NYC Tidal Marsh Assessment: Condition, Vulnerability and Restoration Opportunities

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NYC Parks - Natural Resources Group [1]
The Nature Conservancy[2]
Natural Areas Conservancy [3]

NCER
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Parks

Why Urban Coastal Wetlands

- **Coastal wetlands are a critical part of a livable NYC**
  - resilient Park assets
  - aesthetic, recreational and educational value
  - ecosystem services (fisheries, bird communities, water quality)
- **Coastal wetlands are at risk**
- **Planning, management and restoration can help protect our wetland assets for the future**

Historic NYC Wetland Extent

RPA Historic Tidal Wetlands & NWI Tidal Wetlands

- NWI Tidal Wetlands

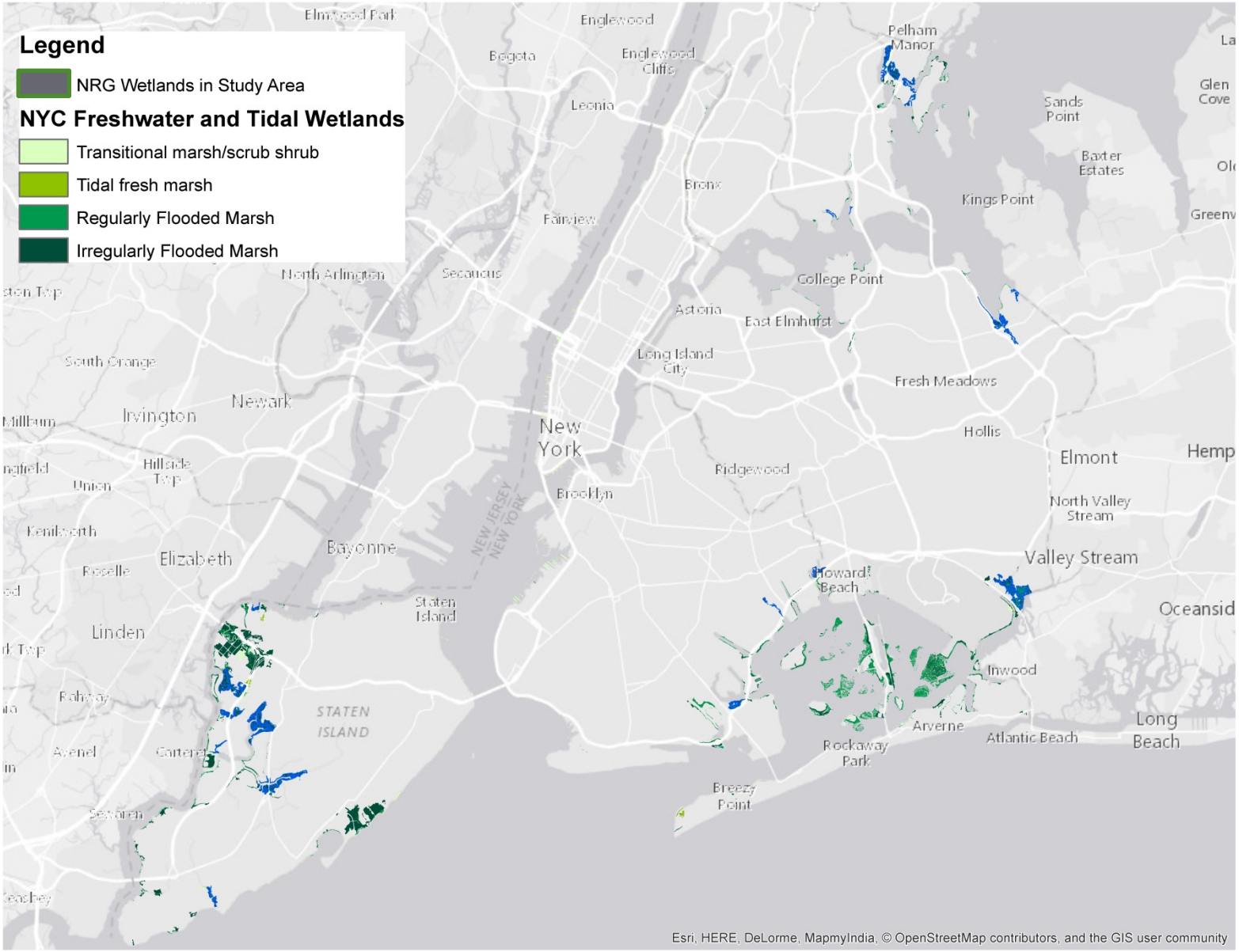
RPA Historic Tidal Wetlands

- Hstoric Wetlands Tidal or Fresh
- Historic Tidal Wetlands

- Borough
- Water Bodies
- Parks

City of New York
Parks & Recreation
Michael R. Bloomberg, Mayor
Adrian Benepe, Commissioner

Current NYC Tidal Wetlands



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Project Goals

- Assess current marsh condition
- Evaluate vulnerability (SLR)
- Identify opportunities for protection, conservation & restoration

Prioritize restoration & protection opportunities

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Ecological Assessment at 25 salt marshes

Desktop Analysis

- Historic Loss Analysis
- SLAMM

Rapid Ecological Assessments

- MidTRAM
- Marsh-wide assessments

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Identify key ecological attributes of marsh condition for which there are measurable indicator variables:

Marsh area

% Development in buffer

Species richness

Total cover

Low marsh soil strength

Breeding bird count

Bare soil cover

Pool expansion

Ditch density

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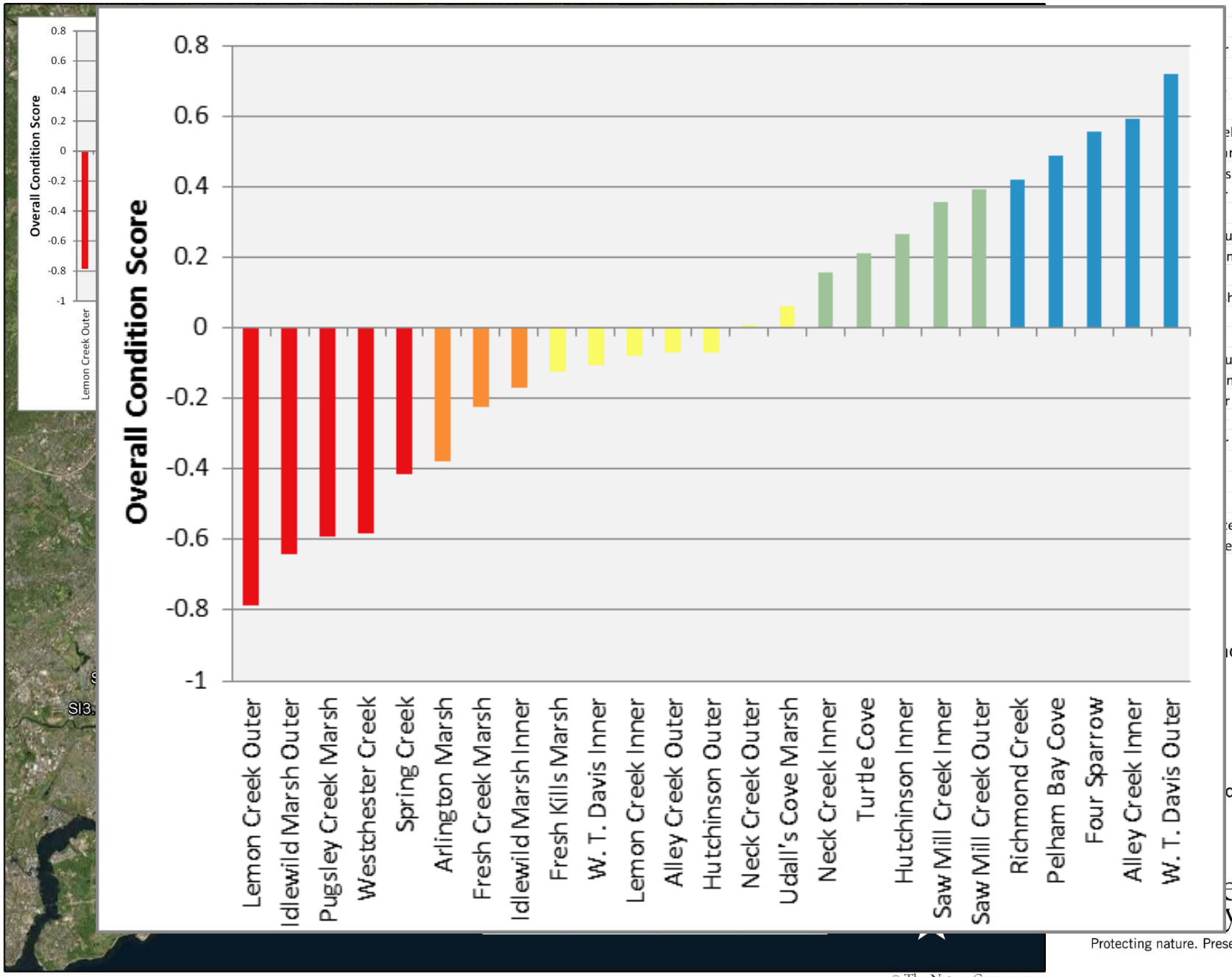
Overall Condition Score



	Score
r	-0.07
	0.27
	0.49
	0.21
ek	-0.58
rsh	-0.59
sh	0.06
	-0.07
	0.59
uter	-0.64
ner	-0.17
	-0.42
h	-0.22
	0.56
	-0.38
uter	0.40
ner	0.36
r	0.01
	0.16
r	0.72
	-0.11
	0.42
	-0.13
er	-0.79
er	-0.08

dition

dition

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Identify key measurable indicators of vulnerability available from SLAMM outputs, field and desktop assessments

- Percent high marsh
- Marsh area
- Edge density
- Waterward loss
- Potential gain from migration
- Potential loss by SLR

Idlewild Park, Queens, NY

Salt marsh

Recently lost salt marsh

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Sea Level Affecting Marshes Model (SLAMM)

Current marsh boundary

Vulnerability metric:

Potential marsh migration
(greater than 75% likelihood)

Potential marsh loss
(less than 25% likelihood)

Likelihood of Coastal Marsh 2080s Idlewild Park

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The Nature Conservancy

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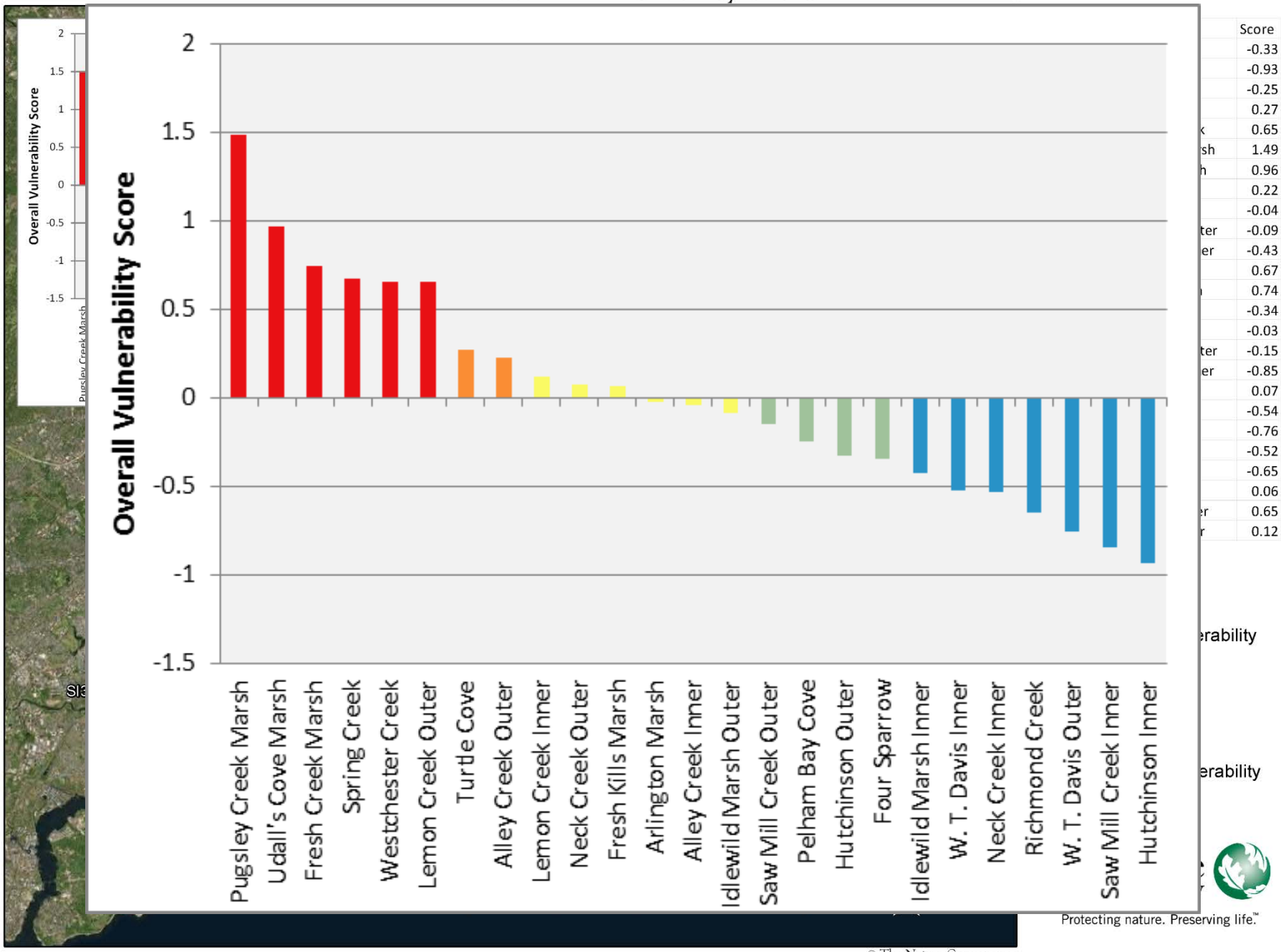
Overall Vulnerability Score



	Score
	-0.33
	-0.93
	-0.25
	0.27
k	0.65
sh	1.49
h	0.96
	0.22
	-0.04
ter	-0.09
er	-0.43
	0.67
	0.74
	-0.34
	-0.03
ter	-0.15
er	-0.85
	0.07
	-0.54
	-0.76
	-0.52
	-0.65
	0.06
er	0.65
r	0.12

erability

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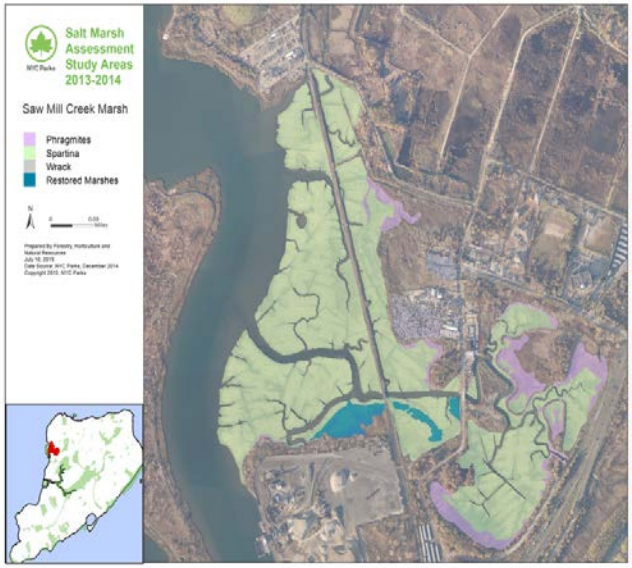
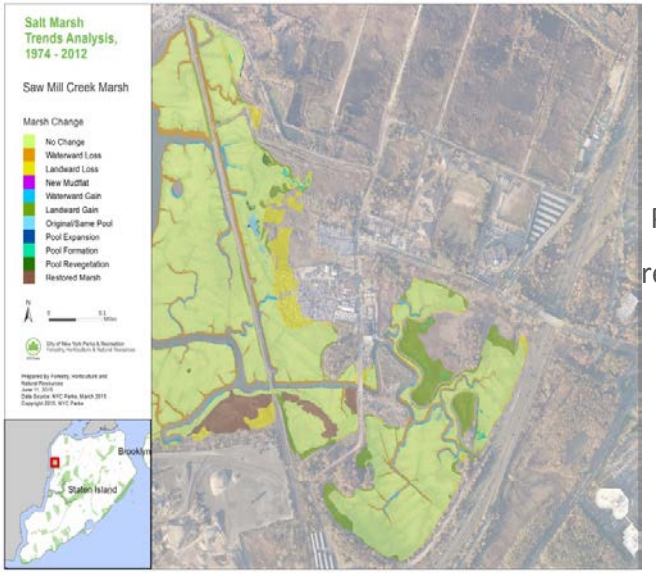
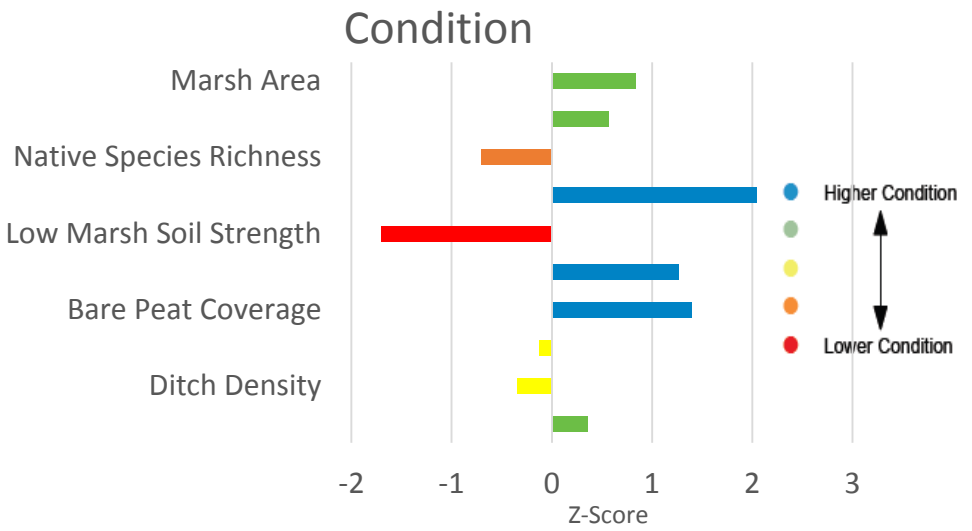
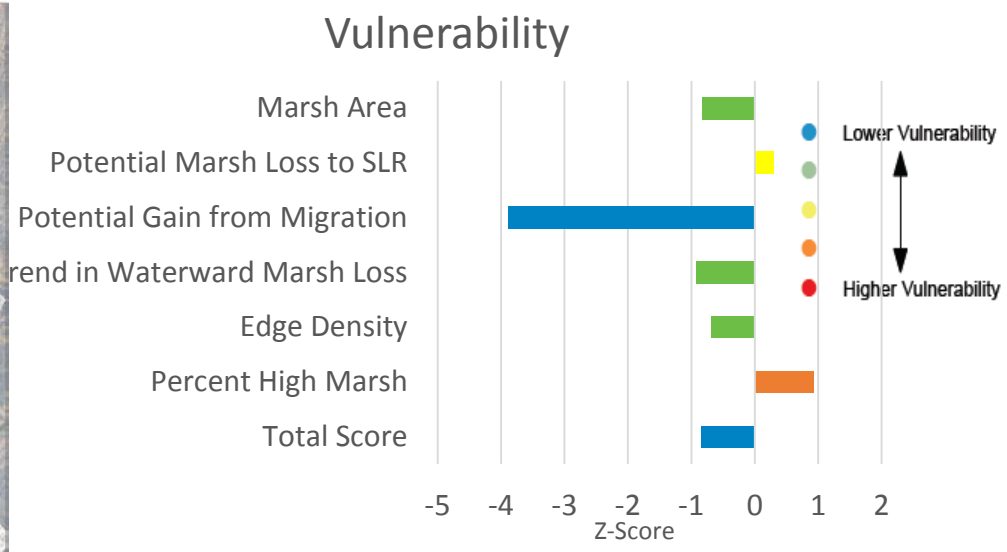
Example – Saw Mill Creek Marsh, Staten Island









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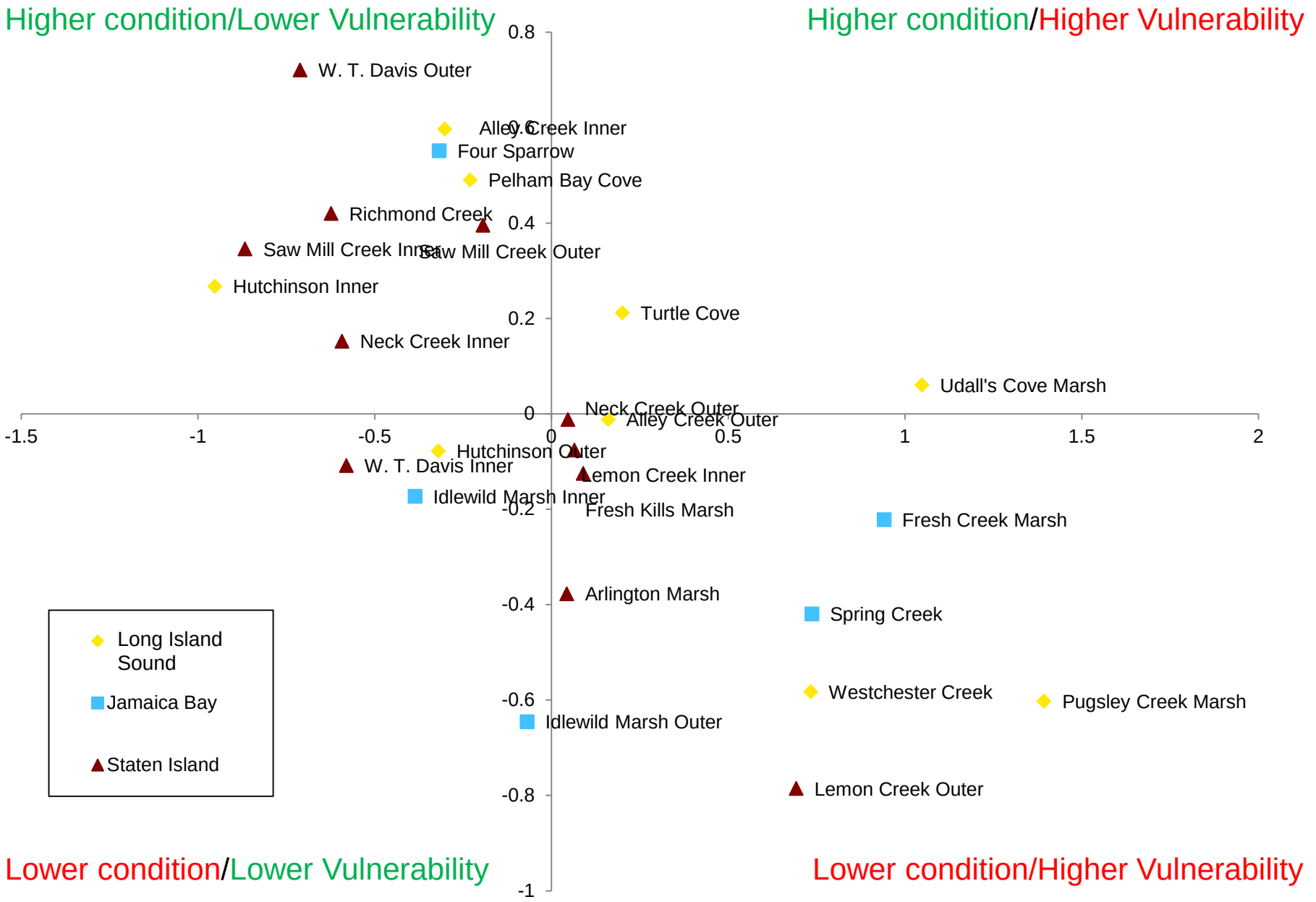
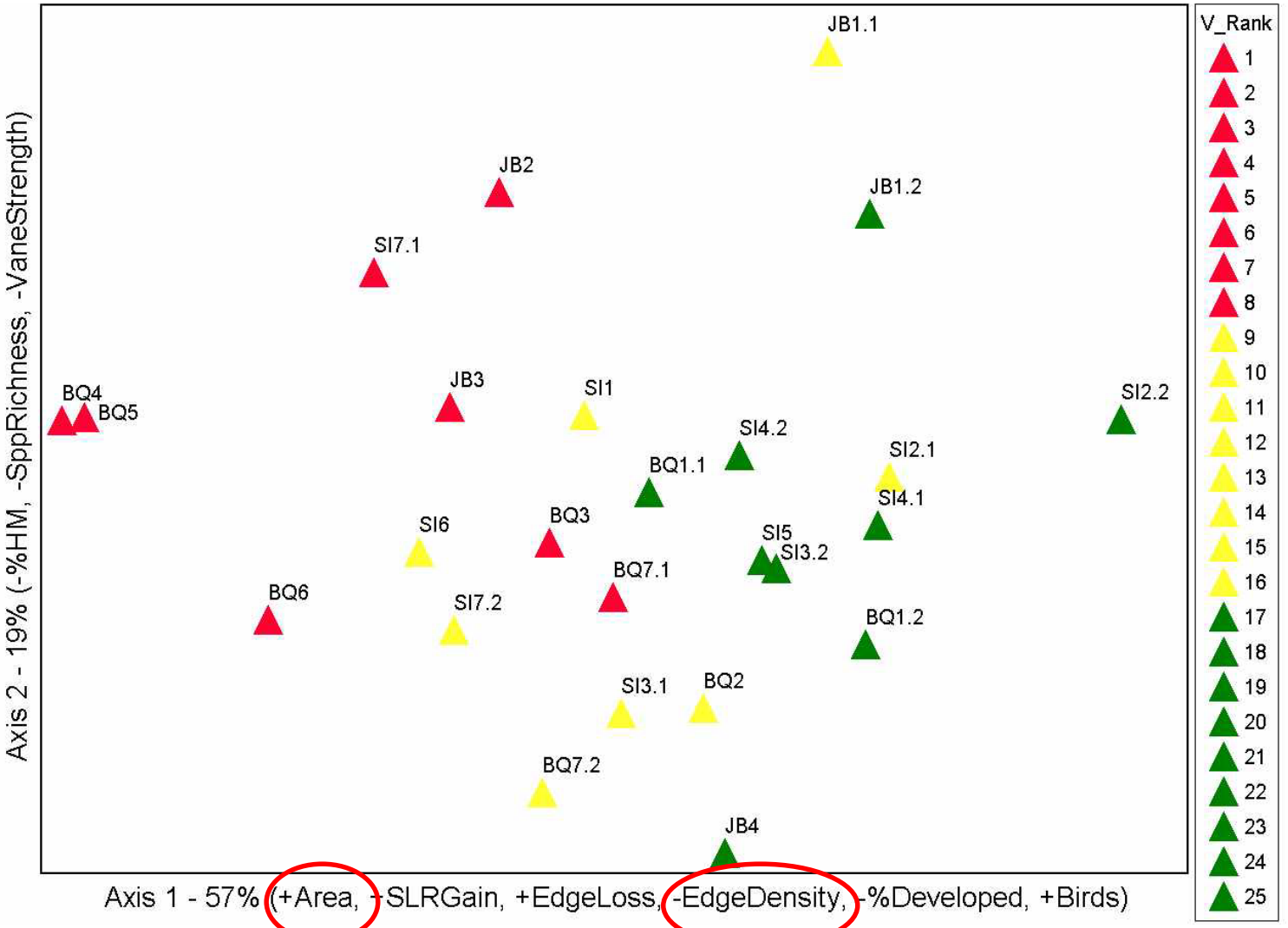
Marsh Condition vs. Vulnerability



Marsh Area and Shape Explain Trends in Condition and Vulnerability Variables



R^2 = 0.70

R^2 = -0.89

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Identify and prioritize strategies for restoration

Short/Mid-Term: Increase viability of existing marsh sites

- ✓ Remove fill and re-establish hydrology
- ✓ Remove debris and revegetate
- **Increase elevation** of drowning marsh surface
- **Restore shore edge** of marsh where eroded

Long Term: Assure sustainability of marsh ecosystems

- **Secure adjacent parcels** where marsh can migrate
- **Remove hard surfaces** that impede marsh migration

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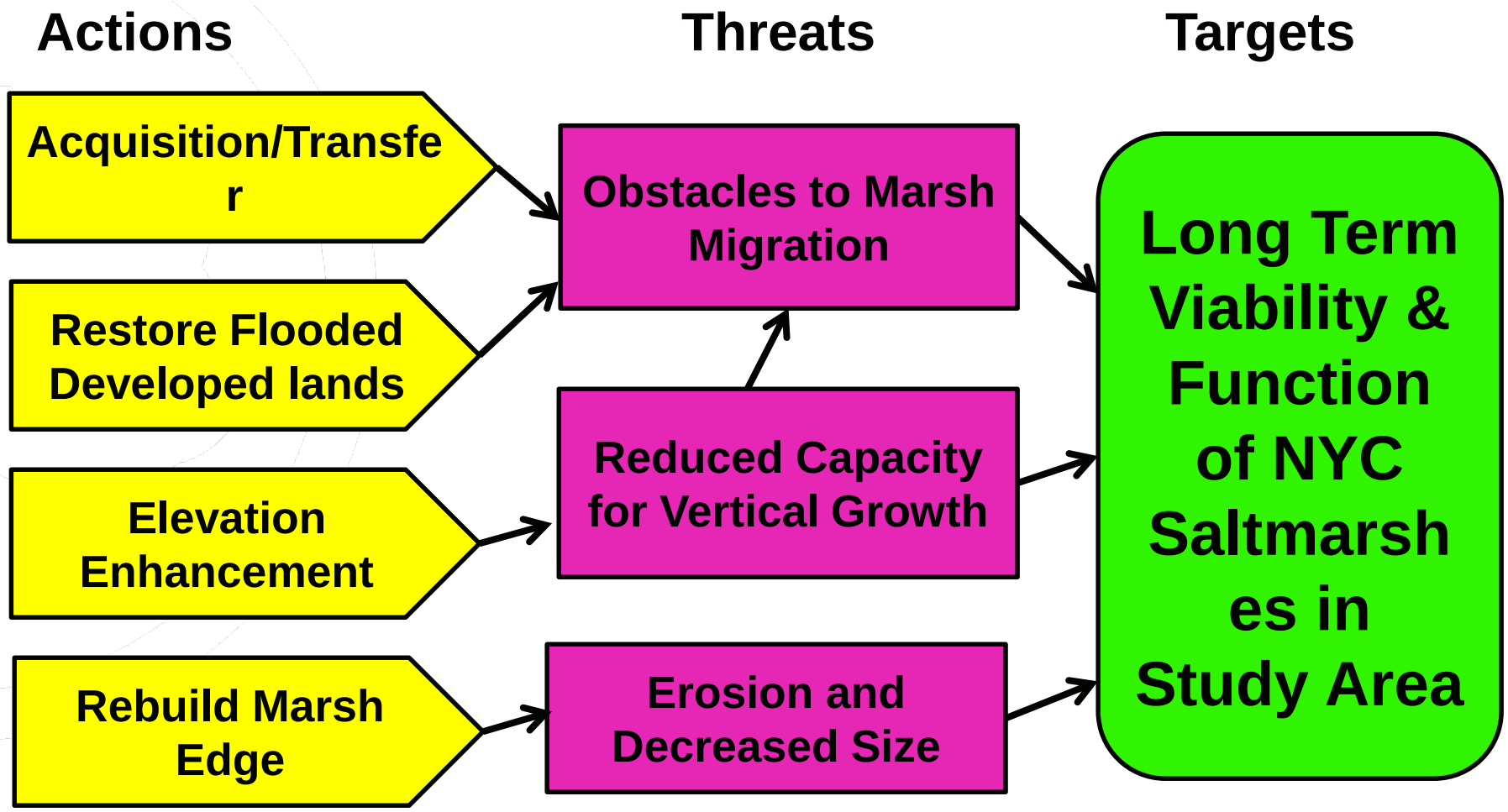
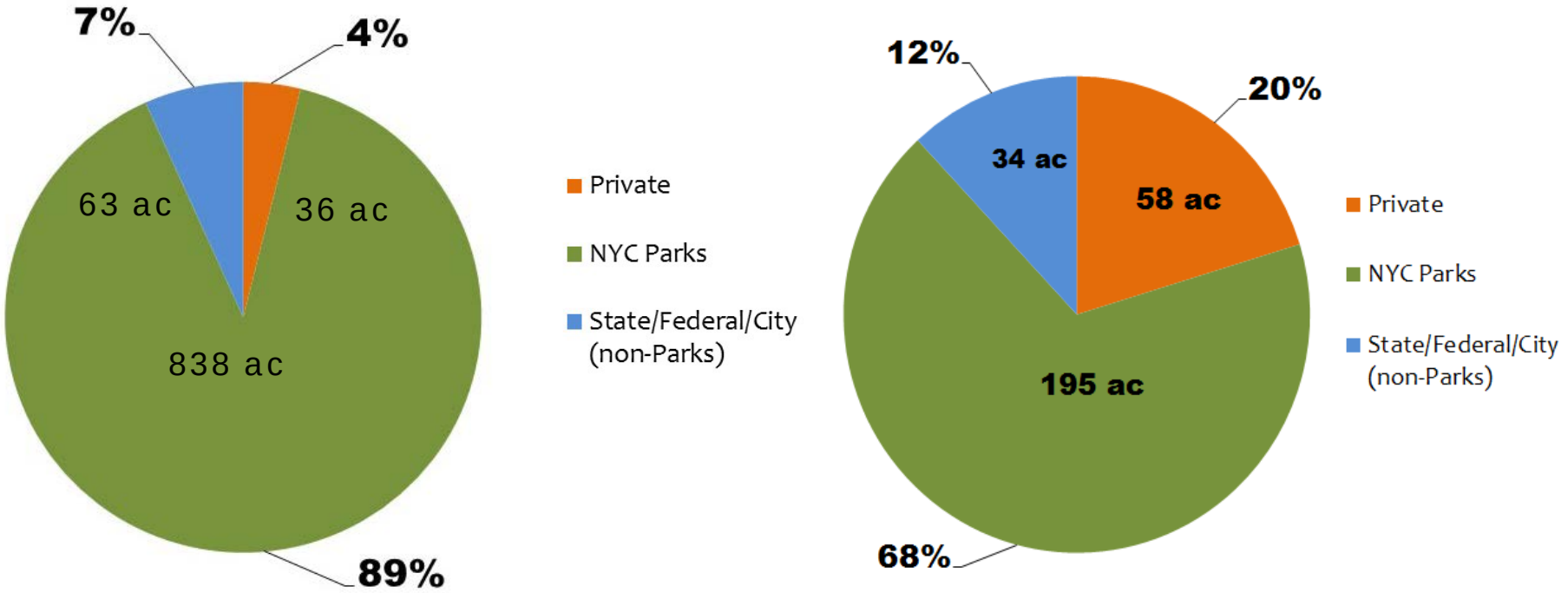
Opportunities for Restoration / Conservation



Acquisition/ Transfer

Ownership across 25 NYC Marsh complexes



Current Marsh

Future Marsh with SLR

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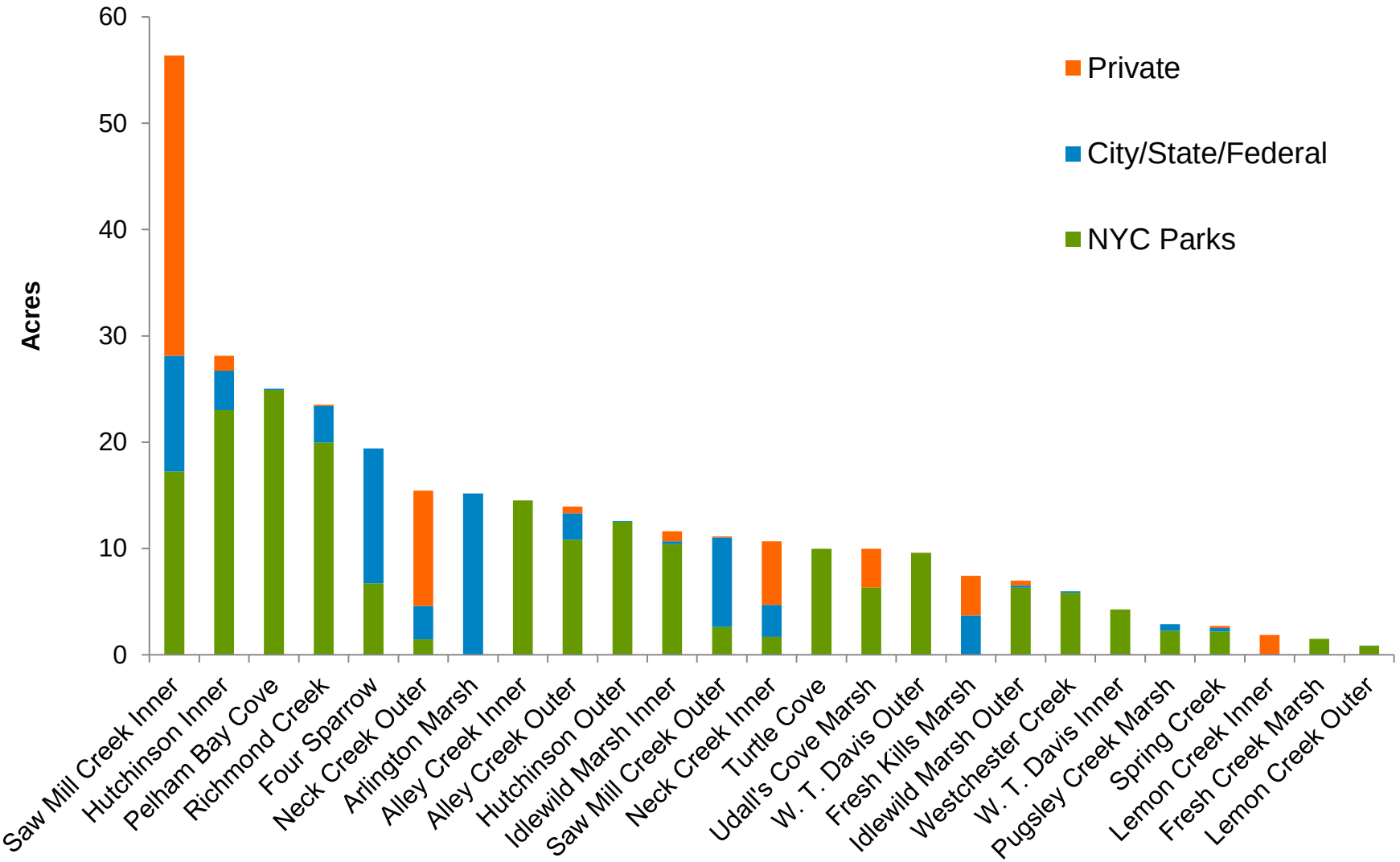
Future new marsh acres in Study Area



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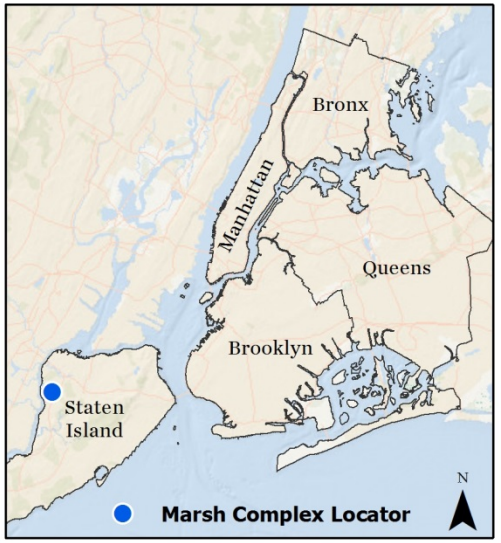
Marsh Advancement by Parcel

Saw Mill Creek Inner



Legend

Marsh Study Area

Parcel ownership

City/State/Federal

Parks and Rec

Private

Potential study area marsh migration by parcel (2085)

< 0.1 acre

0.1 - 0.5 acre

> 0.5 acre

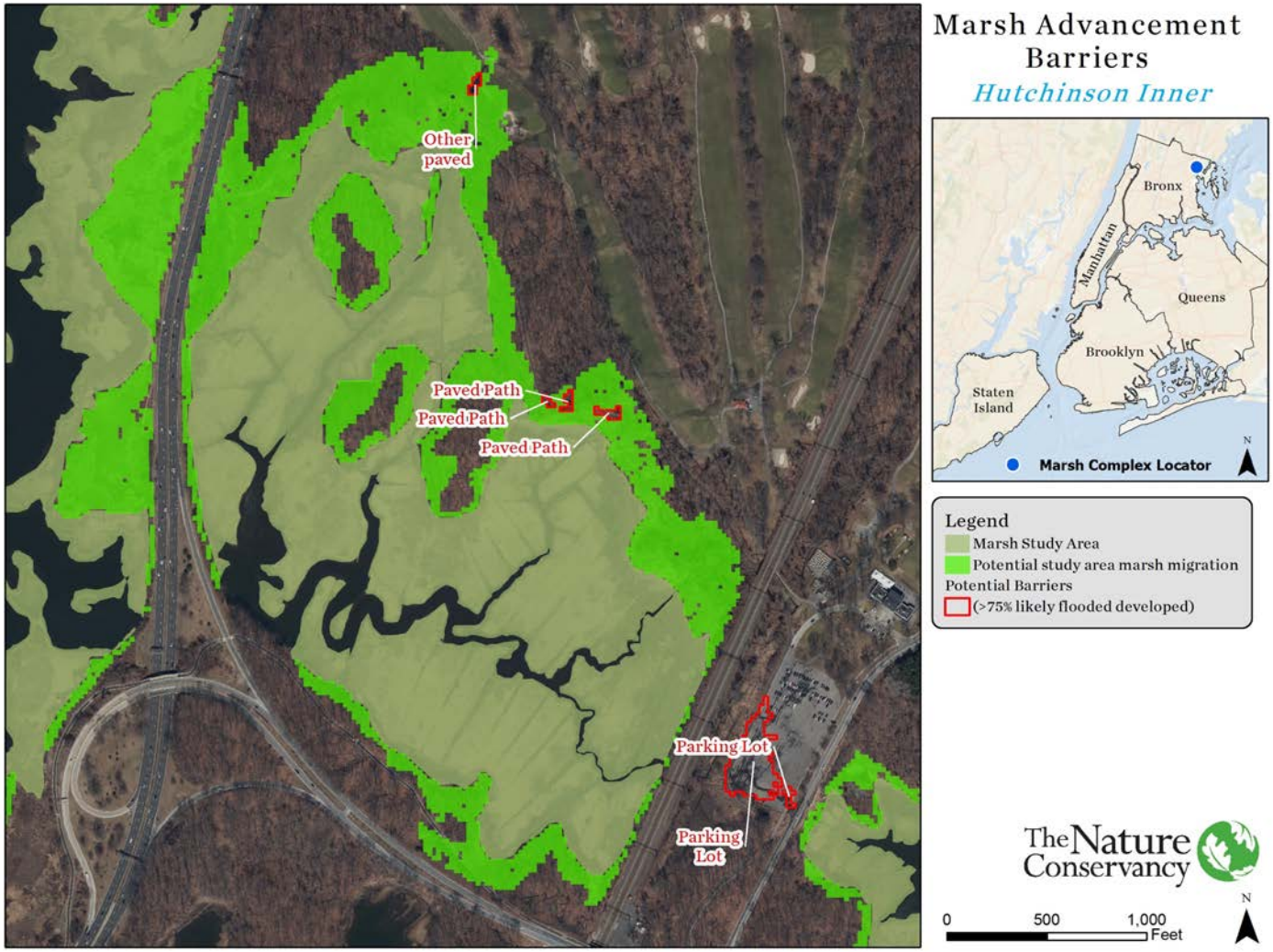
Transportation/planned development

The Nature Conservancy

0 1,450 2,900 Feet

N

Restore Flooded Developed lands



Action prioritized by area of opportunity

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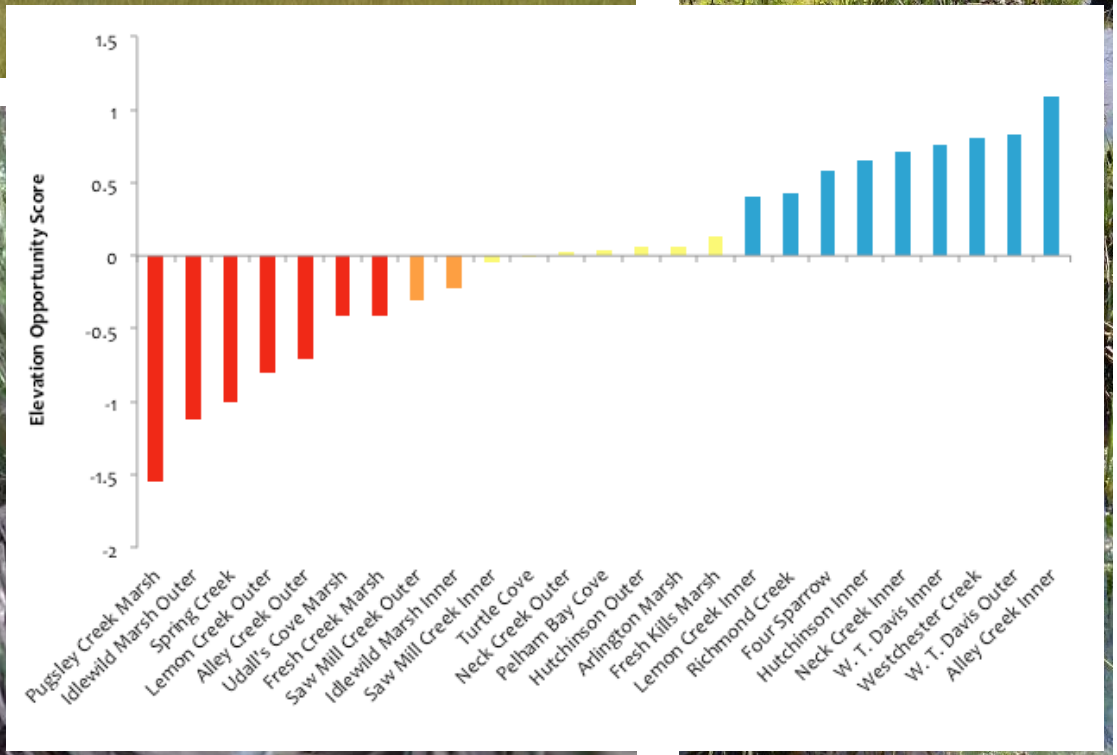
Elevation Enhancement



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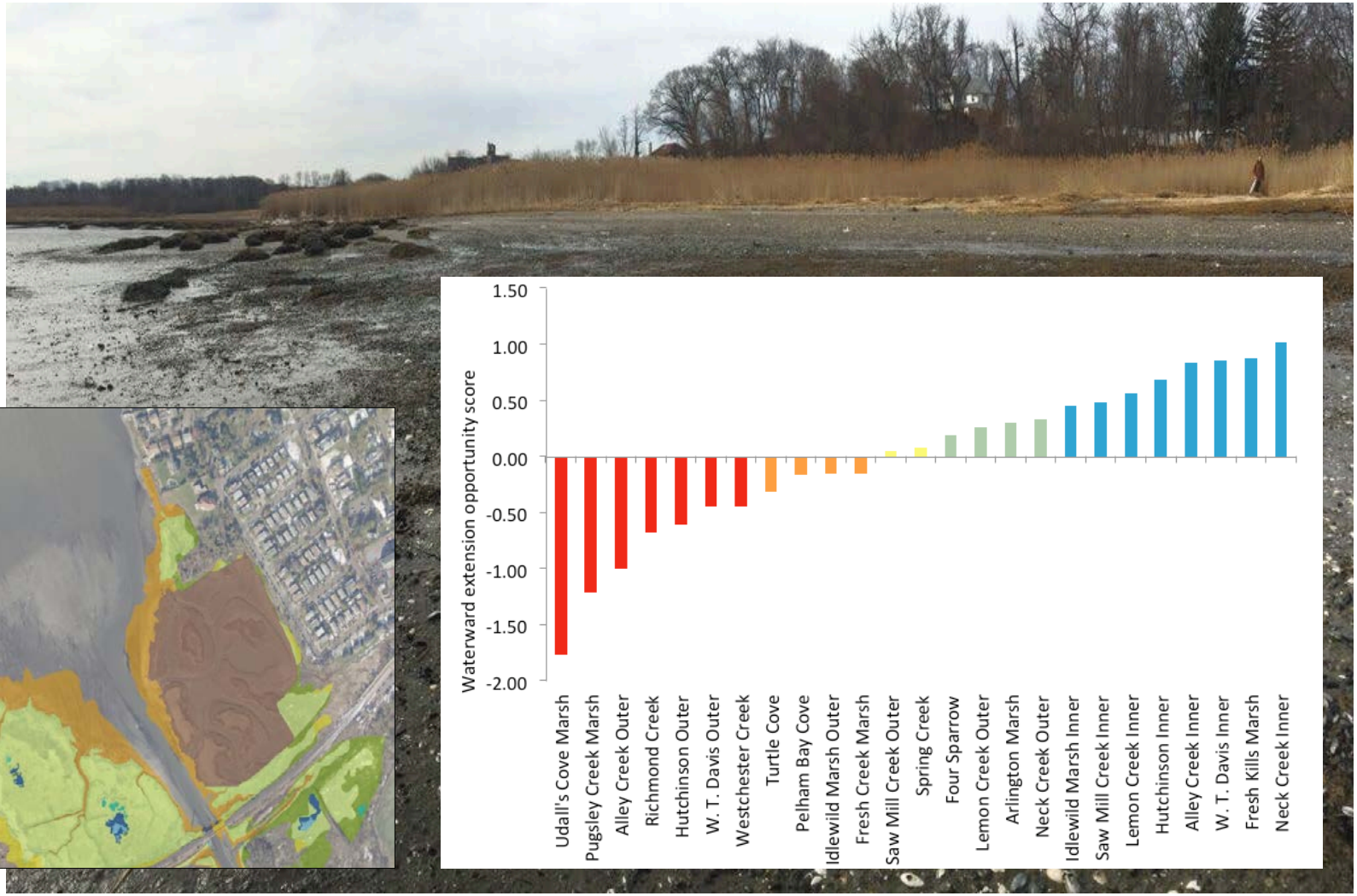
Action prioritized by % low marsh and future marsh loss in SLAMM

Rebuild Marsh Edge



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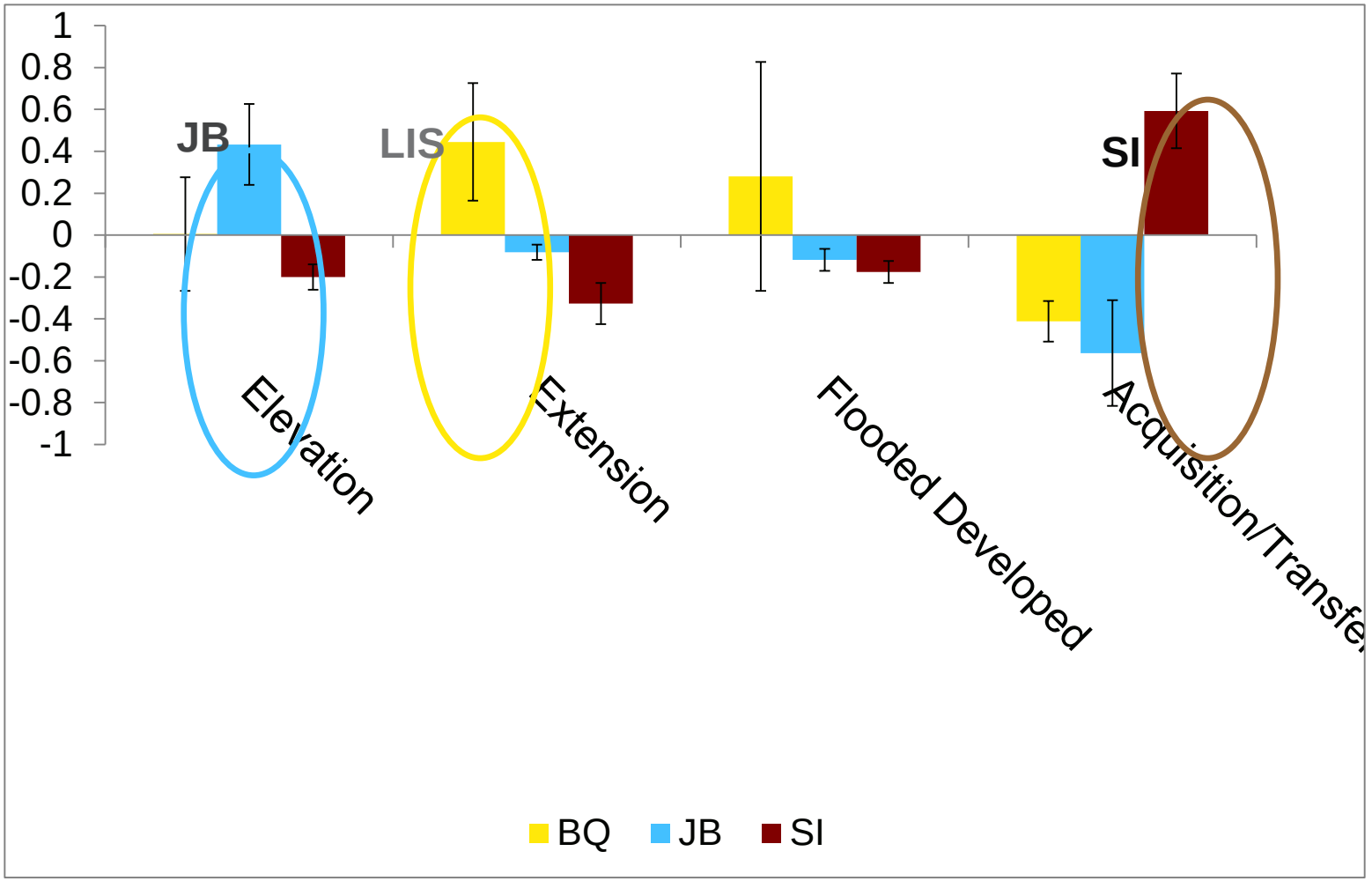
Action prioritized by acres, width and % of recent marsh lost and future marsh loss in SLAMM


Are these a better long-term investment?
Lower Condition / Higher Vulnerability
Moderate Condition & Vulnerability
Higher Condition / Lower Vulnerability
Is there anything we can do to save marshes that are highly vulnerable to begin with?
W. T. Davis Outer
Alley Creek Inner
Four Sparrow
Pelham Bay Cove
Richmond Creek
Saw Mill Creek Inner
Saw Mill Creek Outer
Hutchinson Inner
Neck Creek Inner
Turtle Cove
Udall's Cove Marsh
Neck Creek Outer
Alley Creek Outer
Hutchinson Outer
Lemon Creek Inner
W. T. Davis Inner
Fresh Kills Marsh
Idlewild Marsh Inner
Fresh Creek Marsh
Arlington Marsh
Spring Creek
Westchester Creek
Pugsley Creek Marsh
Idlewild Marsh Outer
Lemon Creek Outer
Condition
Vulnerability
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1.5
-1
-0.5
0
0.5
1
1.5
2

Watershed / Water-body Considerations



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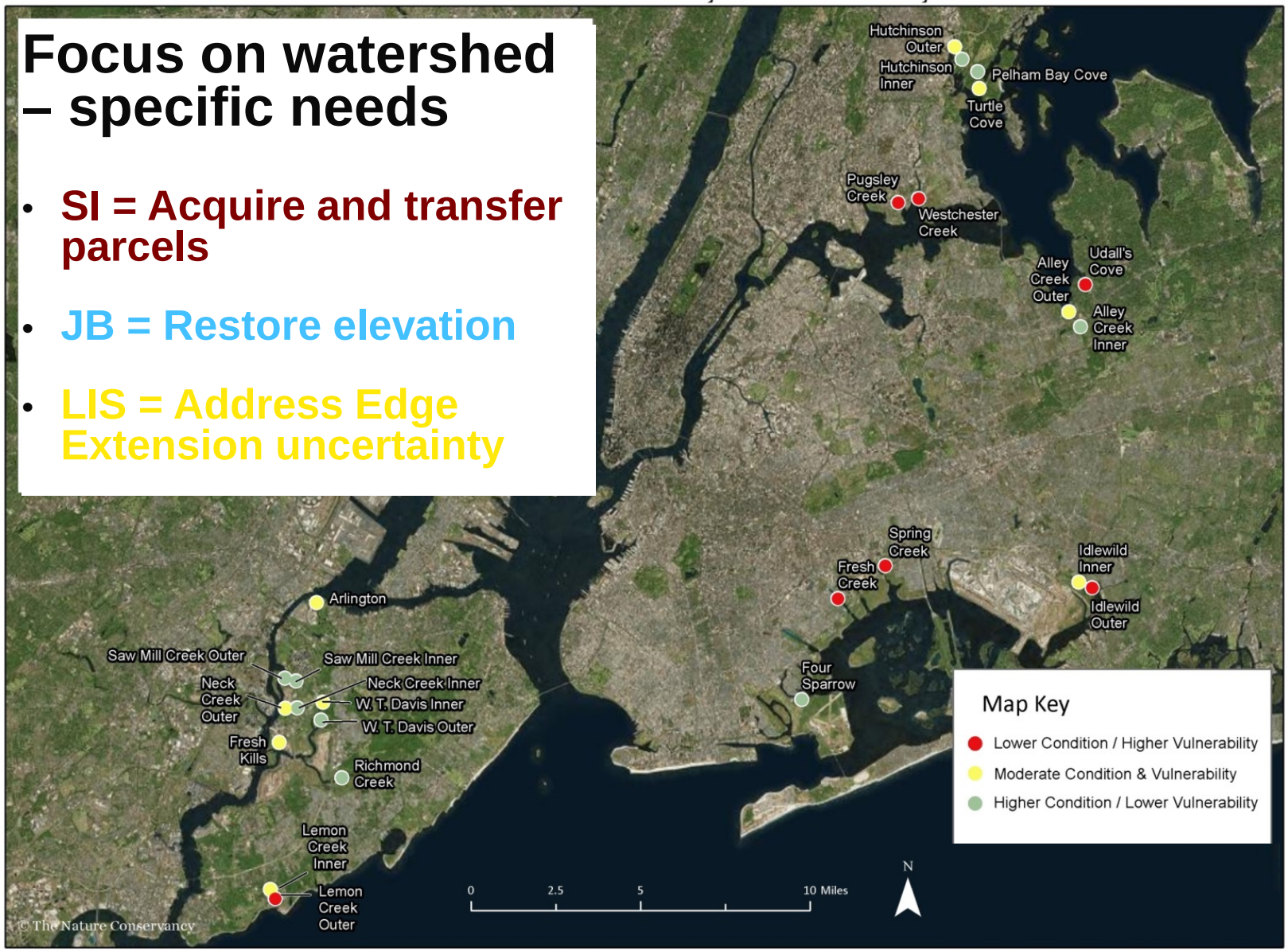
Focus on watershed – specific needs

- **SI = Acquire and transfer parcels**
- **JB = Restore elevation**
- **LIS = Address Edge Extension uncertainty**



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Next Steps

- **Preserve existing marsh ecosystems and marsh migration zones for future** – explore acquisition and easement strategies

- **Prioritize high condition / low vulnerability marshes** through best management practices and these 4 conservation strategies as needed
  - **Address uncertainty** - study shoreline retreat, sediment supply, and **wave energy**
  - **Consider size and shape -** conserve and restore to reduce fragmentation for long term health and viability

- **Consider** s**ocio-economic or ecosystem services** when pursuing opportunities for low condition / high vulnerability marshes

- Consider a watershed approach to conserving wetlands in addition to site by site restoration projects.

Appropriate strategy depends on goals, landscape context, time horizon, and socioeconomic factors

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Kathleen Drake

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United States Environmental Protection Agency