

Level 1 Landscape Scale Analysis of Florida Wetland Condition

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Landscape Development Intensity Index (LDI)

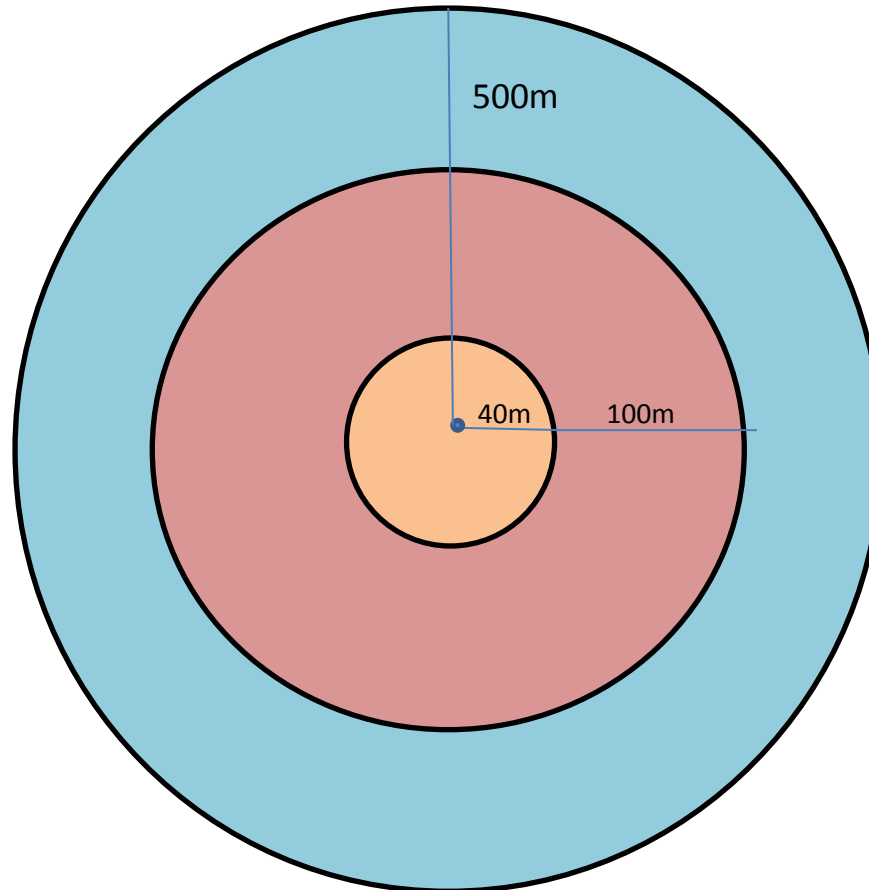
- Level 1 Landscape Scale Assessment
 - Uses non-renewable energy intensity of surrounding land uses to predict ecological condition of study area
 - Captures secondary impacts that spread from energy intensive land uses
 - water and air pollution, altered environmental conditions, etc. (Brown and Vivas, 2005)
- Has been used across wetland types in at least 5 different states as a human disturbance gradient (Vivas and Brown, 2006; Margriner, 2011; Bourdaghs et al, 2006; Mack, 2006; Reiss et al, 2010)

Landscape Development Intensity Index (LDI)

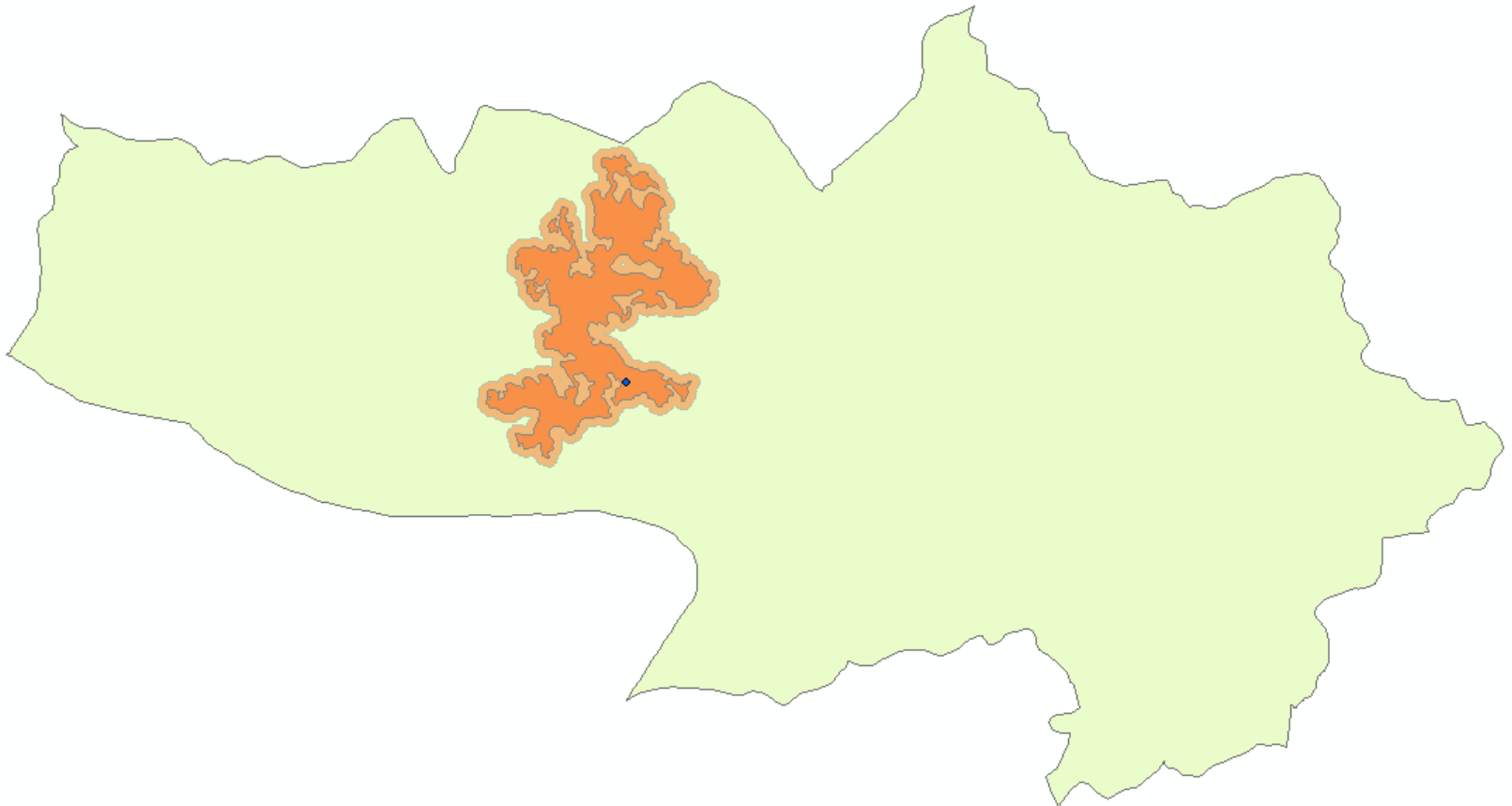
- Done in addition to data collected for NWCA
 - First time used to analyze a point
- Geographic Information System (GIS) based
- Adjustable scales
- Score range
 - 0 (Natural, undeveloped land)
 - 42 (Highly developed)

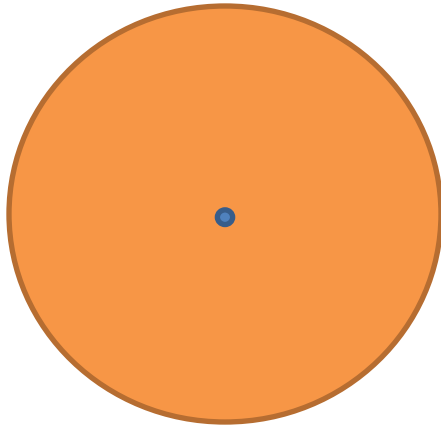
7 LDI Scales

- LDI_{AA} - Assessment Area as defined by NWCA
- $LDI_{AA-100mZone}$ - 100m buffer of AA
- LDI_{140} - 140m radius circle from wetland sample point
- LDI_{500} - 500m radius circle from wetland sample point



- LDI_{Feature} - NWI wetland containing point
- $LDI_{\text{Feature-100mZone}}$ - 100m buffer of Feature
- $LDI_{\text{Watershed}}$ - USGS 12 digit watershed boundary set





Wetland sample point
and polygon of desired
LDI index scale

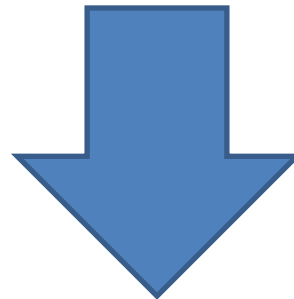


Land use file



Notes	LDI Category	Non-Renewable Areal Empower Intensity (E15 sej ⁻¹ *ha ⁻¹ *yr ⁻¹)	LDI for Land Use
1	Natural Land / Open Water	0.0	0.0
2	Pine Plantation	0.5	1.0
3	Low Intensity Open Space / Recreational	0.5	1.0
4	Unimproved Pastureland (with livestock)	0.5	1.0
5	Improved Pasture (no livestock)	2.0	3.0
6	Low Intensity Pasture (with livestock)	3.4	4.3
7	High Intensity Pasture (with livestock)	5.9	6.0
8	Medium Intensity Open Space / Recreational	6.1	6.1
9	Citrus	7.8	6.9
10	General Agriculture	15.1	9.3
11	Row crops	20.3	10.5
12	High Intensity Agriculture (dairy farm)	50.4	14.2
13	Recreational / Open Space (High-intensity)	123.0	18.0
14	Single Family Residential (Low-density)	197.5	20.0
15	Transportation- 2 lanes highway	308.0	21.9
16	Single Family Residential (Med-density)	658.3	25.2
17	Single Family Residential (High-density)	921.7	26.7

Non-renewable areal
empower intensity by land use
(Reiss, Brown and Lane 2010)



$$LDI = 10 \log_{10} \left[\frac{AEI_{Total}}{AEI_{Ref}} \right]$$



$LDI_{AA} = 0.0$

$LDI_{140m} = 30.7$

$LDI_{Feature} = 16.6$

$LDI_{Watershed} = 21.1$

$LDI_{AA-100mzone} = 34.8$

$LDI_{500m} = 30.8$

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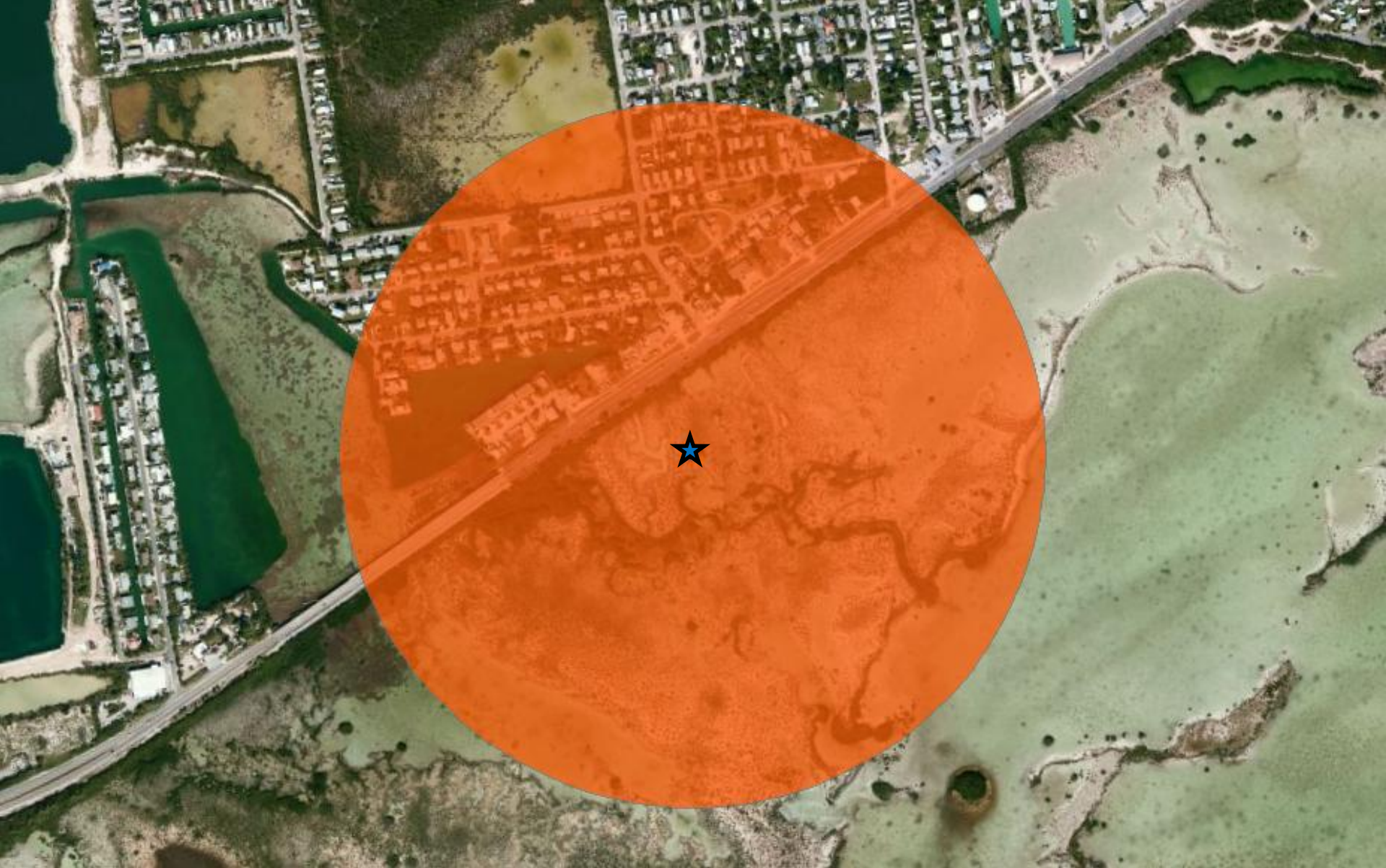
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Results

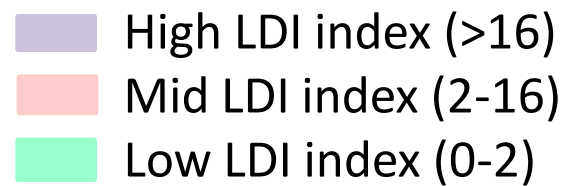
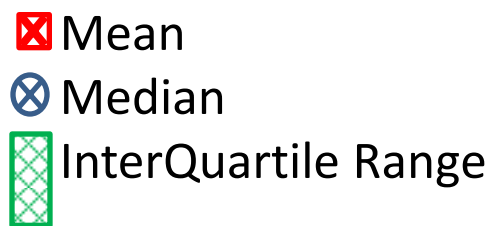
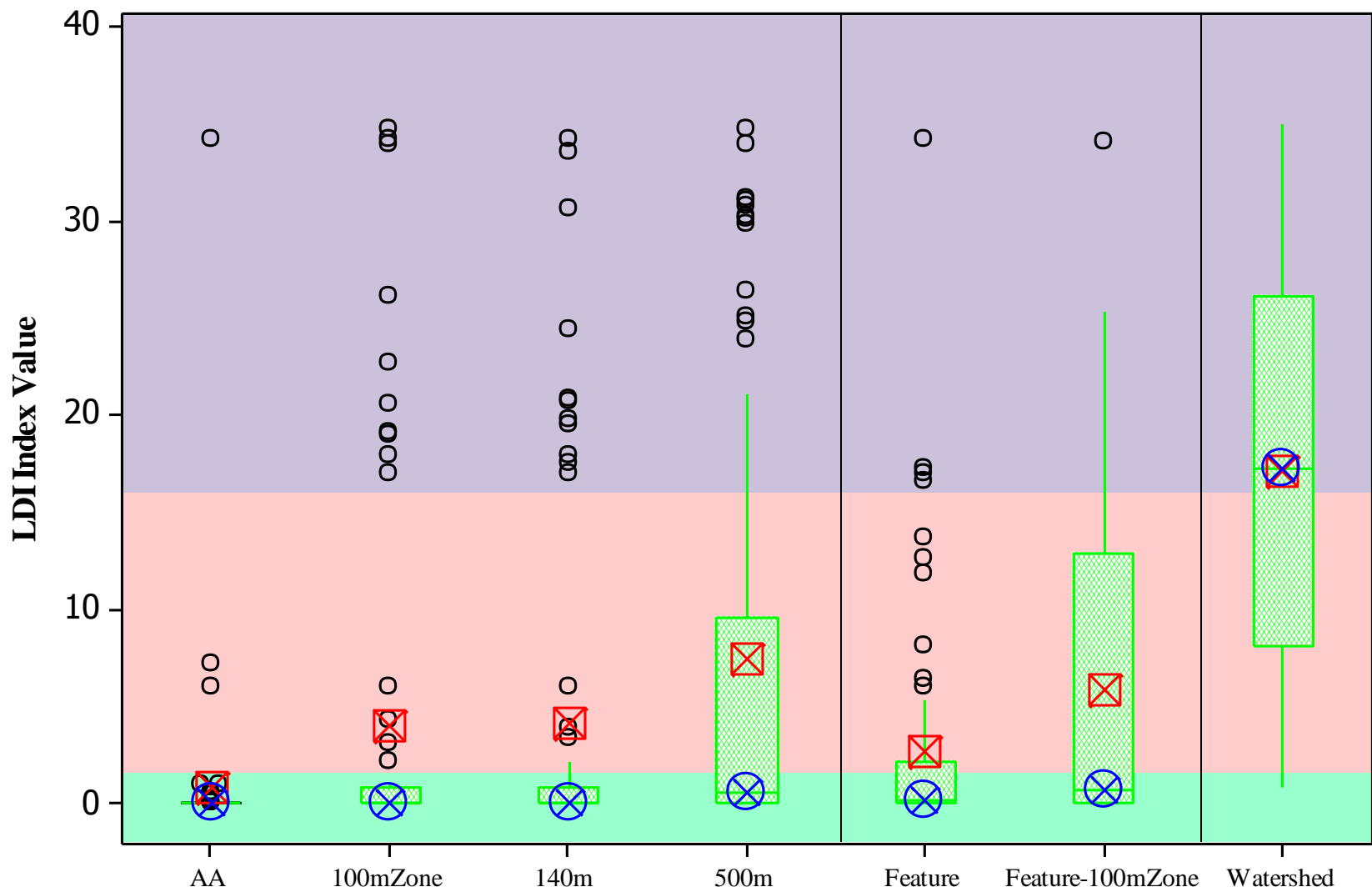
- Total of 469 scores for 67 sites (7 scales each)
- 178 scores of 0 across all scales
- Maximum score for each scale exceeds 34
 - 5 different sites
- LDI_{AA} (0.8) and $LDI_{Feature}$ (2.7) had the lowest means; $LDI_{Watershed}$ (17.1) had the highest
- LDI_{AA} , $LDI_{AA-100mZone}$, and LDI_{140m} all had medians of 0

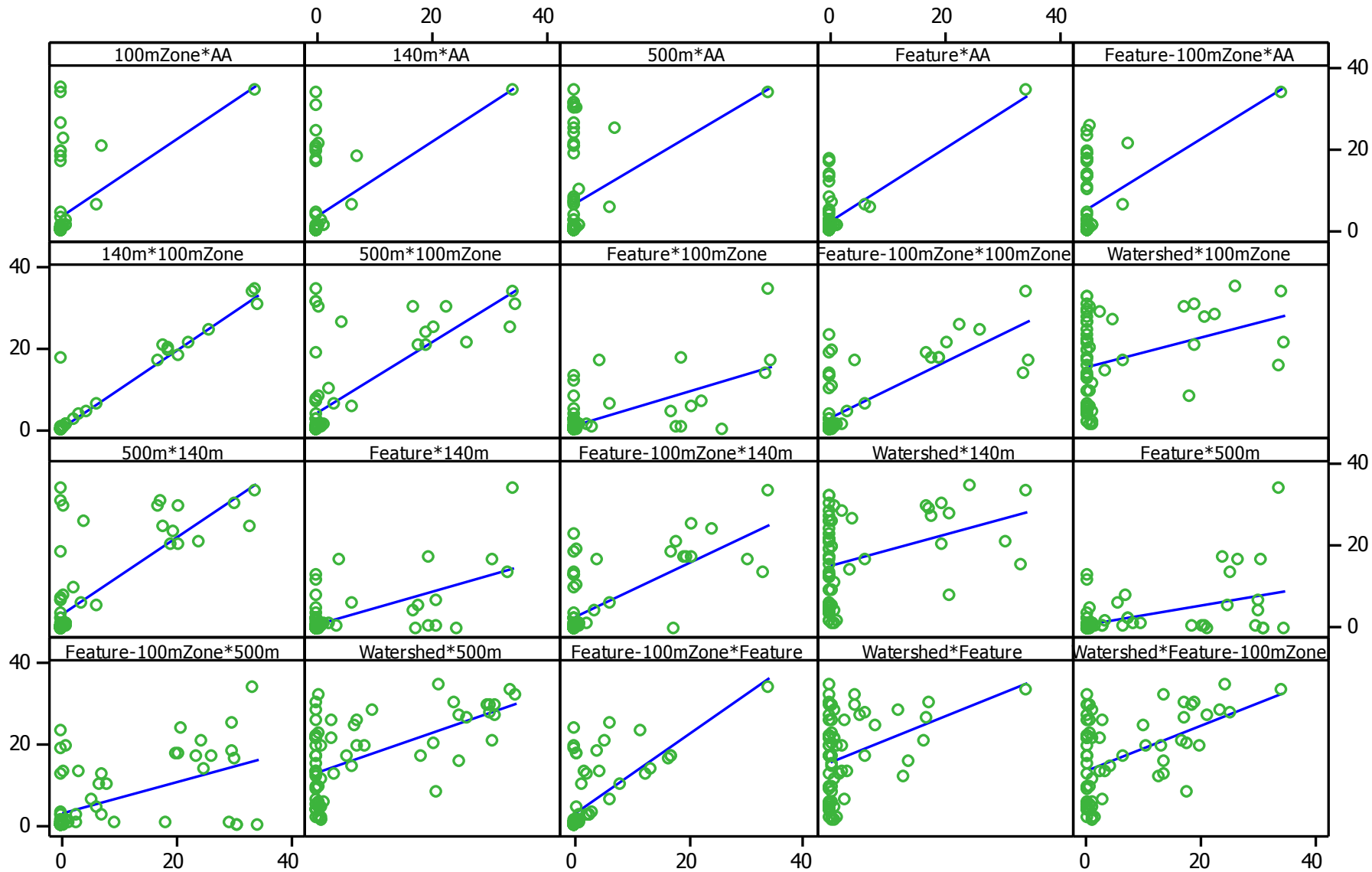
Minimum Score Example: NWCA- 1247_{AA} and 1247_{AA 100m Zone} and 1247_{140m} = 0



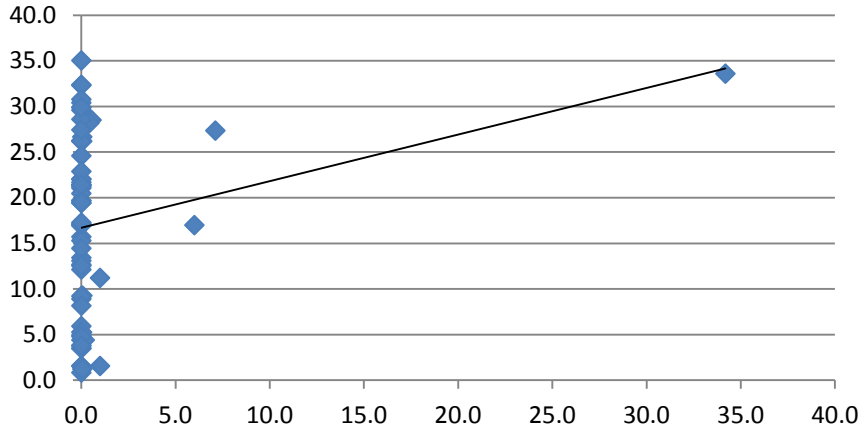
Maximum Score: NWCA-3091 $LDI_{\text{Watershed}} = 35$



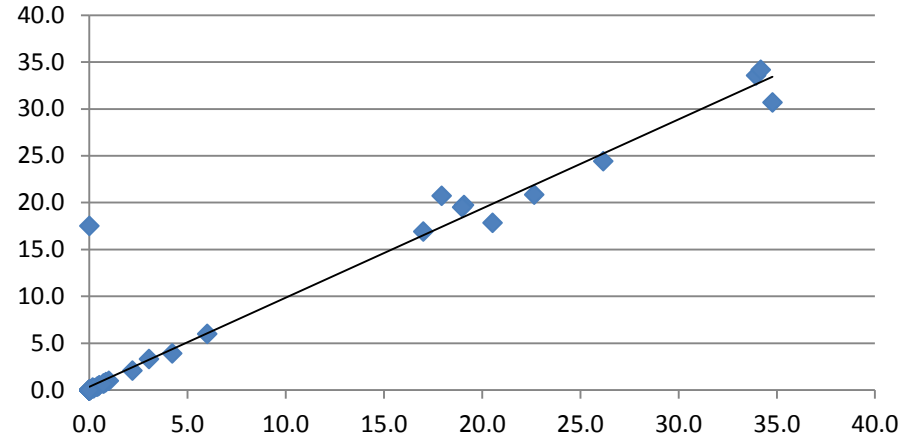




AA vs Watershed



AA 100m zone vs 140m



Pearson Correlation Coefficient

LDI Scale	AA	100mZone	140m	500m	Feature	Feature-100mZone
100mZone	0.449 *					
140m	0.446 *	0.968 *				
500m	0.309 ^	0.688 *	0.737 *			
Feature	0.668 *	0.640 *	0.617 *	0.479 *		
Feature-100mZone	0.441 *	0.772 *	0.693 *	0.532 *	0.672 *	
Watershed	0.221 ~	0.329 *	0.353 *	0.563 *	0.343 *	0.490 *

*p<0.01, ^p<0.05, ~p<0.10

Reiss et al (2012)

Summary

- Landscape scale assessment of random wetland points in Florida
- 6 smallest scales have a right skewed distribution
 - Overall, 178 LDI index scores = 0
- Watershed scale has uniform distribution
- Different scales capture different stresses on wetland sample point
- Level II and III data will provide more information on the LDI scales that best capture different wetland stressors

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Questions

