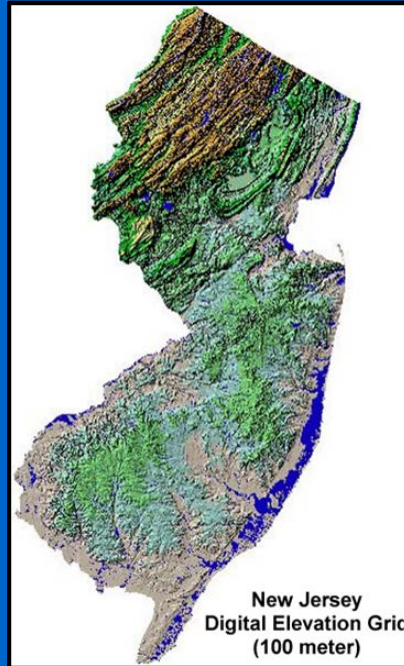


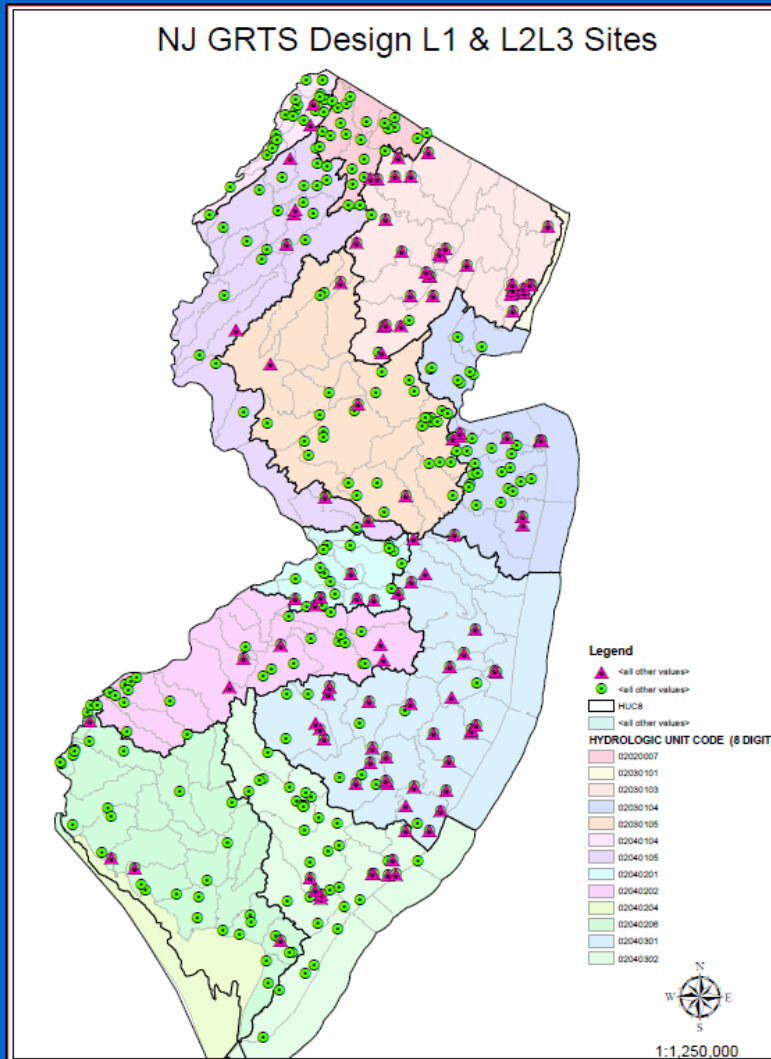
New Jersey's Wetland Condition Assessment Intensification Study: A Multi-Tiered Assessment of Wetlands and Watersheds



Kathleen Strakosch Walz, NJ NHP
Don Faber-Langendoen, NatureServe
Joint NEBAWWG-MAWWG Fall 2018 Meeting
Cooperstown, NY - November 14-16, 2018

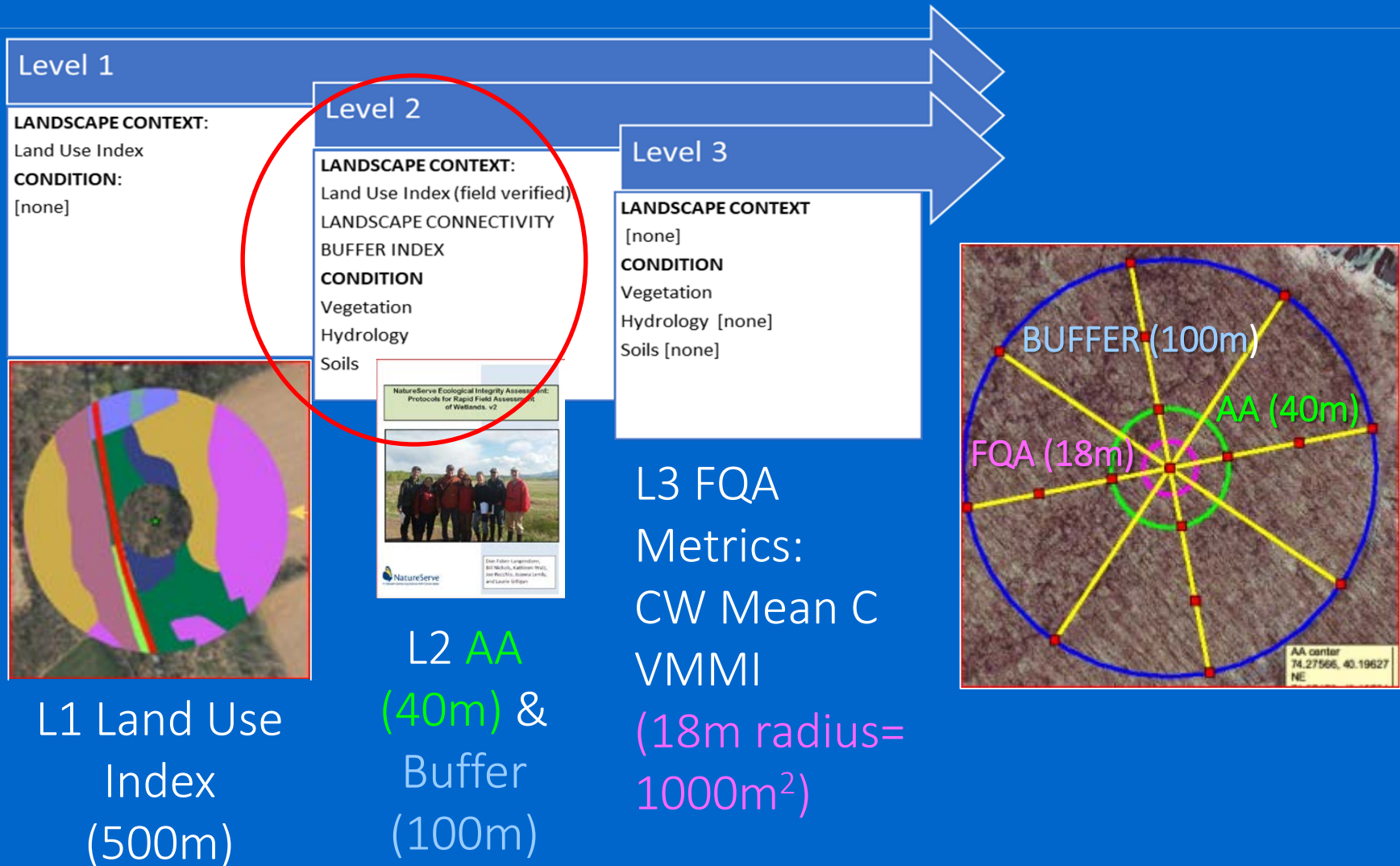


Generalized Random Tessellation Sampling (GRTS) Study Design



- 4 wetland types (E2EM, PEM, PSS, PFO) in 11 HUC8 watersheds
- Initial calibration of EIA methods using 114 Level 2 sites with Level 3 FQA data and Level 1 data that focused on 2 watersheds.
- Level 1 GIS analysis using 344 GRTS sites. Between 24-42 sites per watershed.

Ecological Integrity Assessment Protocol (EIA): Landscape, Buffer and Assessment Area



Level 2 EIA Scorecard:

- Metrics
- Rank Factor
- Weighting
- Stressor Index

State/Prov: NJ Site: Stockholm Valley
 ObsArea Name: Lake Stockholm Brook Confluence South of ROW
 Project: NJWET County: NJ - Sussex
 Observers: Kathleen Walz, Gemma Milly, Jason Beury

ObsArea Code: NJWET-1360
 Analysis Obs Code: 167N1360H
 ObsDate: 2014/07/30 ObsID: 5355

Macrogrou(p)s: M069 Eastern North American Marsh, Wet Meadow & Shrubland
 HGM: Slope
 Cowardin: Palustrine (Scrub-Shrub Wetland)

Human Stressors Index (HSI) Scores:

by Major Ecological Factor (MEF): Buffer: 2 (Medium) Veg: 2 (Medium) Soil: 0 (Absent) Hydro: 3 (High)
 Total: 2.1 (Medium) Abiotic: 2 (Medium) Onsite: 2 (Medium)

Protocol: NatureServe Wetland 2015

Ecological Integrity

Rank Factor: LANDSCAPE CONTEXT

MEF: LANDSCAPE

LAN1. Contiguous Natural Land Cover
 LAN2. Land Use Index

MEF: BUFFER

BUF1. Perimeter with Natural Buffer
 BUF2. Width of Natural Buffer
 BUF3. Condition of Natural Buffer

Rank Factor: CONDITION

MEF: VEGETATION

VEG1. Native Plant Species Cover
 VEG2. Invasive Nonnative Plant Species Cover
 VEG3. Native Plant Species Composition
 VEG4. Overall Vegetation Structure
 VEG5. Woody Regeneration
 VEG6. Coarse Woody Debris

MEF: HYDROLOGY

HYD1. Water Source
 HYD2. Hydroperiod
 HYD3. Hydrologic Connectivity

MEF: SOIL

SOI1. Soil Condition

Wt	Field Rating	Field Pts	Calc Pts	Calc Rating
			3.03	B+
0.3			3.83	A+
0.33			3.50	A-
1	B	3		
1	A	4		
0.66			4.00	A+
n/a	A	4		
n/a	A	4		
n/a	A	4		
0.7			2.68	B-
0.55			2.67	B-
1	C+	2.25		
1	C-	1.75		
1	C	2		
1	B	3		
1	B	3		
1	A	4		
0.35			2.33	C+
1	B	3		
1	C	2		
1	C	2		
0.1			4.00	A+
1	A	4		



Level 2 Stressors by Wetland Type

MAJOR ECOLOGICAL FACTOR	STRESSOR	% of All L2 Sites	WETLAND TYPE		
			E2EM	PEM PSS	PFO
BUFFER					
Vegetation	Invasive plant species	63%	66%	69%	53%
Hydrology	Dam, ditch, diversion, dike, levee	52%	79%	38%	40%
Soils	Trash or refuse dumping	44%	47%	38%	47%
Development	Roads (gravel, paved, highway), Railroad	34%	32%	28%	43%
AA					
Vegetation	Invasive plant species	48%	45%	62%	38%
Hydrology	Dam, ditch, diversion, dike, levee	24%	32%	24%	17%
Soils	Trash or refuse dumping	14%	8%	14%	19%
BUFFER & AA					
	None Present	9%	5%	3%	17%



Phragmites



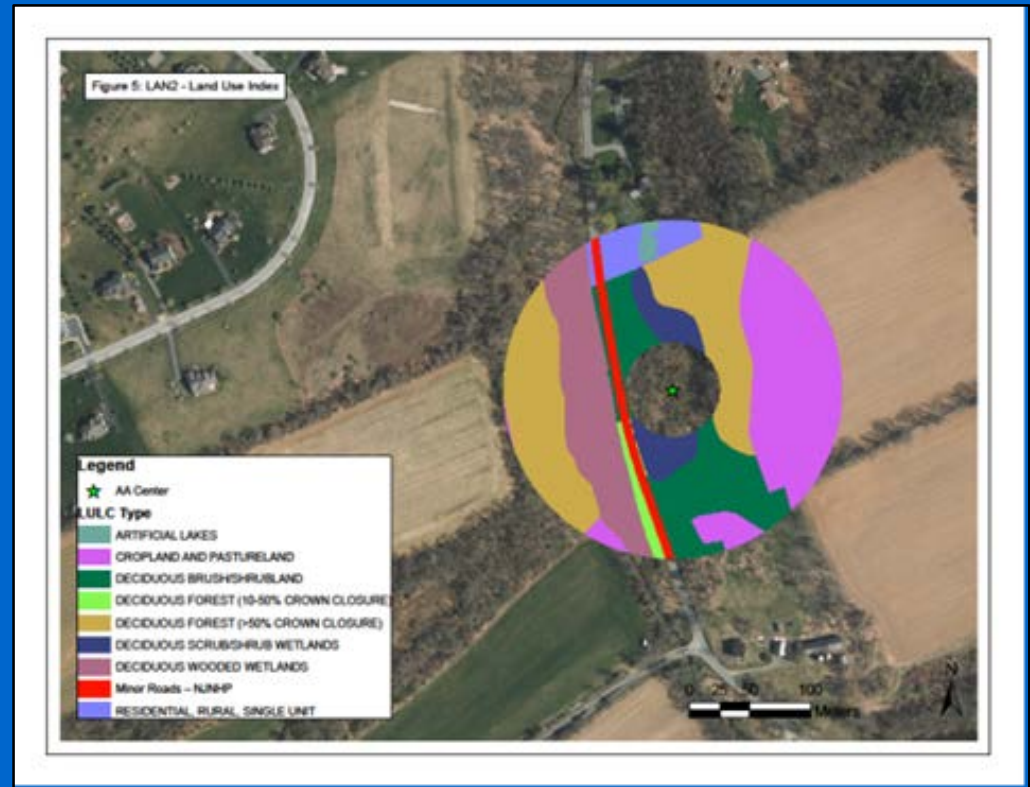
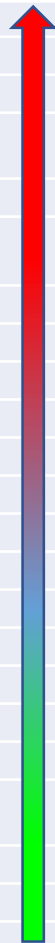
Ditching



Phragmites & Ditching in AA & Buffer of E2EM site

Level 1: NJDEP LULC12 Land Use Coefficients & EIA Land Use Index (LUI) Scores

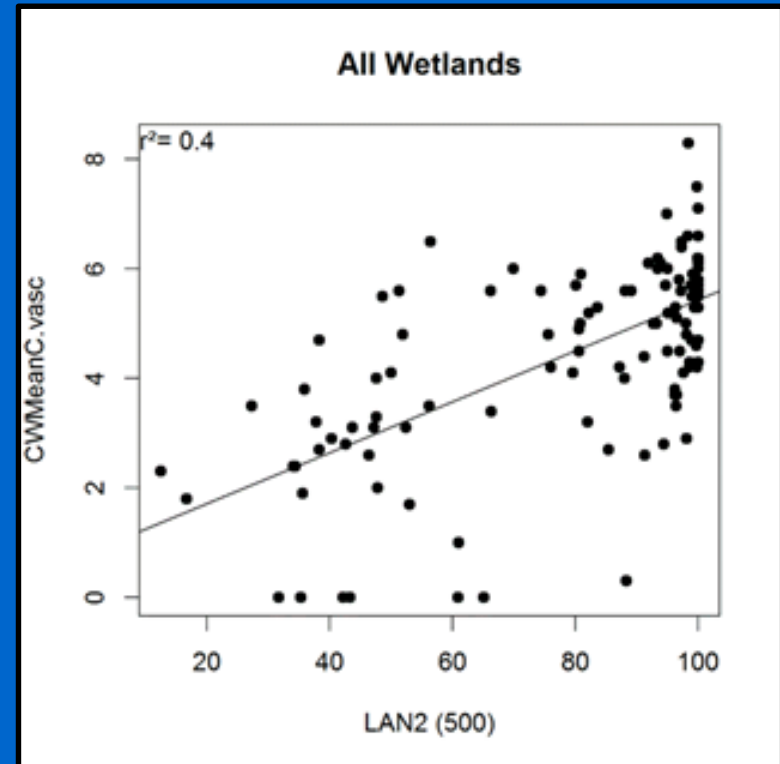
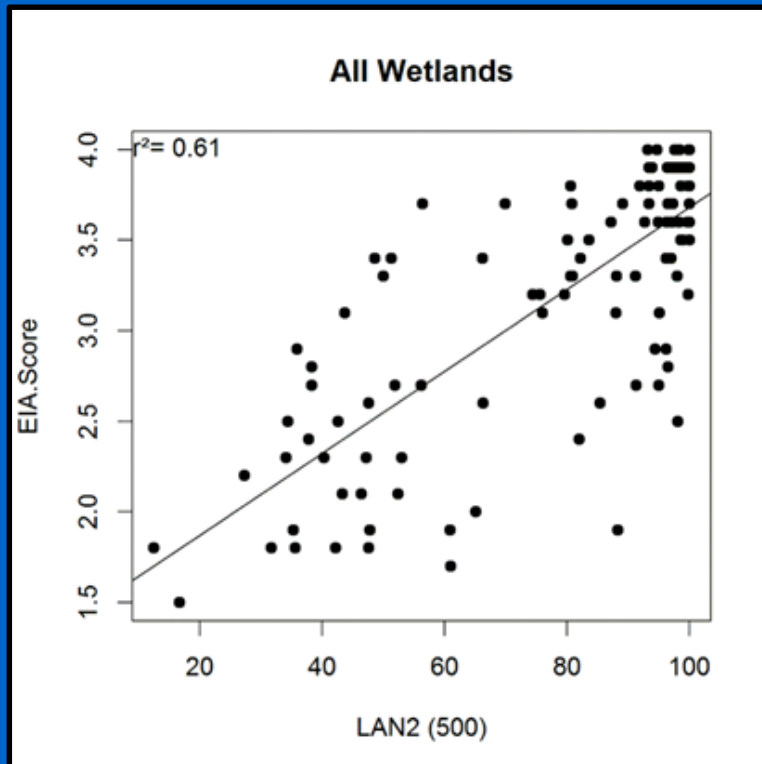
NJDEP LULC 2012 Land Use Type EXAMPLES	EIA Land Use Index (LUI) Co-Efficient
Upland Rights-of-Way, Developed	0
Cropland and Pastureland	2
Disturbed Tidal Wetlands (WETLANDS)	2
Disturbed Wetlands (Modified) (WETLANDS)	2
Phragmites Dominate Urban Area	2
Orchards, Vineyards, Nurseries, Horticultural Areas, Sod Farms	3
Agricultural Wetlands	4
Plantation	4
Upland Rights-of-Way, Undeveloped	5
Wetland Rights-of-Way (WETLANDS)	5
Phragmites Dominate Coastal Wetlands	5
Phragmites Dominate Interior Wetlands	5
Old Field (< 25% Brush Covered)	7
Coniferous Forest (>50% Crown Closure)	10
Atlantic White Cedar Wetlands	10
Coniferous Scrub/Shrub Wetlands	10
Deciduous Wooded Wetlands	10
Freshwater Tidal Marshes	10
Herbaceous Wetlands	10
Mixed Forested Wetlands (Coniferous Dom.)	10
Saline Marshes (High marsh vegetation)	10
Saline Marshes (Low marsh vegetation)	10
Vegetated Dune Communities	10



LUI Score based on sum of area-weighted land use coefficient in 500m Surrounding Landscape

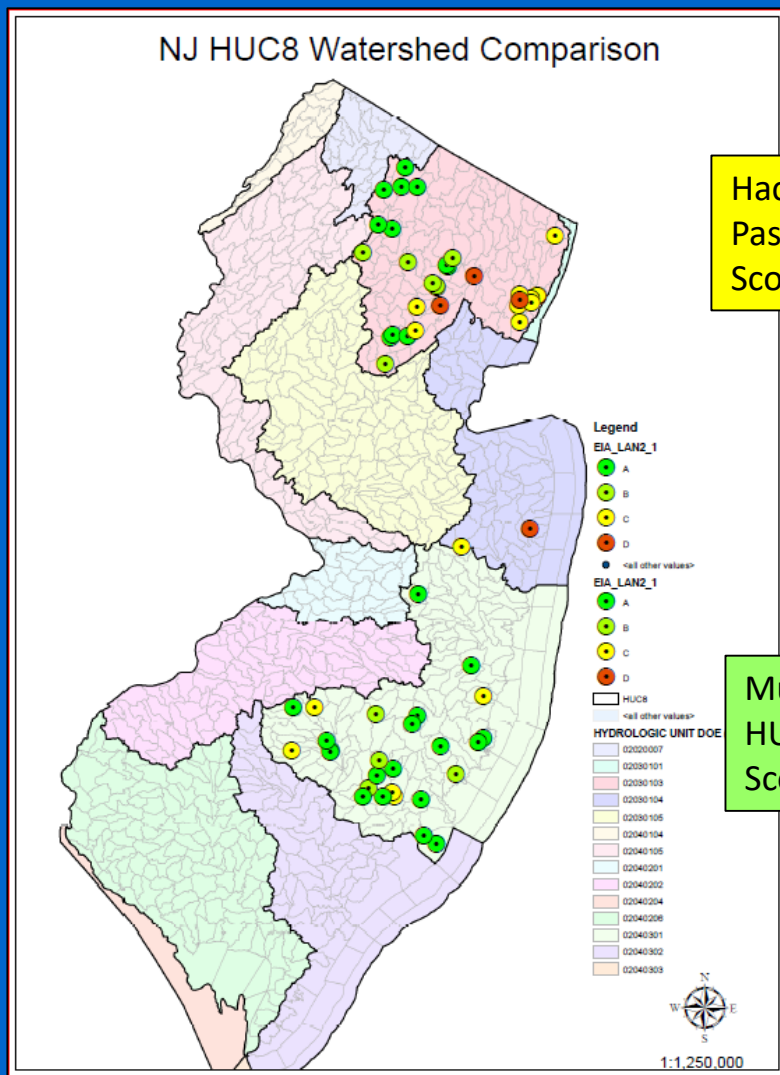
Increasing stress by land use type

Level 1 Validation based on Level 2 & 3 data



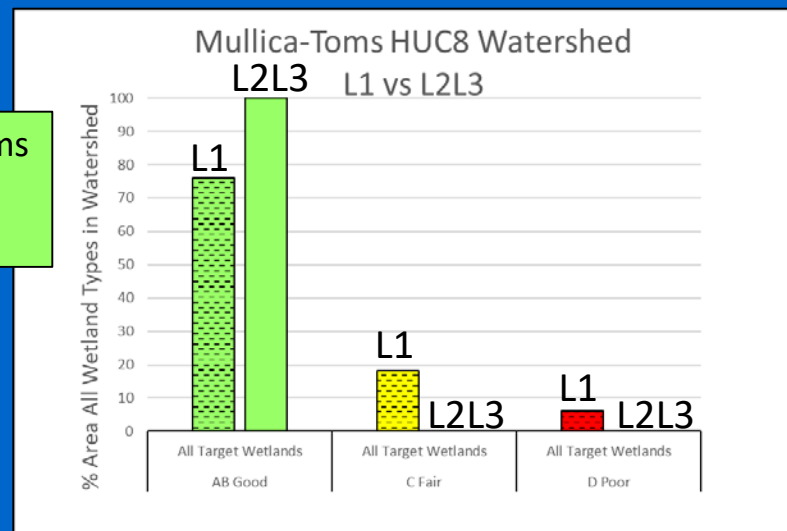
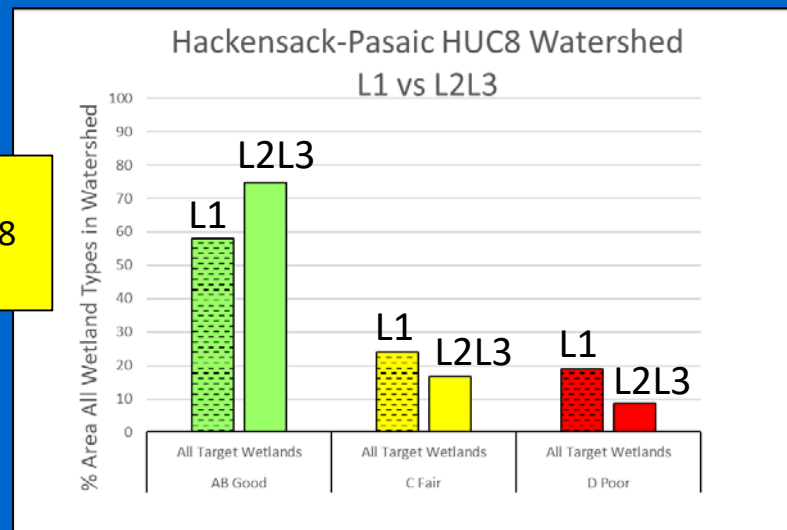
Predicting overall L2 EIA score ($R^2=0.61$) and L3 CW Mean C ($R^2=0.4$) based on the L1 Land Use Index metric for all wetlands.

Comparison of L1 vs L2L3 in two watersheds

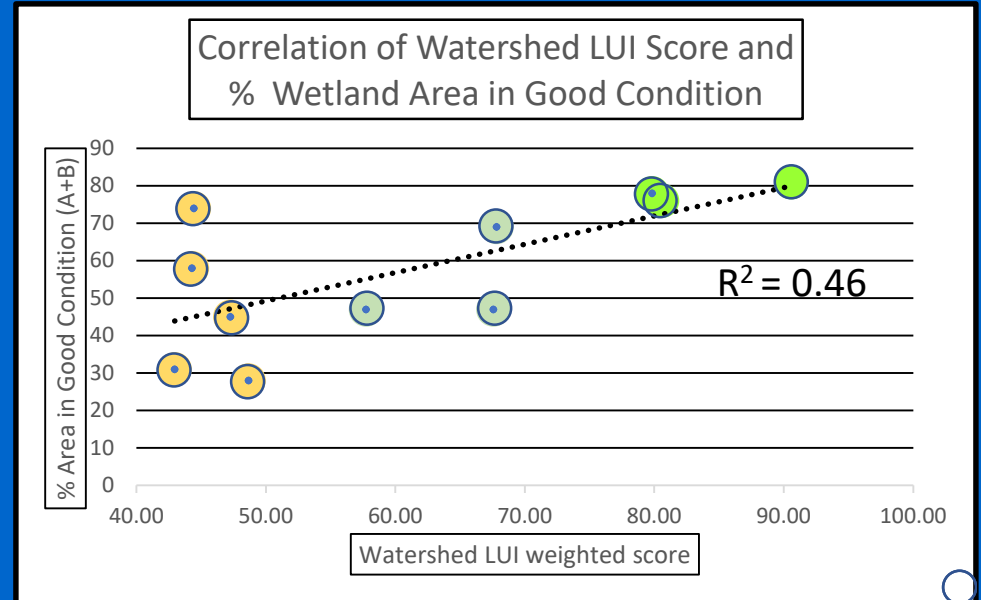
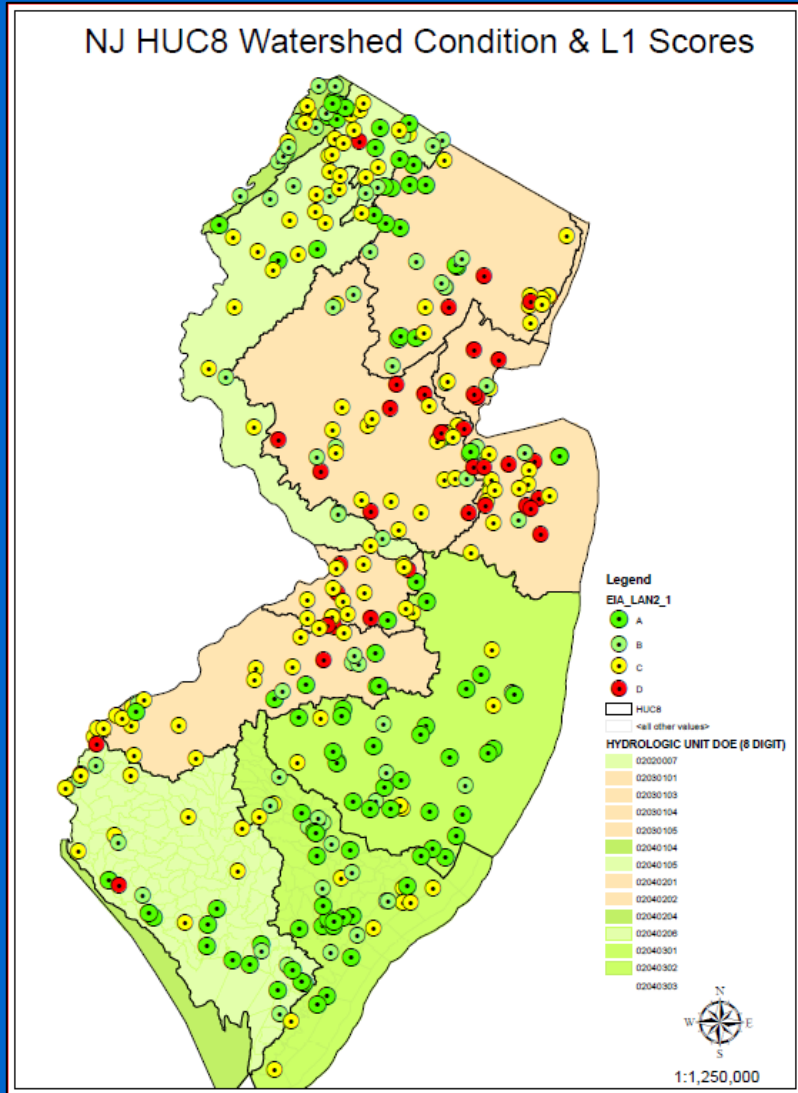


Hackensack-Passaic HUC8
Score = C

Mullica-Toms HUC8
Score = B



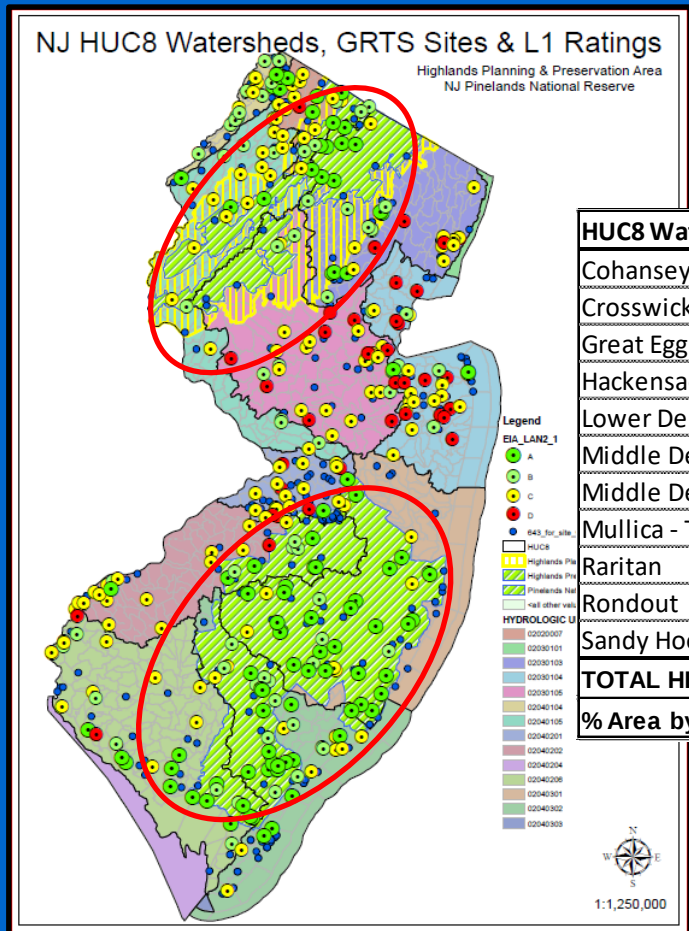
Watershed & Wetland Condition Scores



Good correlation between overall watershed condition and L1 wetland condition scores

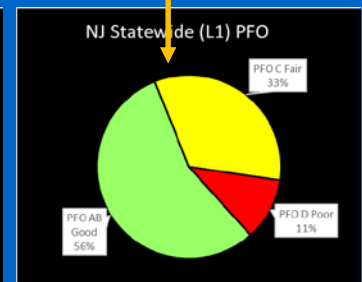
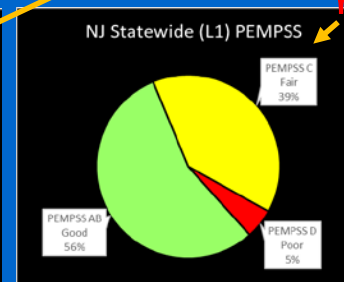
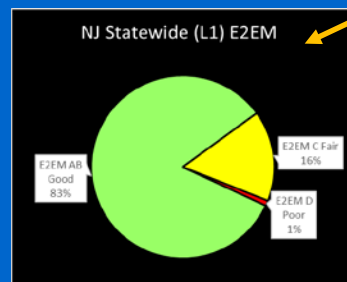
62% Area of NJ Wetlands are in Good Condition!

Most are E2EM (83%) & PFO (56%)



The best quality wetlands in NJ occur on protected lands in the northern Highlands & southern Pinelands Preservation Areas

HUC8 Watershed Name	HUC8 Code	E2EM	PEM	PSS	PFO	TOTAL Ha
Cohansey - Maurice	2040206	28,451	2,746	3,195	35,933	70,325
Crosswicks - Neshaminy	2040201	0	850	1,428	9,026	11,304
Great Egg Harbor	2040302	23,335	979	2,637	27,695	54,646
Hackensack-Passaic	2030103	1,114	2,285	1,916	18,613	23,928
Lower Delaware	2040202	10	1,556	2,784	26,274	30,624
Middle Delaware - Mongaup - Brodhead	2040104	0	395	394	1,817	2,606
Middle Delaware - Musconetcong	2040105	0	1,882	2,485	17,055	21,421
Mullica - Toms	2040301	20,096	2,769	6,410	64,039	93,314
Raritan	2030105	970	1,537	3,161	28,662	34,331
Rondout	2020007	0	1,333	1,173	4,817	7,323
Sandy Hook - Staten Island + Lower Hudson	2030104+01	1,806	646	497	5,992	9,048
TOTAL HECTARES		75,783	16,978	26,082	240,028	358,871
% Area by Wetland Type		21%	5%	7%	67%	100%



SUMMARY

- A high correlation between Level 2 EIA condition scores, and Level 3 floristic quality metrics (Cover-weighted Mean C and NWCA Vegetation Multimetric Index).
- Ground-based metrics provided a robust measure of wetland condition across wetland types and a strong response to human stressors.
- Level 1 metric (Land Use Index) was sufficiently predictive of on-site ecological integrity to provide the basis for a state-wide, watershed and wetland type-based assessment of condition.
- 62% of all wetlands in New Jersey are in Good condition and they are predominantly found in less impacted watersheds.

NEXT STEPS...

Network of Reference Standard Wetland Sites for Monitoring & Setting Restoration Standards

