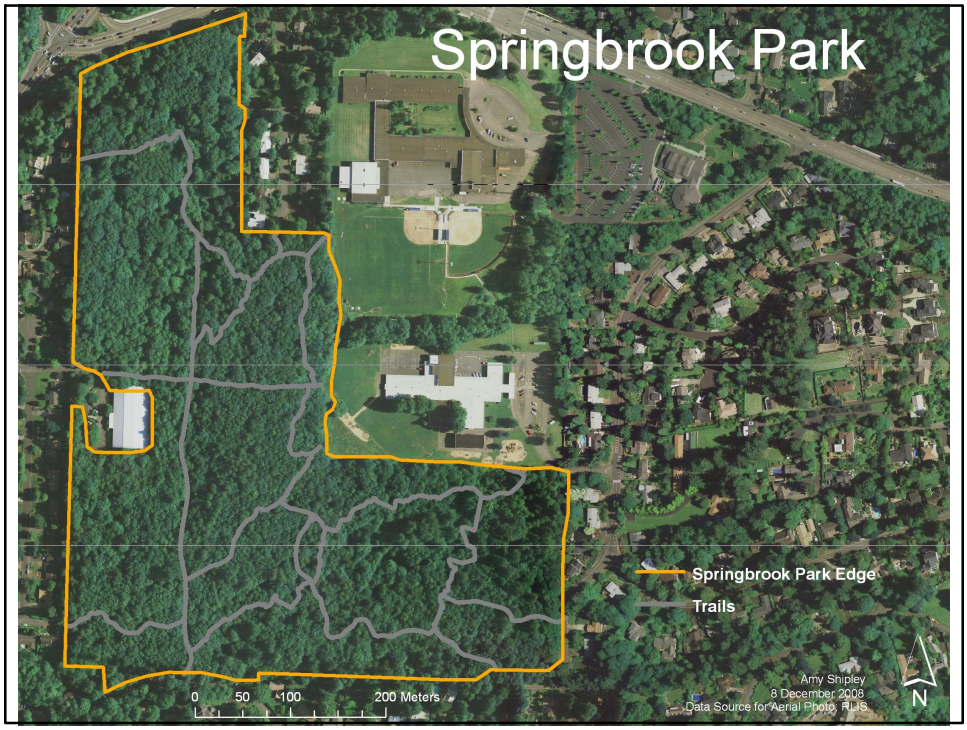
- Are fledgling towhees more likely to be found closer to trails? Closer to park edges?
- What types of vegetation do fledgling towhees use?

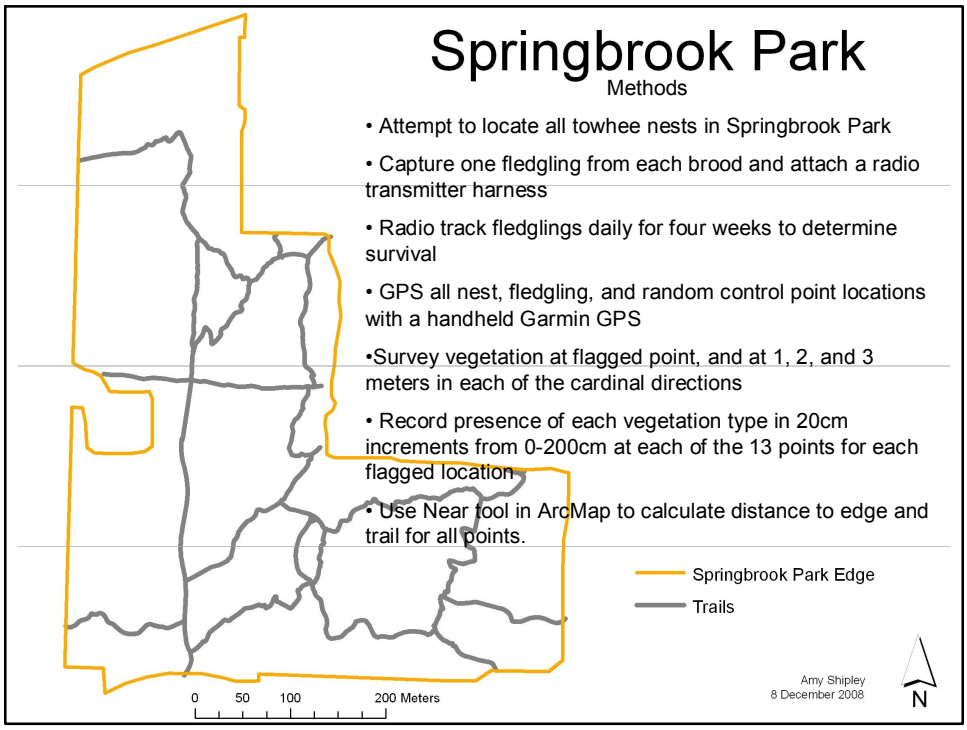
  -important for hiding from predators, foraging

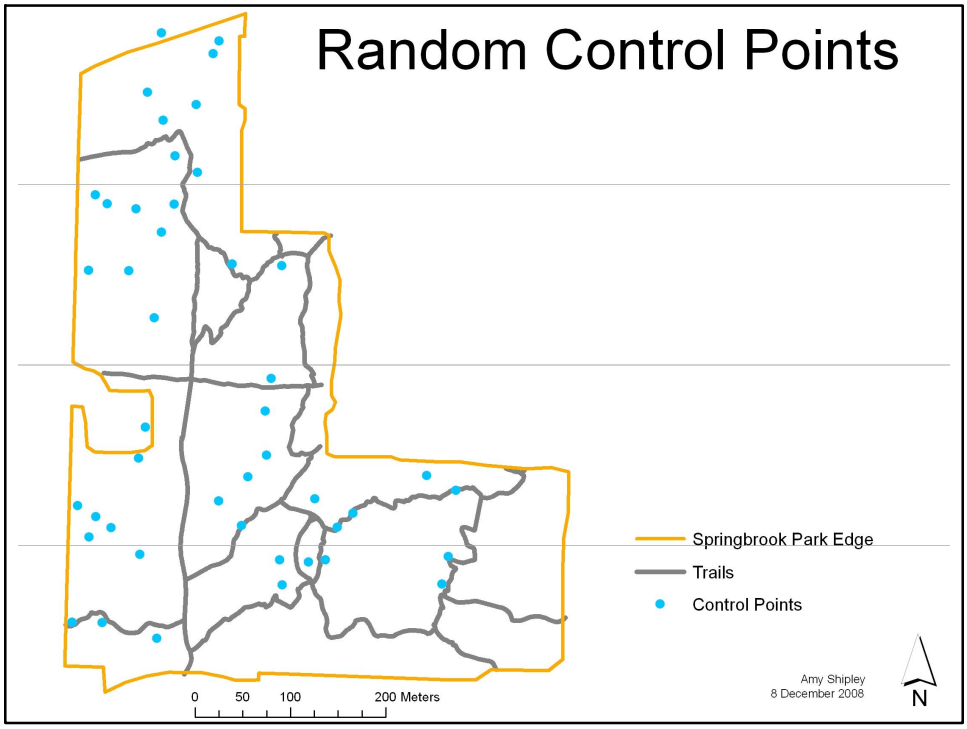
- Are the different types of vegetation found closer to trails? Closer to park edges?

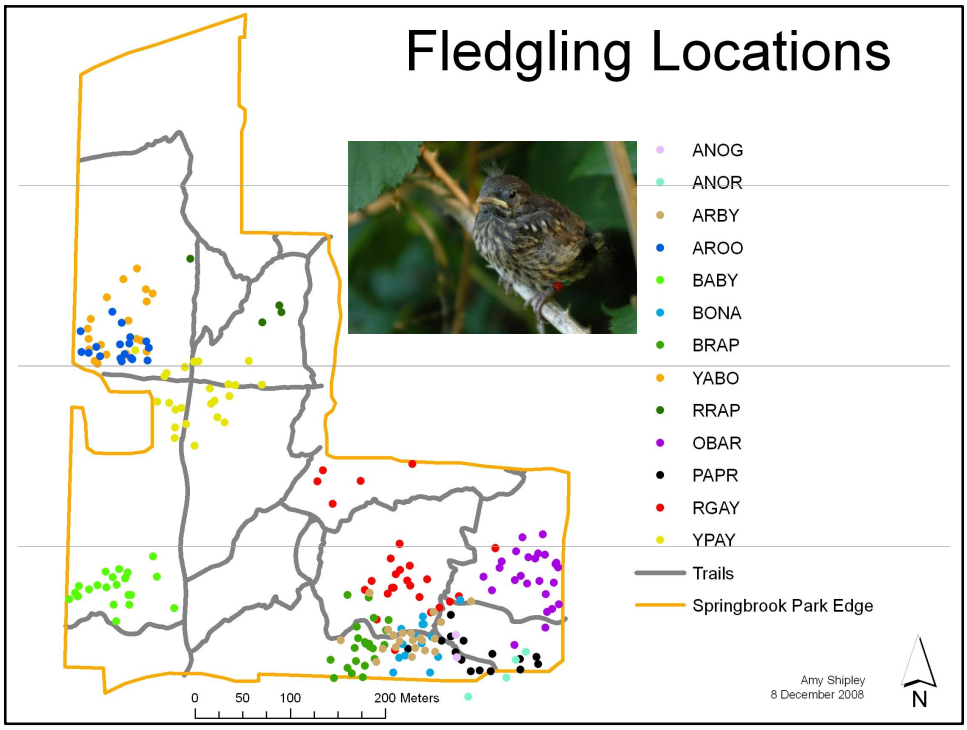

0 1 2 4 Kilometers
Amy Shipley
8 December 2008
Data Source for Aerial Photo: IRIS
N


0 1 2 4 Kilometers
Amy Shipley
8 December 2008
Data Source for Aerial Photo: IRIS
N

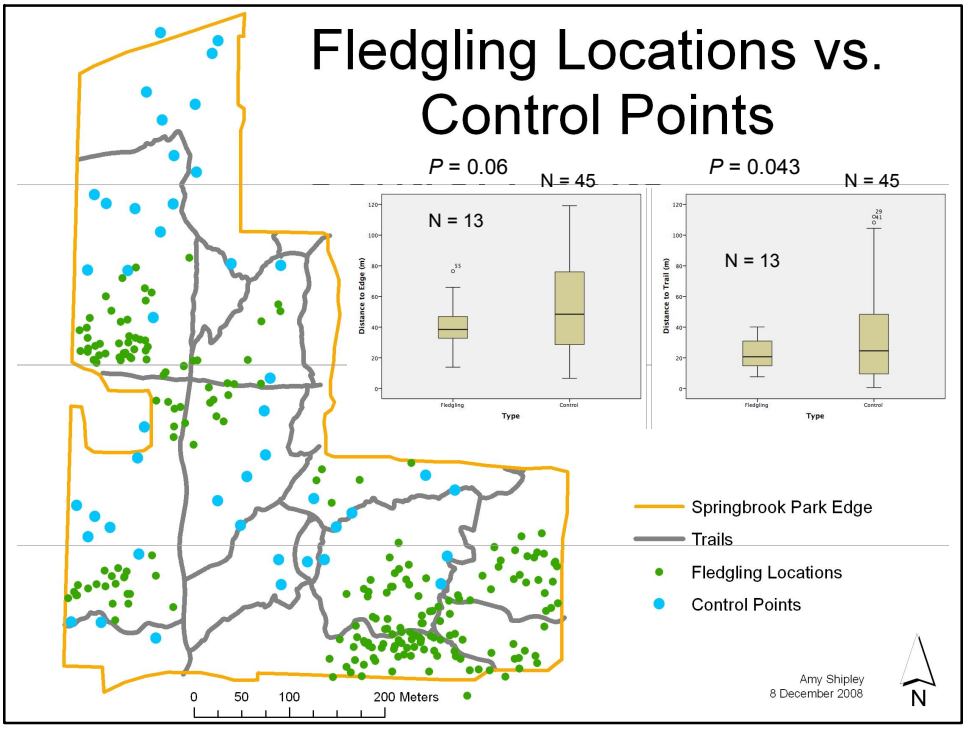

Springbrook Park
Springbrook Park Edge
Trails
0 50 100 200 Meters
Amy Shipley
8 December 2008
Data Source for Aerial Photo: PLUS
N


Springbrook Park
Methods
• Attempt to locate all towhee nests in Springbrook Park
• Capture one fledgling from each brood and attach a radio transmitter harness
• Radio track fledglings daily for four weeks to determine survival
• GPS all nest, fledgling, and random control point locations with a handheld Garmin GPS
•Survey vegetation at flagged point, and at 1, 2, and 3 meters in each of the cardinal directions
• Record presence of each vegetation type in 20cm increments from 0-200cm at each of the 13 points for each flagged location
• Use Near tool in ArcMap to calculate distance to edge and trail for all points.
Springbrook Park Edge
Trails
0 50 100 200 Meters
Amy Shipley
8 December 2008
N


Random Control Points
Springbrook Park Edge
Trails
Control Points
0 50 100 200 Meters
Amy Shipley
8 December 2008
N


Fledgling Locations
ANOG
ANOR
ARBY
AROO
BABY
BONA
BRAP
YABO
RRAP
OBAR
PAPR
RGAY
YPAY
Trails
Springbrook Park Edge
0 50 100 200 Meters
Amy Shipley
8 December 2008
N

Fledgling Locations vs. Control Points



Non-native Vegetation

English Ivy (*Hedera helix*)

Himalayan Blackberry (*Rubus discolor*)

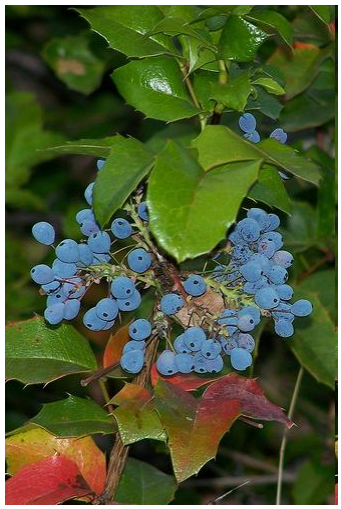
Non-native Vegetation

Black Hawthorn (*Crategus douglasii*)

Holly (*Ilex aquifolium*)

Native Vegetation

Red Huckleberry
(*Vaccinium parvifolium*)



Oregon Grape
(*Mahonia nervosa*)

Native Vegetation

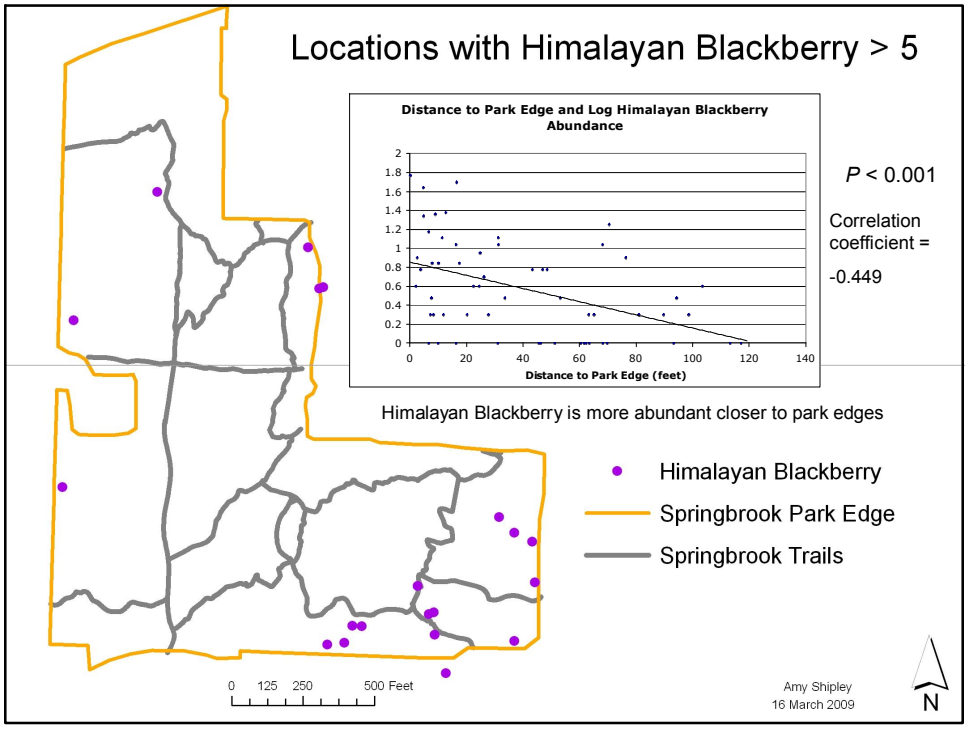
Salal (*Gaultheria shallon*)

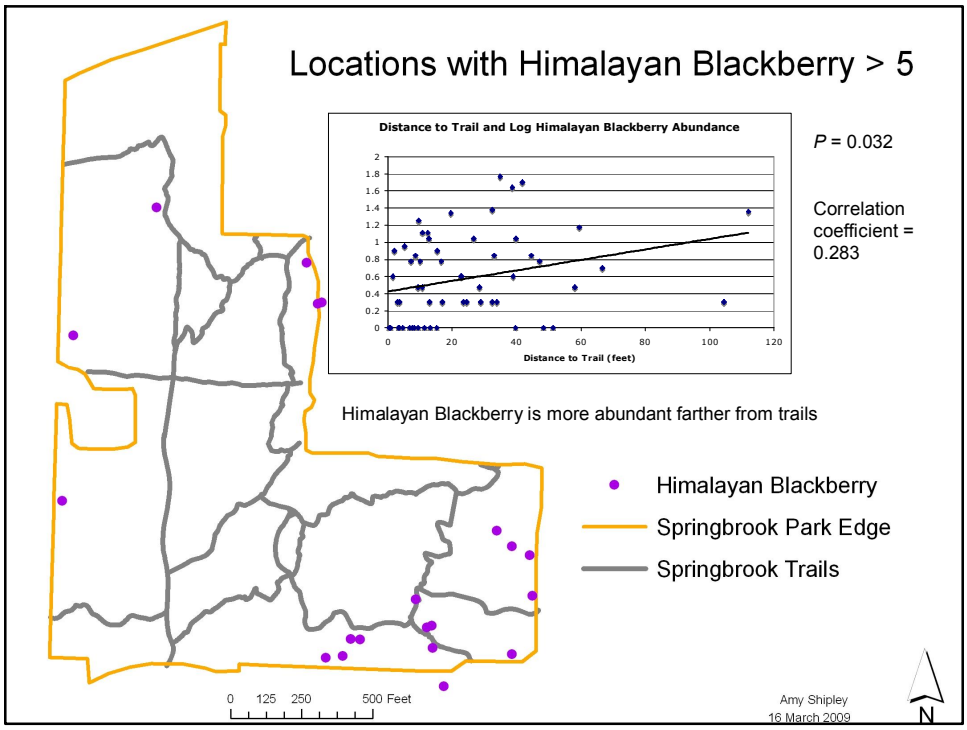
Snowberry
(*Symphoricarpos albus*)

Native Vegetation

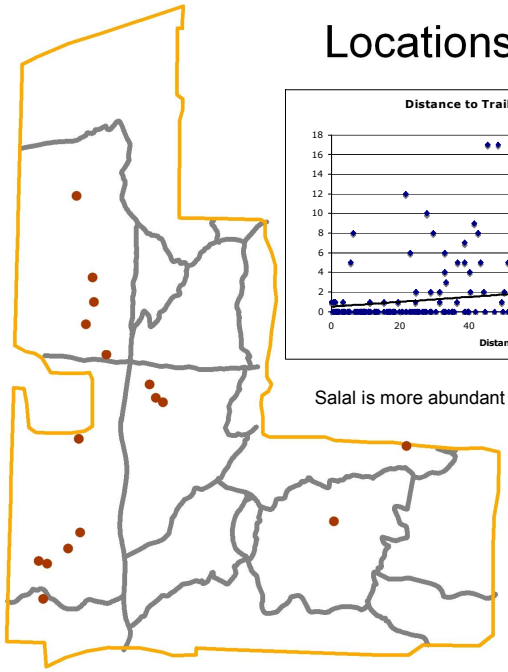
Sword Fern (*Polystichum munitum*)

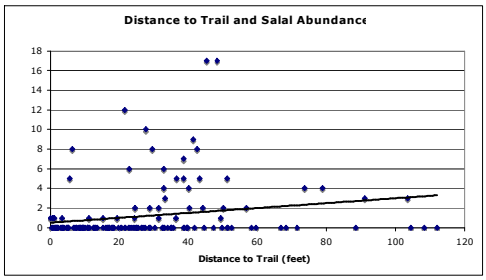
Waterleaf
(*Hydrophyllum spp.*)


Locations with Himalayan Blackberry > 5
Distance to Park Edge and Log Himalayan Blackberry Abundance
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0
20
40
60
80
100
120
140
Distance to Park Edge (feet)
P < 0.001
Correlation coefficient = -0.449
Himalayan Blackberry is more abundant closer to park edges
Himalayan Blackberry
Springbrook Park Edge
Springbrook Trails
0 125 250 500 Feet
Amy Shipley
16 March 2009
N


Locations with Himalayan Blackberry > 5
Distance to Trail and Log Himalayan Blackberry Abundance
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0
20
40
60
80
100
120
Distance to Trail (feet)
P = 0.032
Correlation coefficient = 0.283
Himalayan Blackberry is more abundant farther from trails
Himalayan Blackberry
Springbrook Park Edge
Springbrook Trails
0 125 250 500 Feet
Amy Shipley
16 March 2009
N

Locations with Salal > 5





P = 0.011

Correlation coefficient = 0.203

Salal is more abundant farther from trails

Salal

Springbrook Park Edge

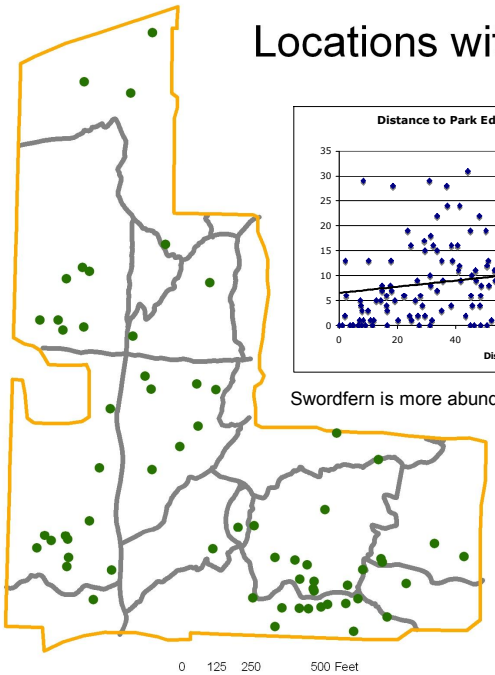
Springbrook Trails

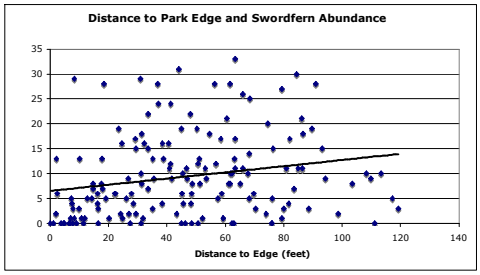
0 125 250 500 Feet

Amy Shipley
16 March 2009

N

Locations with Swordfern > 10





P = 0.007

Correlation coefficient = 0.213

Swordfern is more abundant farther from park edges

Swordfern

Springbrook Park Edge

Springbrook Trails

0 125 250 500 Feet

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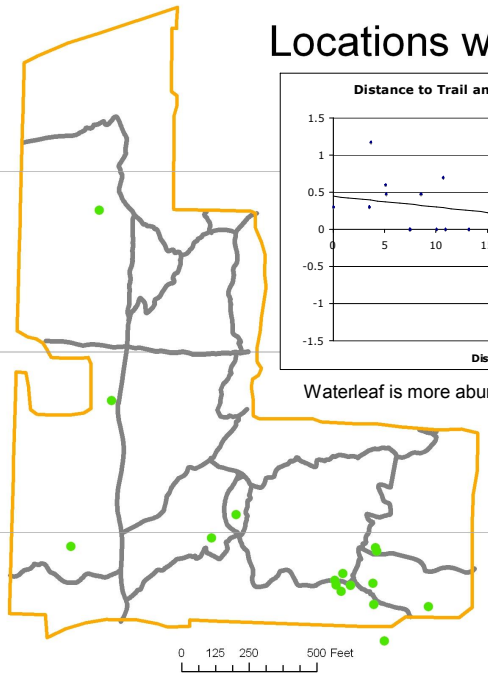
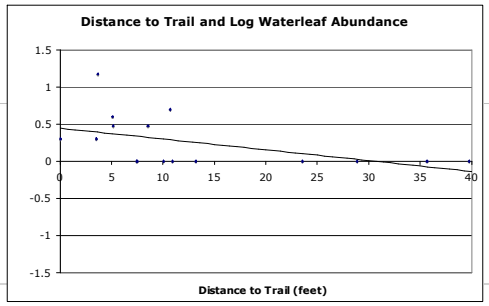
16 March 2009

N

Locations with Waterleaf > 0





$P = 0.045$

Correlation coefficient = -0.496

Waterleaf is more abundant closer to trails

Waterleaf
Springbrook Park Edge
Springbrook Trails

Amy Shipley
16 March 2009

N

Which vegetation types do fledglings use?

- Conduct independent samples *t*-tests on fledgling and random locations for each vegetation type
- Fledglings were found in areas with significantly more
  - Himalayan Blackberry $p = 0.04$
  - Holly $p = 0.04$
  - Snowberry $p = 0.01$
  - Swordfern $p = 0.03$
  - Waterleaf $p = 0.05$

Are fledglings using this dense vegetation to hide from predators?

Do these vegetation types provide good foraging habitat for towhee parents?

Next steps:

Determine if fledgling mass gain (a measure of health) is correlated with vegetation type

Determine if there is a correlation between fledgling mass gain and distance to park edge or trail

Acknowledgments

Advisor: Dr. Michael Murphy

Field Assistants:

Adam Elzinga

Heather Radke

Zach Holmboe

Jenny Kinder

Julia Ruppell

QuickTime™ and a
TIFF (Uncompressed) decompressor
are needed to see this picture.

References

Baker, P.J. et al. 2005. Impact of predation by domestic cats *Felis catus* in an urban area. Mammal Review 35 (3&4) 302-312.

Bock, C.E., and Z.F. Jones. 2004. Avian habitat evaluation: should singing birds count? Frontiers in Ecology and the Environment 2(8): 403-410.

Crooks, K.R., and M.E. Soule. 1999. Mesopredator release and avifaunal extinctions in a fragemented system. Nature 400: 563-566.

Greenlaw, J.S. 1996. Spotted Towhee (*Pipilo maculatus*). *In* The Birds of North America, No. 263 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

Miller, J.R. and N. Thompson Hobbs. 2000. Recreational trails, human activity, and nest predation in lowland riparian areas. Landscape and Urban Planning 50: 227-236.

References cont.

Patten, M.A. and D.T. Bolger. 2003. Variation in top-down control of avian reproductive success across a fragmentation gradient. Oikos 101: 479-488.

Sinclair, K.E. et al. 2004. Mammalian nest predators respond to greenway width, landscape context and habitat structure. Landscape and Urban Planning 71: 277-293.

Thorington, K.K. and R. Bowman. 2003. Predation rate on artificial nests increases with human housing density in suburban habitats. Ecography 26: 188-196.

Zanette, L., P. Doyle, and S.M. Tremont. 2000. Food shortage in small fragments: evidence from an area-sensitive passerine. Ecology 81(6): 1654-1666.