NYC AND LOS ANGELES: CLIMATE CHANGE & USING TREE DIVERSITY TO BUILD A SUSTAINABLE URBAN FOREST

Matthew P. Wells
Urban Forester
City of Santa Monica

Presentation Outline

Urban Tree Canopy Loss

Climate Change

Sustainable Forest Management

Urban Tree Diversity

Diversity Prioritization

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New York and Los Angeles

City of
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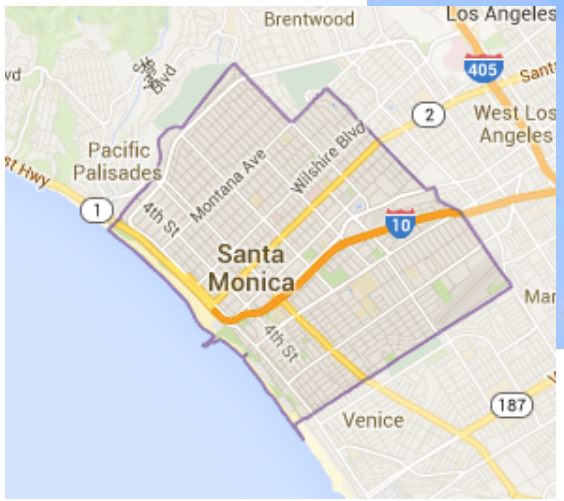
NYC Parks

City of Santa Monica & LA



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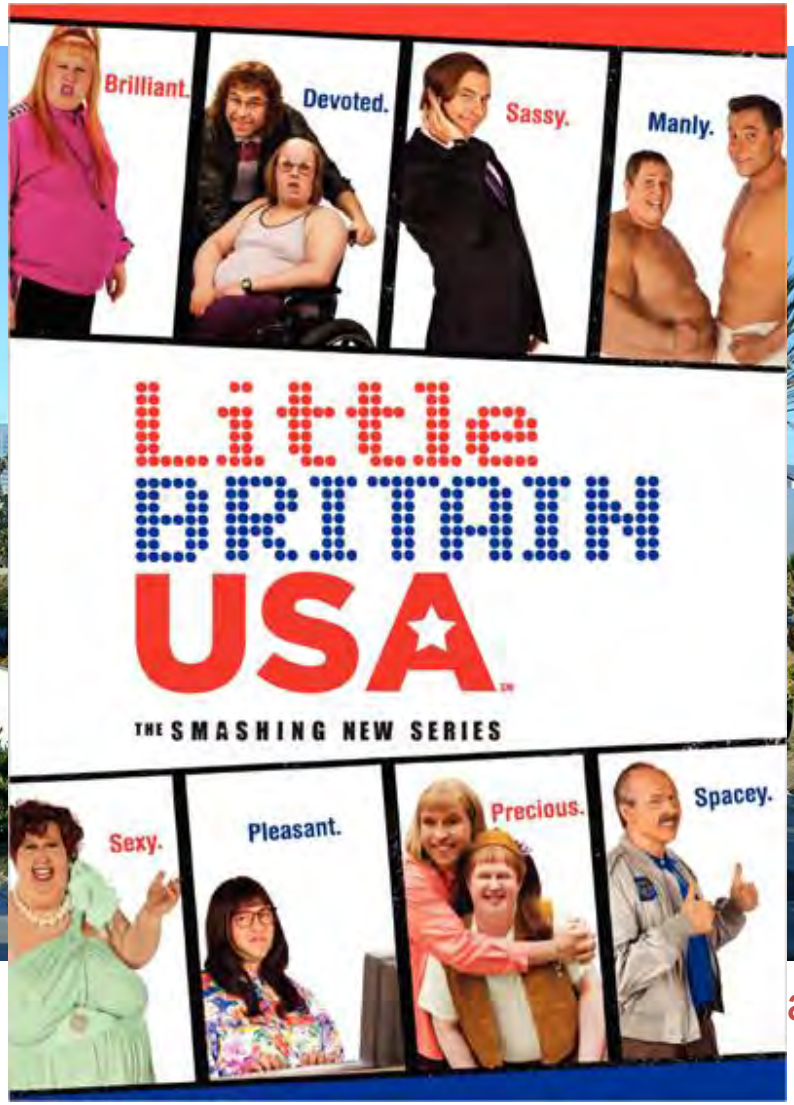

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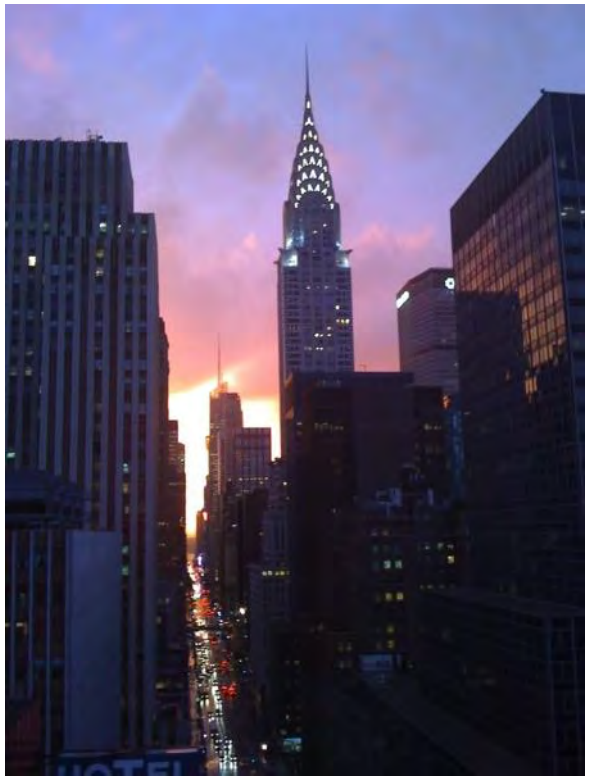
Urban Forests by Numbers



Estimated 2M
Park Trees

6,335
Park Trees

620,000
Street Trees

26,813
Street Trees

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santamonica
CALIFORNIA'S MOST
CELEBRATED BEACH CITY

Urban Tree Canopy Loss

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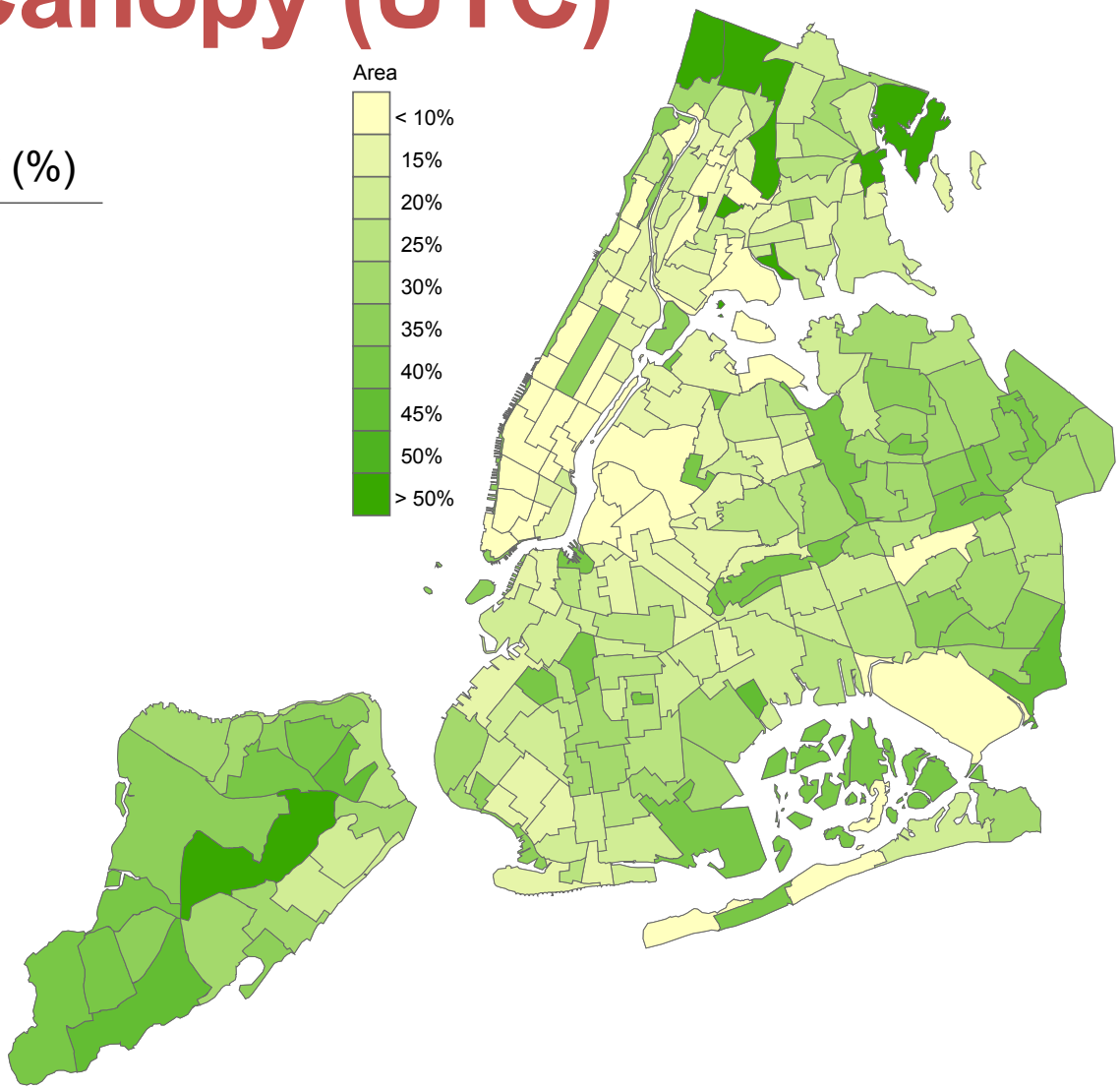
Urban Tree Canopy (UTC)

City	Tree Cover (%)
Atlanta, GA	37
Austin, TX	34
Boston, MA	29
Washington, DC	28
US National Average	*27*
Seattle, WA	25
NYC & Los Angeles	*21*
London, UK	*20*
Santa Monica, CA	*15*
Jersey City, NJ	12
Chicago, IL	11



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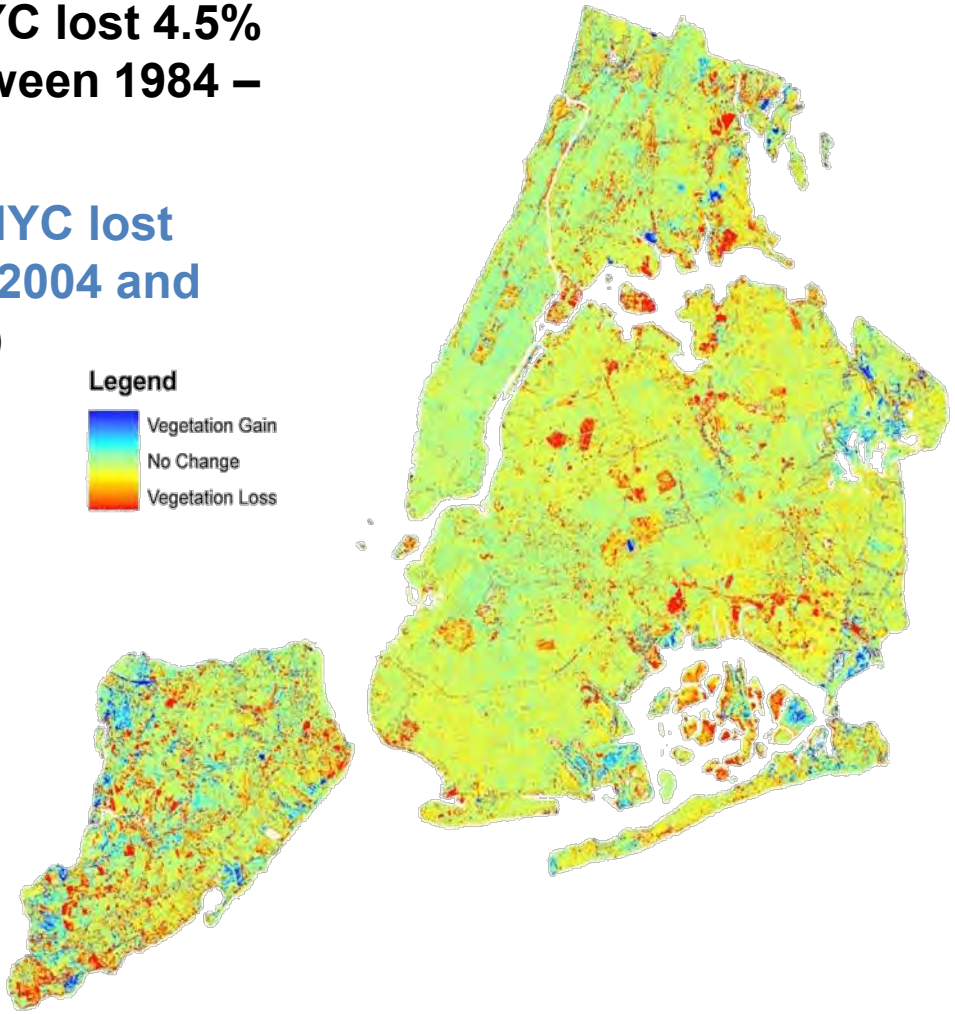
Urban Tree Canopy Loss

Columbia University found that NYC lost 4.5% vegetative cover (9,000 acres) between 1984 – 2002

A US Forest Service study found NYC lost 1.2% area of tree canopy between 2004 and 2009 (Nowak and Greenfield, 2012)

6% Drop in total UTC in 5 Years

This same study discovered that 19 out of 20 US cities were losing urban tree canopy



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Urban Tree Canopy Loss

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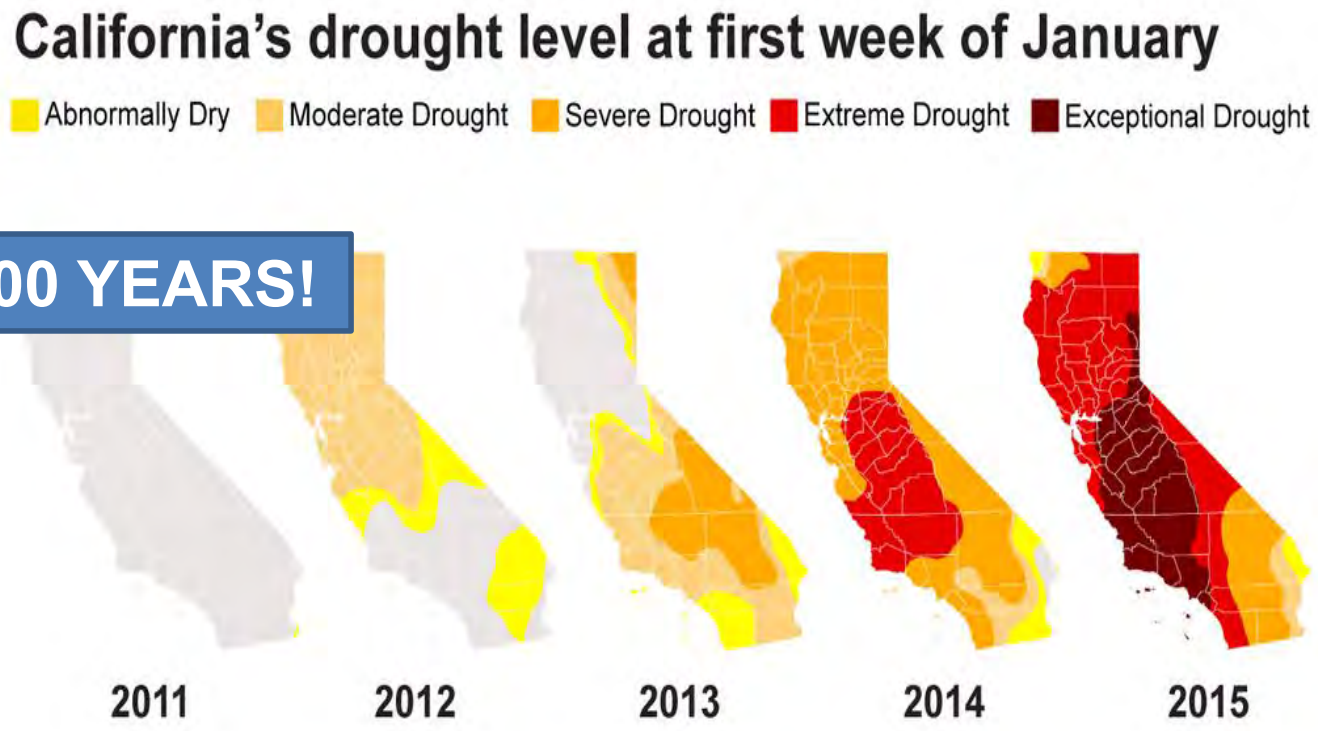
Tree Diversity to Build a Sustainable Urban Forest: Matt Wells

One of the biggest risks to the urban forest is, risk!

Wells, 2015

Urban Tree Canopy Loss
Climate Change: Drought



WORST IN 500 YEARS!

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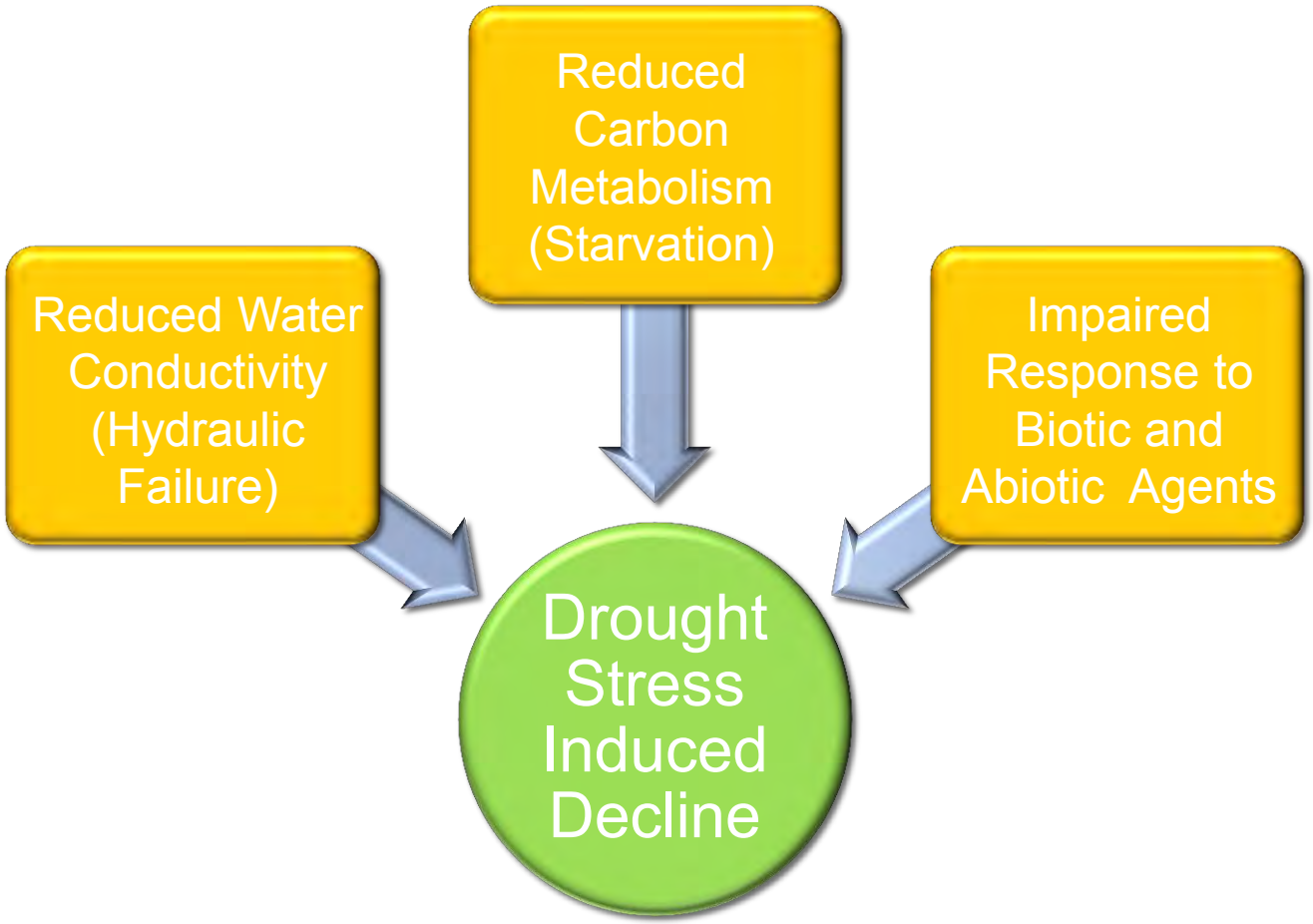
Drought: Threat to Urban Forest



A Summary of the Physiological Impacts of Drought Stress in Trees

(McDowell et al., 2013; McDowell, 2011)

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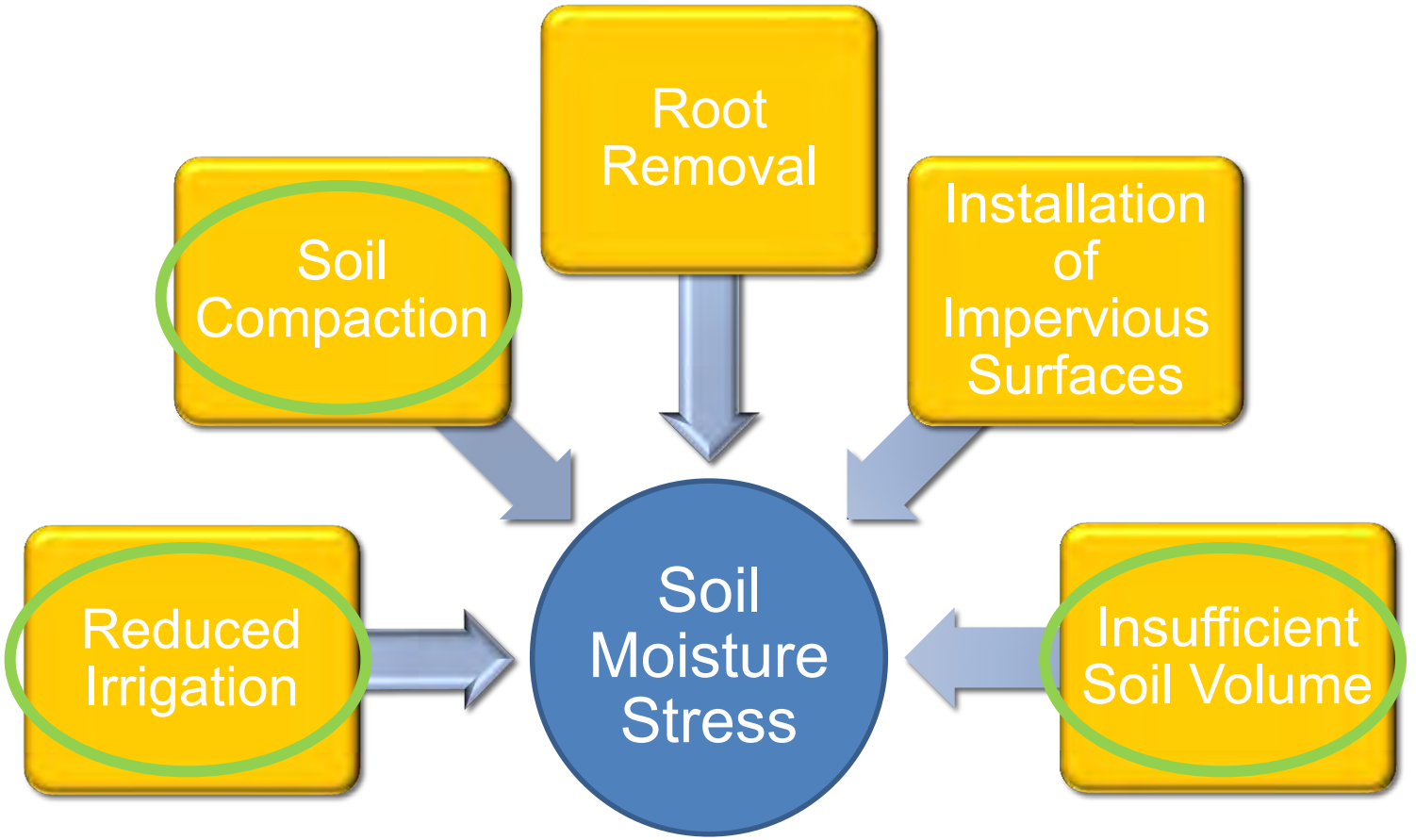
Drought Stress: Contributing Factors



(Modified from Connella, 2008)

Drought Stress

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Los Angeles Times

Source: LA Times

April 2015: 14,000 dead park trees reported in last year due to drought

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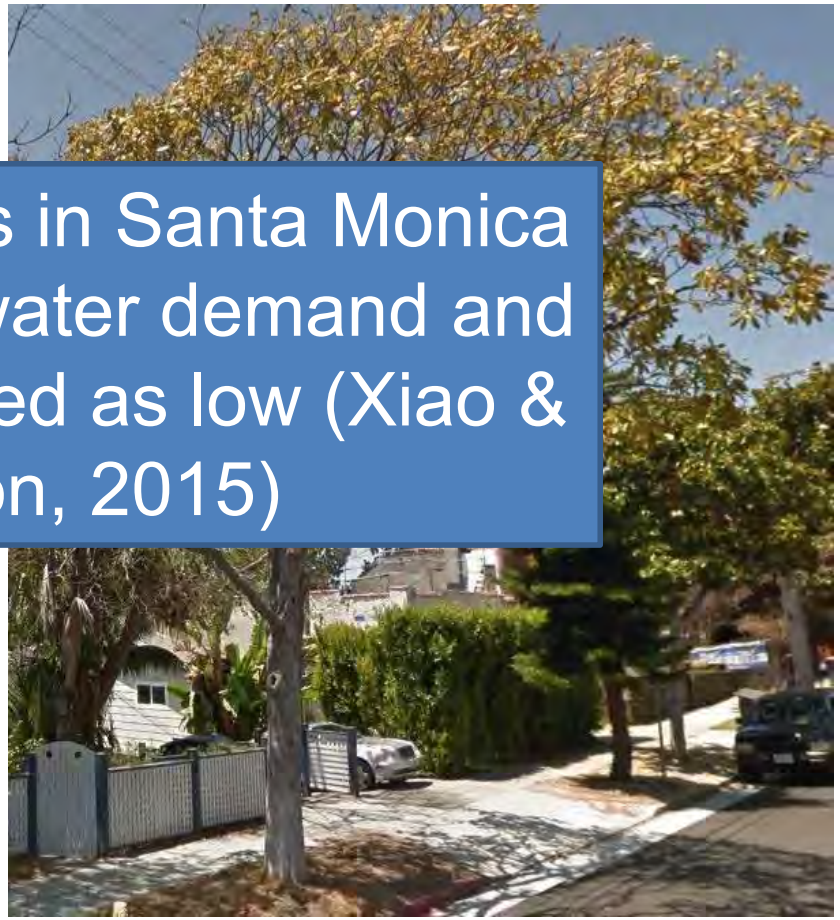
Drought Stress – Reduced Irrigation

June 2011

August 2014



55% of public trees in Santa Monica have a moderate water demand and 44% are categorized as low (Xiao & McPherson, 2015)

Urban Tree Canopy Loss
Climate Change: Extreme Weather

OEM
New York City Office of Emergency Management

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NYC Parks

- Service Requests
- Work Orders

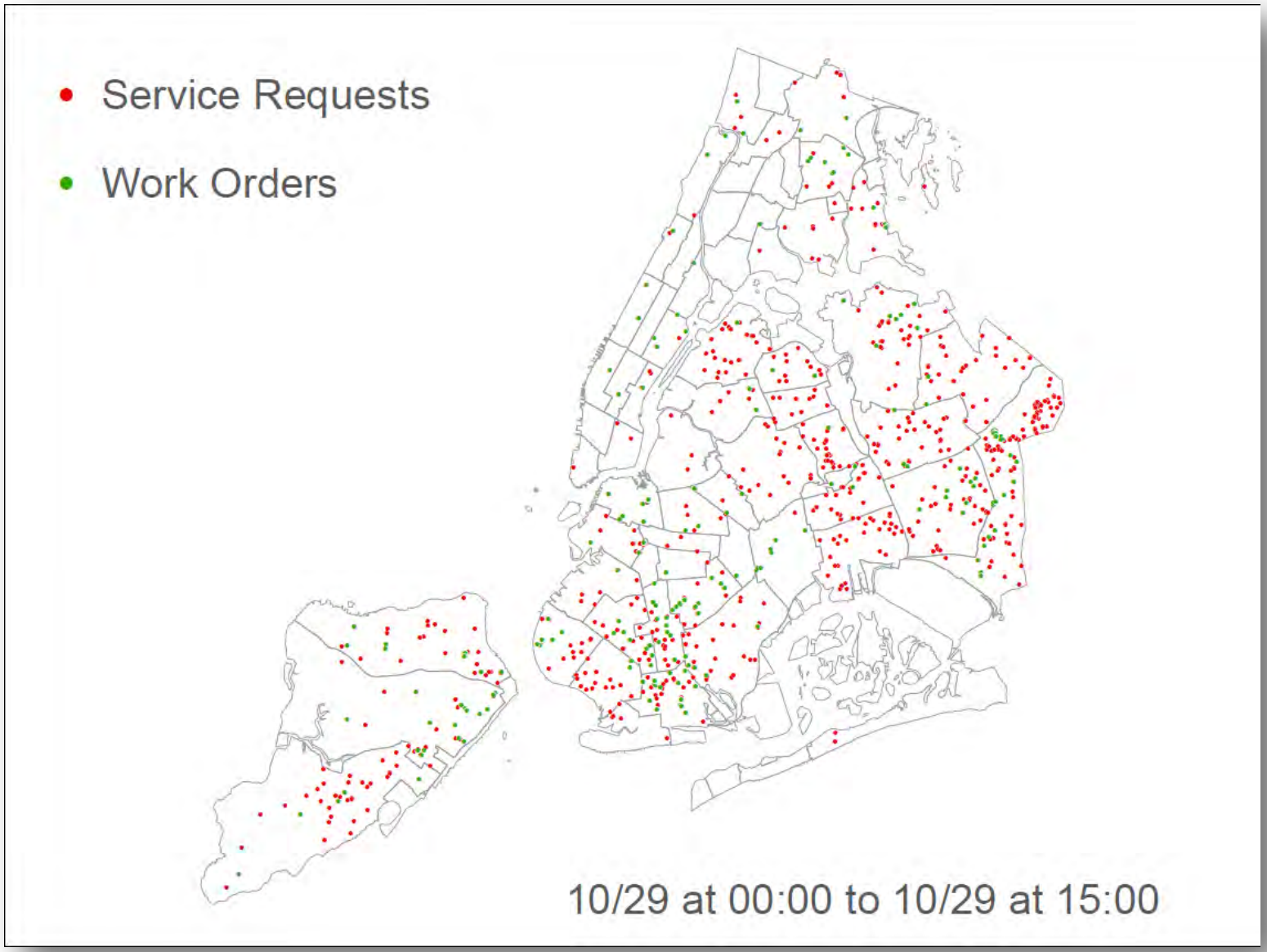
$32 Billion Damages

53 Fatalities

FORESTRY STORM MOBILE

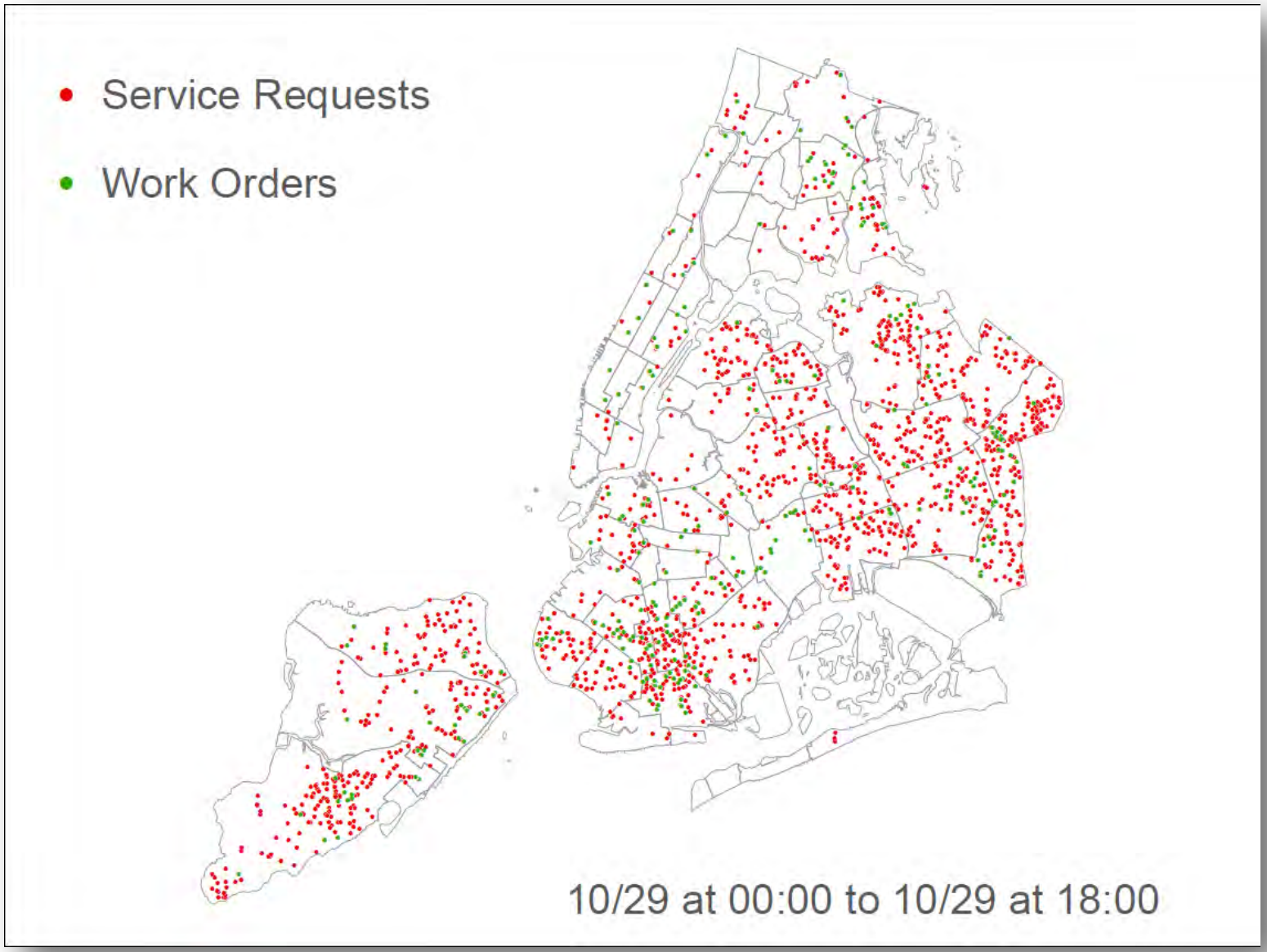
NYC Parks

Hurricane Sandy: 10/29/2012



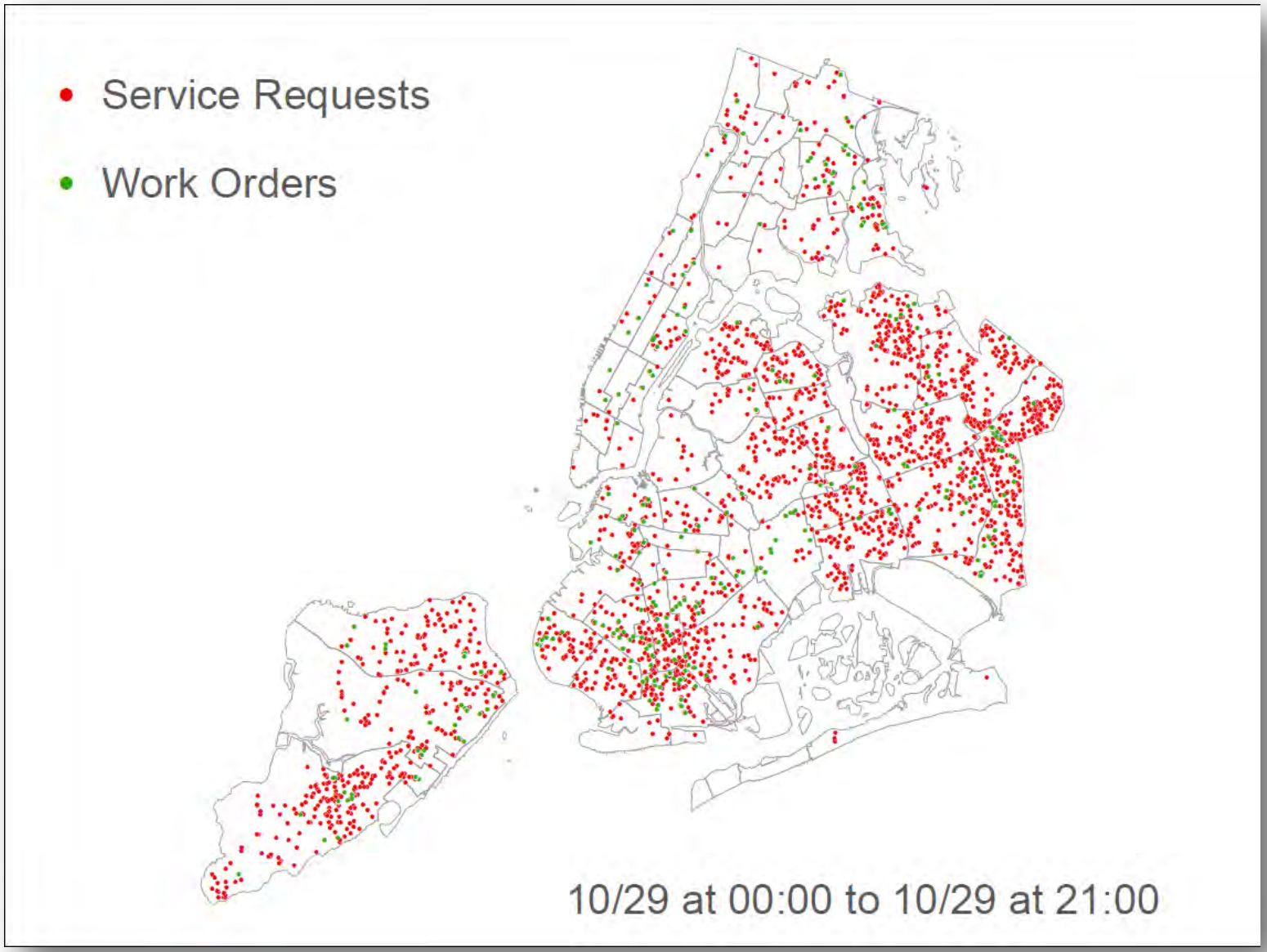
NYC Parks

Hurricane Sandy



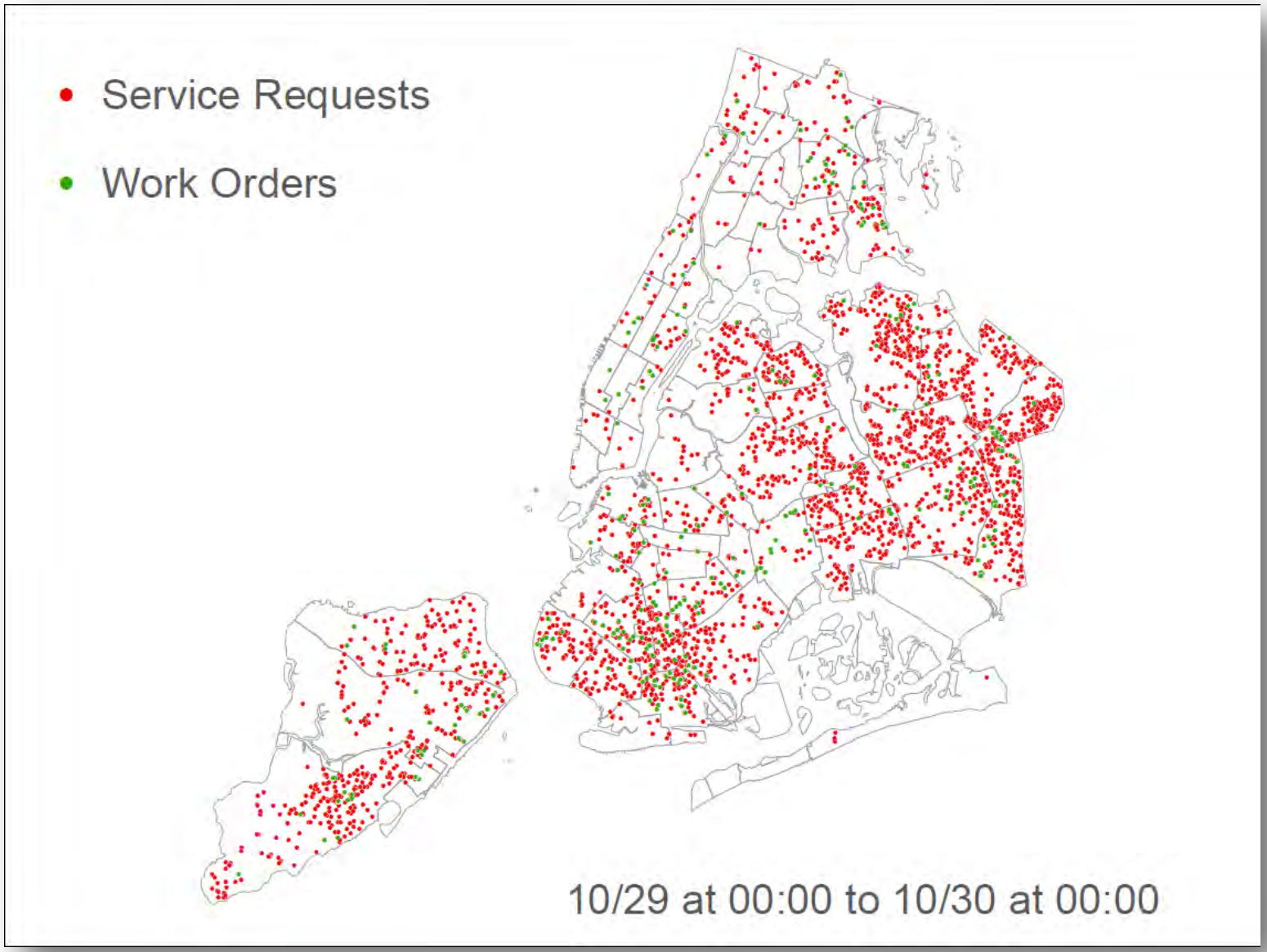
NYC Parks

Hurricane Sandy



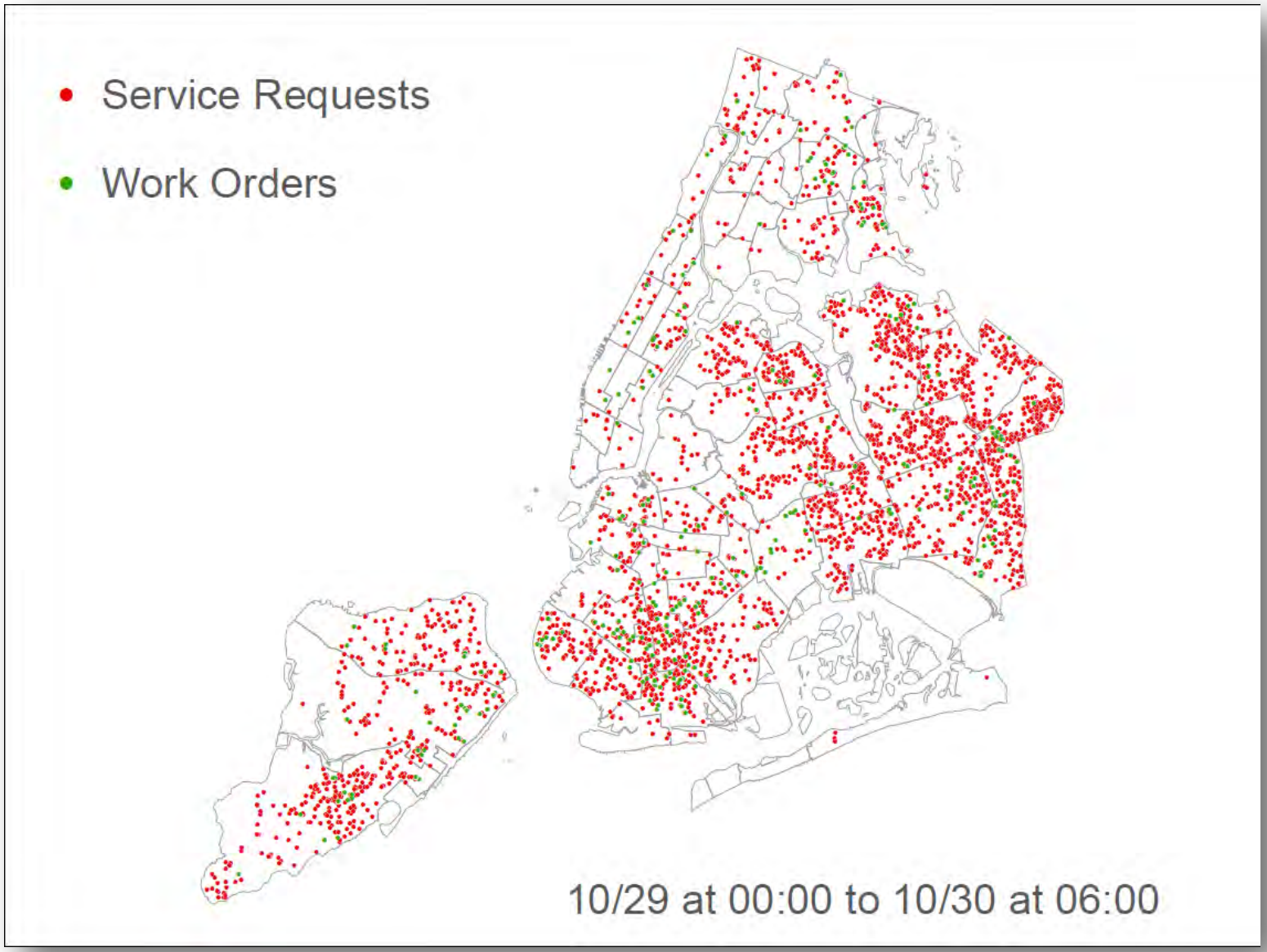
NYC Parks

Hurricane Sandy



NYC Parks

Hurricane Sandy

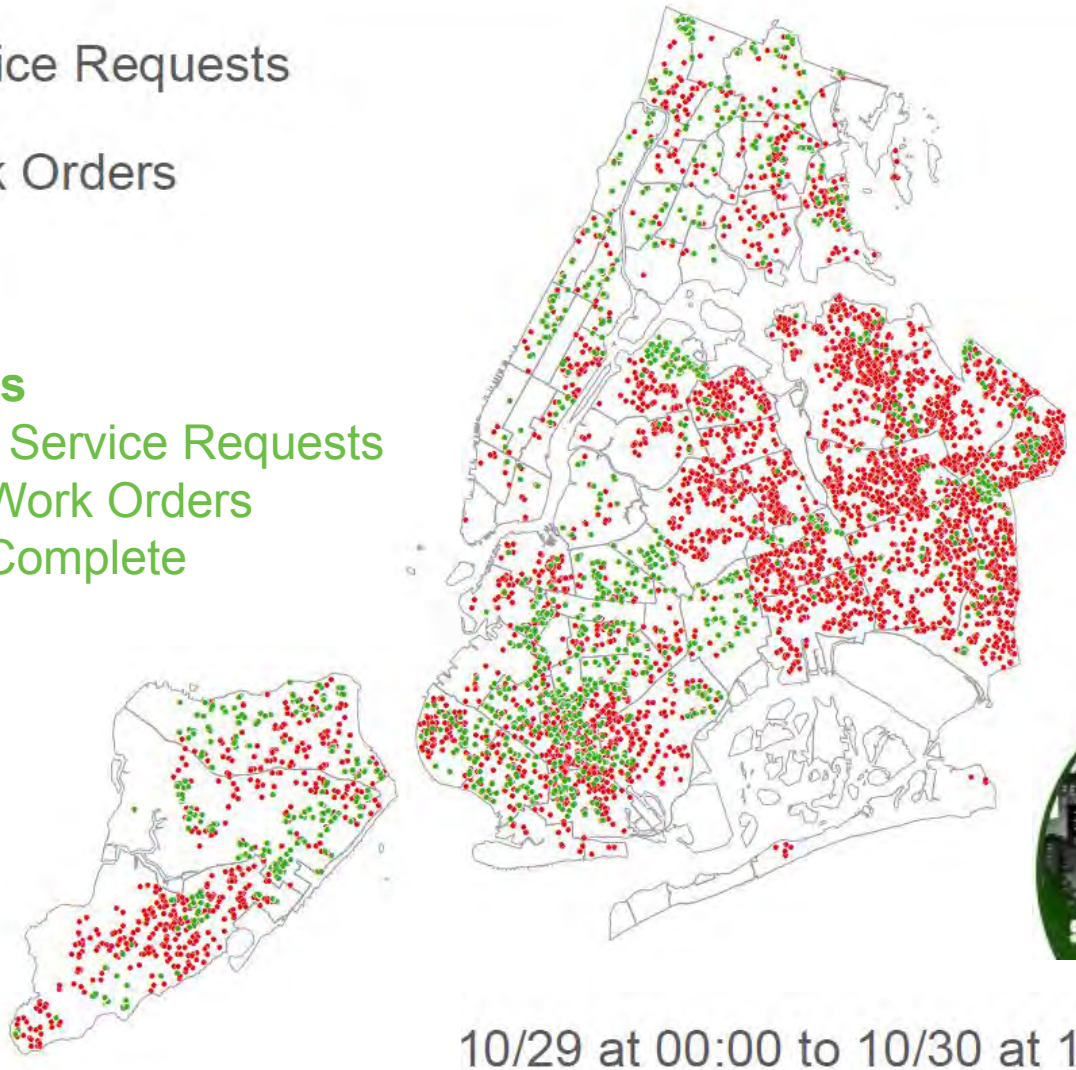


NYC Parks

Hurricane Sandy

- Service Requests
- Work Orders

Totals
6050 Service Requests
710 Work Orders
140 Complete

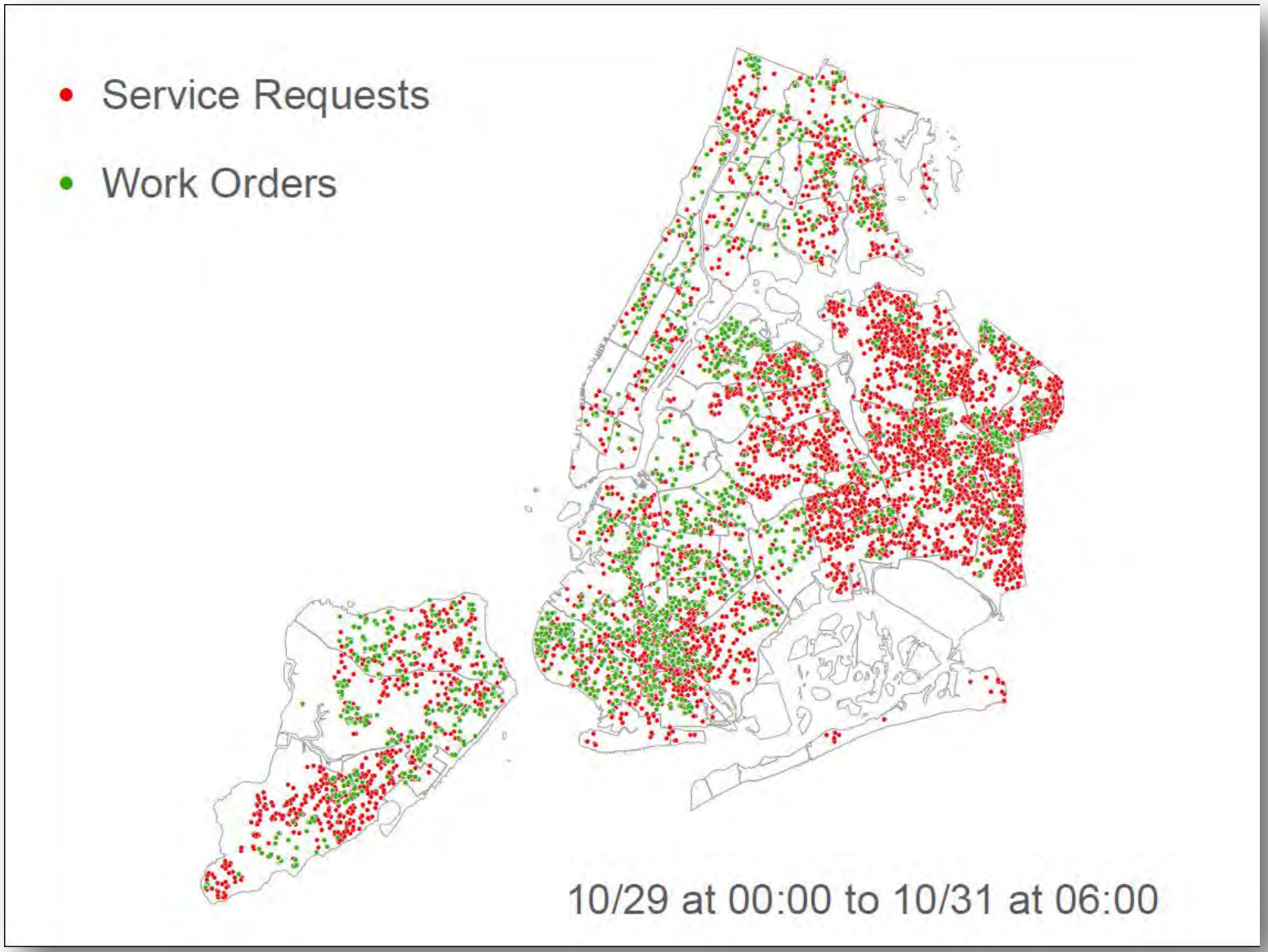


10/29 at 00:00 to 10/30 at 15:00

FORESTRY STORM MOBILE

NYC Parks

Hurricane Sandy

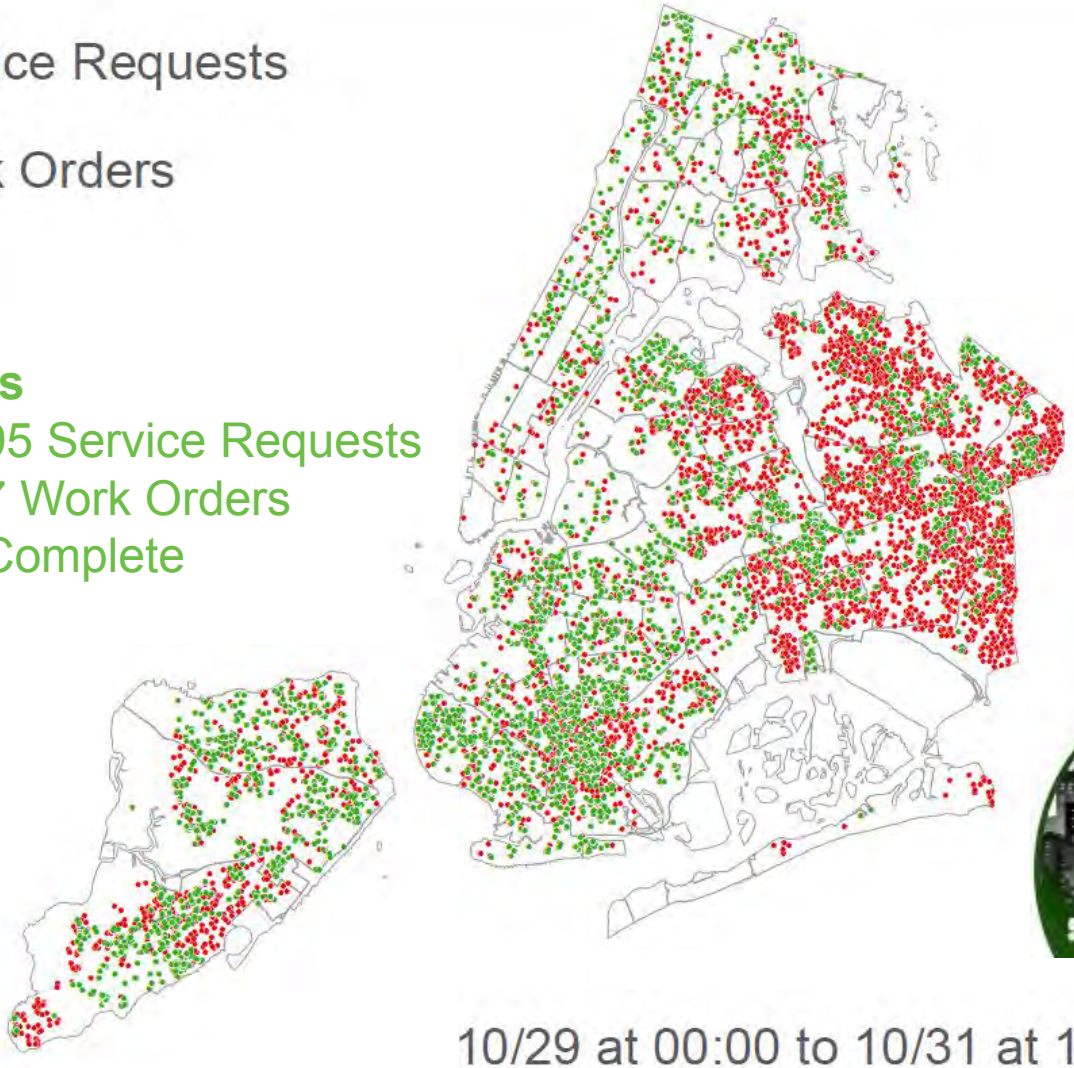


NYC Parks

Hurricane Sandy

- Service Requests
- Work Orders

Totals
10,995 Service Requests
3,687 Work Orders
551 Complete



10/29 at 00:00 to 10/31 at 15:00

FORESTRY STORM MOBILE

NYC Parks

Hurricane Sandy

Climate Change: Extreme Weather

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Climate Change: Extreme Weather

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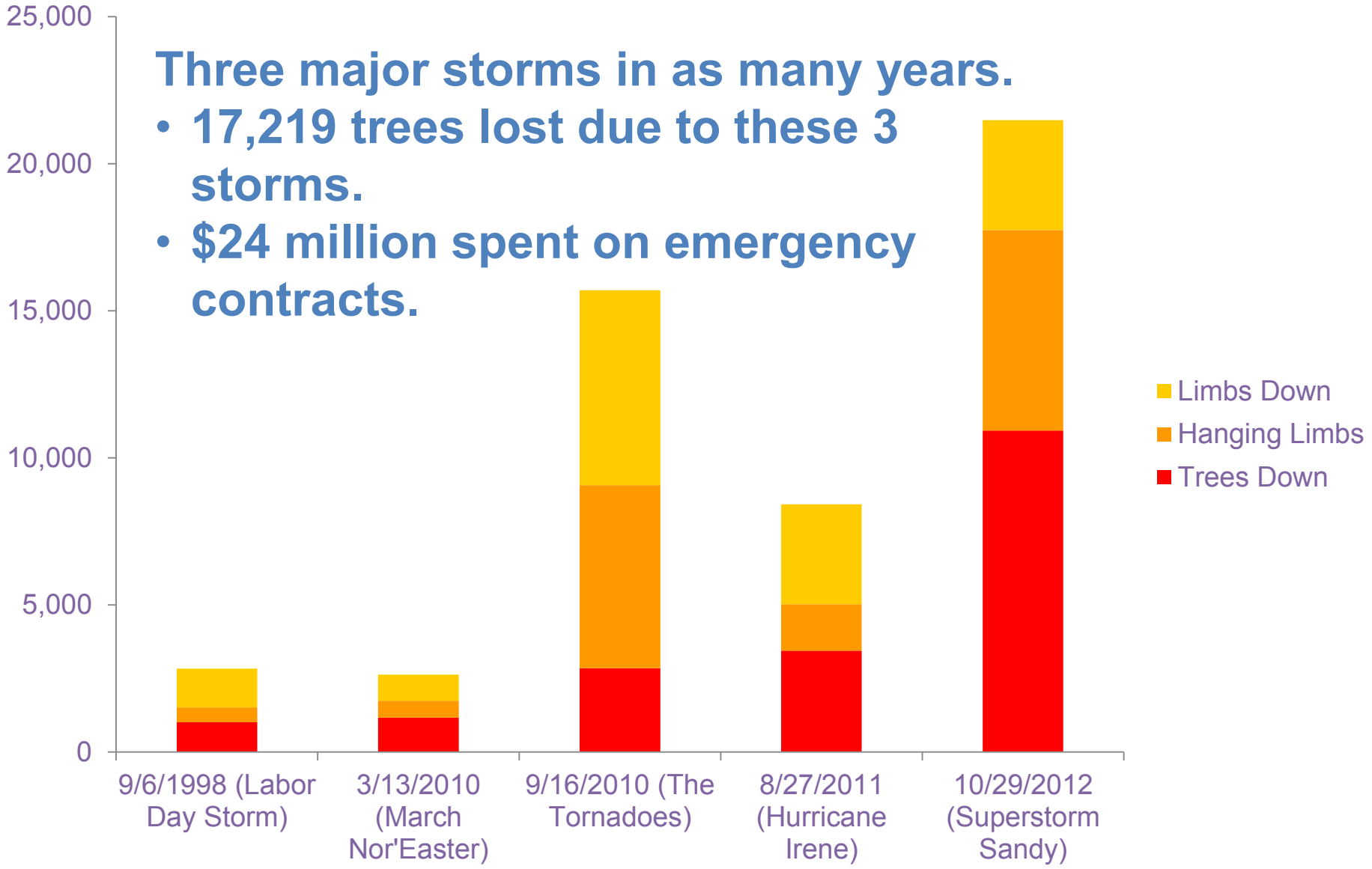
Tree Diversity to Build a Sustainable Urban Forest: Matt Wells

Climate Change: Extreme Weather

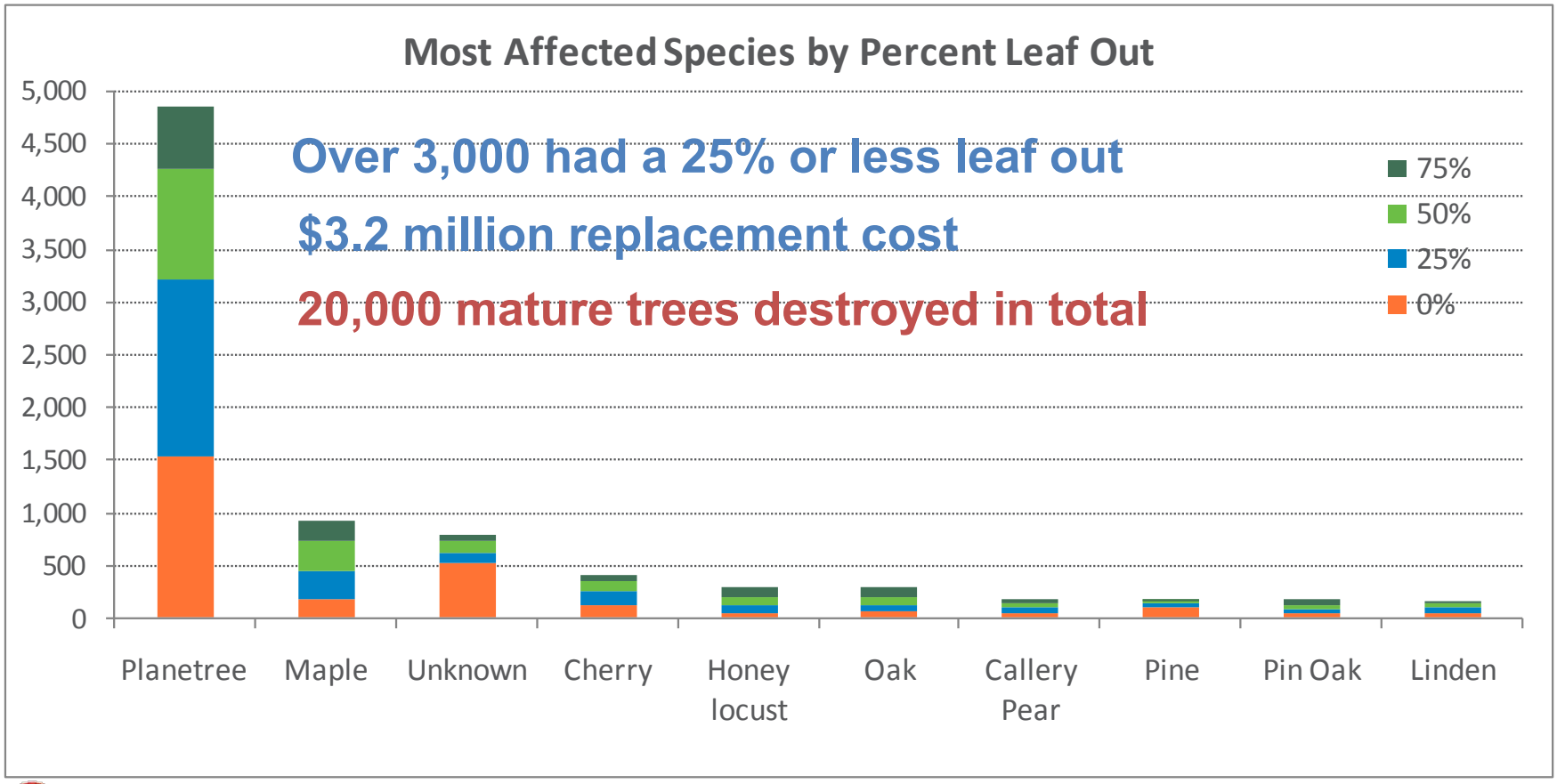


- Hurricane Sandy created a 13-14ft Storm Surge
- 47,800 trees in the inundation zone

August 2011

September 2013

Climate Change: Extreme Weather



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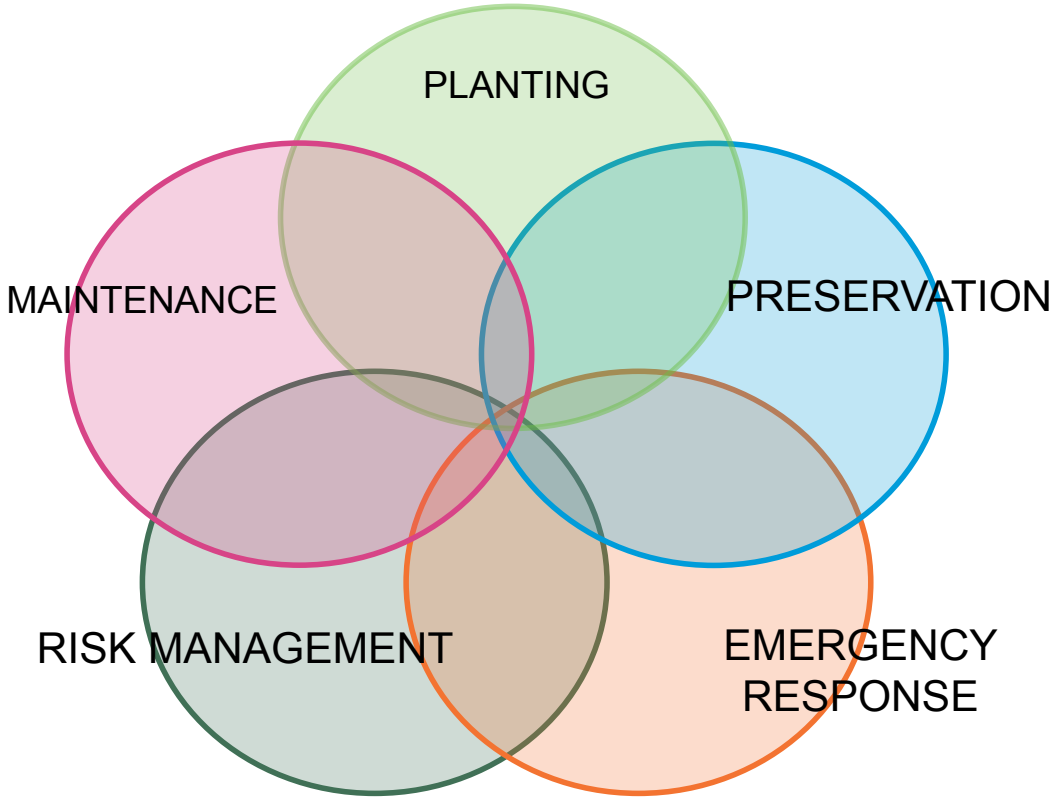
Sustainable Forest Management



Source: Adapted from USDA Forest Service

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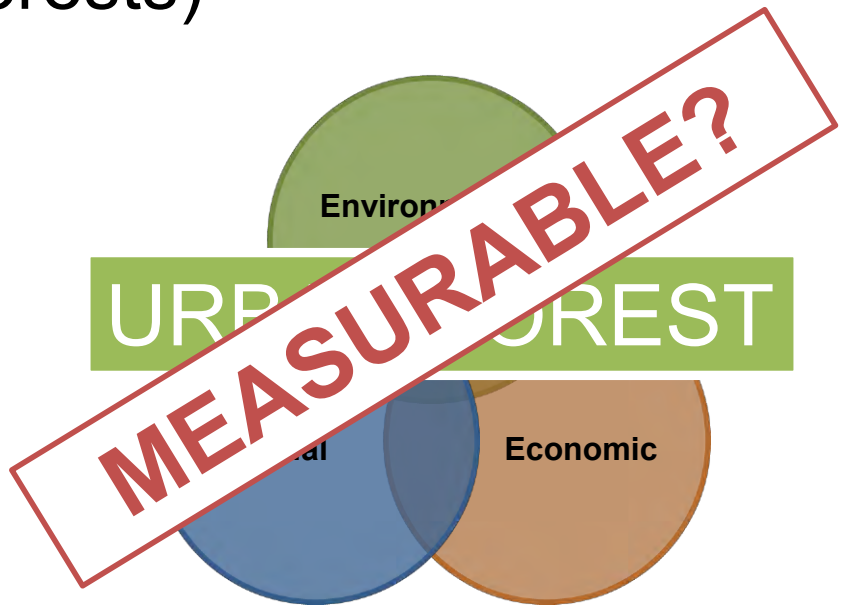
Sustainable Forest Management

"a dynamic and evolving concept, aims to maintain and enhance the economic, social and environmental value of all types of forests, for the benefit of present and future generations."(United Nations Forum on Forests)



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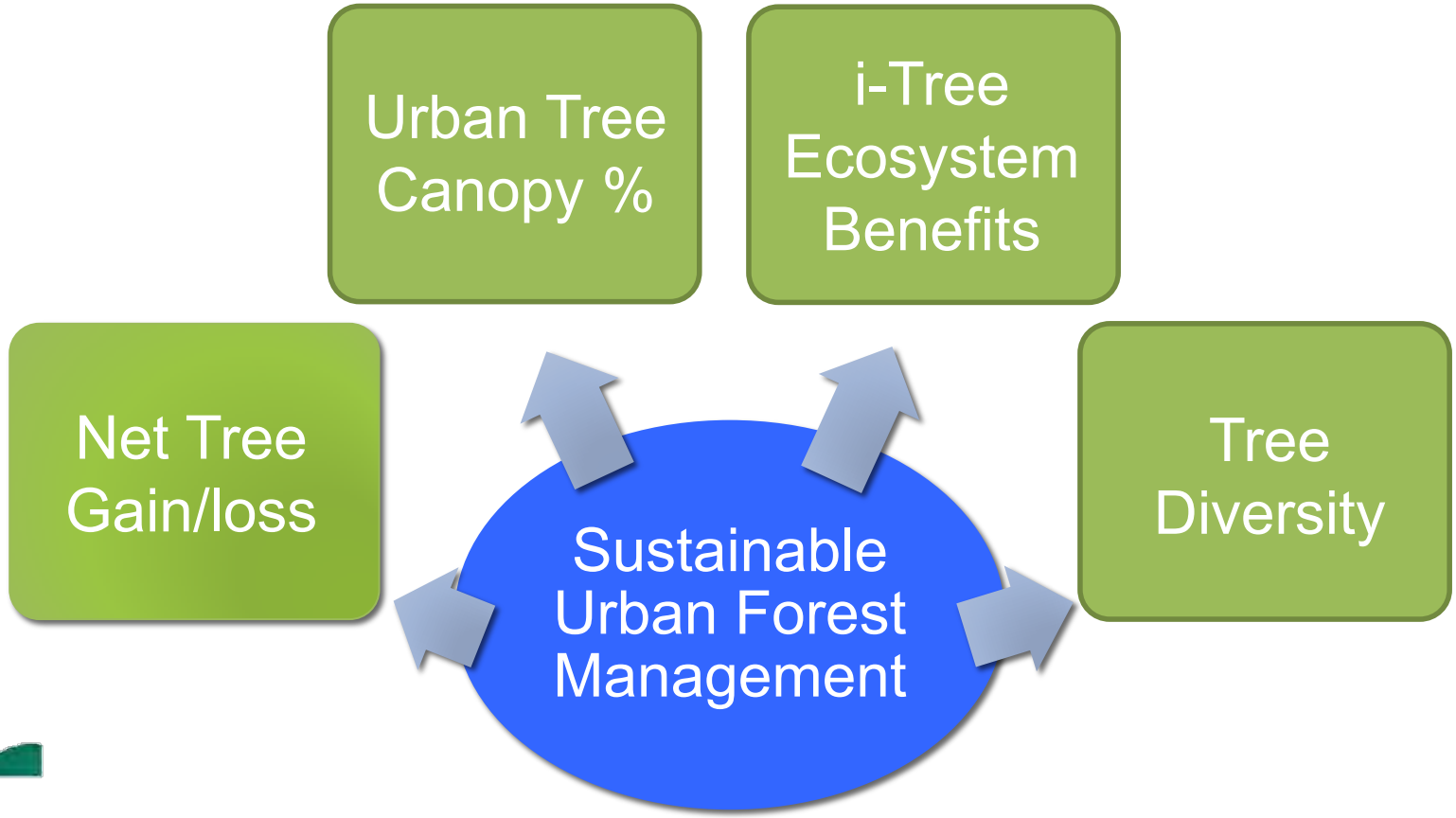
Urban Forest Sustainability Metrics



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i-Tree: Ecosystem Benefits

Trees Need to be in Good Functional Health to Deliver Benefits (Rahman et al., 2011)

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Urban Forest Sustainability Metrics:

Urban Tree Diversity

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Diversity

A range of many people or things that are very different from each other (Oxford Learner's Dictionary, 2014)

Resilience

The ability to become strong, healthy, or successful again after something bad happens (Merriam-Webster, 2014)

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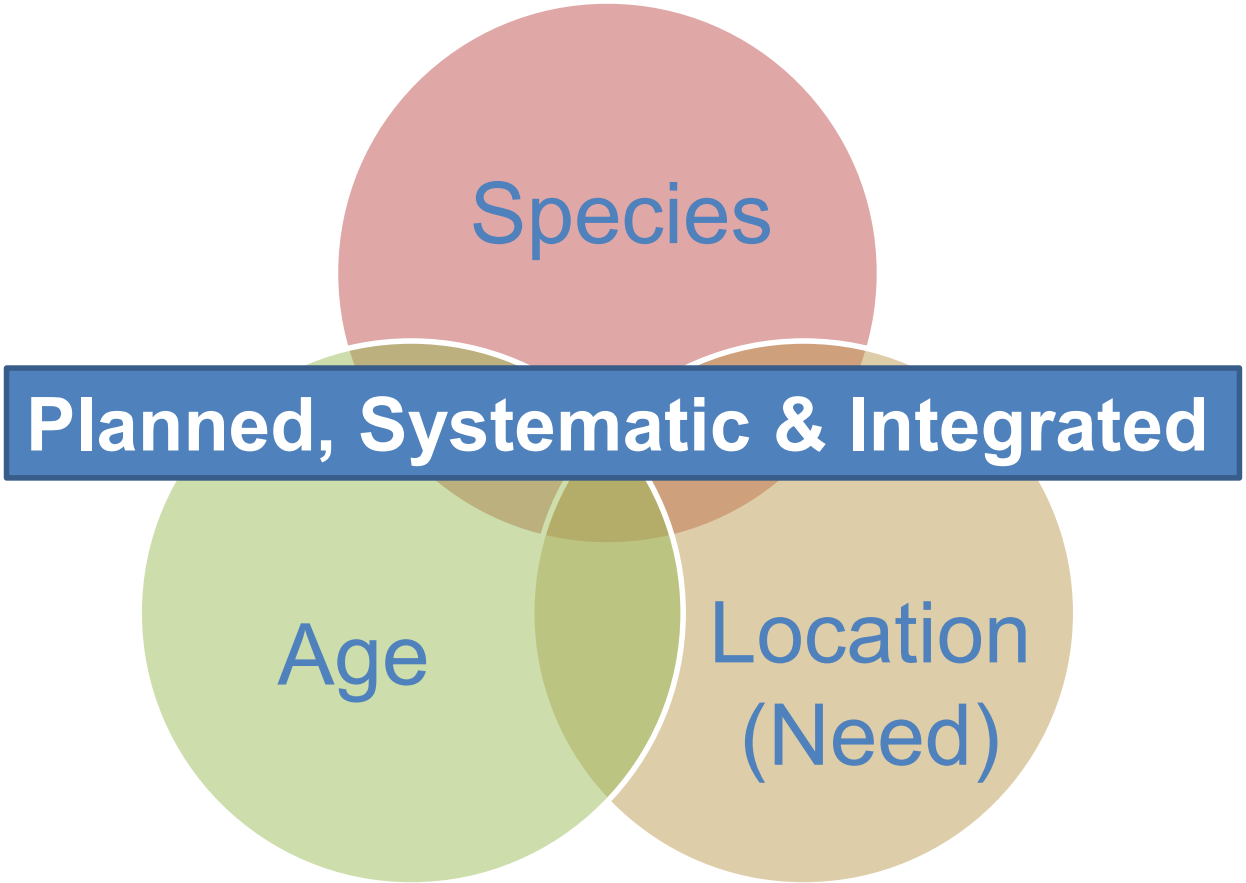
Urban Tree Diversity



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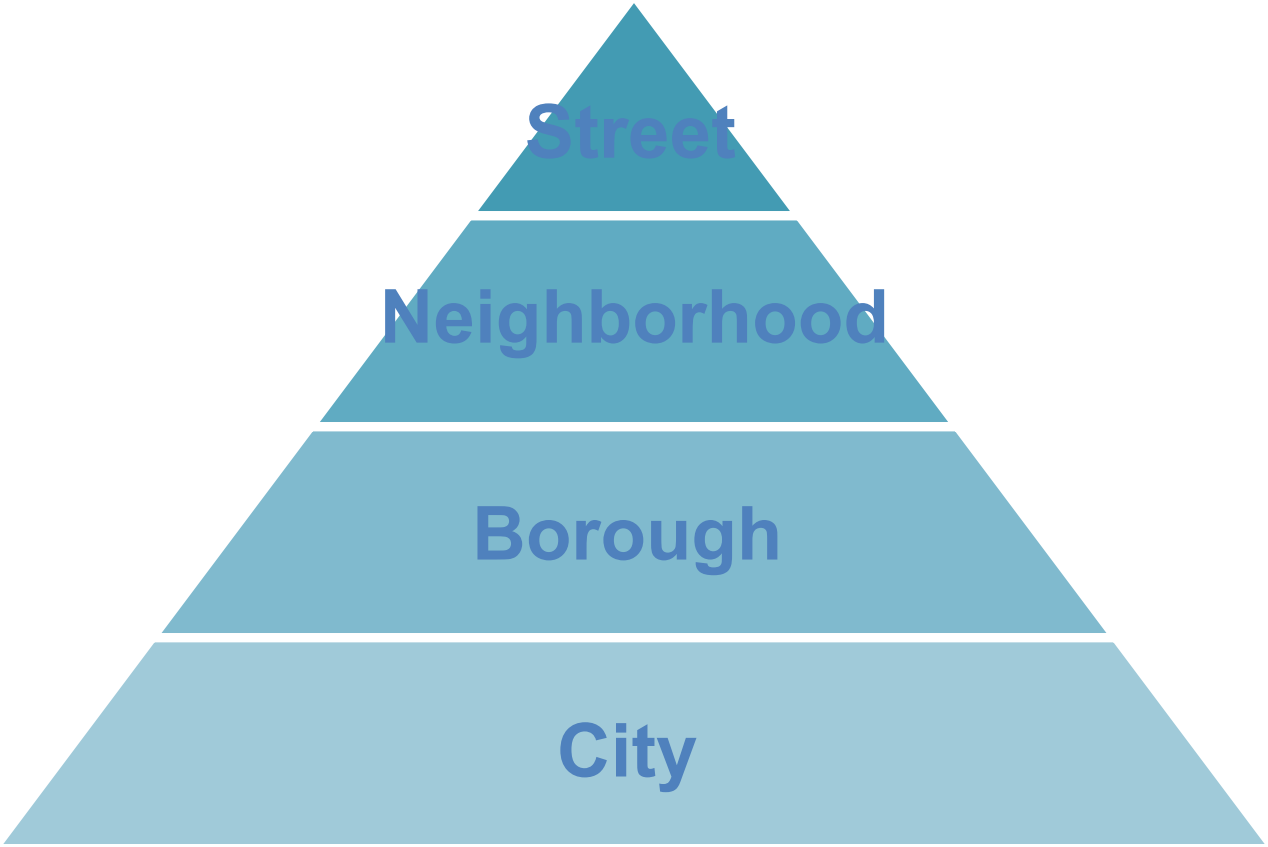
Urban Tree Diversity – What Level?



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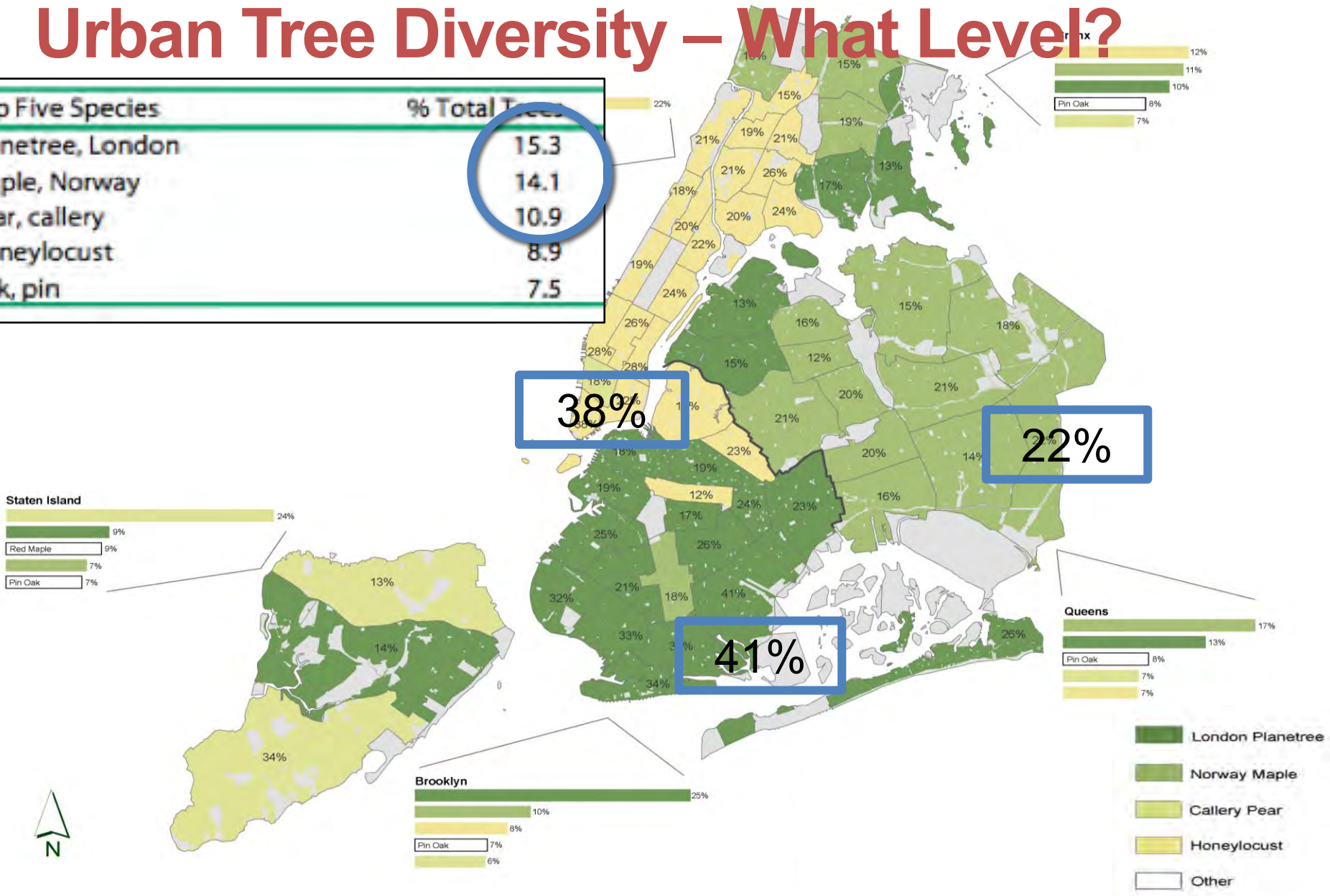
Urban Tree Diversity – What Level?

Top Five Species	% Total Trees
Planetree, London	15.3
Maple, Norway	14.1
Pear, callery	10.9
Honeylocust	8.9
Oak, pin	7.5



Urban Tree Diversity – Planning

"Everyone has a plan 'til they get punched in the mouth."

Mike Tyson

Policies of 49 California municipalities were accessed 82% indicated that species diversity was an objective (Muller and Bornstein, 2010)

Only 48% had codified this objective in a management plan

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Urban Tree Diversity - Species

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Species Diversity Recommendations

Authors	Diversity Recommendations
Miller and Miller (1991); Smiley, Kielbaso and Proffer (1986)	No species shall exceed 10% of the population
Kielbaso (1989)	No species should exceed 5% and no genus should exceed 10%
Santamour (2002)	Plant no more than 10% of any species, no more than 20% of any genus and no more than 30% of any family

10 Genus and 20 Species

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millionTreesNYC

A PLANYC INITIATIVE WITH NYC PARKS AND NEW YORK RESTORATION PROJECT

- Planting 20,000 street trees a year
- 10 year funding allowed for procurement contracts
- 3 nurseries contract grew for NYC Parks

Species Planted

“Once more unto the breach, dear friends, once more…”

William Shakespeare, *Henry V*

Urban Forest Managers overly rely on ‘tried and tested’ species (Sjoman, 2012)

As growing conditions become more challenging, diversity decreases (Pauleit et al., 2002)

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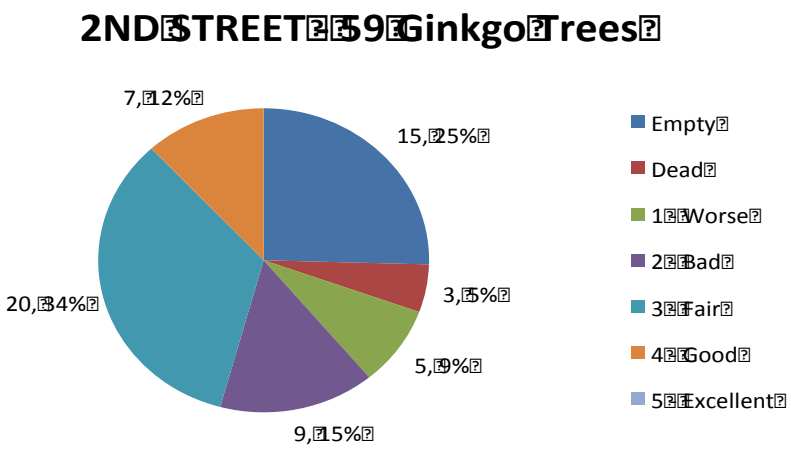
Introducing New Species



2nd Street = 46% Successful Establishment

Baseline = 80% Successful Establishment

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Introducing New Species

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Bring Back the Old (Natives)

Quercus agrifolia (133)

Platanus racemosa (374)

Species Based Pruning Cycles

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Urban Tree Diversity - Age

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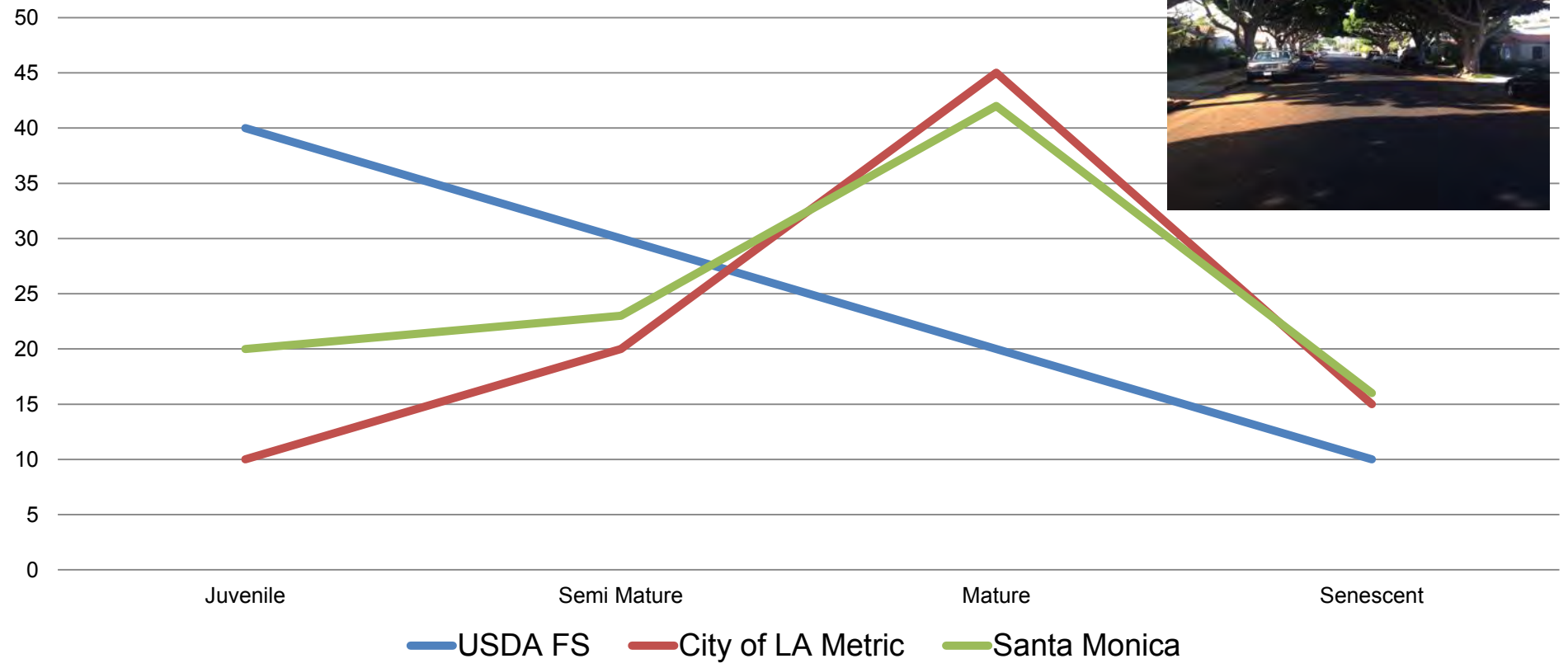
Urban Tree Diversity - Age



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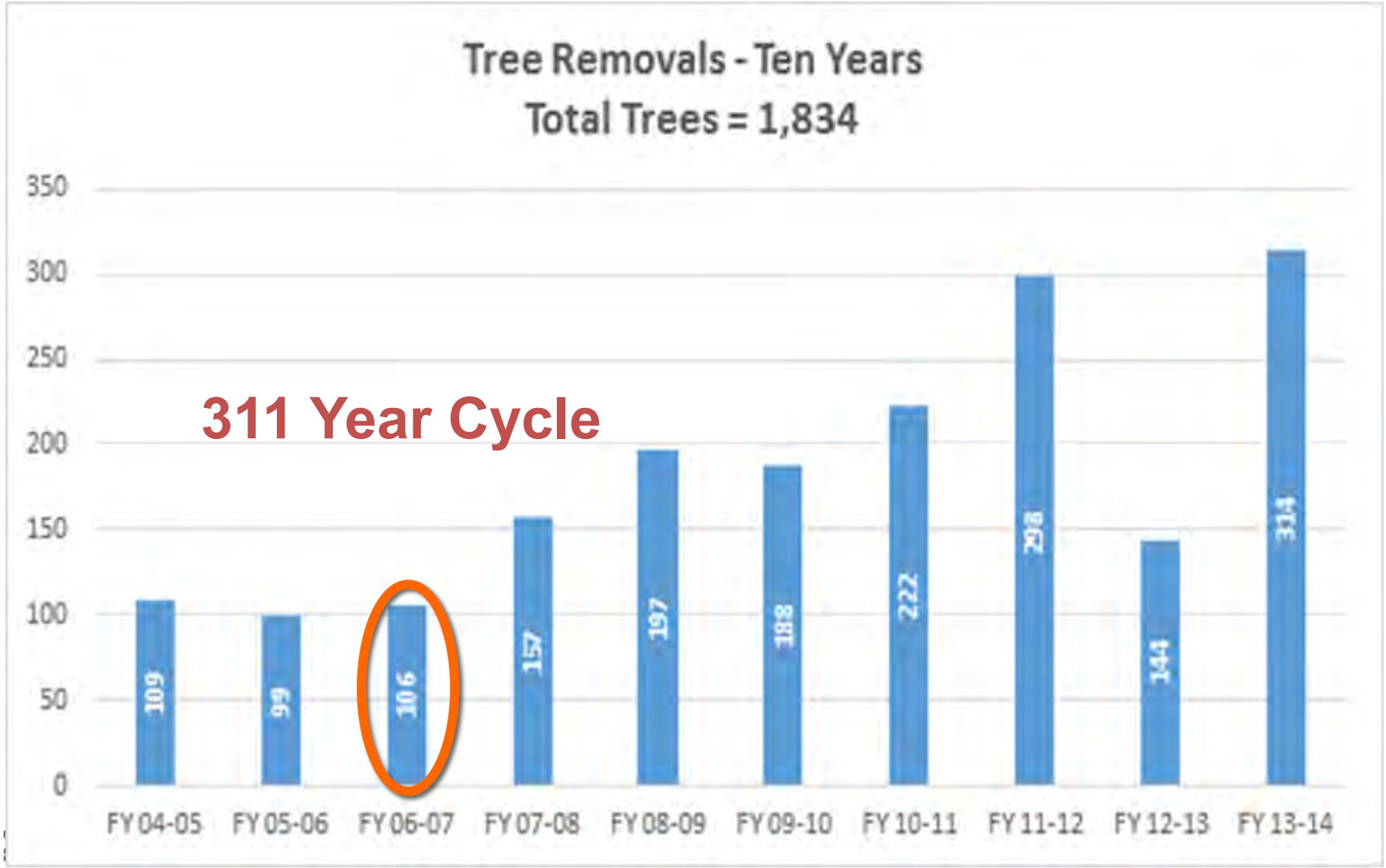
Diversify Through Removal



Urban Tree Diversity – Location (Need)

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Urban Tree Diversity – Location (Need)

Parks traditionally ran a request based street tree planting program

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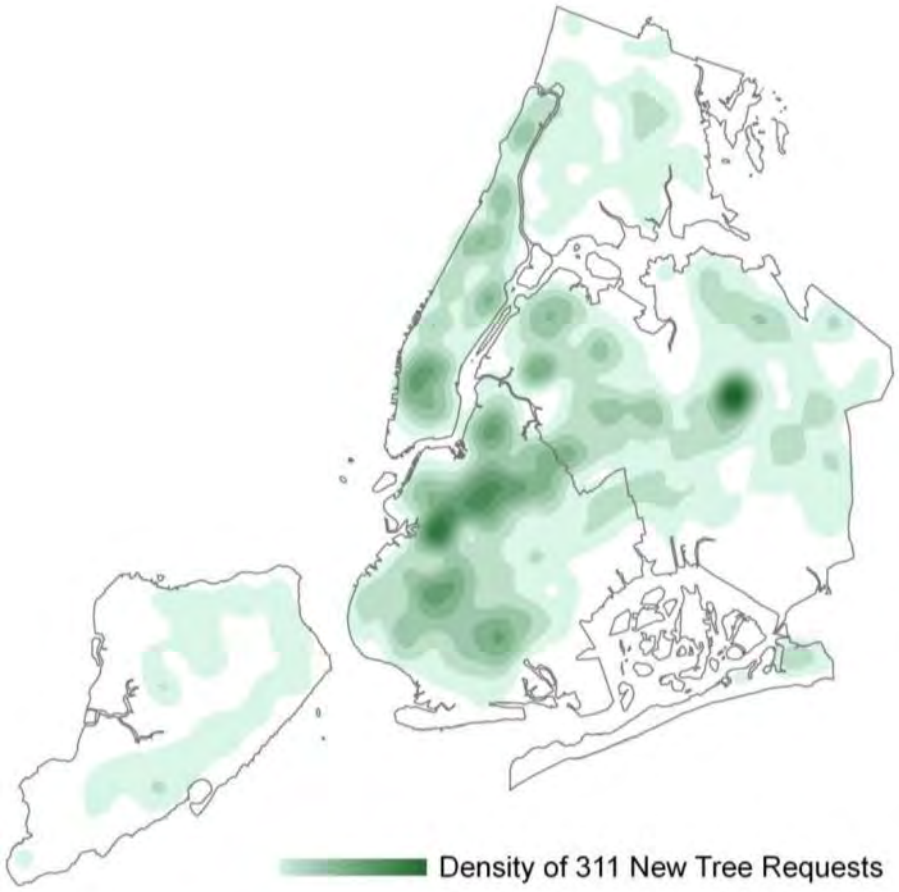
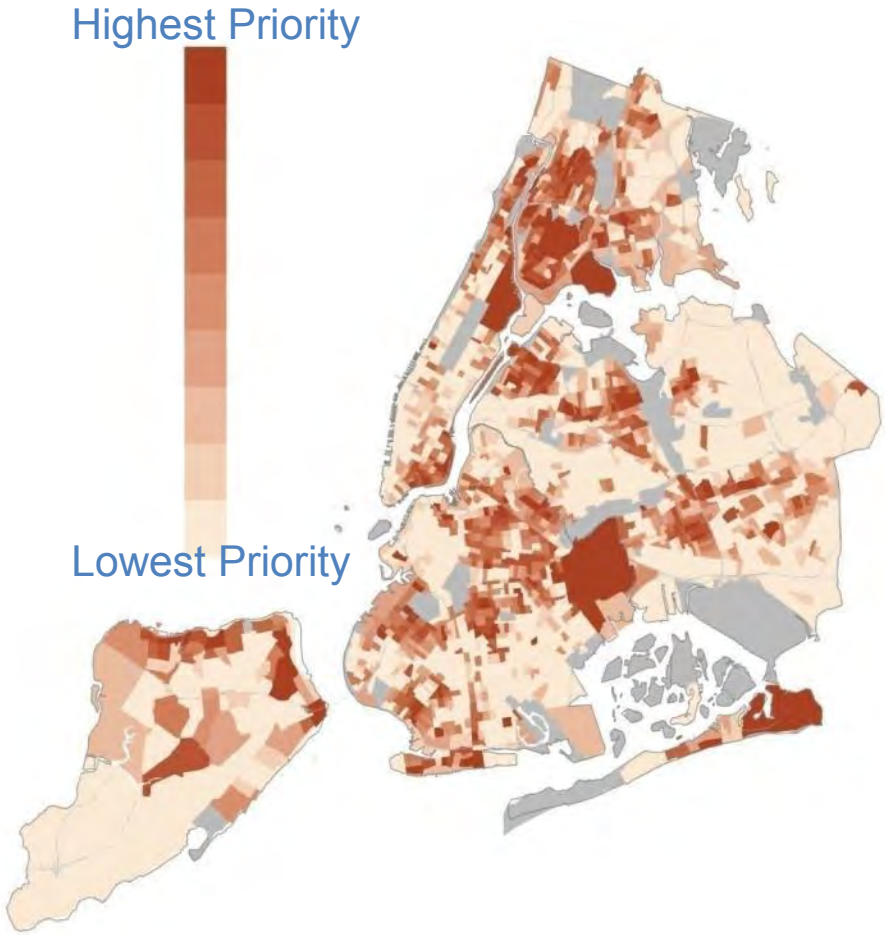
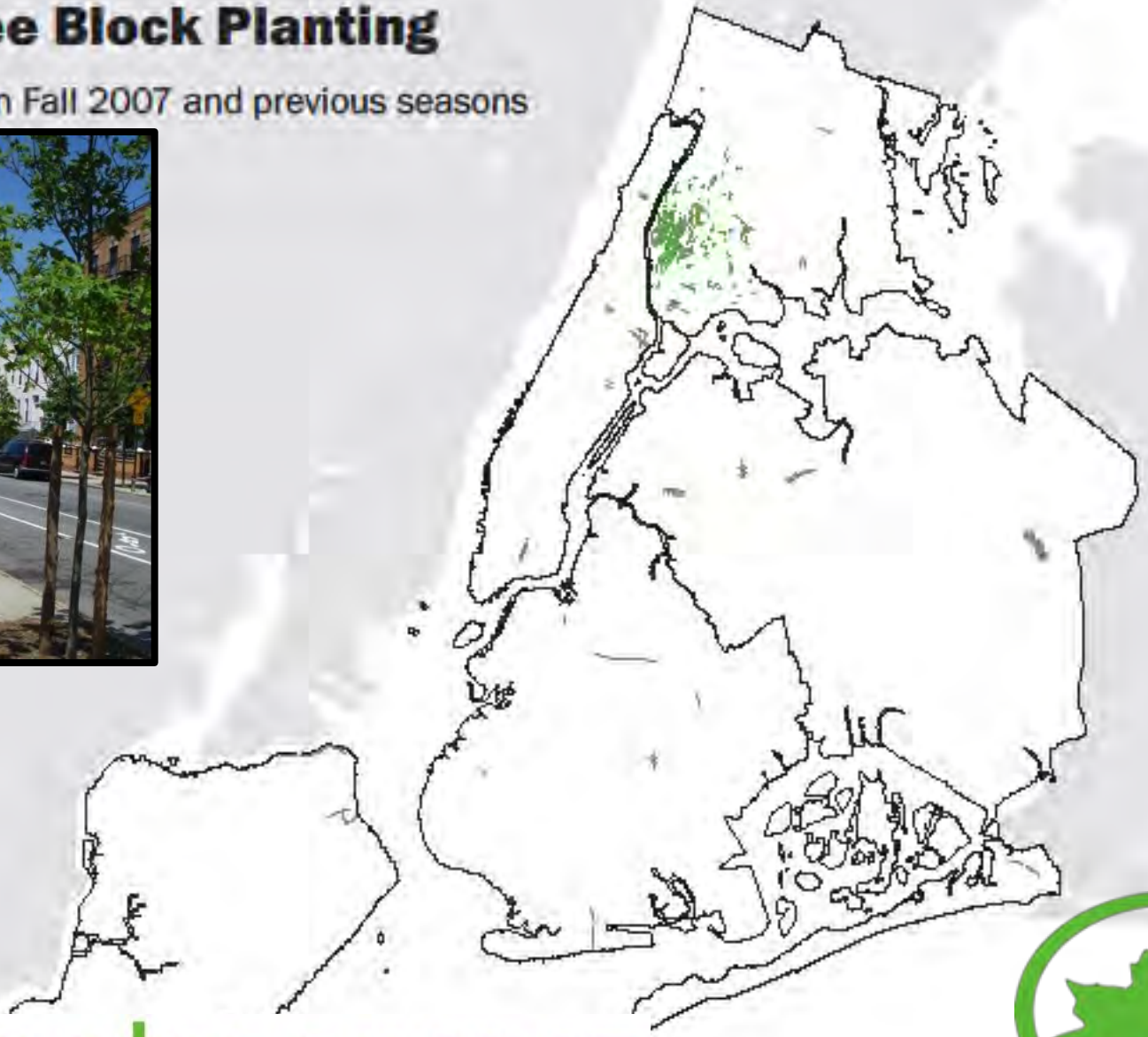




Street Tree Block Planting

— Planted in Fall 2007 and previous seasons



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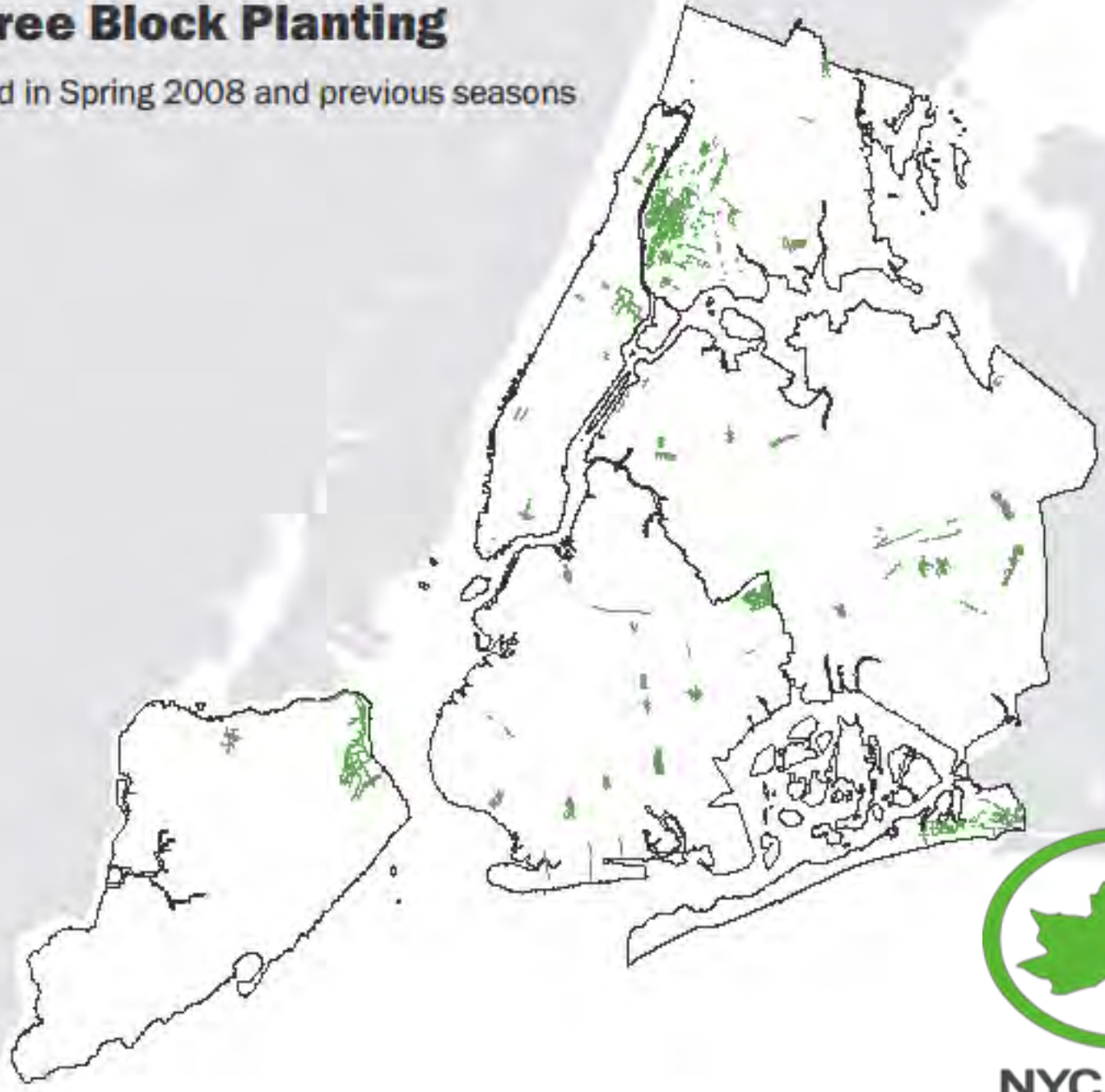
NYC Parks

Street Tree Block Planting

— Planted in Spring 2008 and previous seasons



NYC Parks

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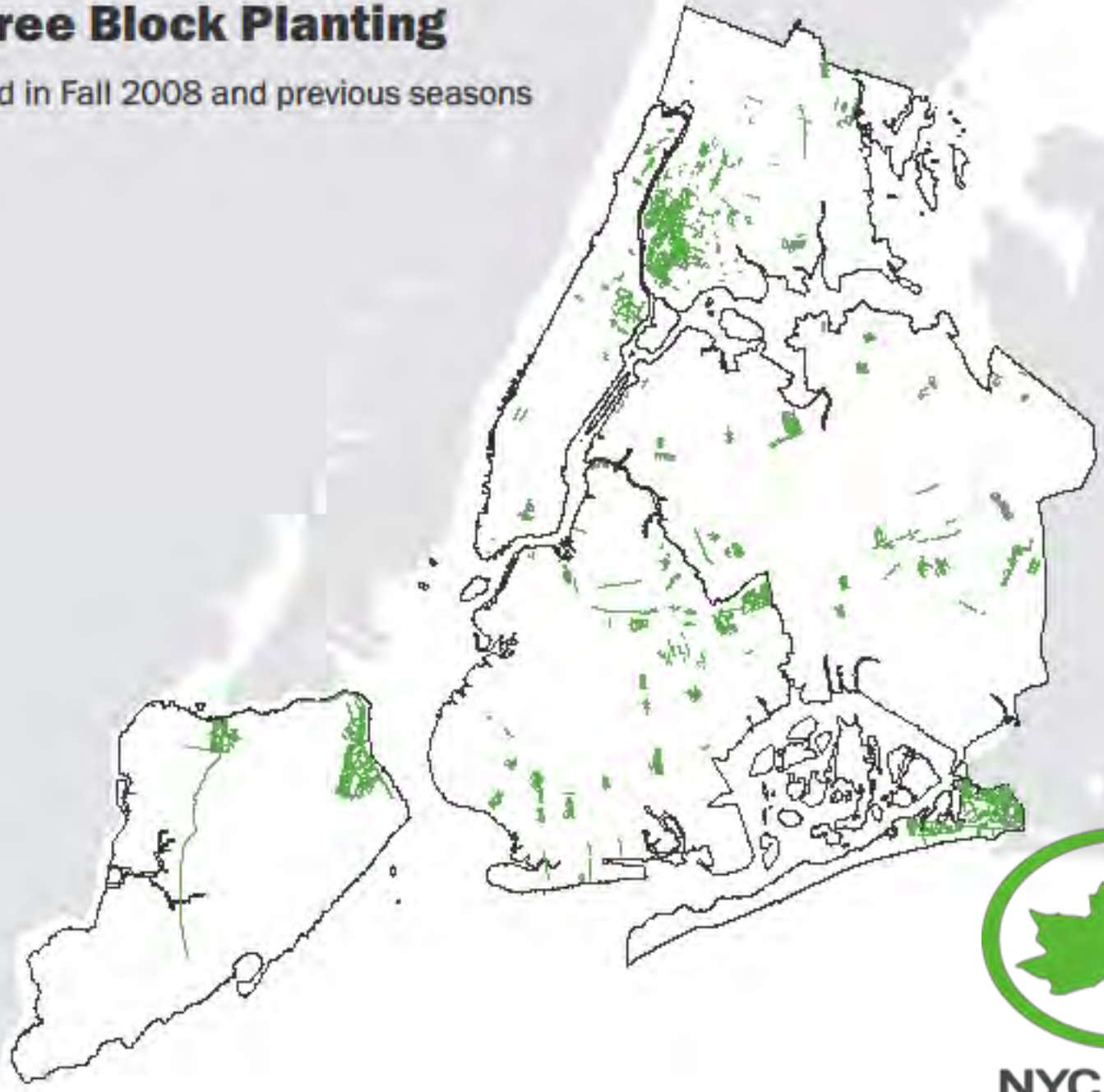

NYC Parks

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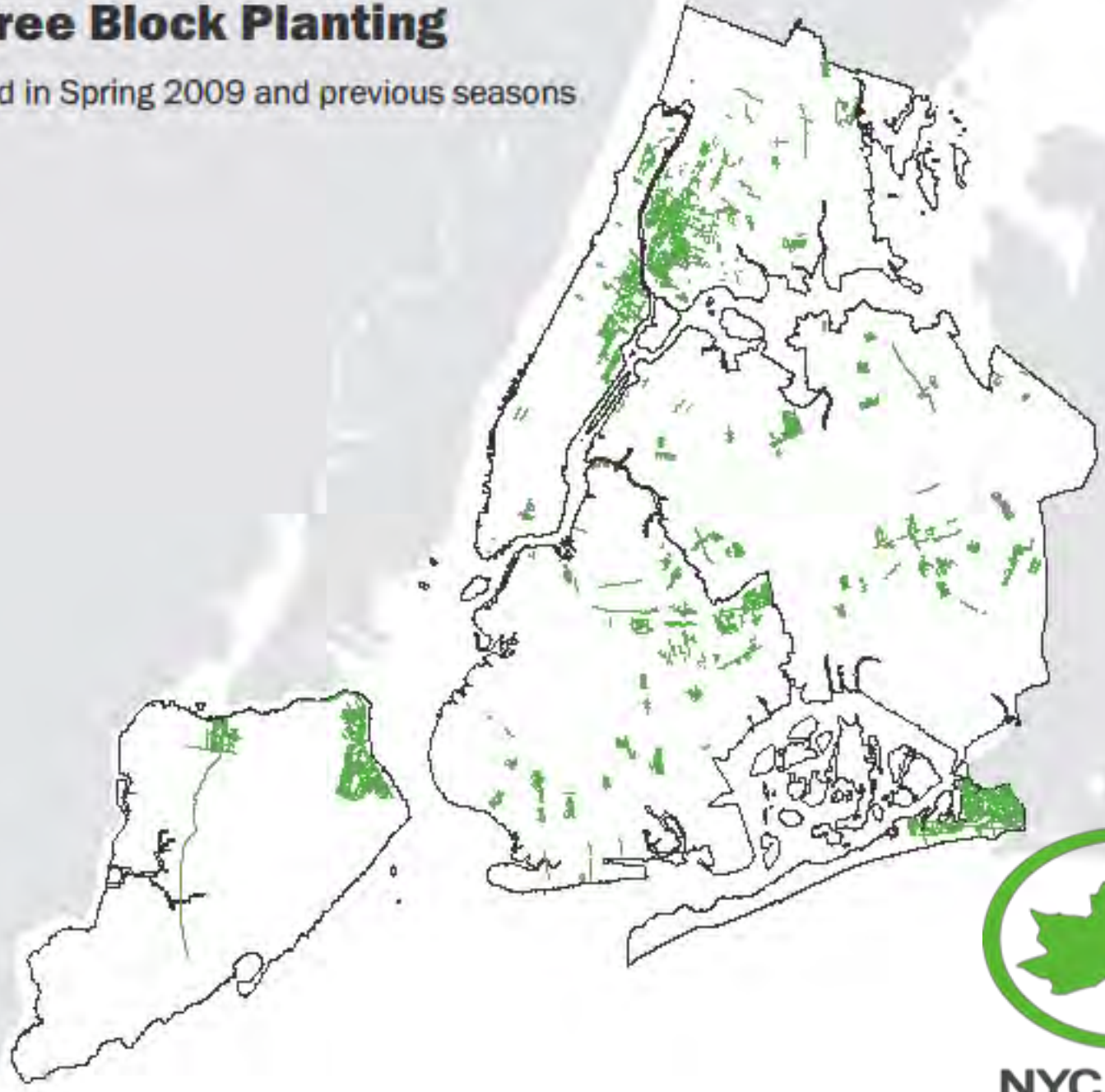

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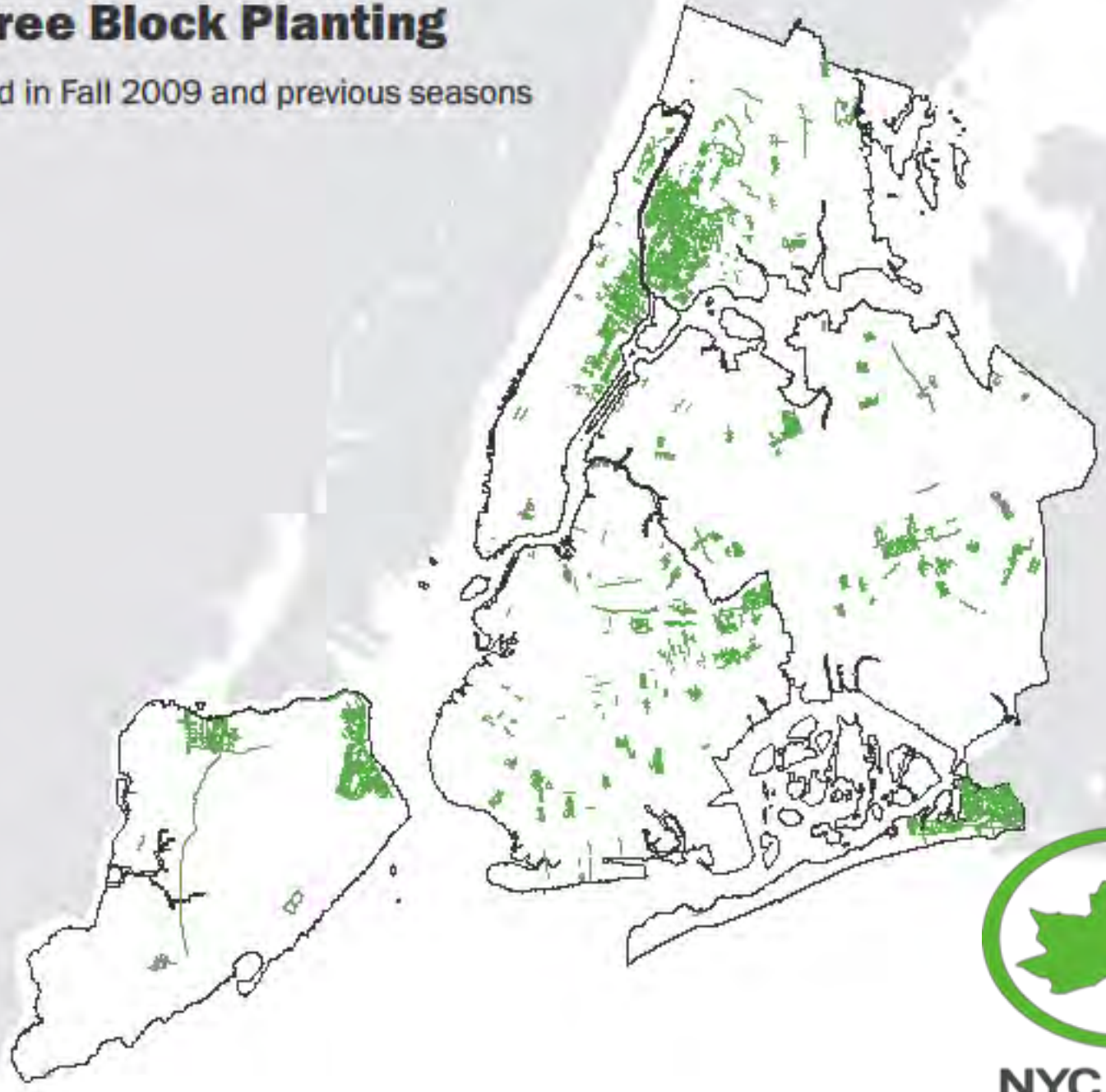

NYC Parks

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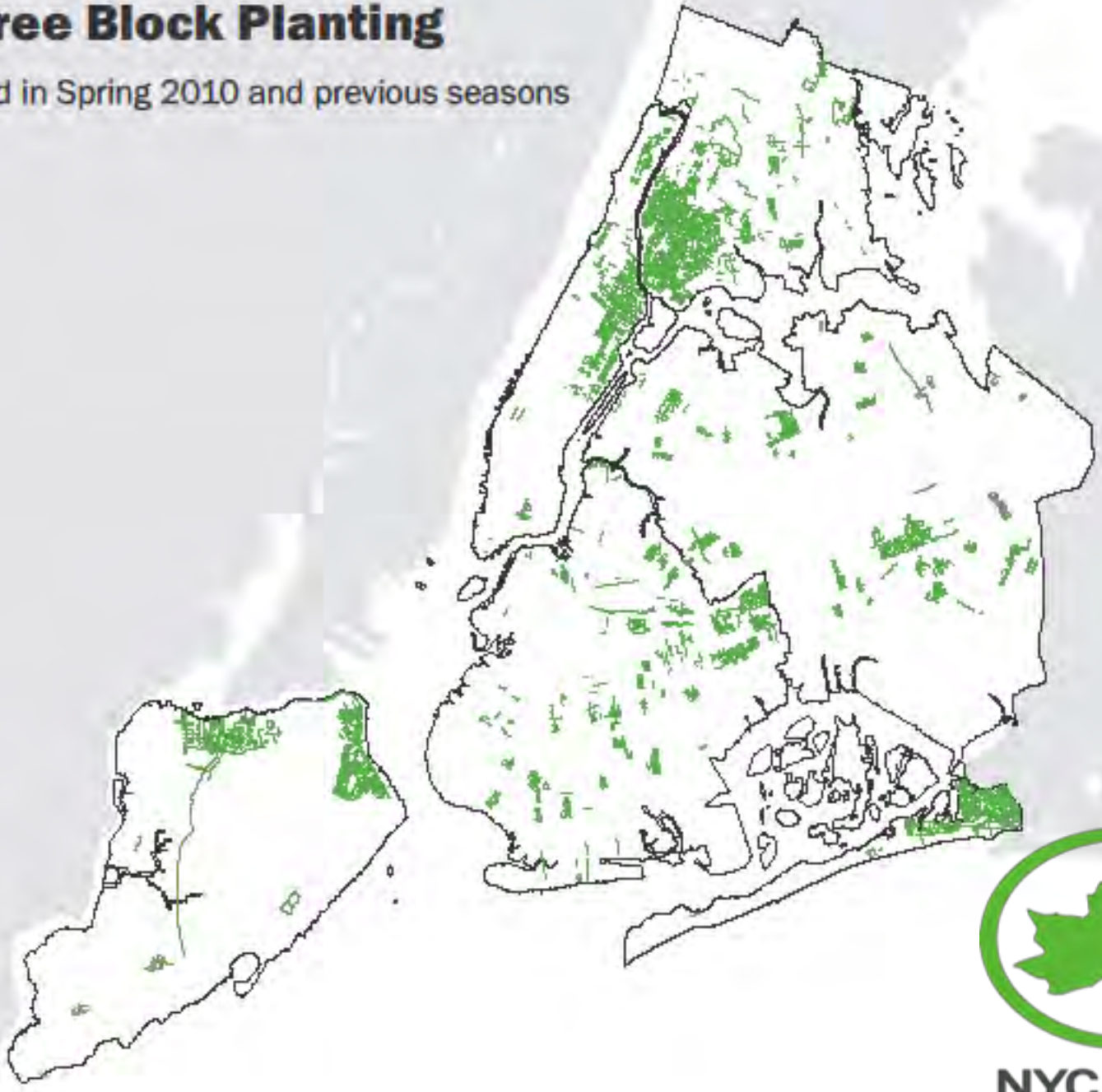

NYC Parks

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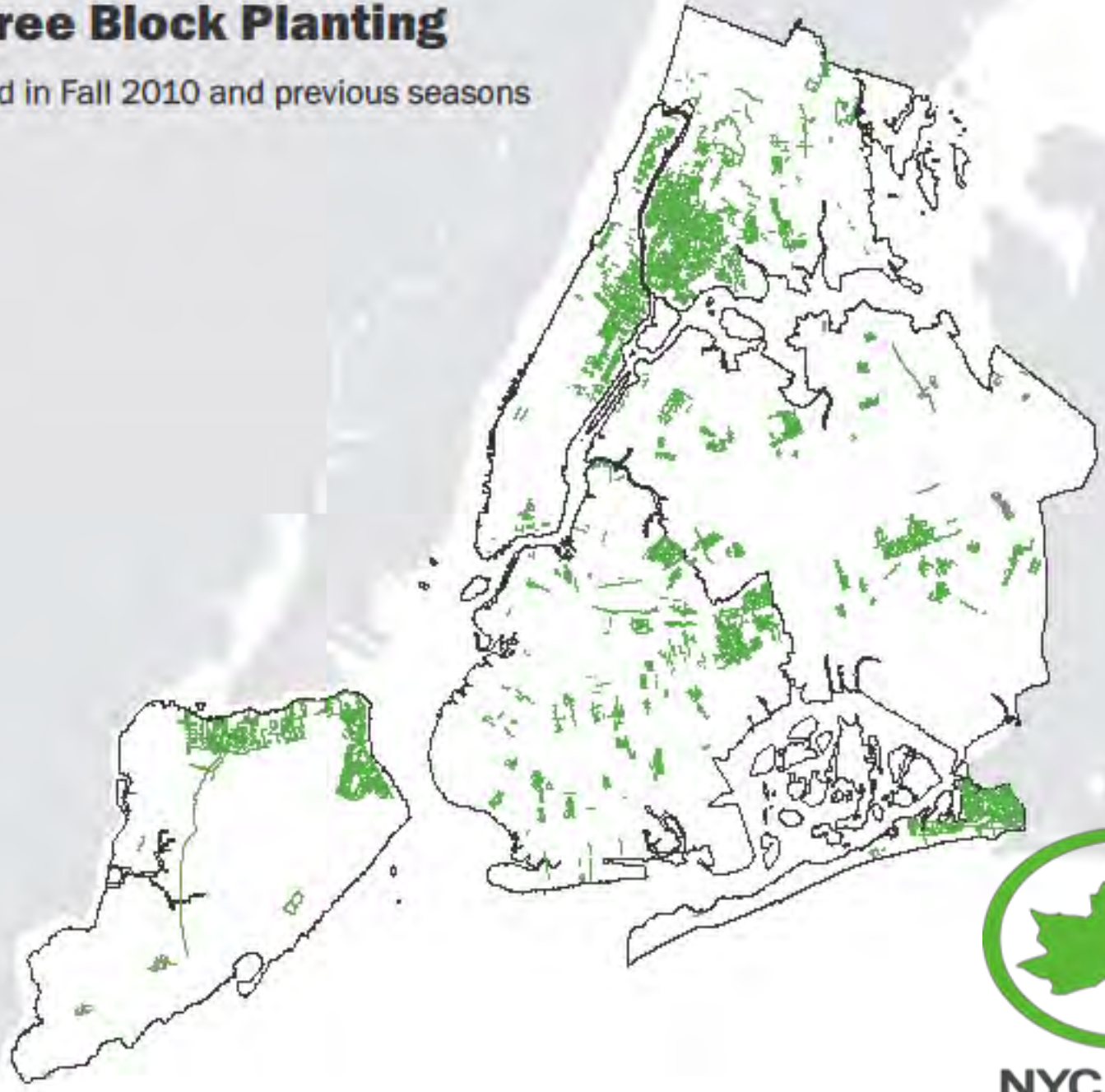

NYC Parks

Street Tree Block Planting

— Planted in Spring 2011 and previous seasons

NYC Parks

million trees NYC

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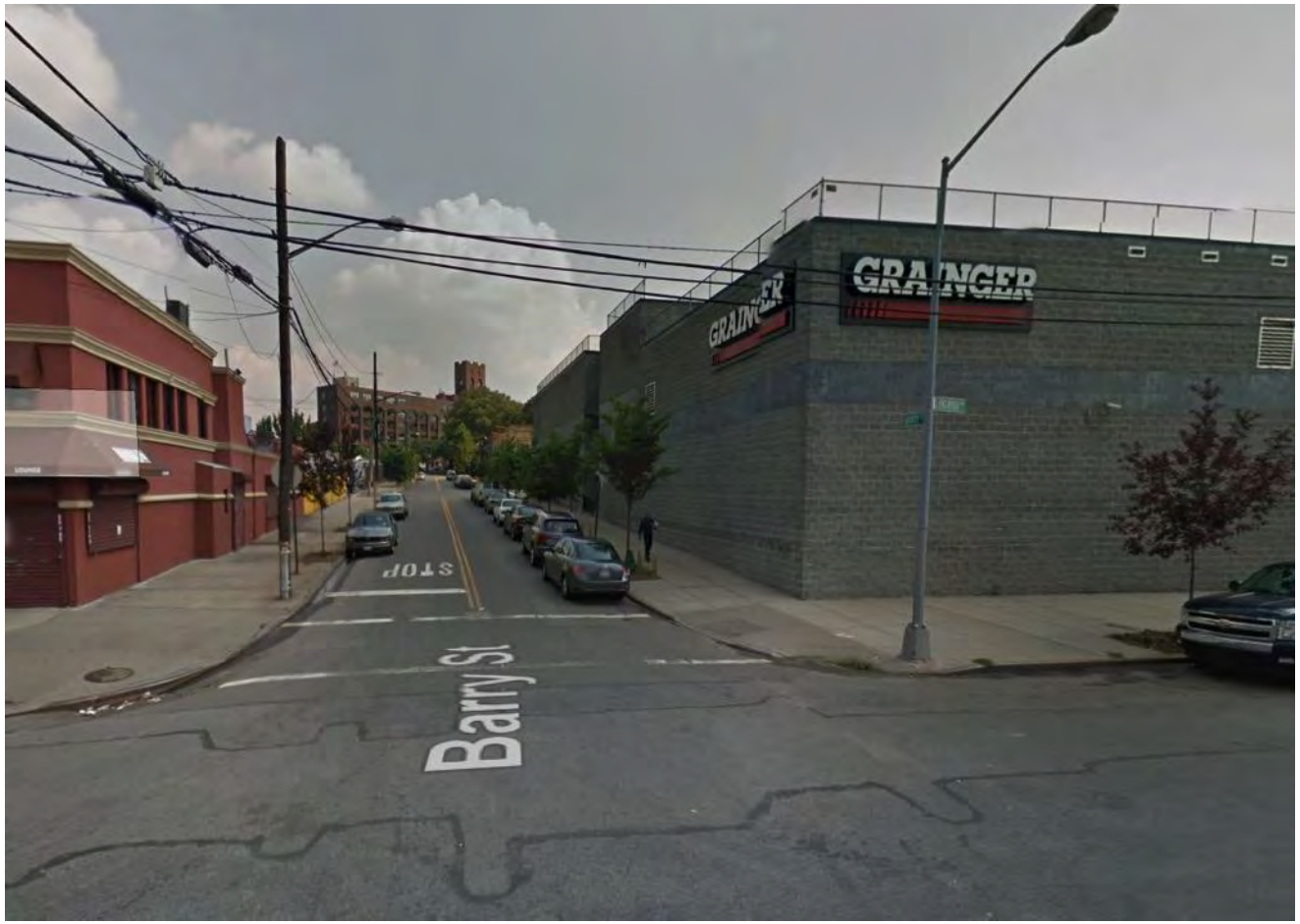

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Tree Diversity Prioritization

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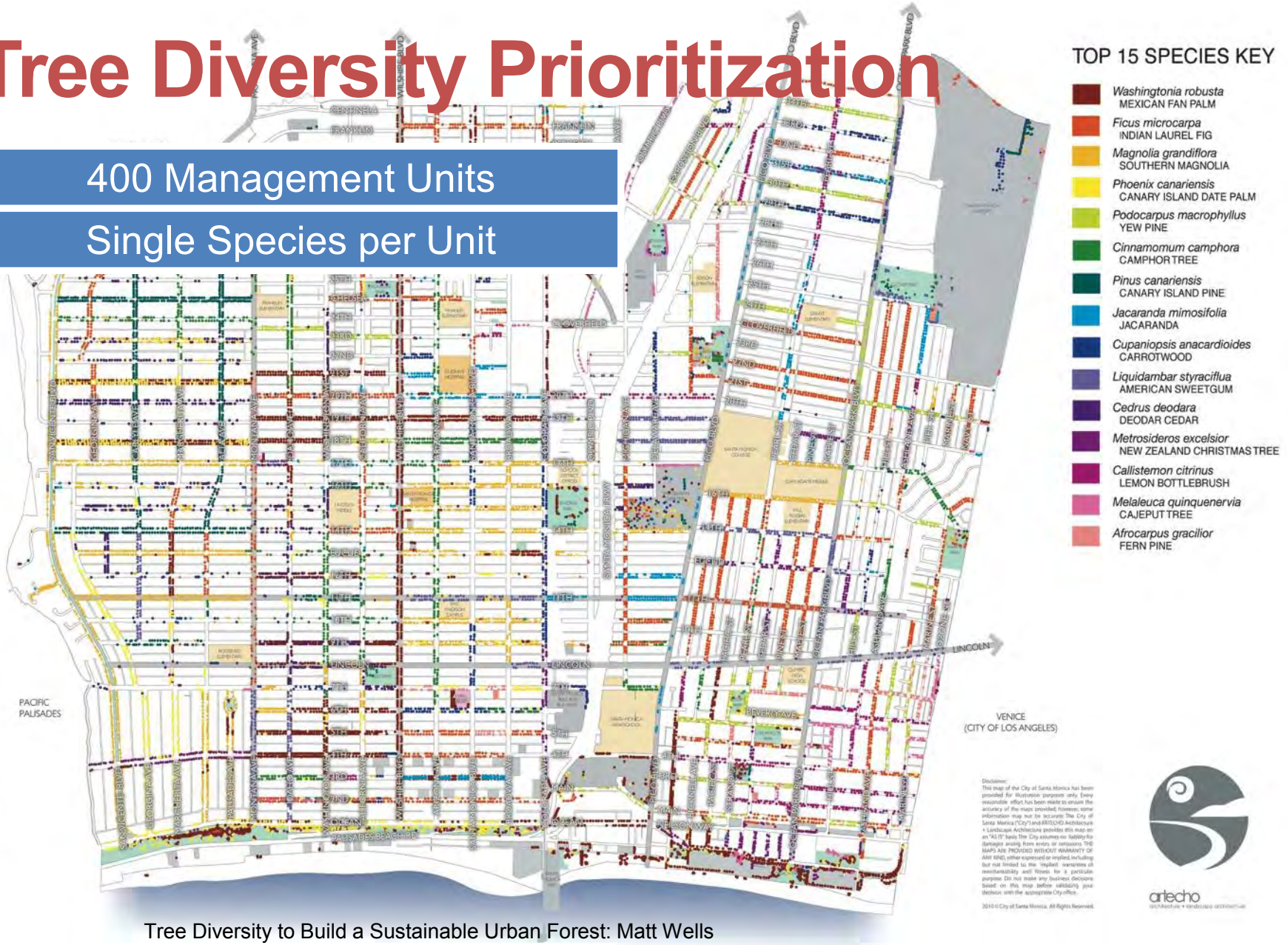
Tree Diversity Prioritization

400 Management Units

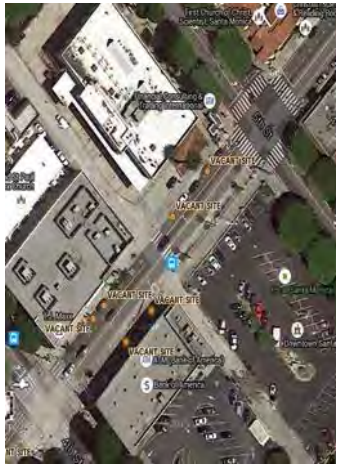
Single Species per Unit

TOP 15 SPECIES



Tree Diversity Priority Model

Per Management Unit



- Environmental Need
- Stocking Level or Canopy Cover
- Age Diversity Rating
- Potential Ecosystem Benefits
- **Planting Priority**

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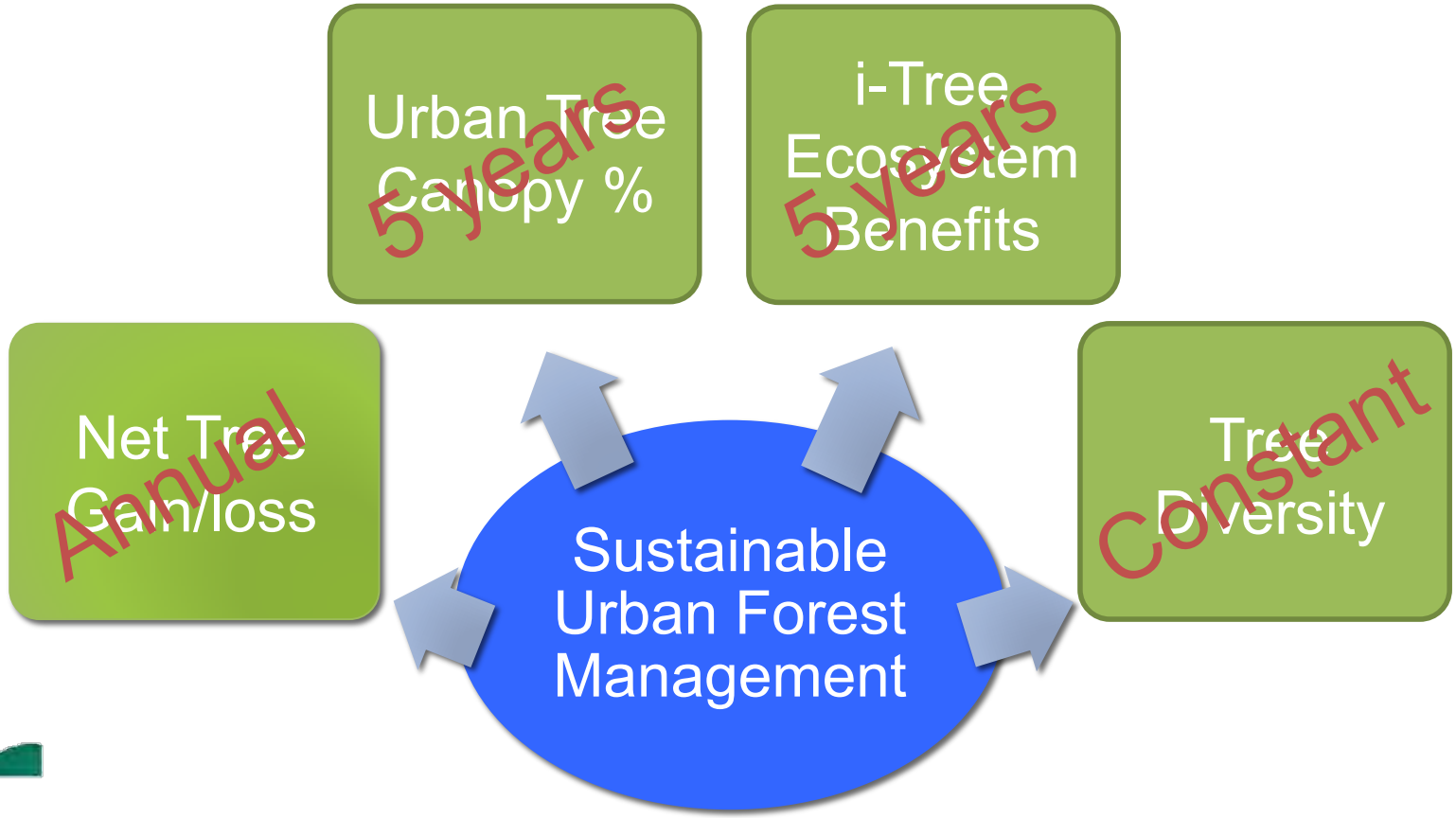
Urban Forest Sustainability Metrics



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Use Research and Planning to Strive for a Sustainable Urban Forest

Thank You

Matthew P. Wells

Urban Forester

City of Santa Monica

matthew.wells@smgov.net

I love Santa Monica trees!
facebook.com/smtrees