



Superstorm Sandy: Impacts, Responses, and Lessons Learned

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Resources

NYC Parks & Recreation

Parks

NYC Parks' Forestry Response to Superstorm Sandy

1. Introduction
2. The History and Background of Parks' Storm Response in New York City
3. Super Storm Sandy
4. The Aftermath and Going Forward



New York City Population



Bronx: 1,392,002

Brooklyn: 2,532,645

Manhattan: 1,601,948

Queens: 2,247,848

Staten Island: 470,467

Total: 8,244,910

Source: <http://www.nyc.gov/html/dcp/html/census/popcur.shtml>

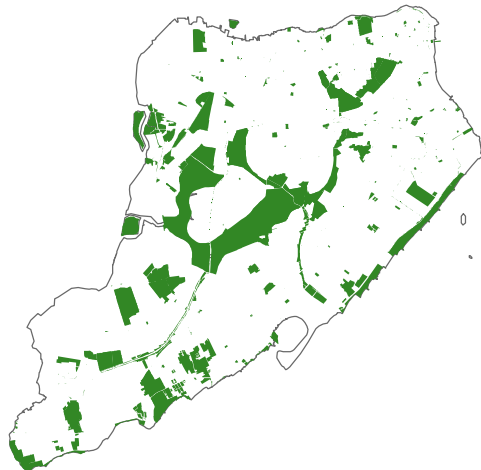
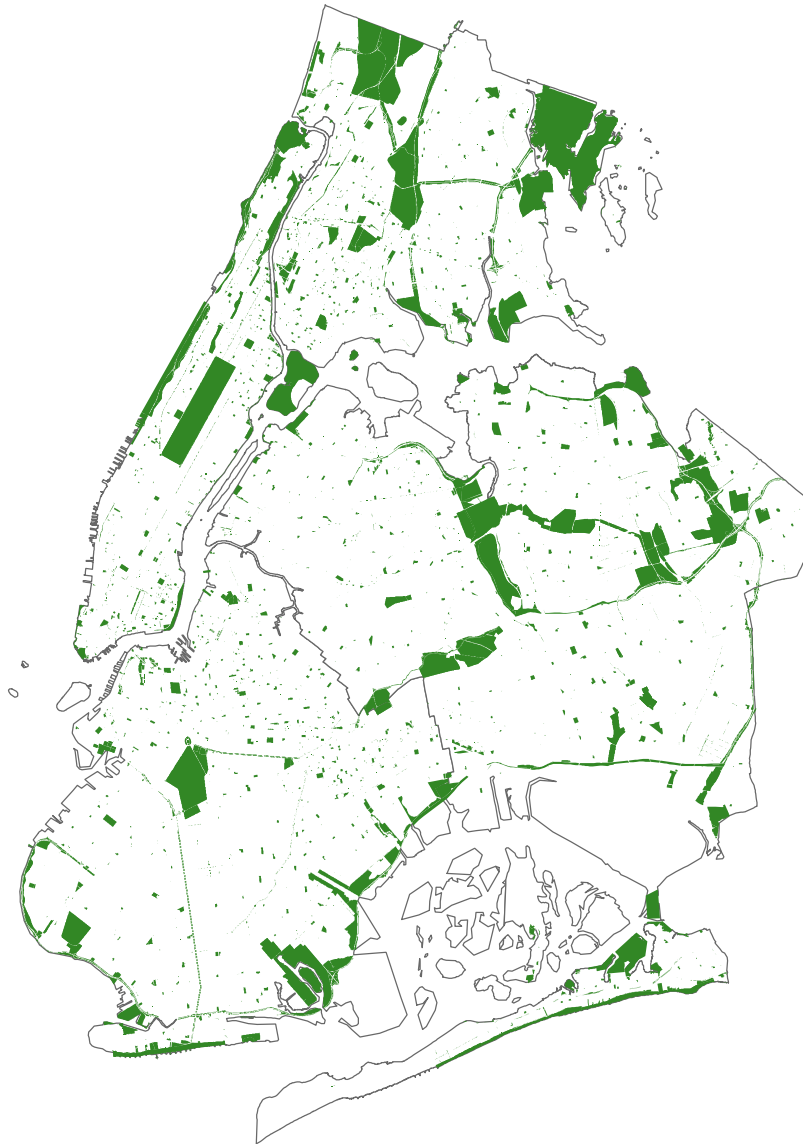


NYC Parks

The Urban Landscape

NYC is 14% Parkland

- more than 5,000 individual properties
- 800 athletic fields
- nearly 1,000 playgrounds
- 550 tennis courts
- 66 public pools
- 48 recreational facilities
- 5 stadia
- 17 nature centers
- 13 golf courses
- 14 miles of beaches
- 1,200 monuments
- 22 historic house museums

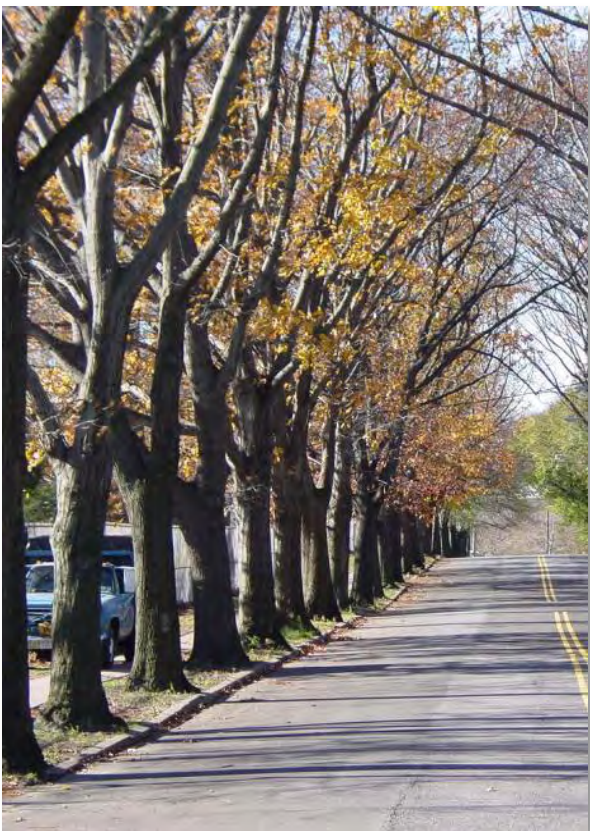


NYC Parks

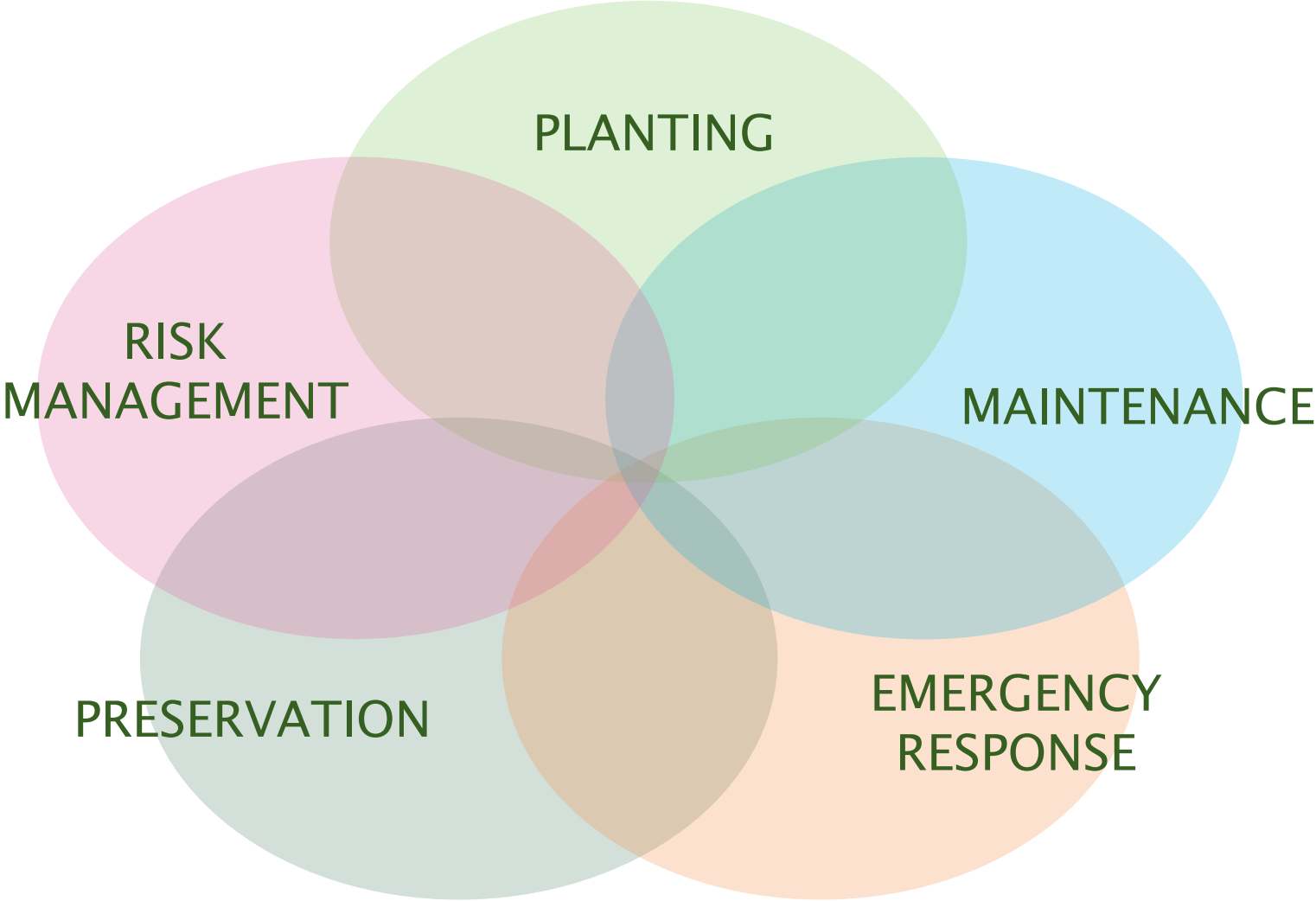
Estimated 2 million trees in landscaped parks & natural areas



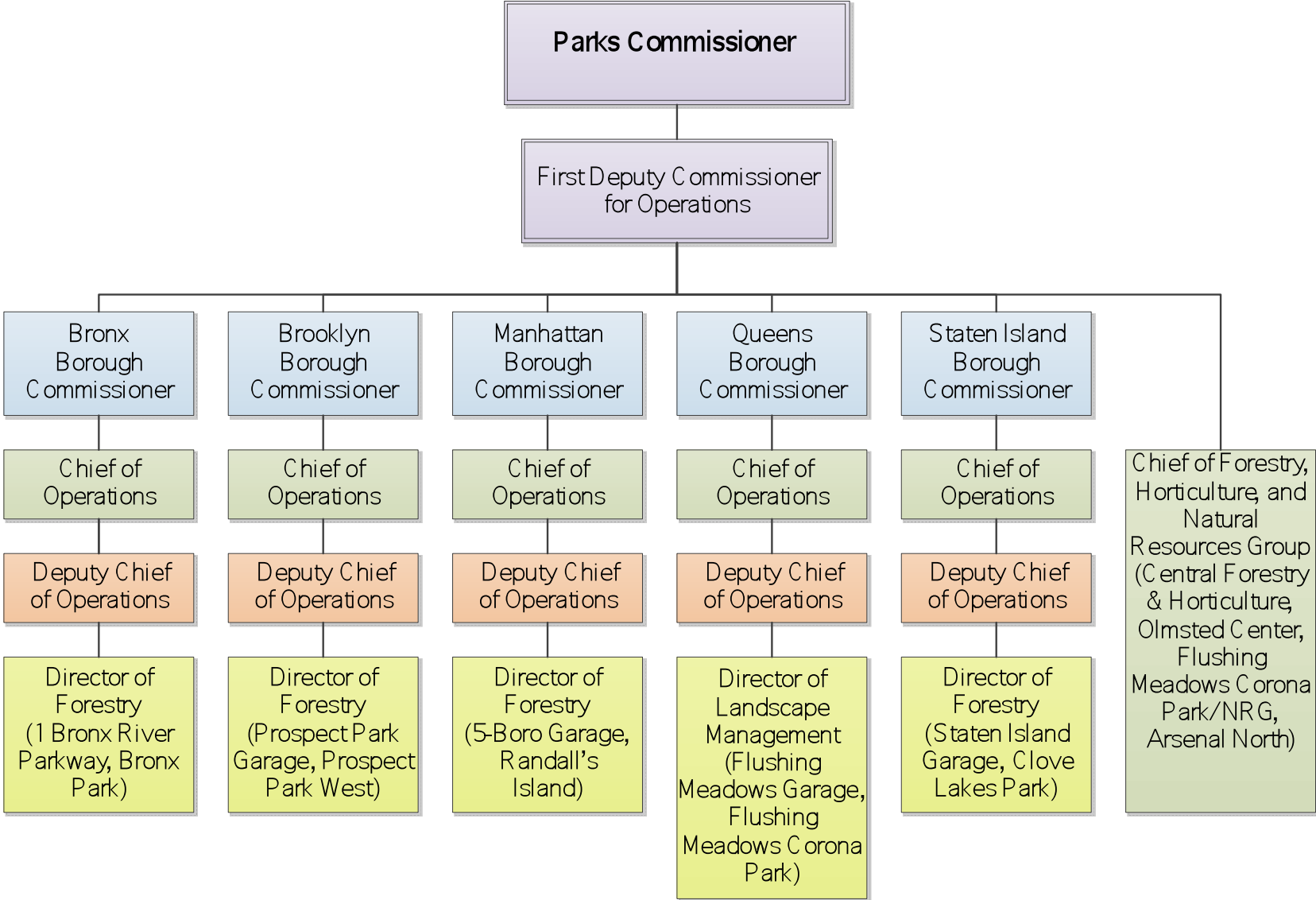
600,000 Street Trees



NYC Urban Forest Management



NYC Urban Forest Management

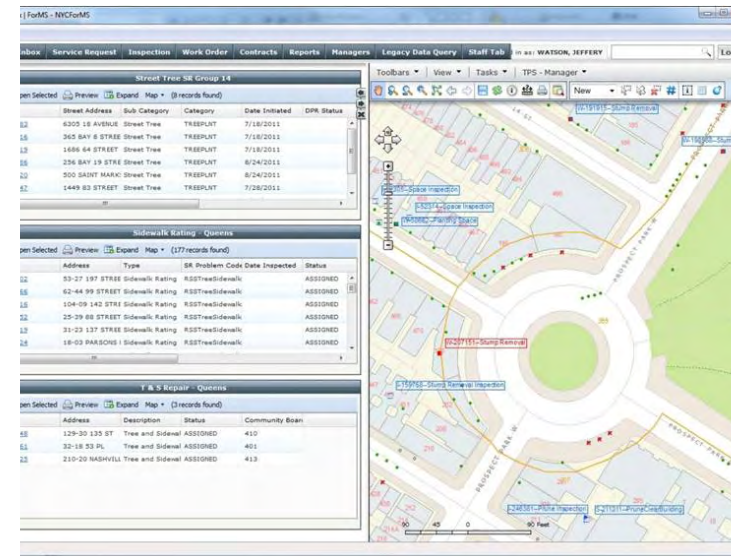


ForMS – Forestry Management System

Computerized inventory and work management database

2-way integration with 311 – public request comes in, forestry response comes out

During storms, the system may be limited to just tree-related emergencies



The History of Parks' Storm Response in NYC





SCENES WROUGHT BY THE RECENT TORNADO AT WOODHAVEN, LONG ISLAND.

1. View on Rockaway avenue, showing Schaeffer's house, near which Mrs. Petroquien was killed. 2. Soliciting contributions for the Relief Fund. 3. Panoramic view, showing wrecked schoolhouse.

(From photographs by J. H. Hare, THE ILLUSTRATED AMERICAN Photographer.)

1st July 27, 1895

N. Y. PUBLIC LIBRARY
PICTURE COLLECTION

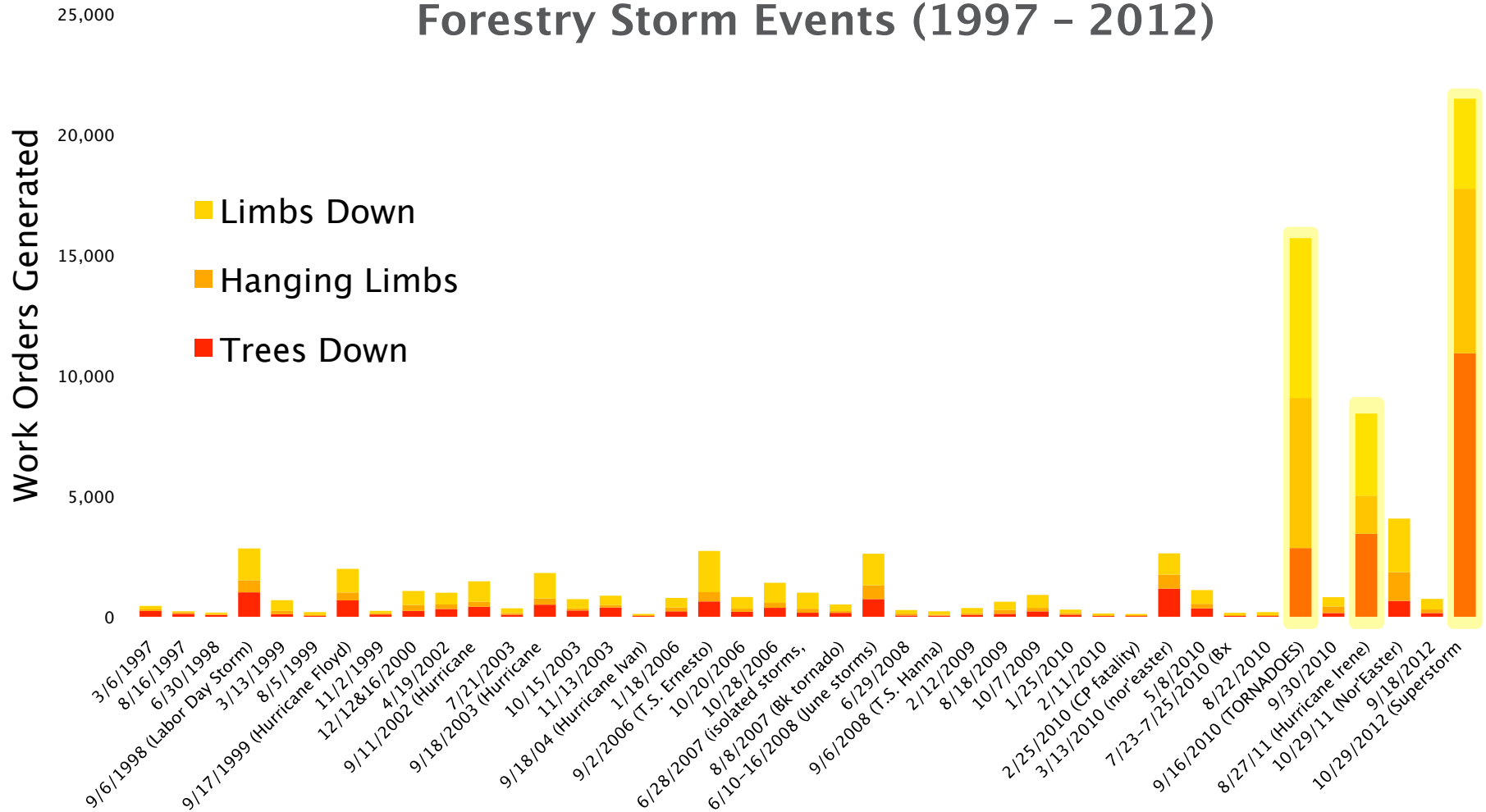


NYC Parks

From photographs by J.H. Hare, The Illustrated American Photographer.

NYC Storm History

Forestry Storm Events (1997 - 2012)



Emergency Protocol for Parks Forestry – an Evolution

City of
Parks &



FORESTRY
PLAN OF

OPERATIONS

Timothy
Director of

Fiona V
Tom Ru

City of
Parks &



FORESTRY
RESPONSE

PLAN OF

Fiona V
Tom Ru

The C
Parks

FORESTRY
PLAN OF

Michael R. Bloomberg
Mayor

Adrian Benepe
Commissioner

March 2011

City of
Parks &

FORESTRY
EMERGENCY
PLAN OF



Michael R. Bloomberg
Mayor

Adrian Benepe
Commissioner



The City of New York
Parks & Recreation

**FORESTRY EMERGENCY
PLAN OF OPERATIONS**
DRAFT

Michael R. Bloomberg
Mayor

Adrian Benepe
Commissioner

March 2011



NYC Parks

“Everyone has a plan ‘til they get punched in the mouth”

- Mike Tyson



September 16, 2010

Tornadoes







NYC Parks





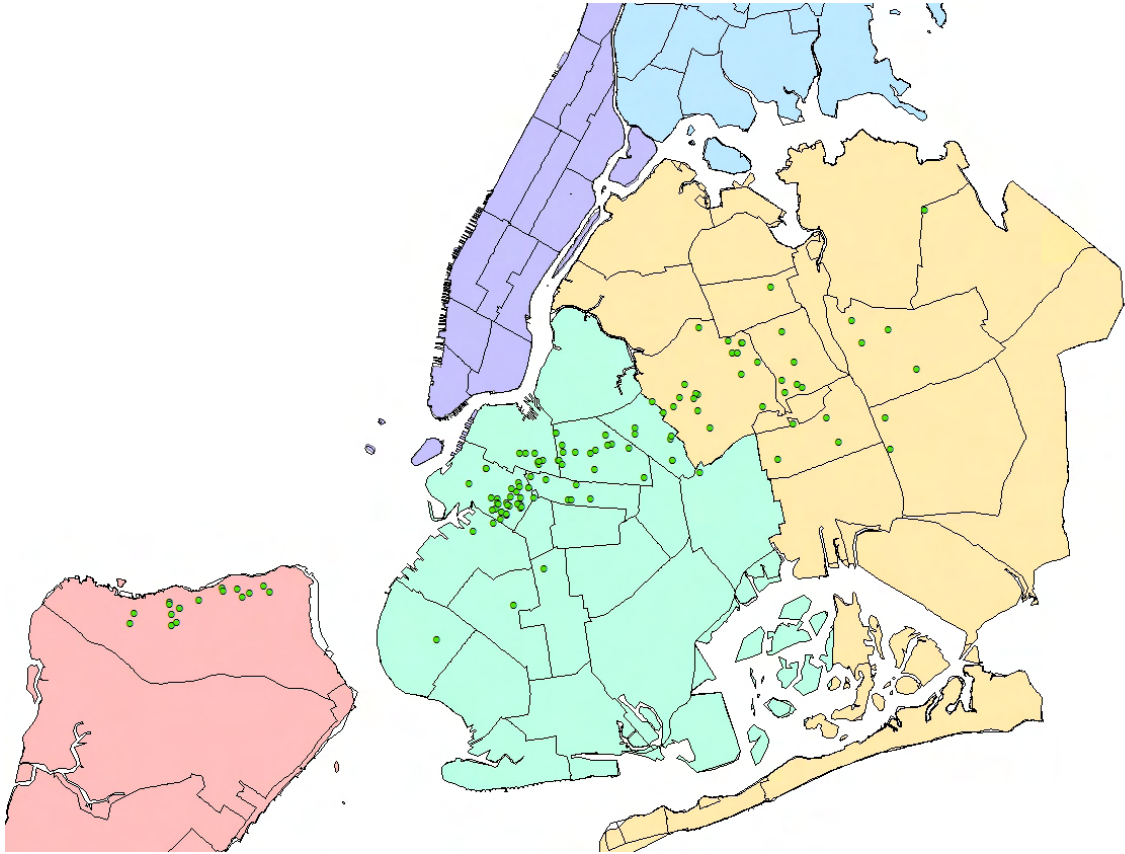
NYC Parks



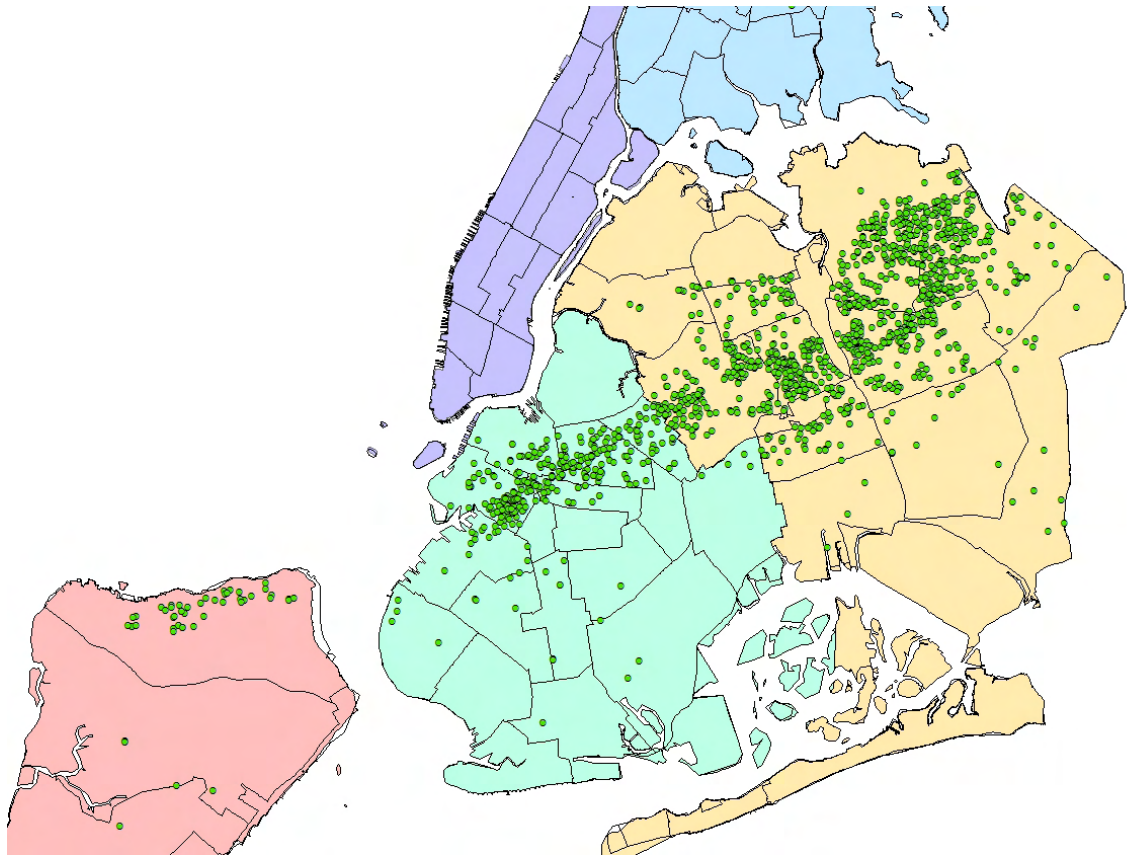




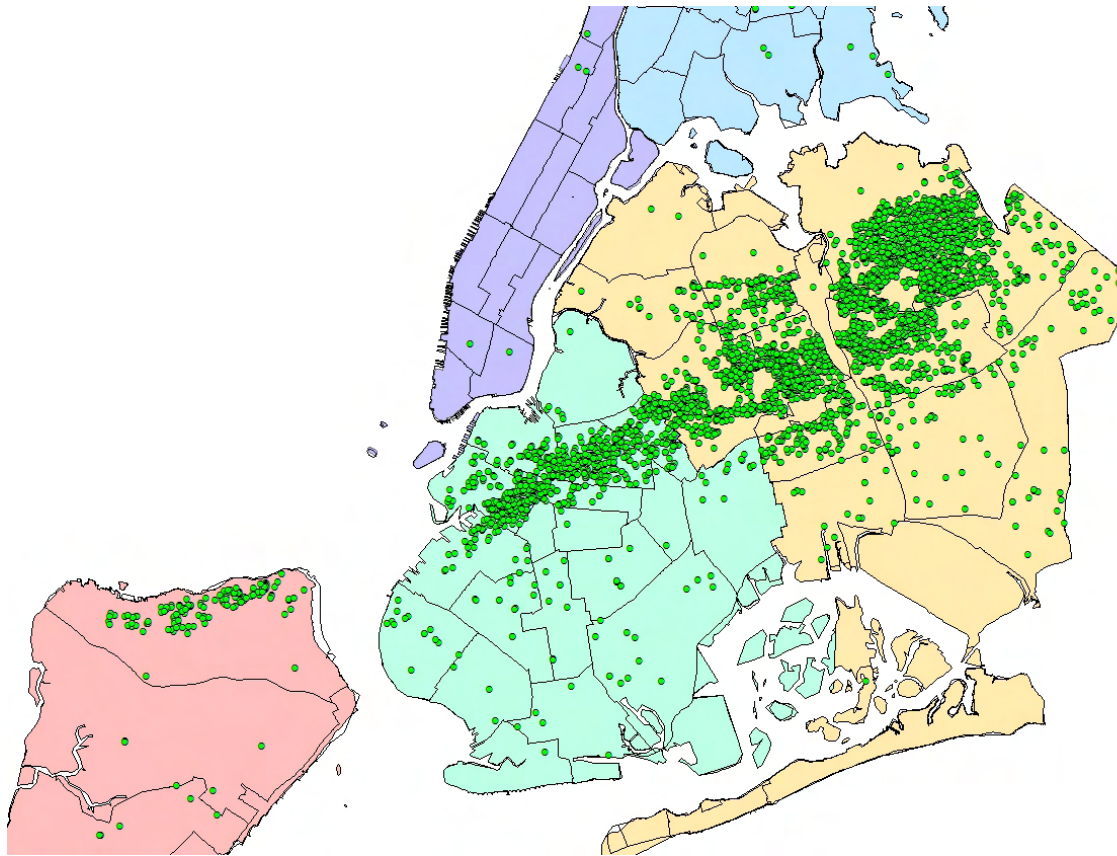
9/16 18:00 134 Service Requests



Brooklyn / Queens (9/16 24:00) 1,612 Service Requests



Brooklyn / Queens Day 3 (9/18 19:00) 5,506 Service Requests



Outside Help

Federal & State Agencies

USFS

- 'Hot-Shot' crew
- APHIS



- FEMA
- National Guard



FEMA



Mutual Aid

- Nassau County
- Westchester County
- Suffolk County



State Agencies

- NYSDAM
- Port Authority
- DOT
- NYSOEM



New York State
Department of Transportation

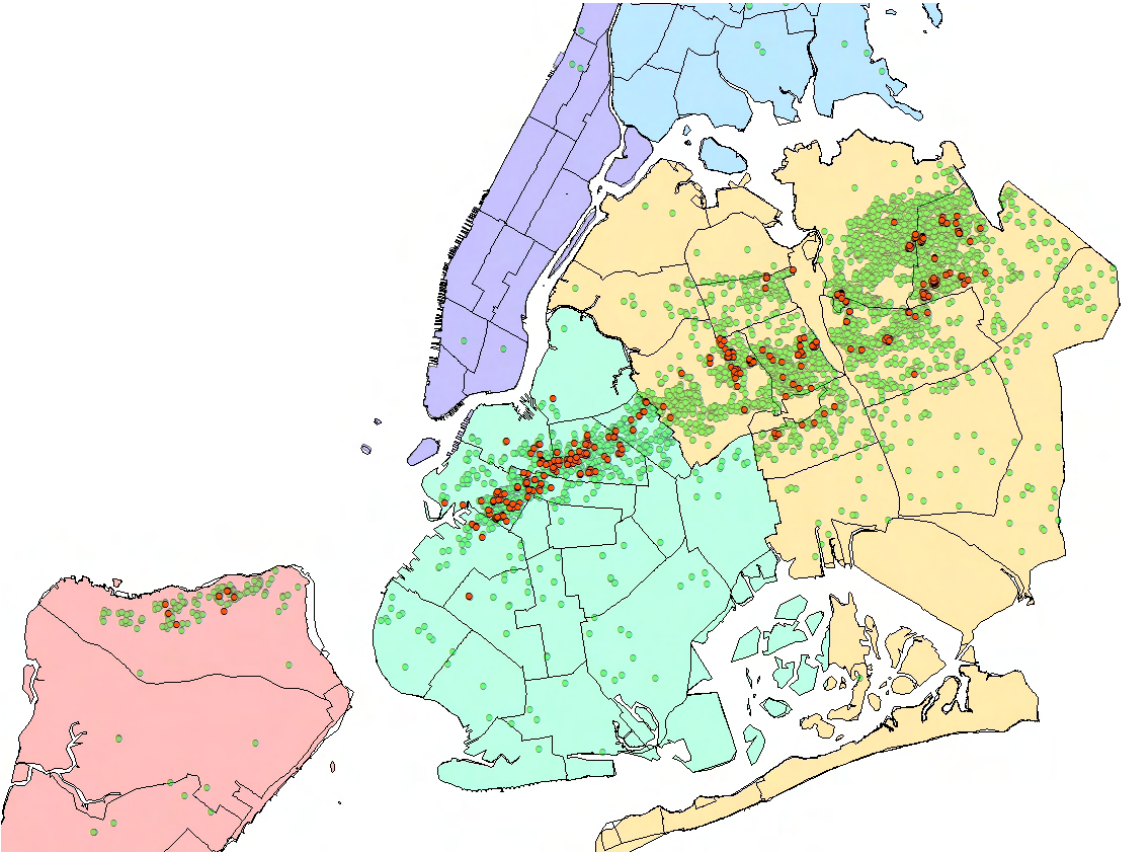
Private Contract

- Lewis Tree Service

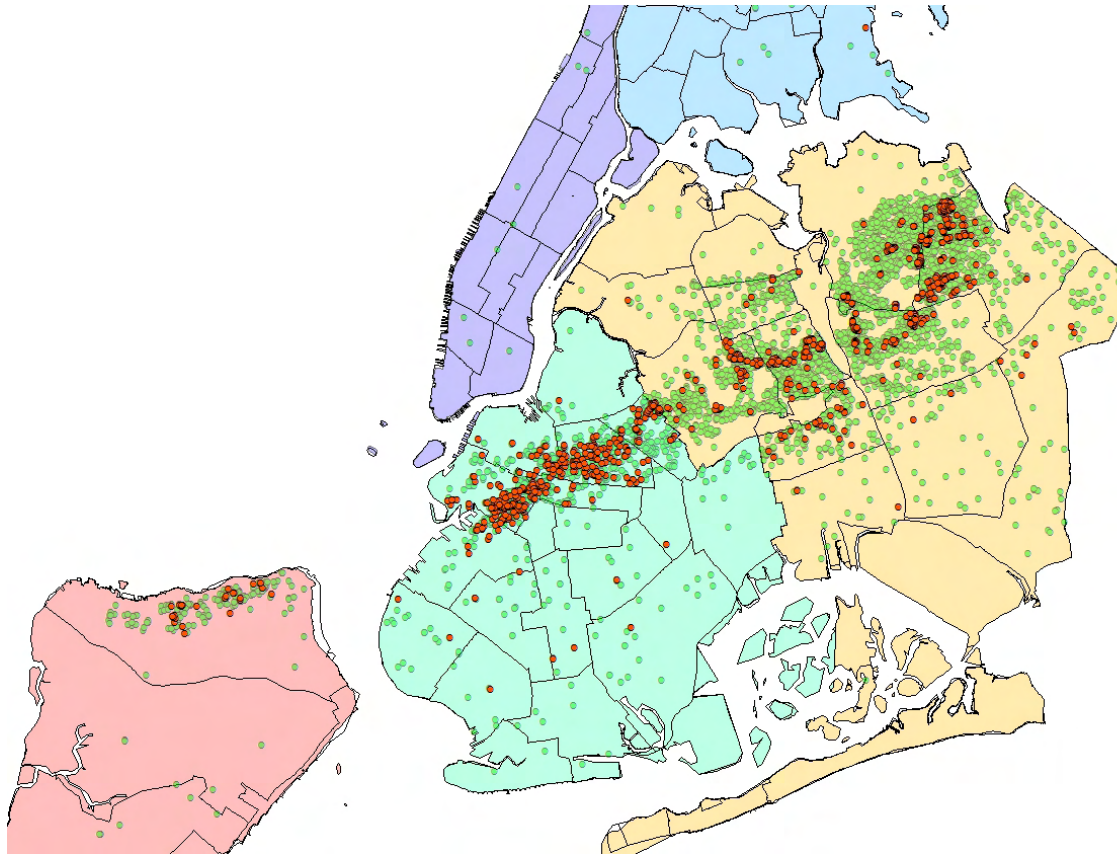


NYC Parks

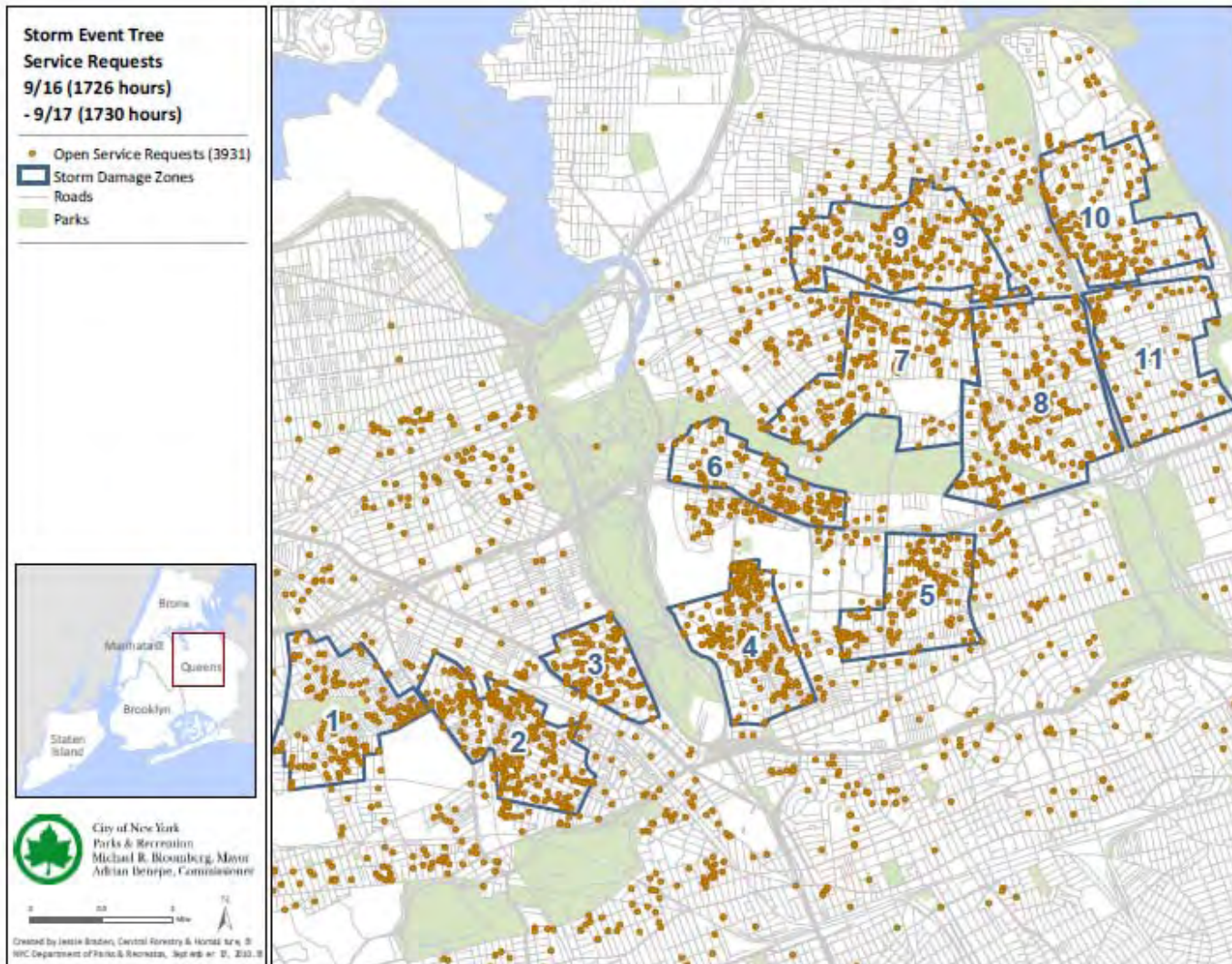
Day 2 (9/17 19:00) 239 Work Orders Closed



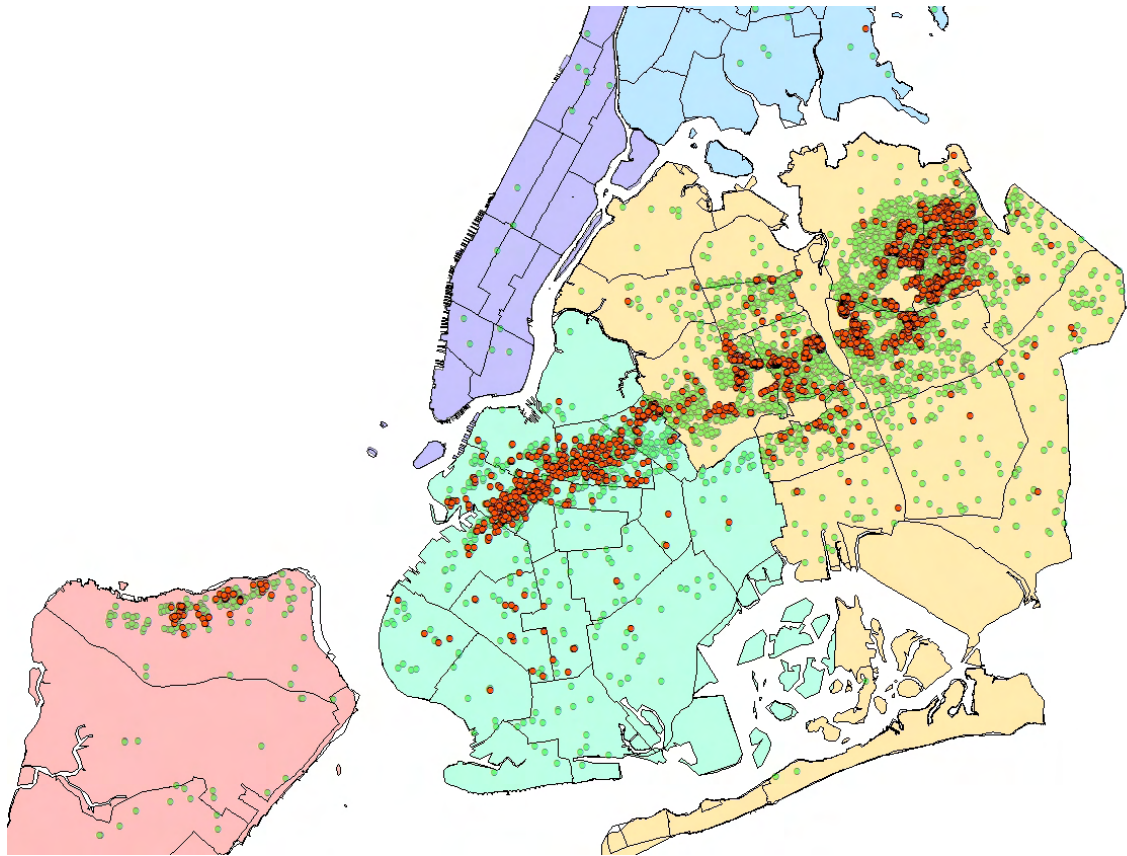
Day 3 (9/18 19:00) 536 Work Orders Closed



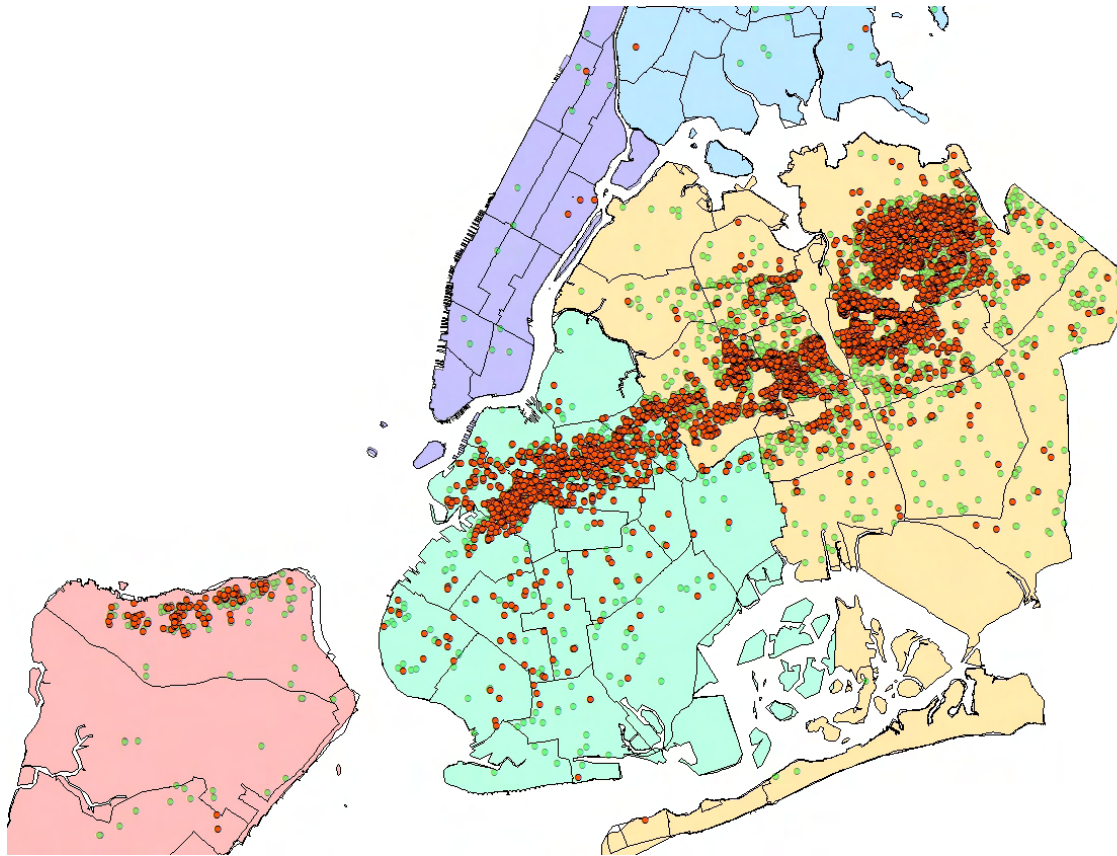
Defined Storm Zones



Brooklyn / Queens Day 7 (9/23 19:00) 2,556 Work Orders Closed



Brooklyn / Queens Day 14 (9/30 19:00) 6,175 Work Orders Closed



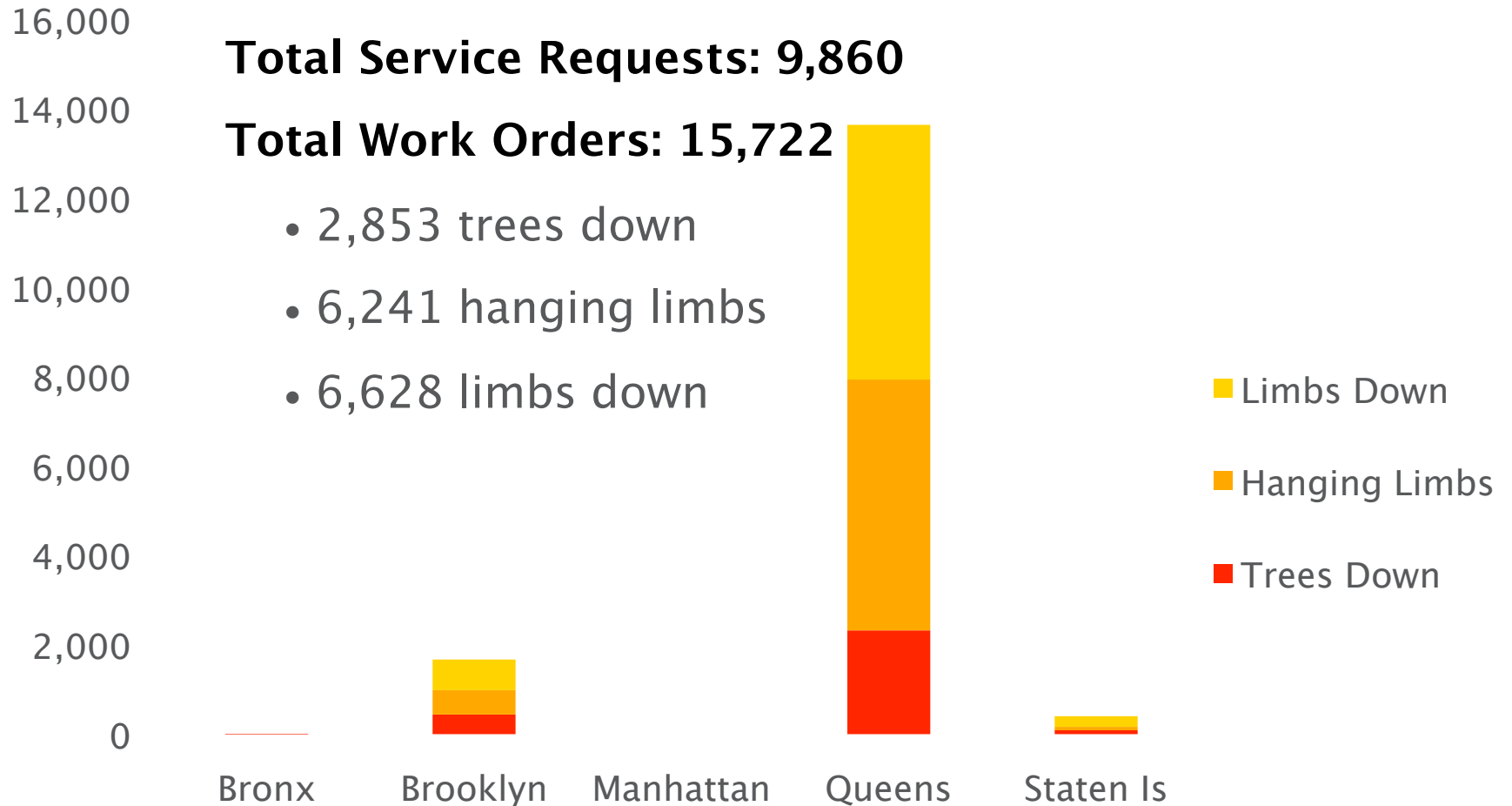
Two Tornadoes and a Macroburst vs NYC Trees

42 Days of Storm Activation

Total Service Requests: 9,860

Total Work Orders: 15,722

- 2,853 trees down
- 6,241 hanging limbs
- 6,628 limbs down



Lessons Learned From the September 16th Tornadoes

- Forestry specialists at OEM Emergency Ops Center (EOC)
- Clearly prioritize inspections and work orders
- Be able to report live from the field in order to update forestry database
- Be able to produce work lists for other agencies and organizations
- Need to approach storm response more strategically and utilize sister agencies
- Update forestry emergency response protocol and train all staff accordingly



Forestry Storm Emergency – ForSE



Forestry Storm Emergency (ForSE) – 2012

- Incorporate ICS Framework
 - Defined Chain of Command
- Developed Strategic Response Tactics
 - Request Based
 - Storm Zone
 - Combined
- Defined Prioritization:
 - Life Safety
 - Property Preservation
 - Quality of Life
 - All other work



The City of New York
Department of Parks & Recreation

FORESTRY STORM EMERGENCY (ForSE)

OPERATIONAL PLAN

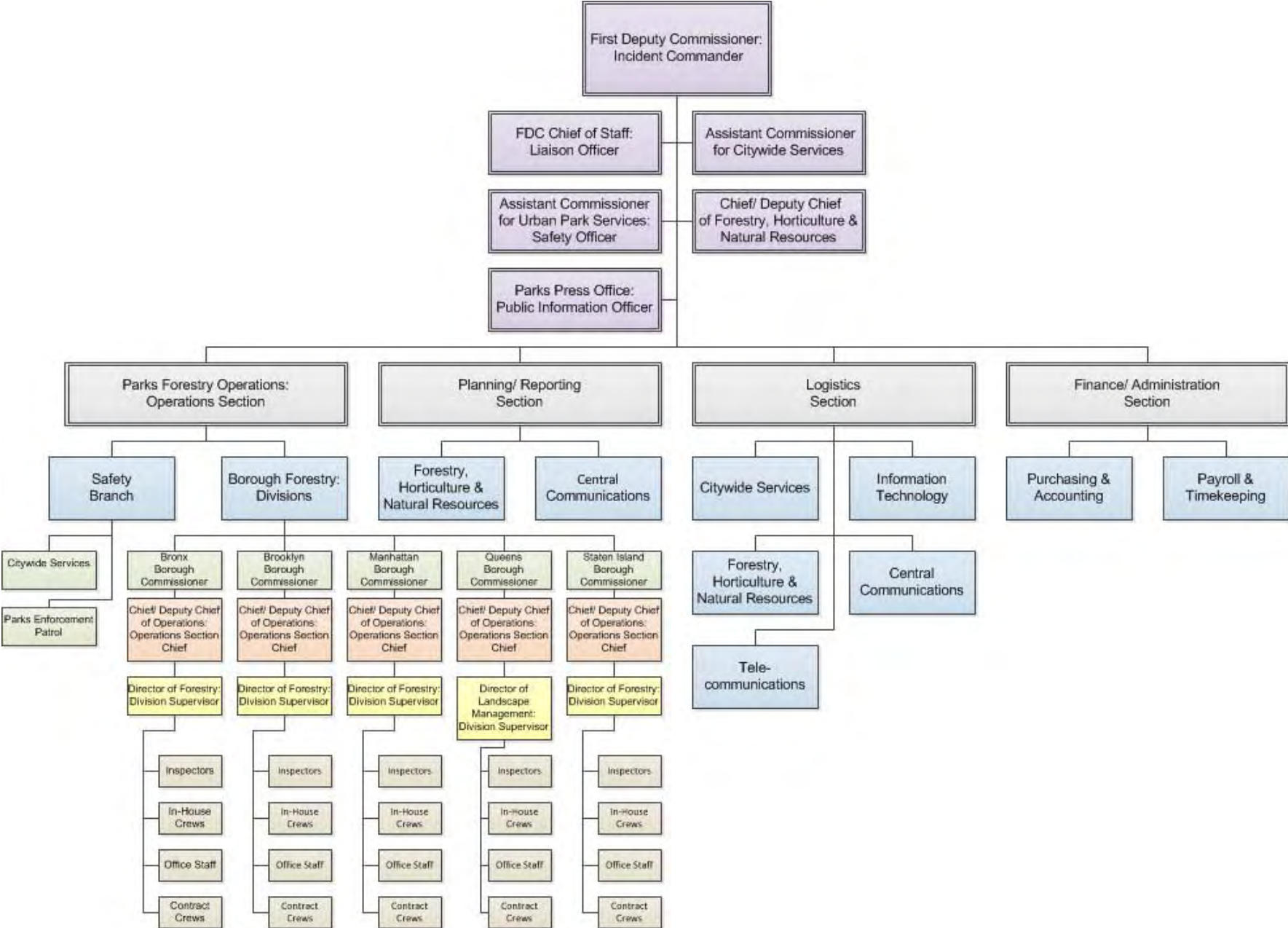
Michael R. Bloomberg, Mayor
Adrian Benepe, Commissioner

August 2012



NYC Parks

Incident Command Structure



Incident Levels

#:

Incident Level	Intensity	Tree Down SRs (greater than or equal to)					Exceeds Weekly Average by
		BX	BK	M	Q	SI	
5	Low	10	15	5	40	10	~ 3 x
4	Medium	25	45	10	100	25	~ 8 x
3		70	110	30	250	60	~ 20 x
2		175	275	80	625	150	~ 50 x
1	High	350	550	170	1,250	300	~ 100 x

Shaded boxes indicate levels at which OEM may convene the Interagency Committee for Downed Trees Emergencies.

Incident levels are based on the number of Tree Down SRs received within 24 hours in any one borough.



Office of Emergency Management's Emergency Operations Center



NYC Parks

Defined Initial Response

- Remove high priority downed trees.
- Ascertain the extent of the storm damage to gain situational awareness.
- Deploy resources including inspectors and debris removal crews based solely on Service Requests and field observations.



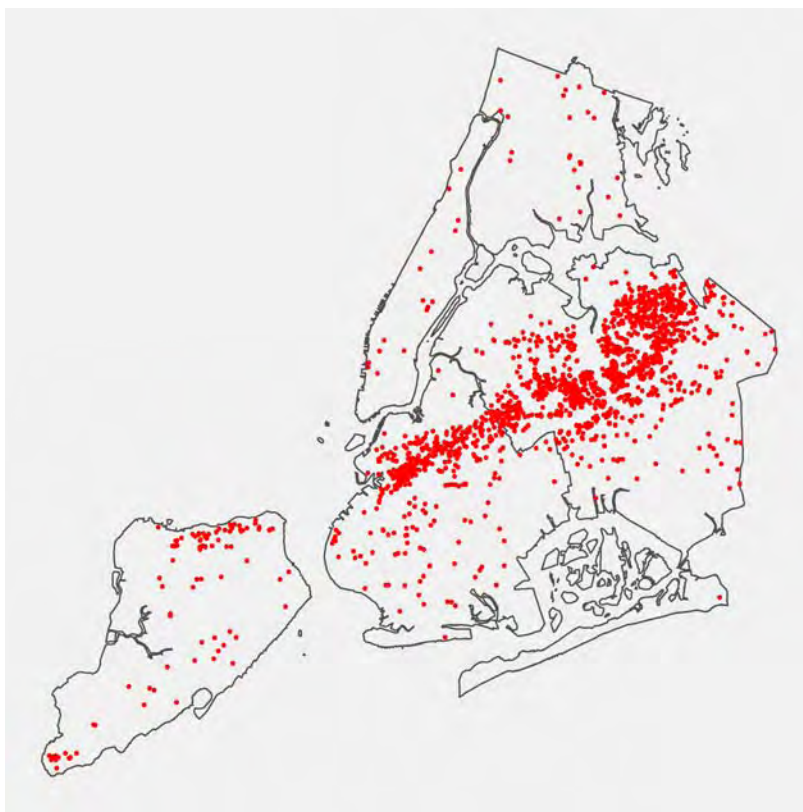
Initial Response – Tactical Decision-Making

Situational awareness

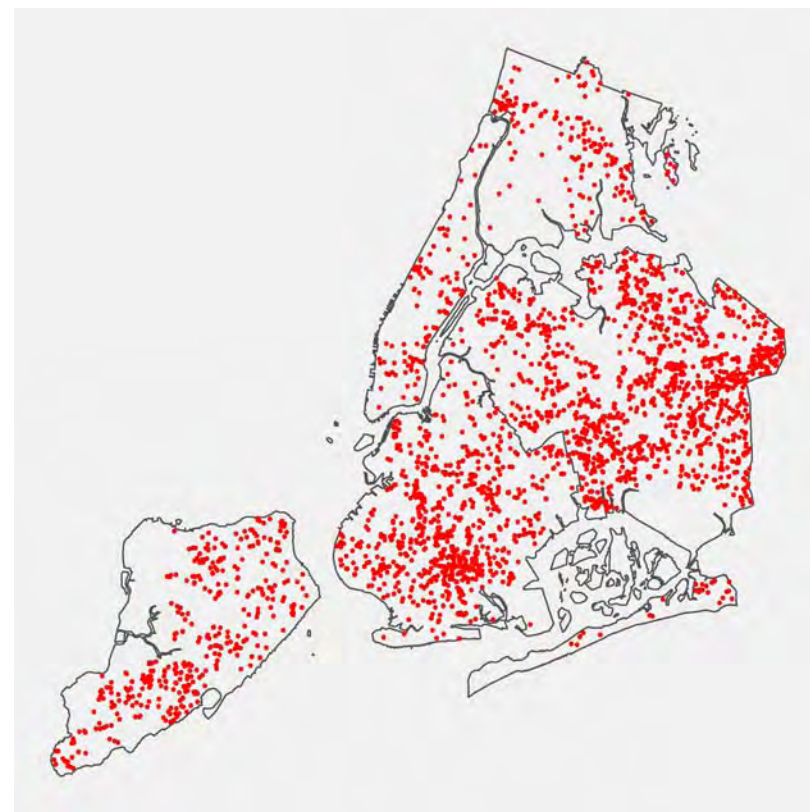
- Request-Based Response
- Storm Zone Response
- Combined Response



Tactical Decision-Making



Tornadoes – September 16, 2010



Irene – August 27, 2011

Inspection & Work Order Prioritization

Incidents are prioritized in the following order:

1. Life safety and obstructed roadways
2. Property preservation
3. Quality of life
4. Vegetative debris reduction and collection
5. Sidewalk restoration and replanting



Life Safety & Obstructed Roadways

Trees causing immediate danger to human health

Trees blocking emergency access routes

Trees on electric wires

Large limbs hanging over public areas and in danger of falling



Property Preservation

Trees down on houses, cars, or other property – stabilized

Trees blocking access to homes



Quality of Life

Fallen trees and hanging limbs that are not interfering with traffic or endangering pedestrians.

Blocked sidewalks

Trees down in parks

Storm-related pruning



Wood Debris Reduction & Disposal

The approach to wood debris disposal will vary based on where the debris is located in relation to the Asian longhorned beetle (ALB) quarantine zones and the severity of the incident.



Sidewalk Restoration & Replanting

DDC sidewalk repairs and replanting



“No plan survives contact
with the enemy.”

– US Navy Seals



Tropical Storm Irene August 28, 2011

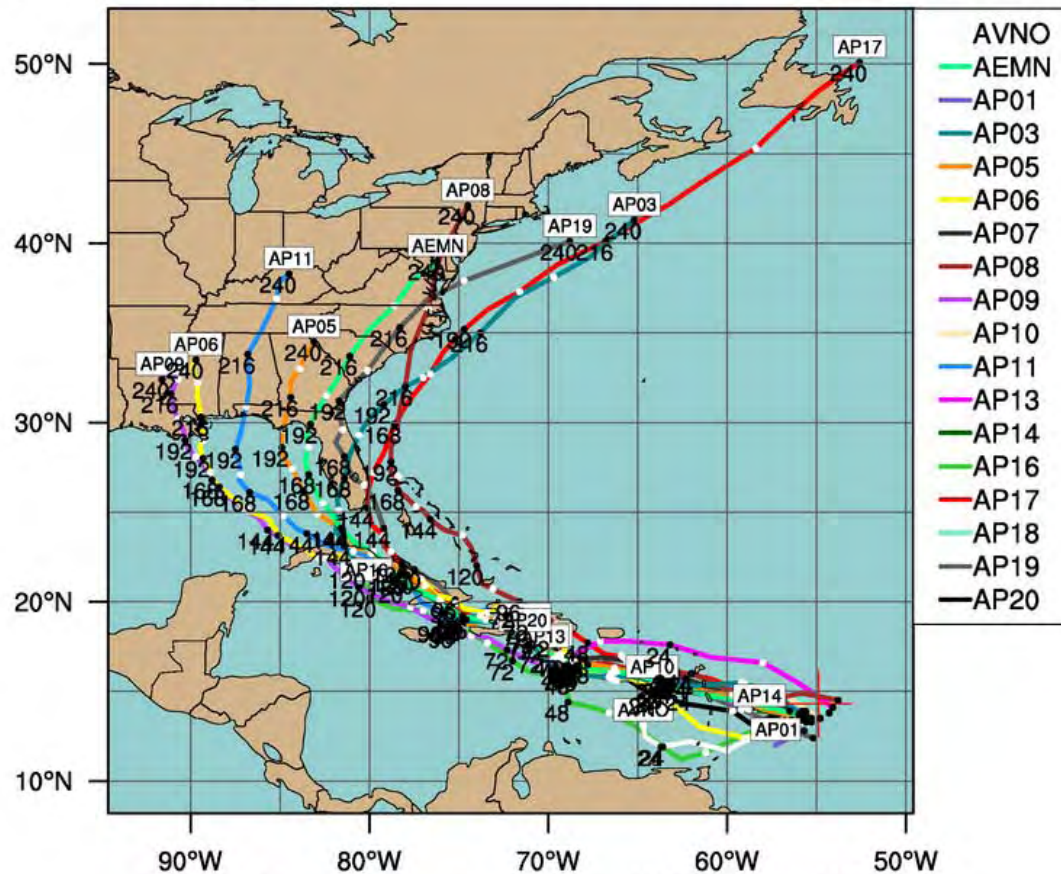


DISTURBANCE INVEST (AL97)

NCEP GFS Ensemble track guidance initialized at 1200 UTC, 20 August 2011

Current Intensity: 30 kt

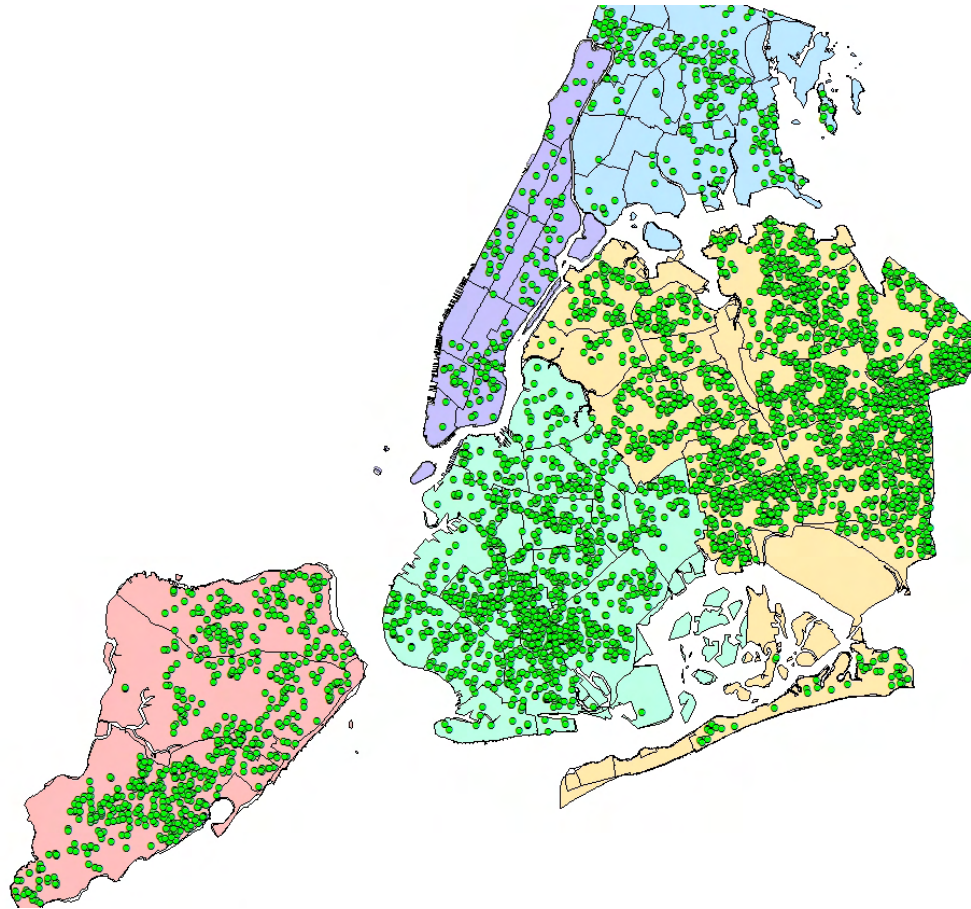
Current Basin: North Atlantic



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8/29 22:00 5,394 Service Requests



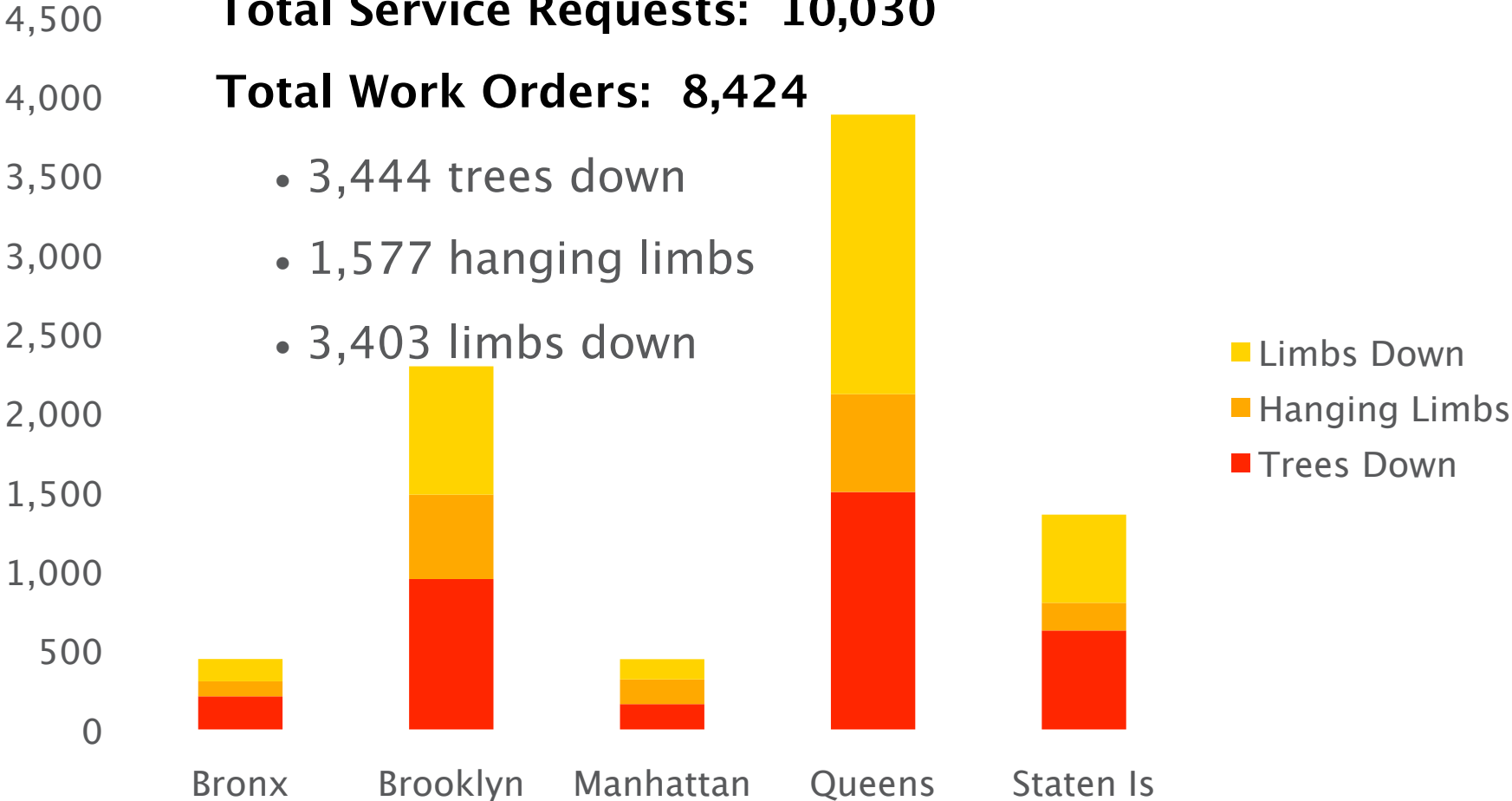
Irene vs NYC Trees

21 Days of Activation

Total Service Requests: 10,030

Total Work Orders: 8,424

- 3,444 trees down
- 1,577 hanging limbs
- 3,403 limbs down





Service Request Distribution and Comparison

	Nor'Easter (3/13/10)		Tornadoes (9/16/10)		T.S. Irene (8/27/11)	
Trees Down	2,739	64%	3,693	37%	4,780	48%
Hanging Limbs	548	13%	2,156	22%	1,629	16%
Limbs Down	1,011	24%	4,001	41%	3,621	36%
Total Calls	4,298		9,850		10,030	
Days Tracked	5 days		15 days		9 days	



Work Order Distribution and Comparison

	Nor'Easter* (3/13/10)		Tornadoes (9/16/10)		T.S. Irene (8/27/11)	
Trees Down	1,165	44%	2,853	18%	2,987	41%
Hanging Limbs	582	22%	6,241	40%	1,214	17%
Limbs Down	883	34%	6,628	42%	3,108	43%
Total Work**	2,630		15,722		8,424	
Days Tracked	20 days		42 days		21 days	

*Work orders generated

** Does not include debris pickups



NYC Parks

Lessons Learned From Tropical Storm Irene

Downed Tree Task Force

Situational Awareness

Emergency Contracts

**Develop Debris
Management Strategy**

Technology Challenges



Storm Mobile



Storm Mobile – StoMo



- Windows application optimized for tablet computers
- 2-way integration with 311
- GPS
- Utilizes citywide wireless network
- SRs & WOs are updated upon syncing
- Near real-time data updating



Storm Mobile

Storm Mobile: Map

On Street: **W 77 ST** Cross Street 1: **CENTRAL PARK W** Cross Street 2: **COLUMBUS AV** < Go To

Borough: **Manhattan** District: **07** Zone: **1072A**

Storm Mobile Ver 1.75: Data Form

Service Request

Request ID: 353847
 Address: 15 WEST 77 STREET
 Type: Limb Down - Car

* RA: **Work Order Created**

Caller Comments
 W 77 st

Other Requests at Address

Type	Resolution	Created On
Limb Down - Car	Work Order Created	4/11/2012

Work Order

WO ID: _____

* House #: **15**

* Street: **WEST 77 STREET**

* WO Type: **Limb Down - Car**

* Status: **Open**

Tree #: _____

Location: _____

Equipment: _____

Diameter: _____

Species: _____

Work Date: **04/11/2012**

State of Site

	Yes	No	N/A
Wire Damage:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sidewalk Damage:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tree Uprooted:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wood Remains:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stump Remains:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

All Workorders at Address

Type	Status
Limb Down - Car	OPEN
Limb Down - Car	OPEN

Storm Mobile

Significant reduction of paperwork

Ability to assign inspectors by zones

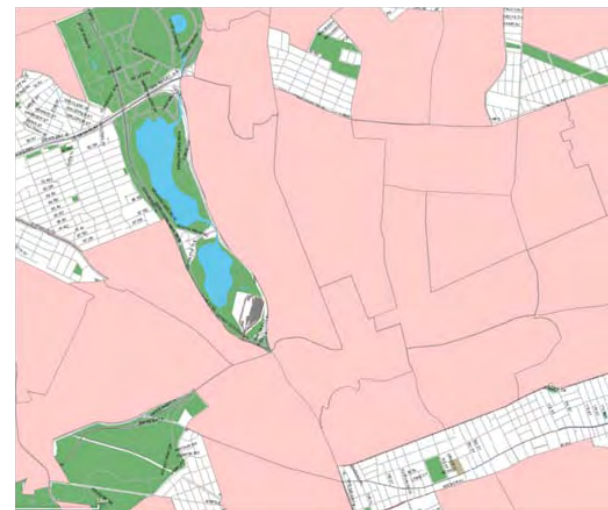
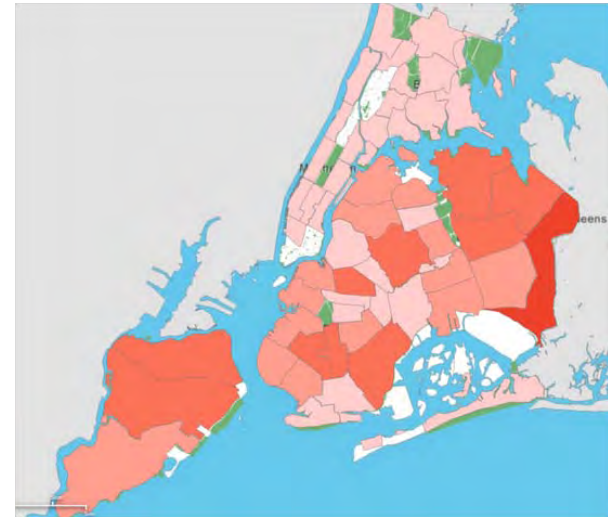
Ability to quickly see where blocked streets are located

Rapid field inspection of service requests

Ability to handle duplicate service requests in the field

Streamlined generation and closure of work orders

Ability to report in near real time



“come on, hit me with your
best shot”

– Pat Benatar



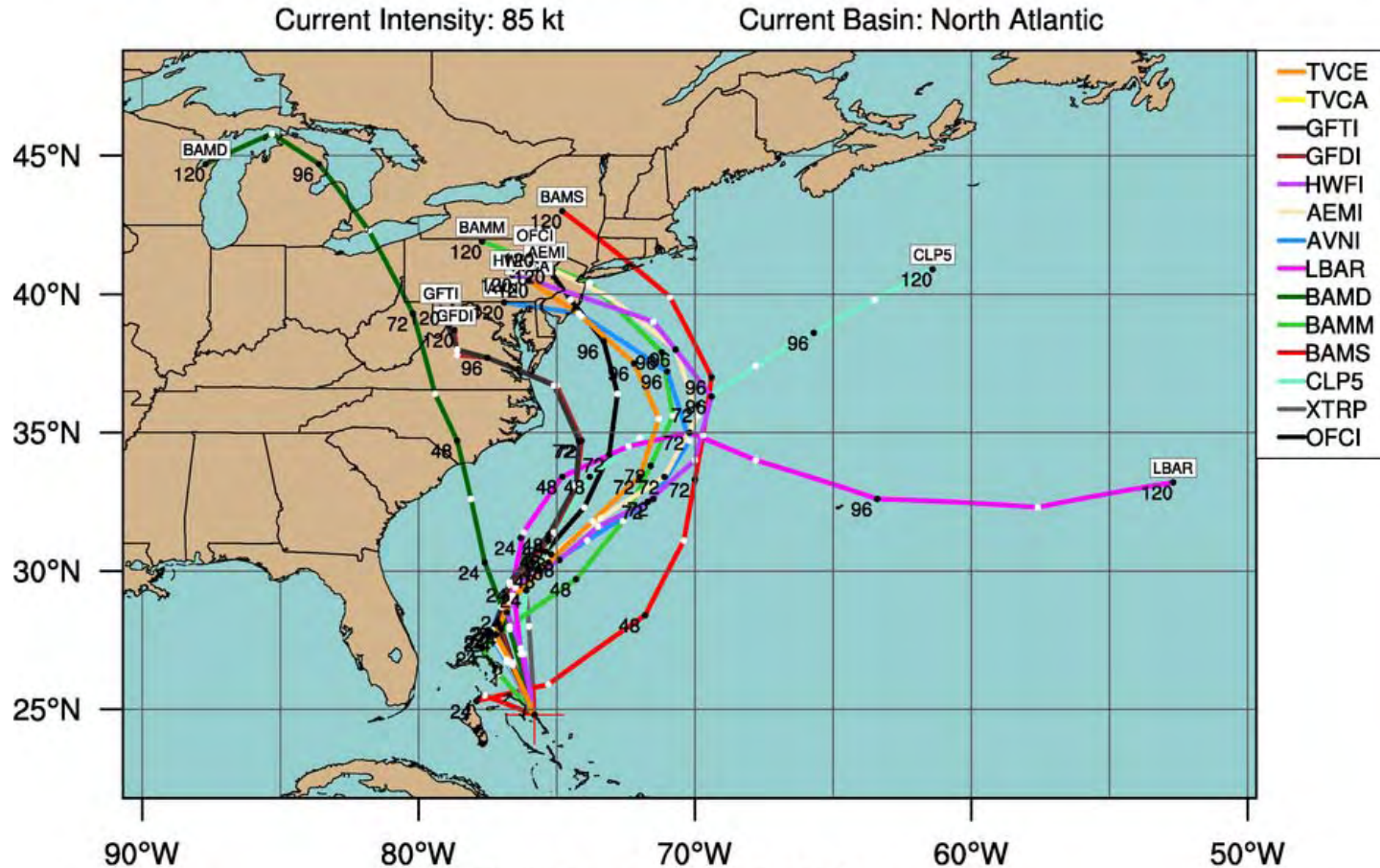
Superstorm Sandy

October 29, 2012



HURRICANE SANDY (AL18)

Early-cycle track guidance initialized at 0000 UTC, 26 October 2012



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Plot generated at 0119 UTC 26 October 2012



NYC Parks

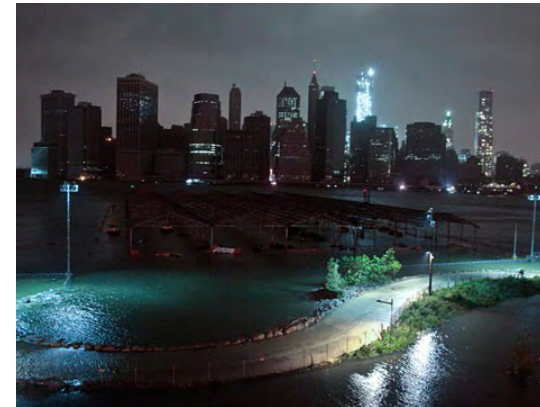
Superstorm Sandy's Strength

- Storm surge was 13–14 feet above Mean Low Water
- Massive power and transportation suspensions
- Second-costliest storm in U.S. history (after Katrina)



Superstorm Sandy's Strength

- Estimated \$19 billion in damage to NYC
- For the first time since 1888, NYSE was closed for two days in a row
- 10,926 street and park trees lost
- 4 dozen lives lost in NYC



• Service Requests

• Work Orders



10/29 at 00:00 to 10/29 at 12:00



• Service Requests

• Work Orders



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



- Service Requests
- Work Orders



10/29 at 00:00 to 10/29 at 18:00



- Service Requests
- Work Orders

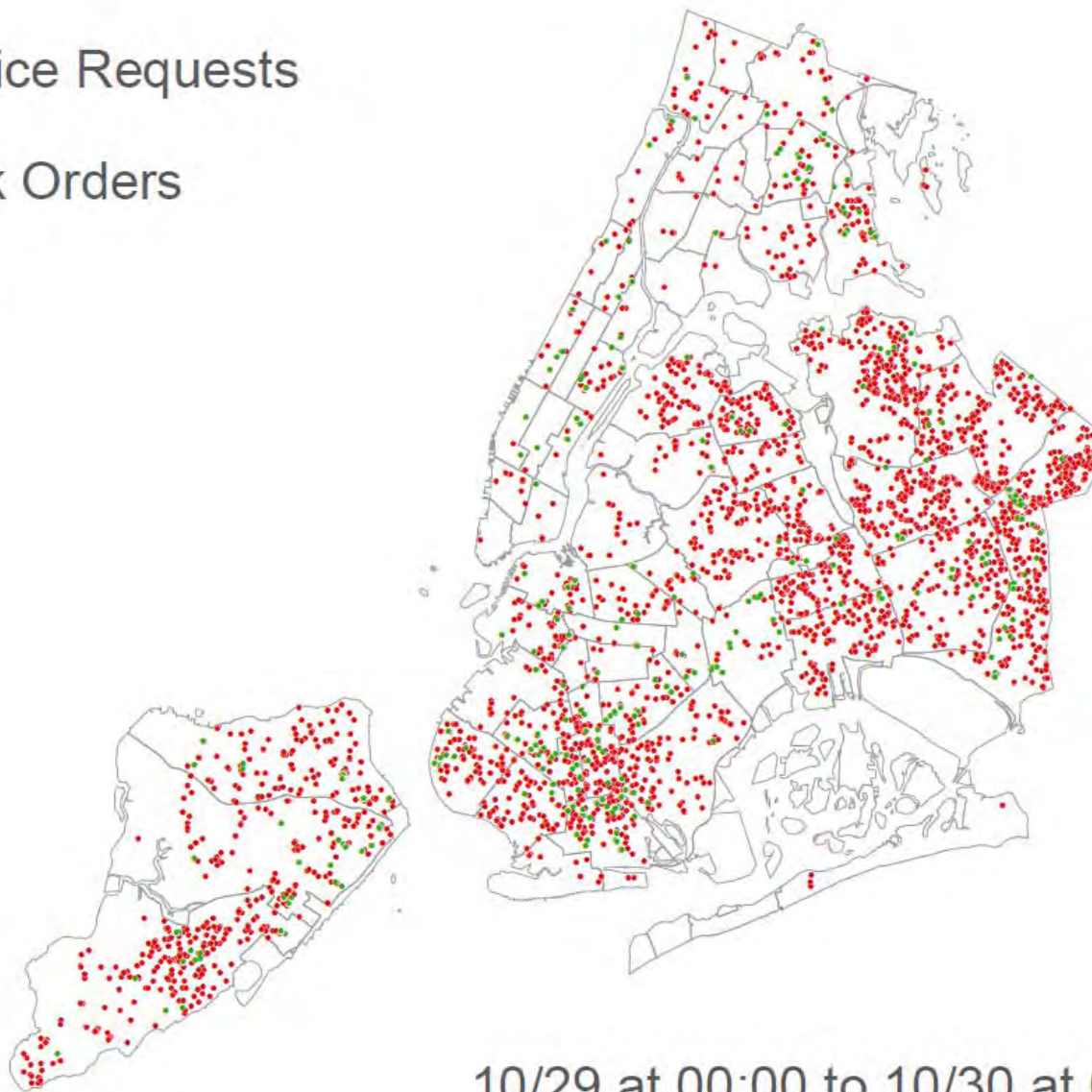


10/29 at 00:00 to 10/29 at 21:00



- Service Requests

- Work Orders



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



- Service Requests
- Work Orders



10/29 at 00:00 to 10/30 at 03:00



- Service Requests
- Work Orders



10/29 at 00:00 to 10/30 at 06:00



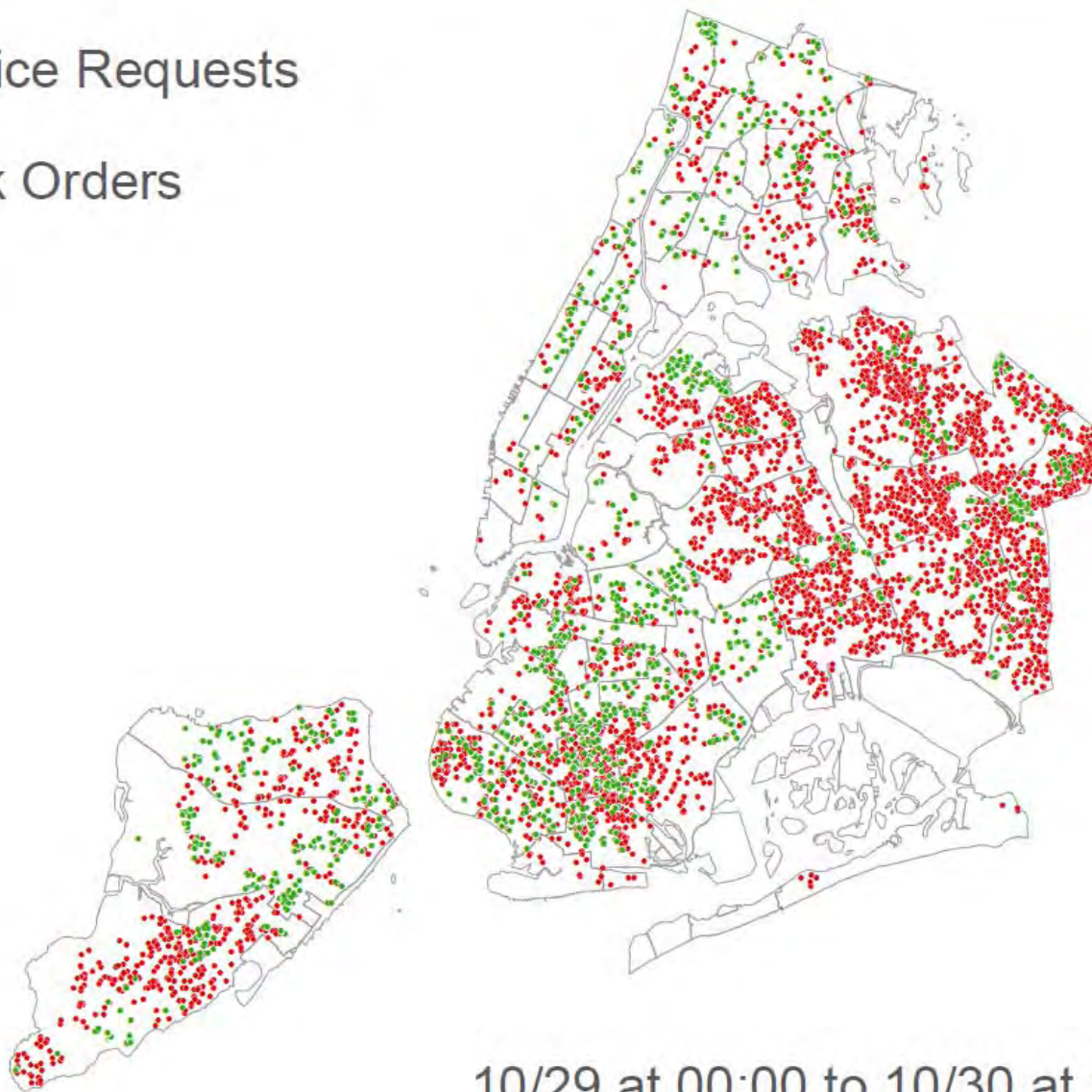
- Service Requests
- Work Orders



10/29 at 00:00 to 10/30 at 09:00



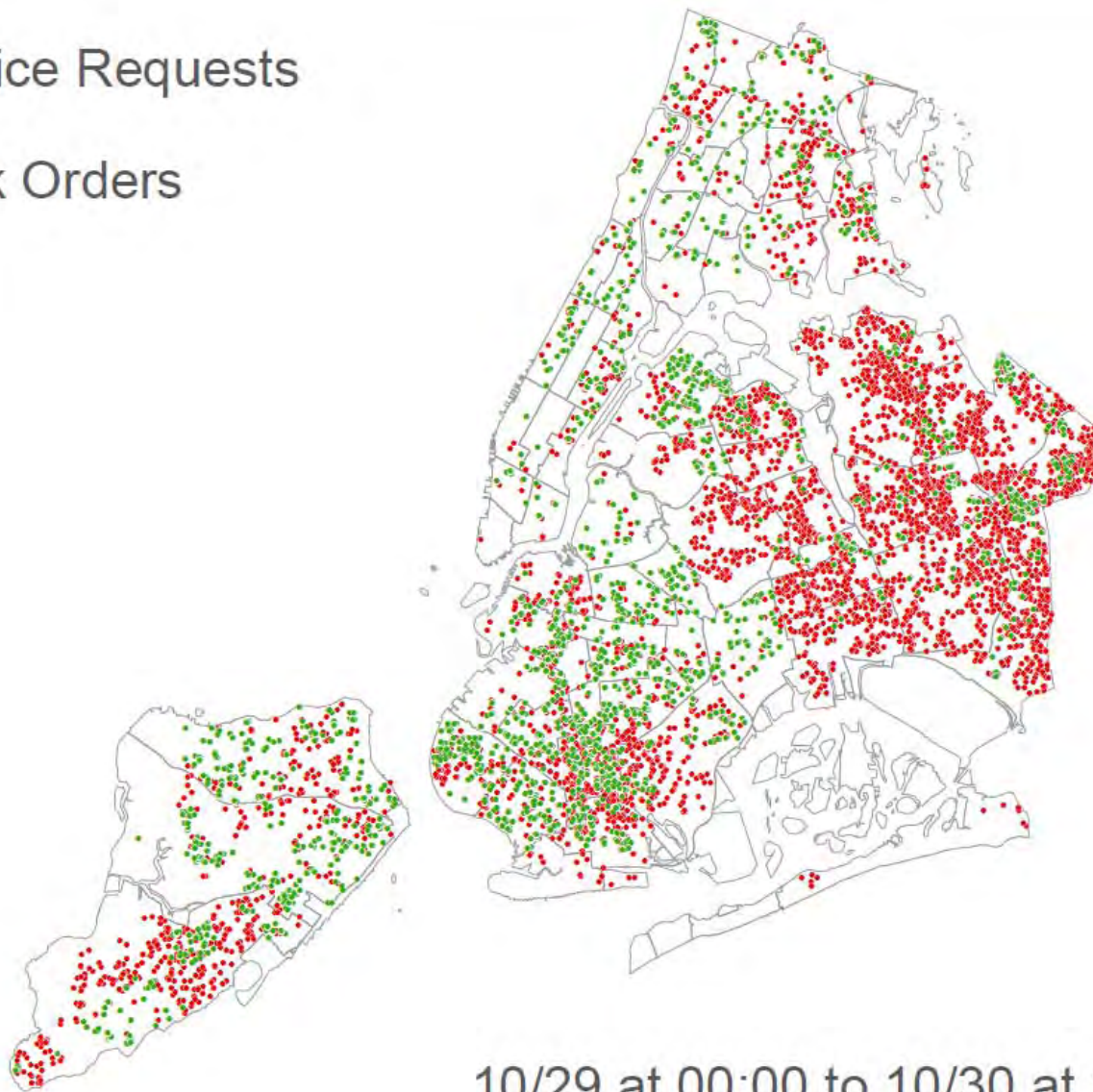
- Service Requests
- Work Orders



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



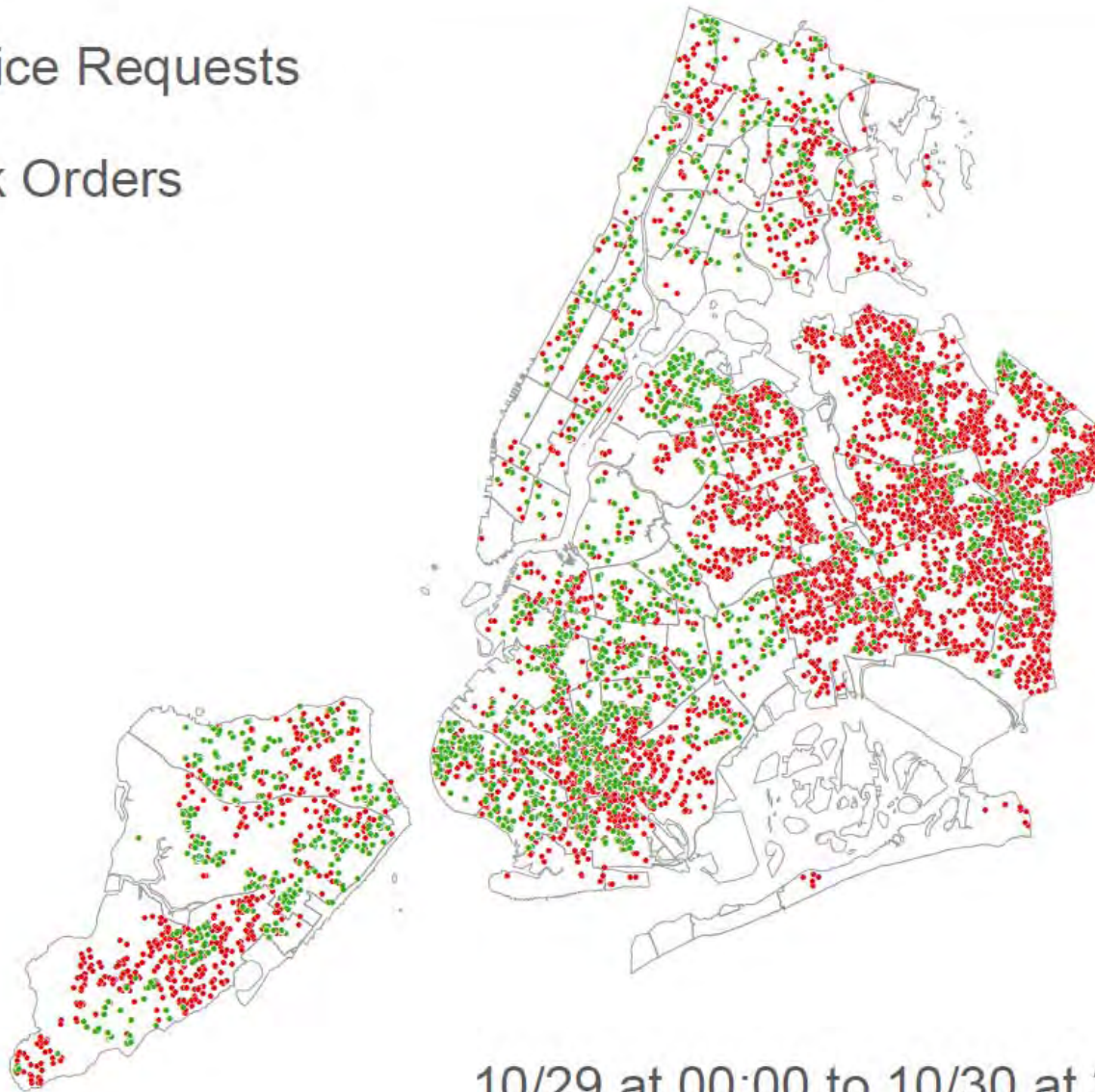
- Service Requests
- Work Orders



10/29 at 00:00 to 10/30 at 18:00



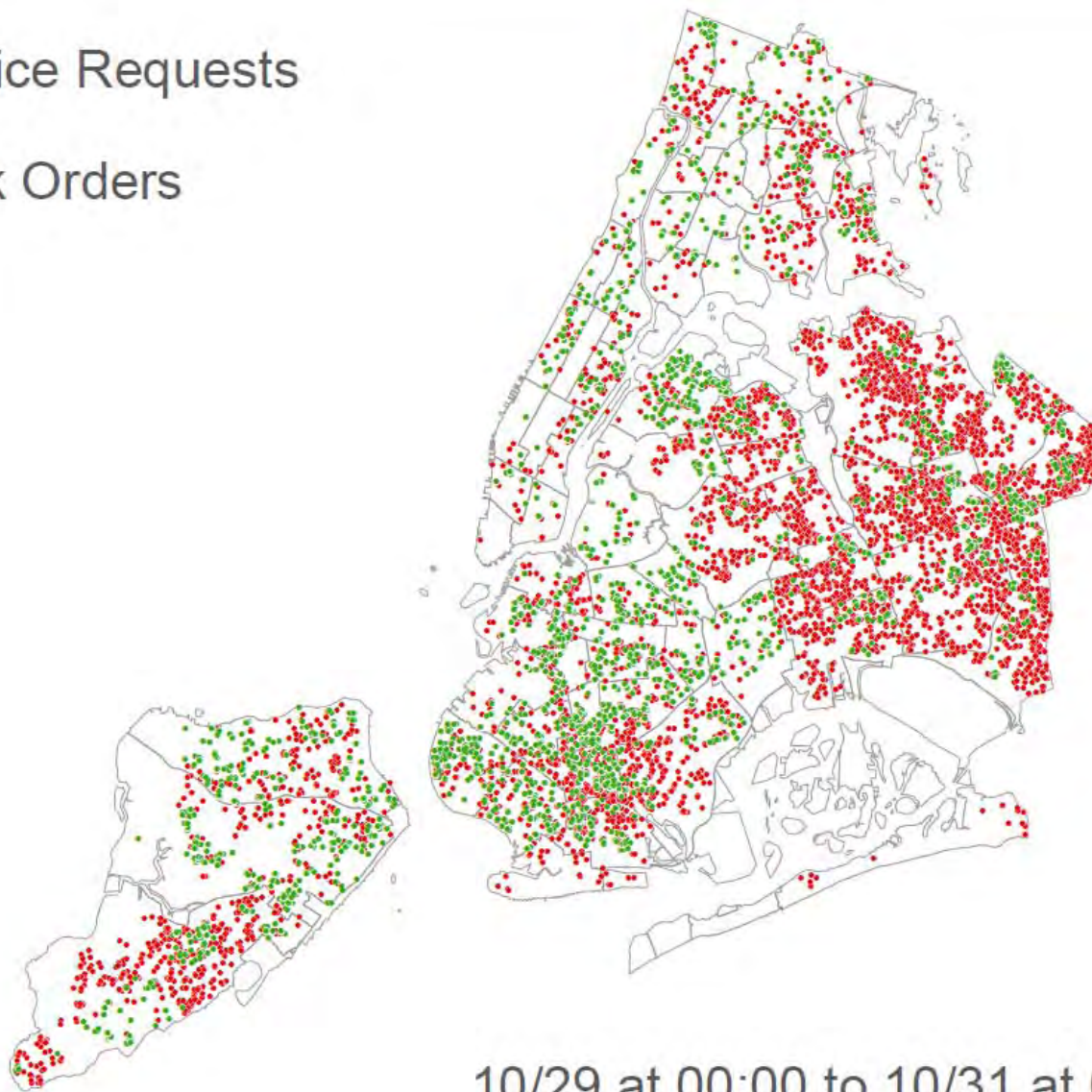
- Service Requests
- Work Orders



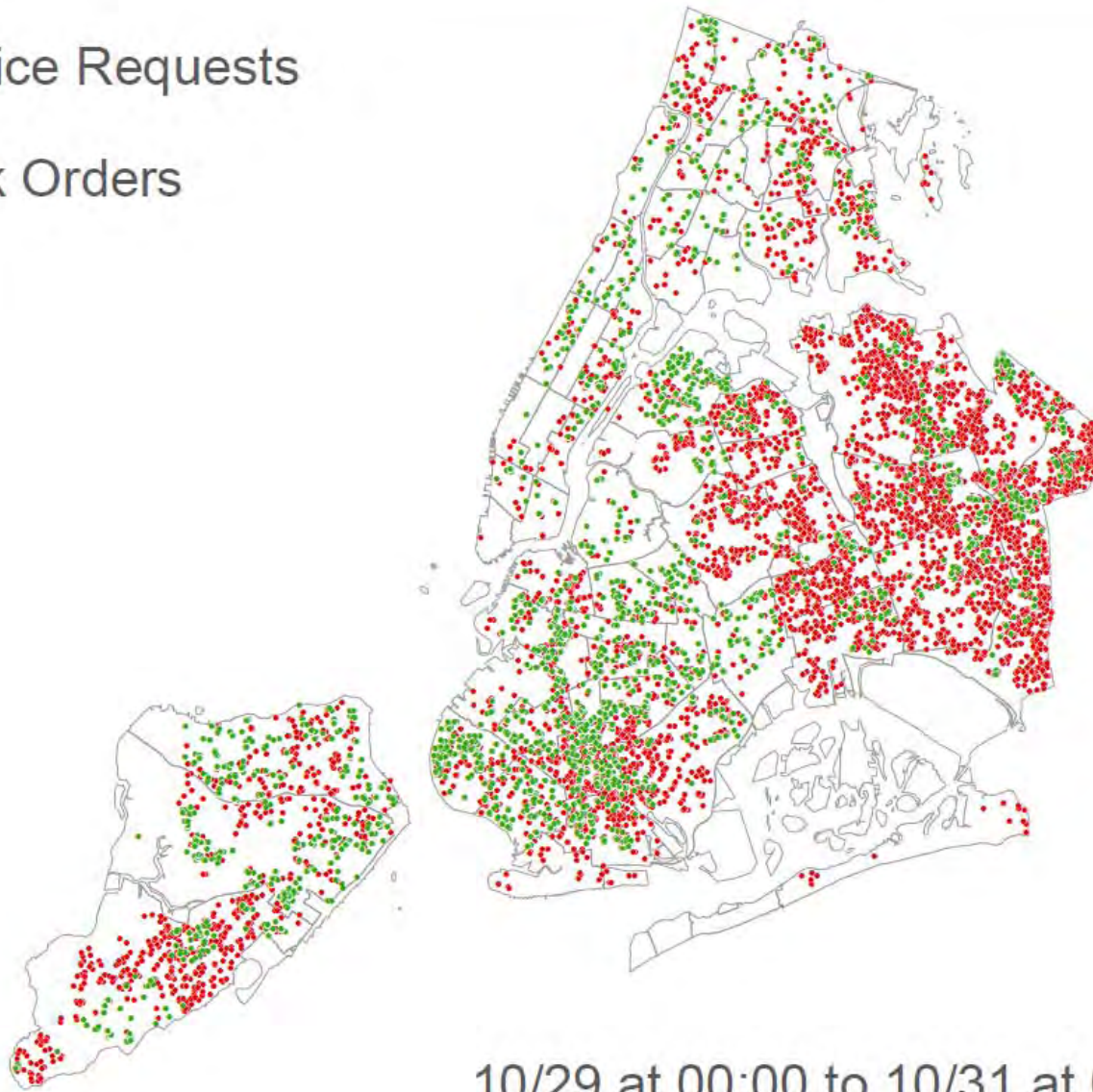
10/29 at 00:00 to 10/30 at 21:00



- Service Requests
- Work Orders



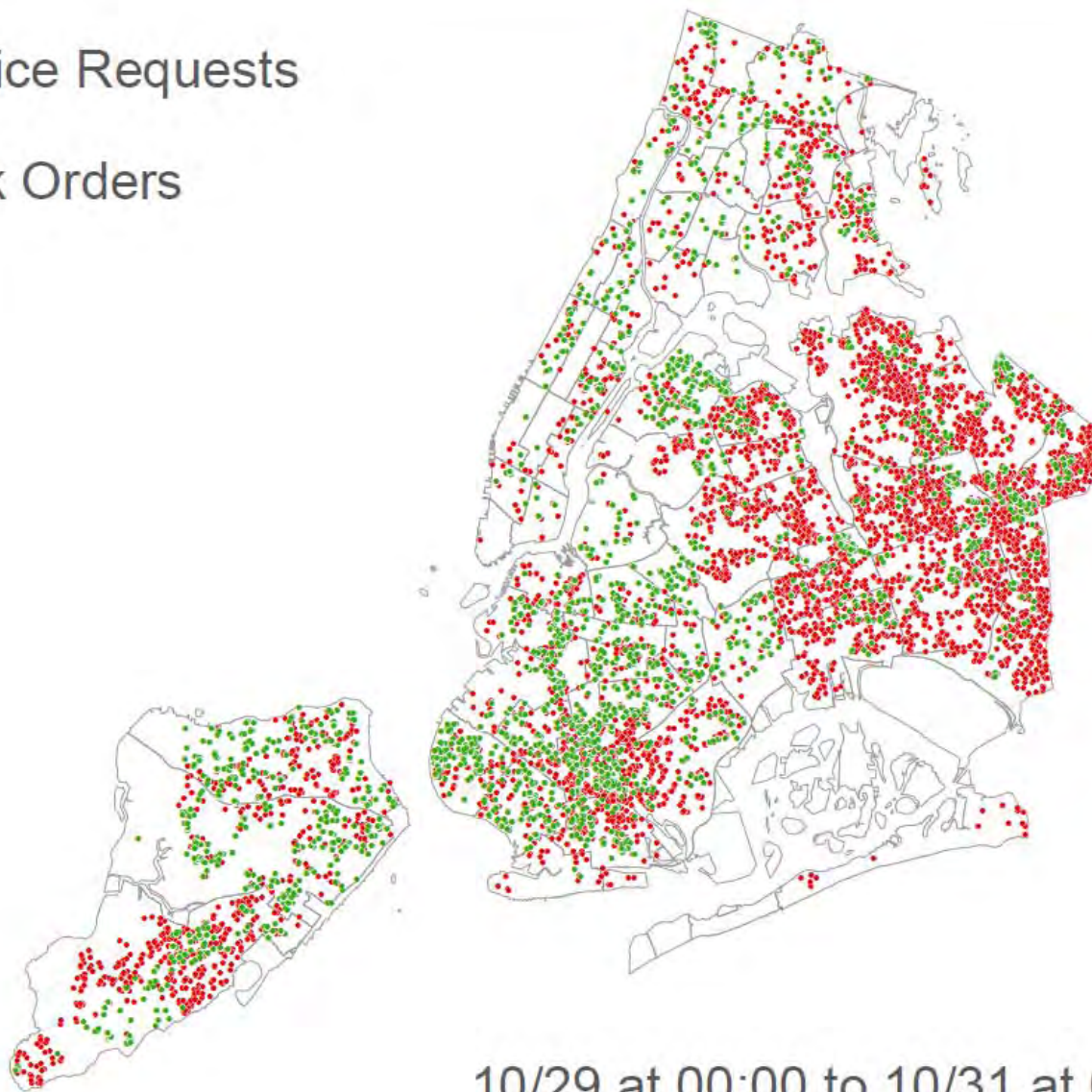
- Service Requests
- Work Orders



10/29 at 00:00 to 10/31 at 06:00



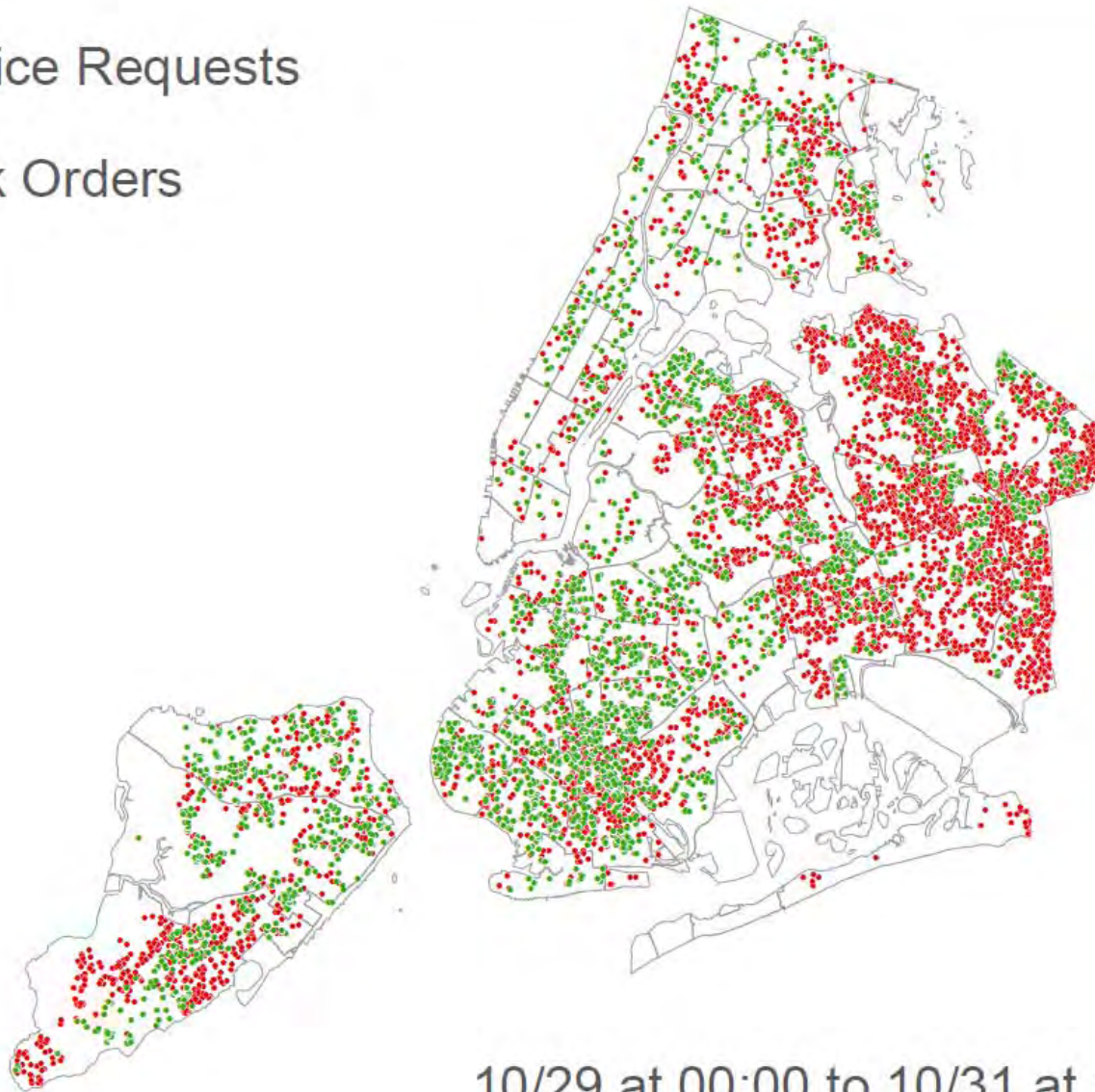
- Service Requests
- Work Orders



10/29 at 00:00 to 10/31 at 09:00



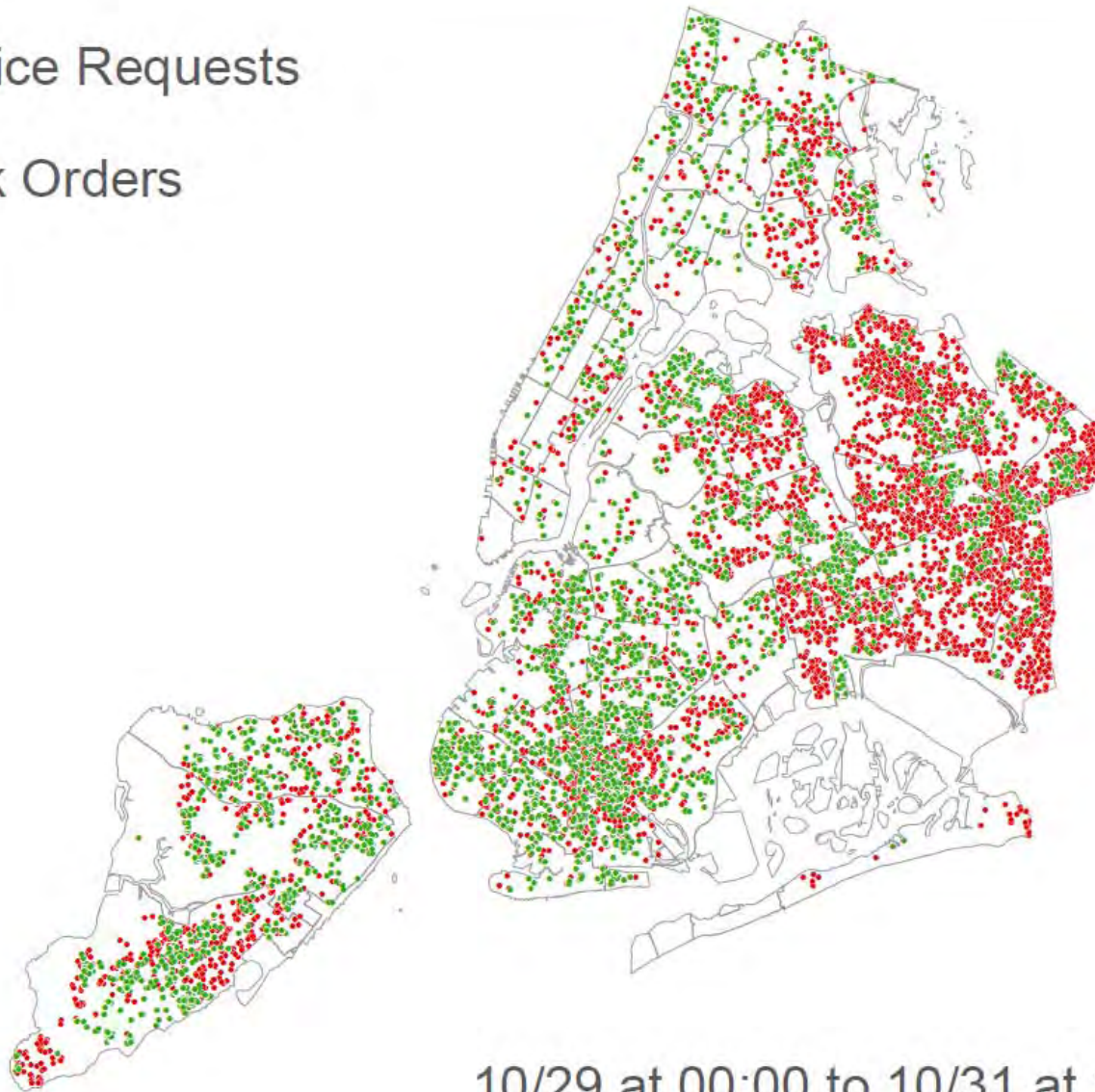
- Service Requests
- Work Orders



10/29 at 00:00 to 10/31 at 12:00



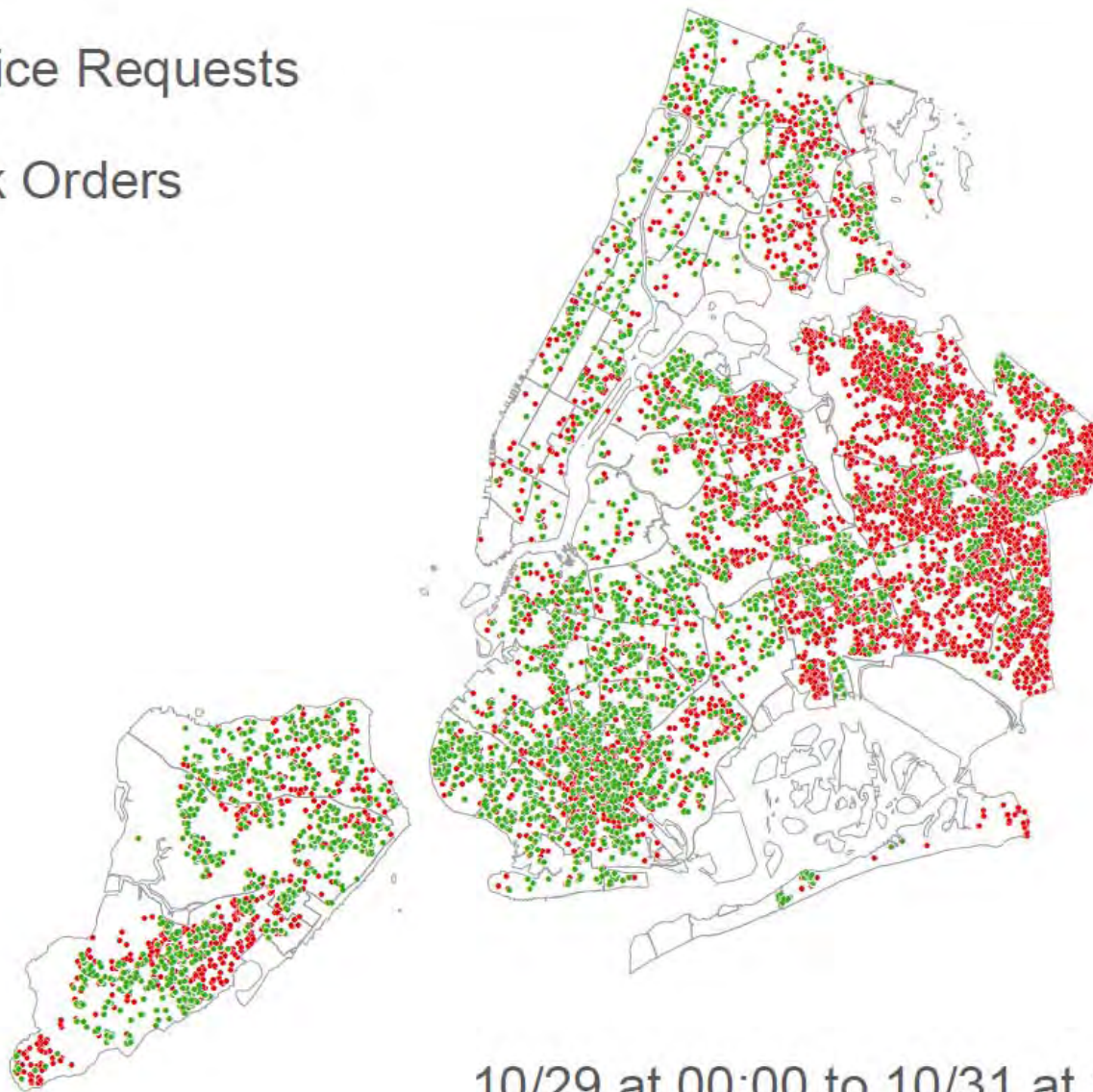
- Service Requests
- Work Orders



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



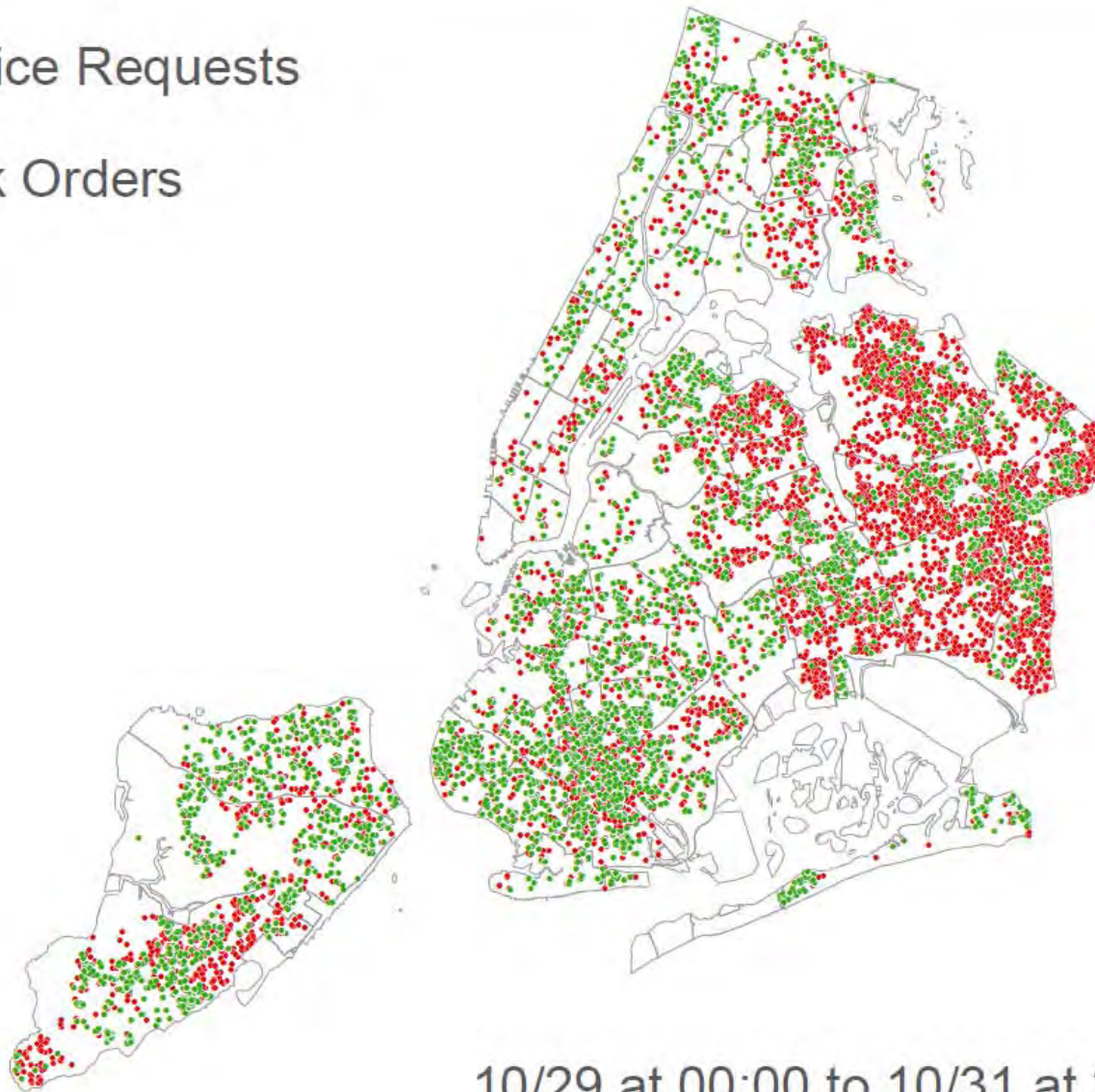
- Service Requests
- Work Orders



10/29 at 00:00 to 10/31 at 18:00



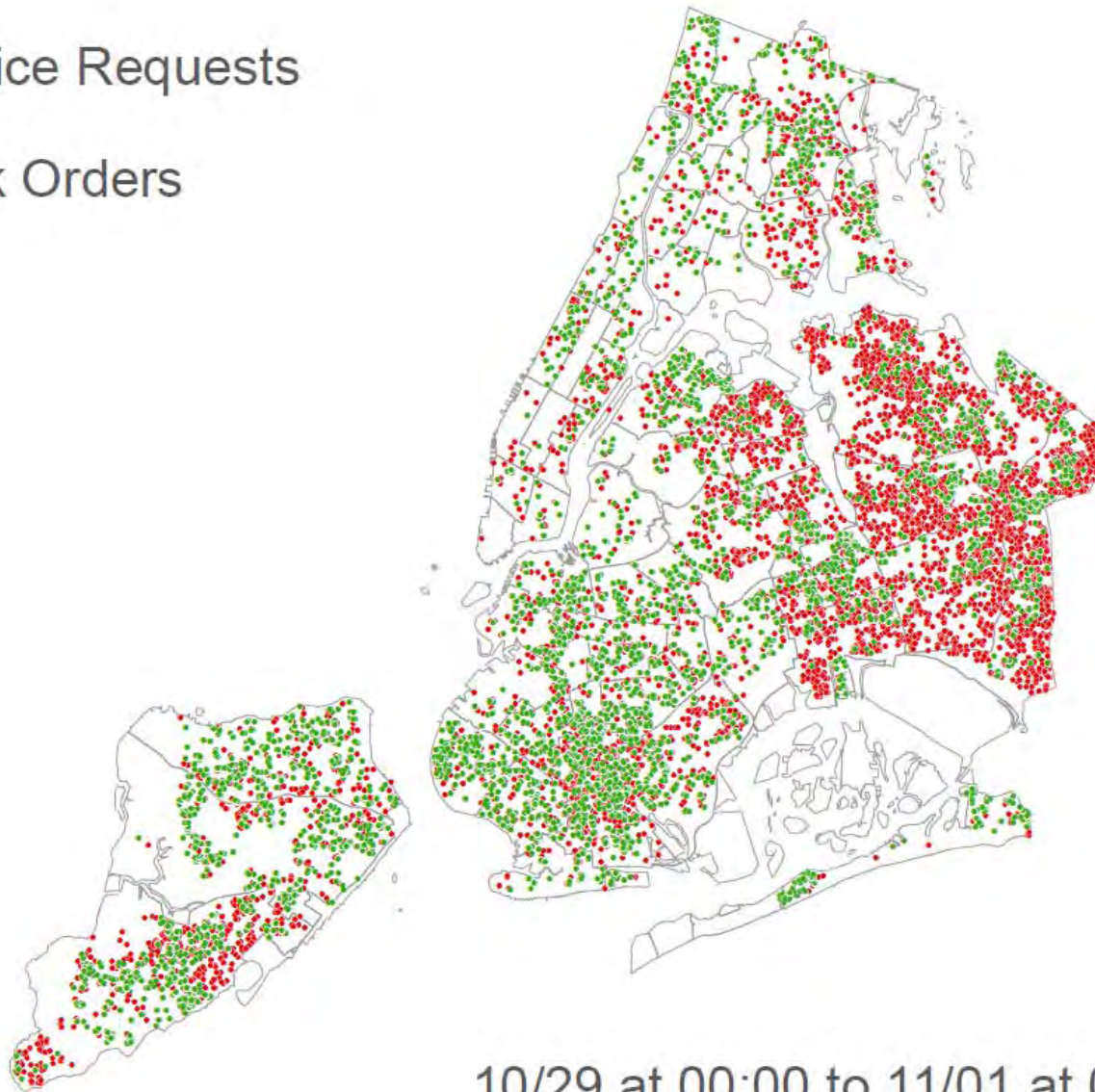
- Service Requests
- Work Orders



10/29 at 00:00 to 10/31 at 21:00



- Service Requests
- Work Orders



10/29 at 00:00 to 11/01 at 00:00



Sandy Damage



Sandy Damage



Sandy Damage



Sandy Damage



Sandy Damage



Sandy Damage



Sandy Damage



Sandy Damage



Sandy Damage



Sandy Damage



Sandy Damage



Sandy Damage



Sandy Damage



Woody Debris Disposal



Woody Debris Disposal



Woody Debris Disposal



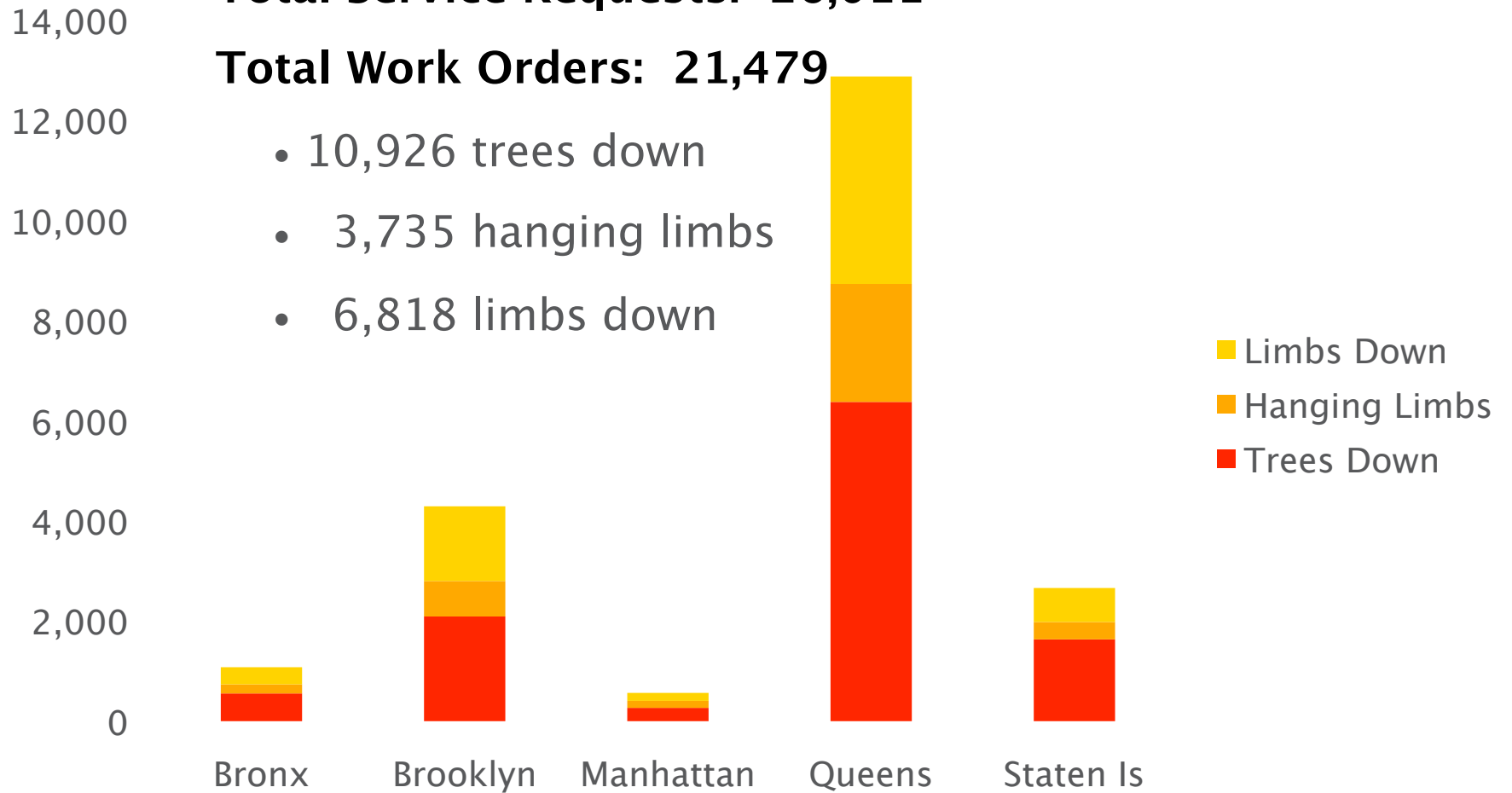
Sandy vs NYC Trees

47 Days of Activation

Total Service Requests: 26,011

Total Work Orders: 21,479

- 10,926 trees down
- 3,735 hanging limbs
- 6,818 limbs down



Lessons Learned From Super Storm Sandy

Situational Awareness

Utility Coordination

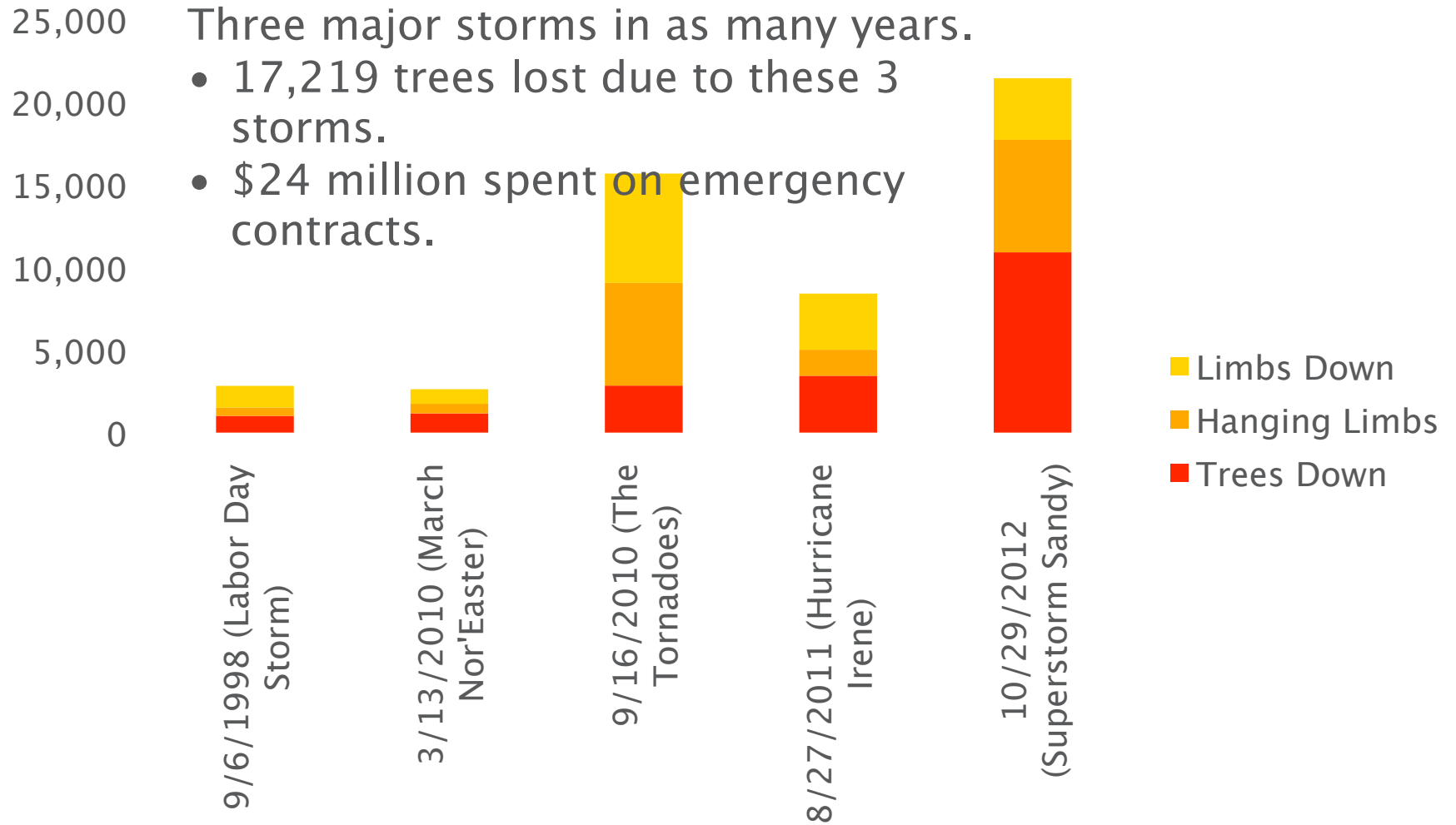
**Develop Debris
Management Strategy**



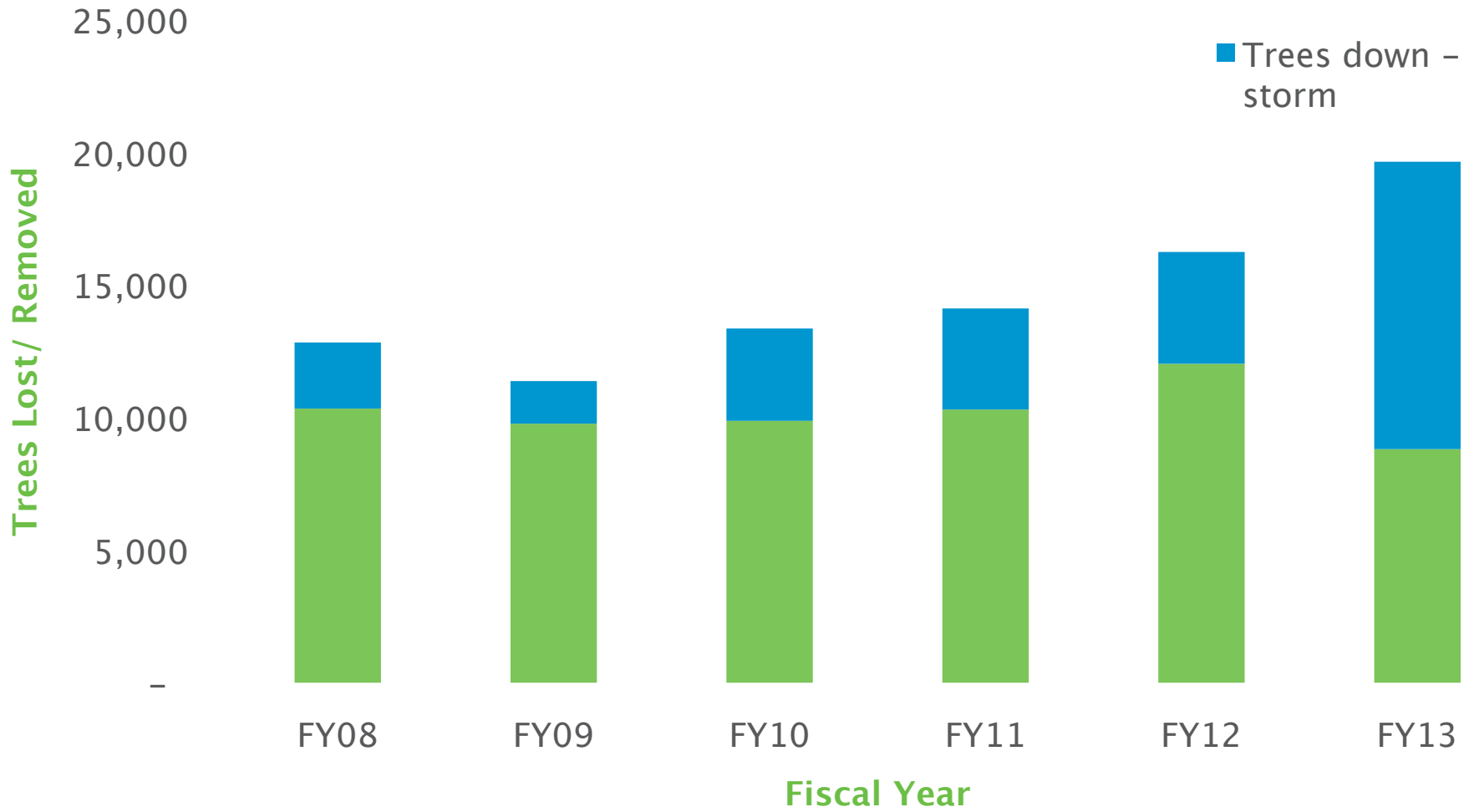
The Aftermath and Moving Forward



Sandy vs Historic Storms

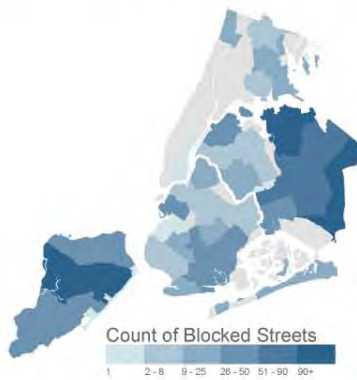
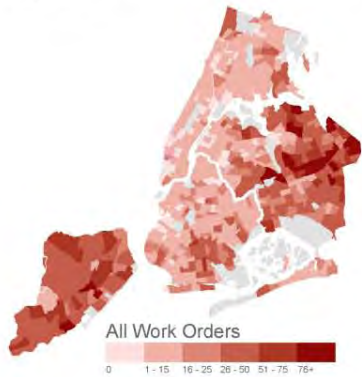


Tree Loss FY08 - 13



Work Orders and Blocked Streets Citywide

Duplicates Omitted.



Hurricane Sandy

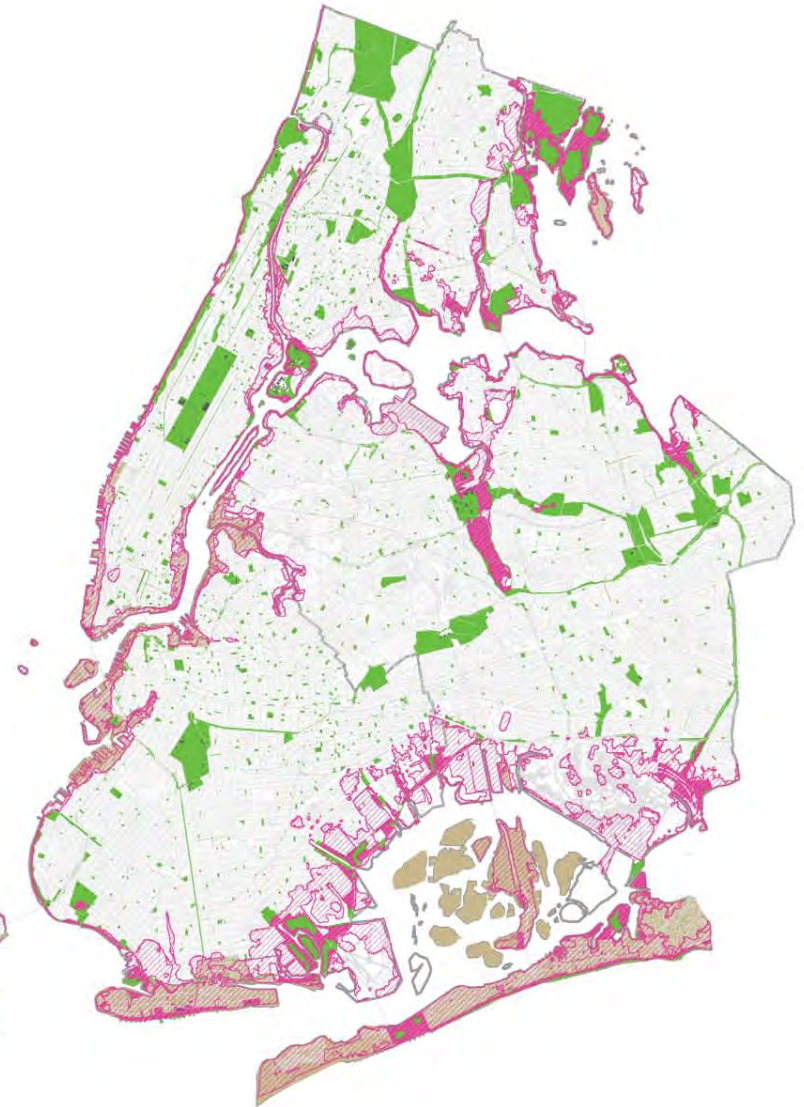
Work order data is drawn from the Forestry Management system for the period beginning on 10/29/2012 at 00:00 and ending 11/7/2012 at 12:00.

Blocked Streets data is from Sunday, November 4, after data from the Situational Awareness update was entered.

Evacuation zone data provided by NYC OEM.

Hindcast inundation areas data provided by FEMA.

Map prepared by Peter Tiso
Forestry, Horticulture, and Natural Resources GIS



Evacuation Zones and Inundated Areas



The New York Times

Bare Trees Are a Lingering Sign of Hurricane Sandy's High Toll



Todd Heisler/The New York Times

A branch on the Lower East Side should have many more leaves at this time of year.

By **KIA GREGORY**

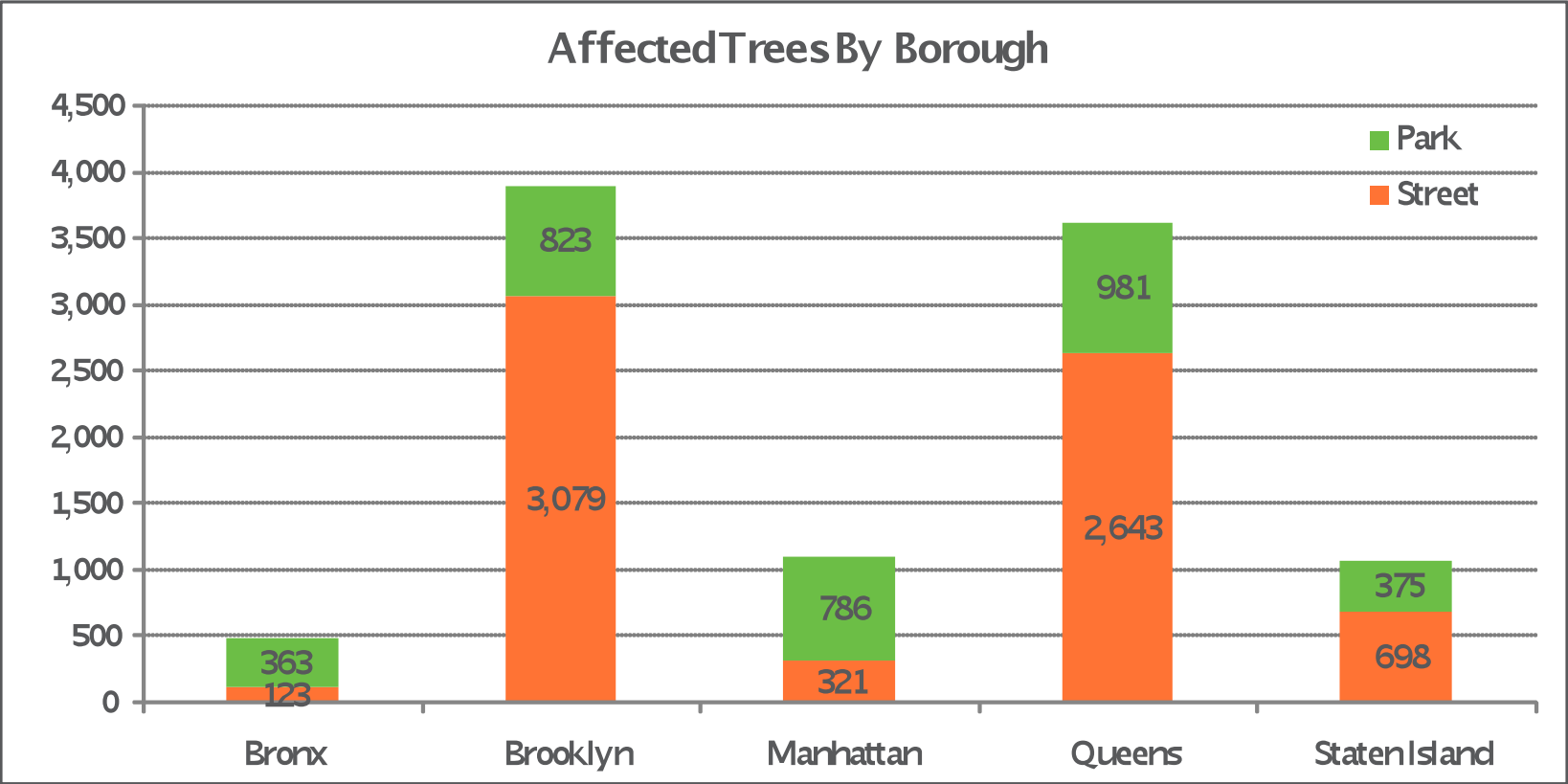
Published: August 18, 2013



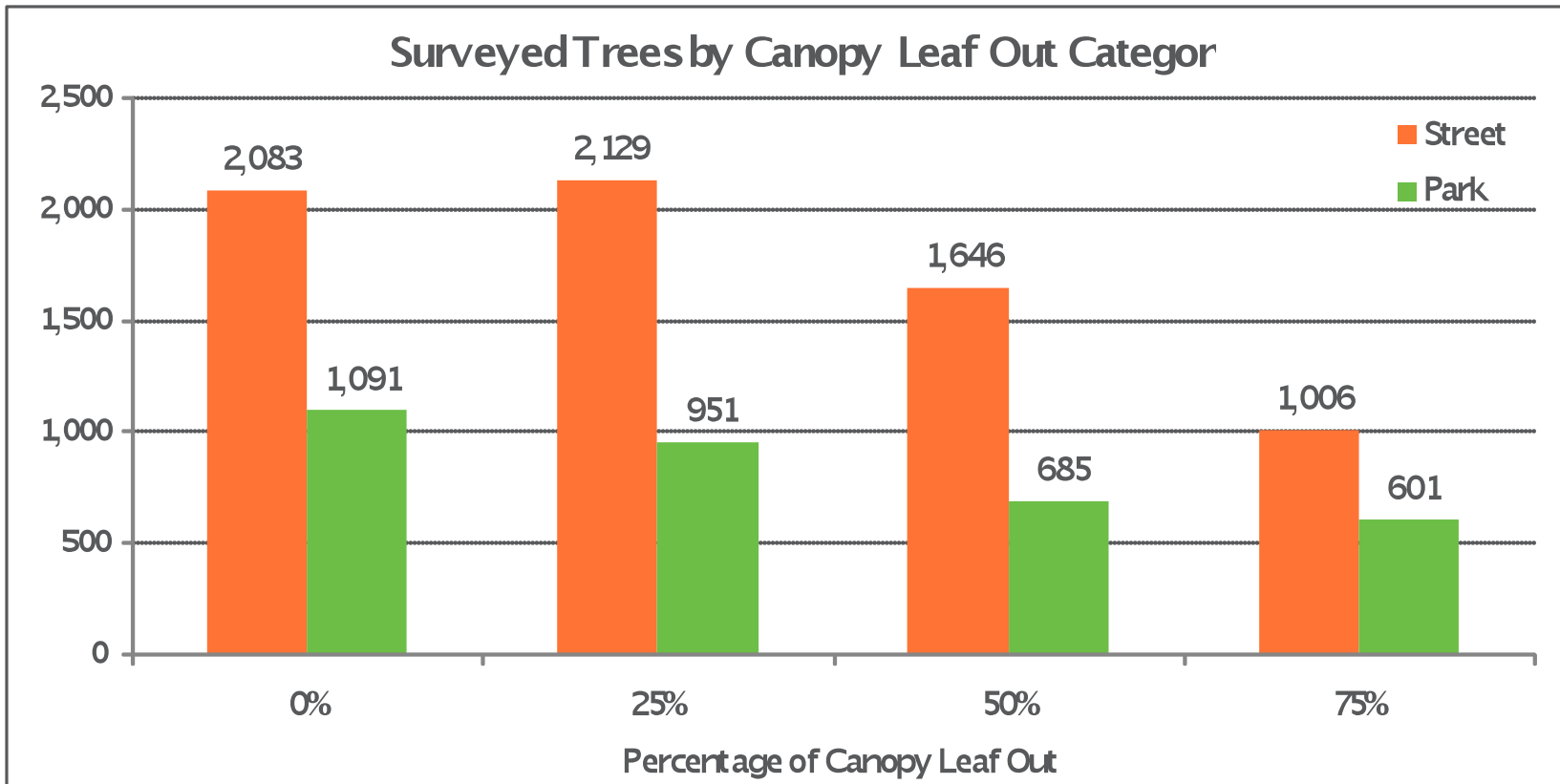
NYC Parks

Post-Sandy Late Leaf Out Survey

Late Leaf Out Survey Results



Surveyed Trees Canopy Leaf Out Distribution



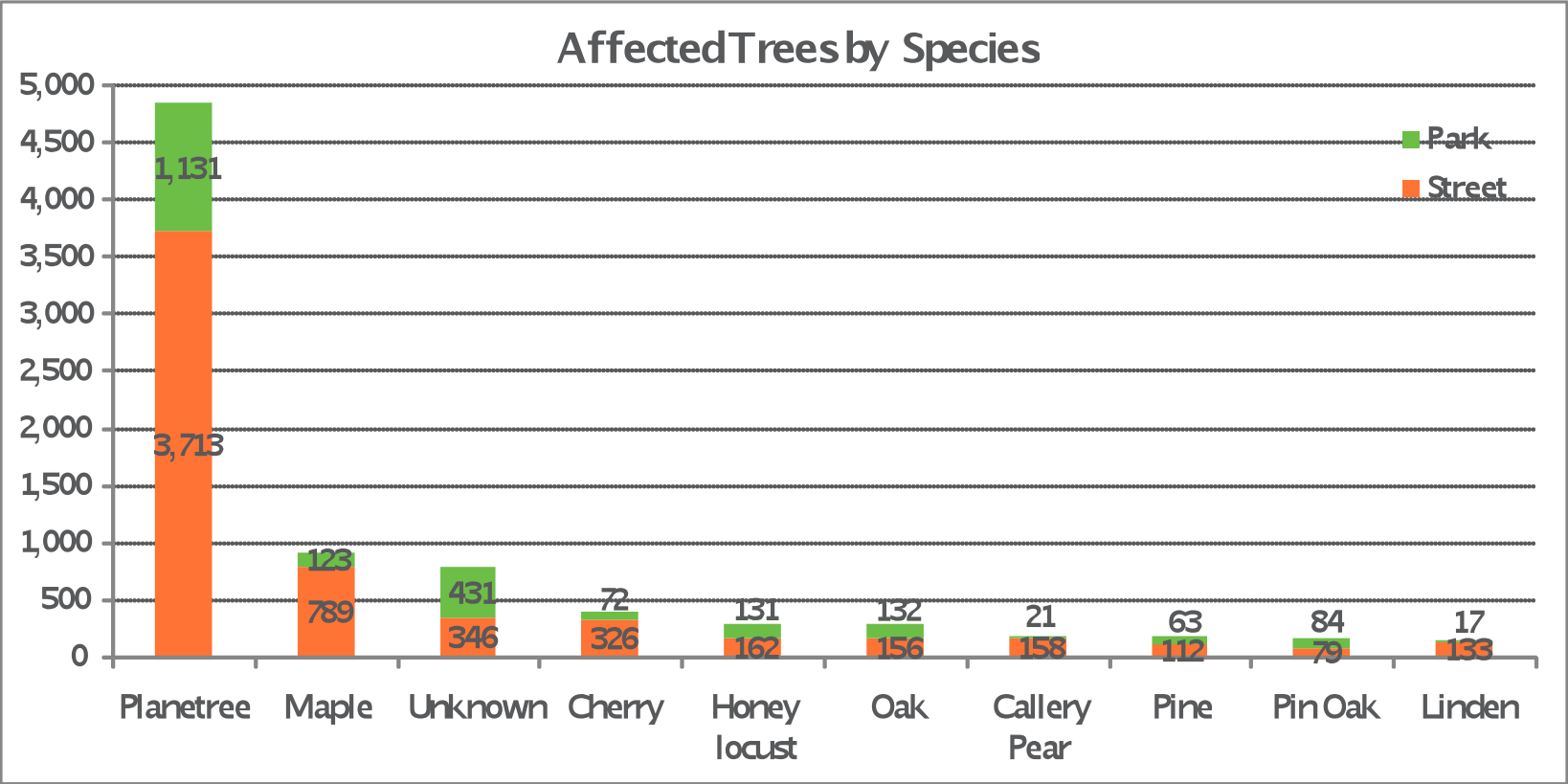
Affected Street Trees Compared to Street Tree Population in the Inundation Zone

Borough	Inundated Street Trees	Affected Street Trees	% Street Trees Affected
Bronx	749	123	16%
Brooklyn	17,414	3,079	18%
Manhattan	3,203	321	10%
Queens	18,084	2,643	15%
Staten Island	8,450	698	8%
Citywide Total	47,900	6,864	14%

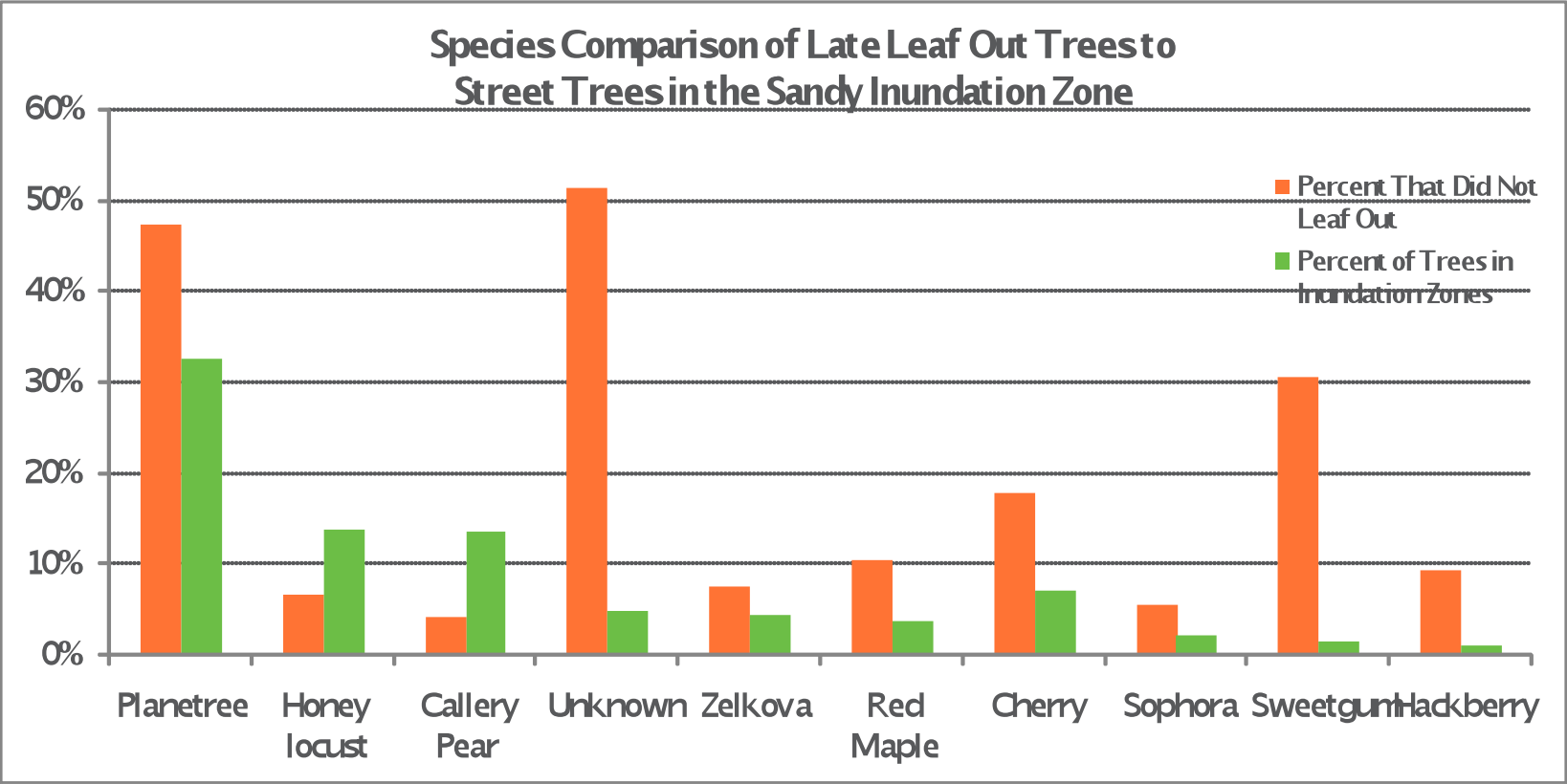
* estimated number of street trees within FEMA's Sandy inundation hindcast



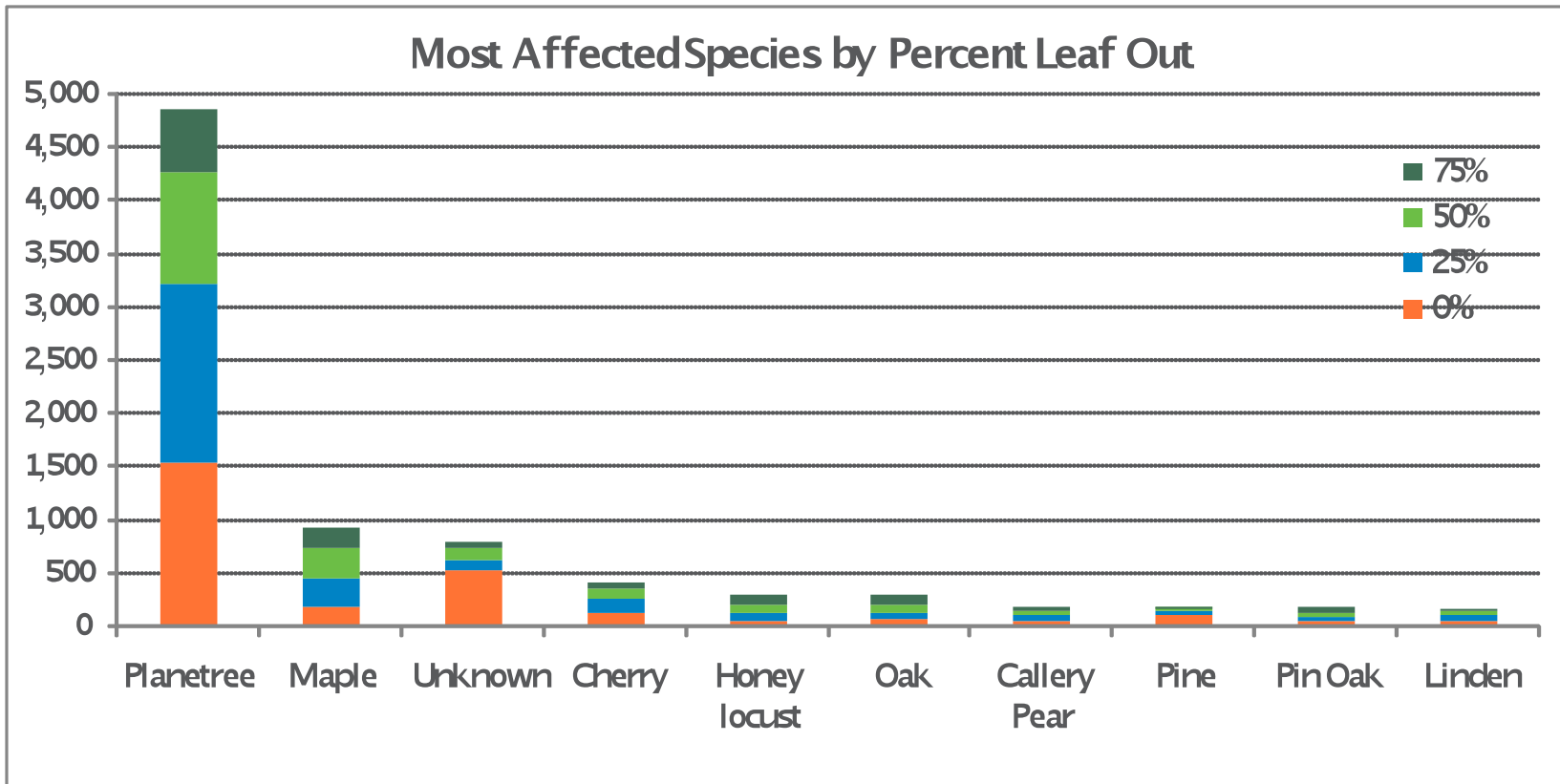
Late Leaf Out Affected Species



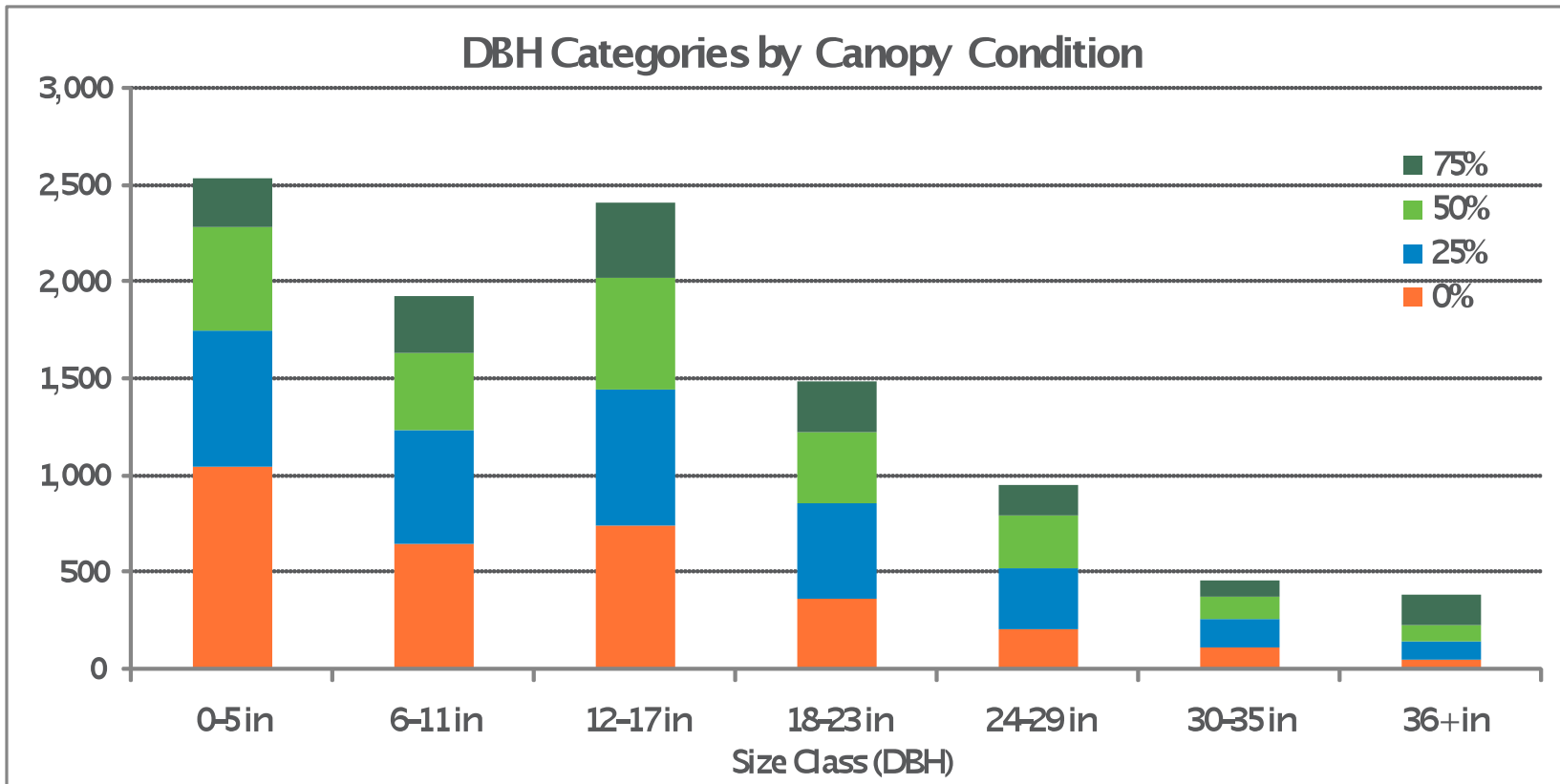
Late Leaf Out Affected Species



Affected Species by Canopy Condition



Affected Tree Diameter Distribution



Comparing Salt Impacts to Routine Removals

Late Leafout Trees

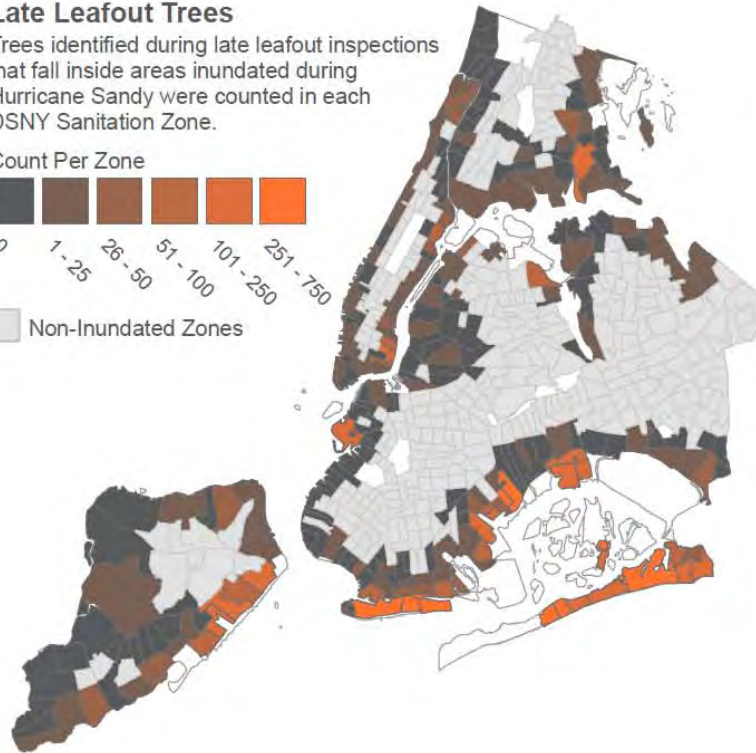
Trees identified during late leafout inspections that fall inside areas inundated during Hurricane Sandy were counted in each DSNY Sanitation Zone.

Count Per Zone



0 1-25 26-50 51-100 101-250 251-750

Non-Inundated Zones



Average Routine Removals

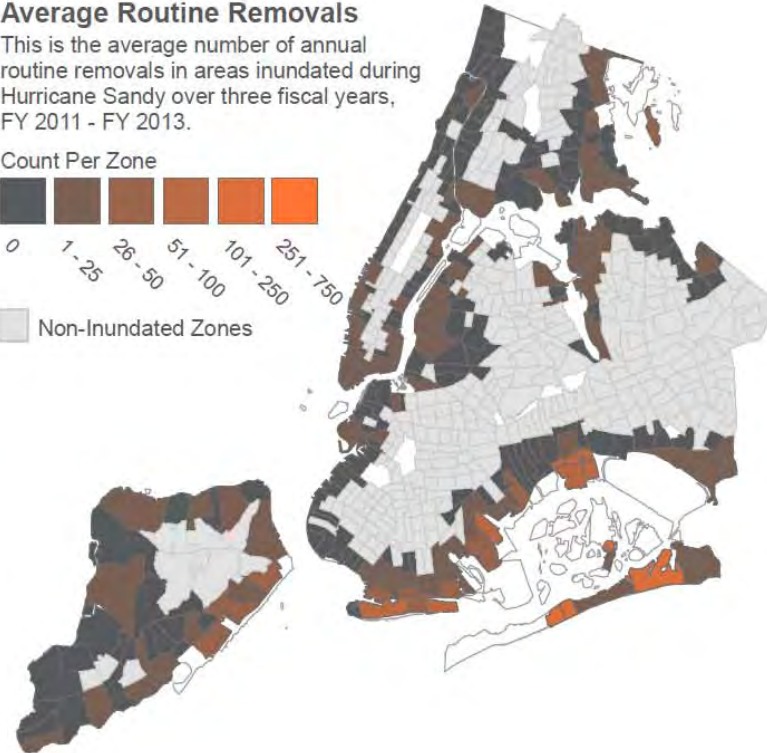
This is the average number of annual routine removals in areas inundated during Hurricane Sandy over three fiscal years, FY 2011 - FY 2013.

Count Per Zone



0 1-25 26-50 51-100 101-250 251-750

Non-Inundated Zones



We compared the Late Leaf Out salt impacted trees data with the average annual dead tree removals in the Sandy inundation zone from fiscal year 2011 to fiscal year 2013.

Difference Between Routine Removals and Late Leafout

By subtracting the count of average routine removals from the count of trees identified during the Late Leafout inspections, sanitation zones in which the greatest differences between routine tree removal and storm-related damage may exist are visible.

Count Per Zone

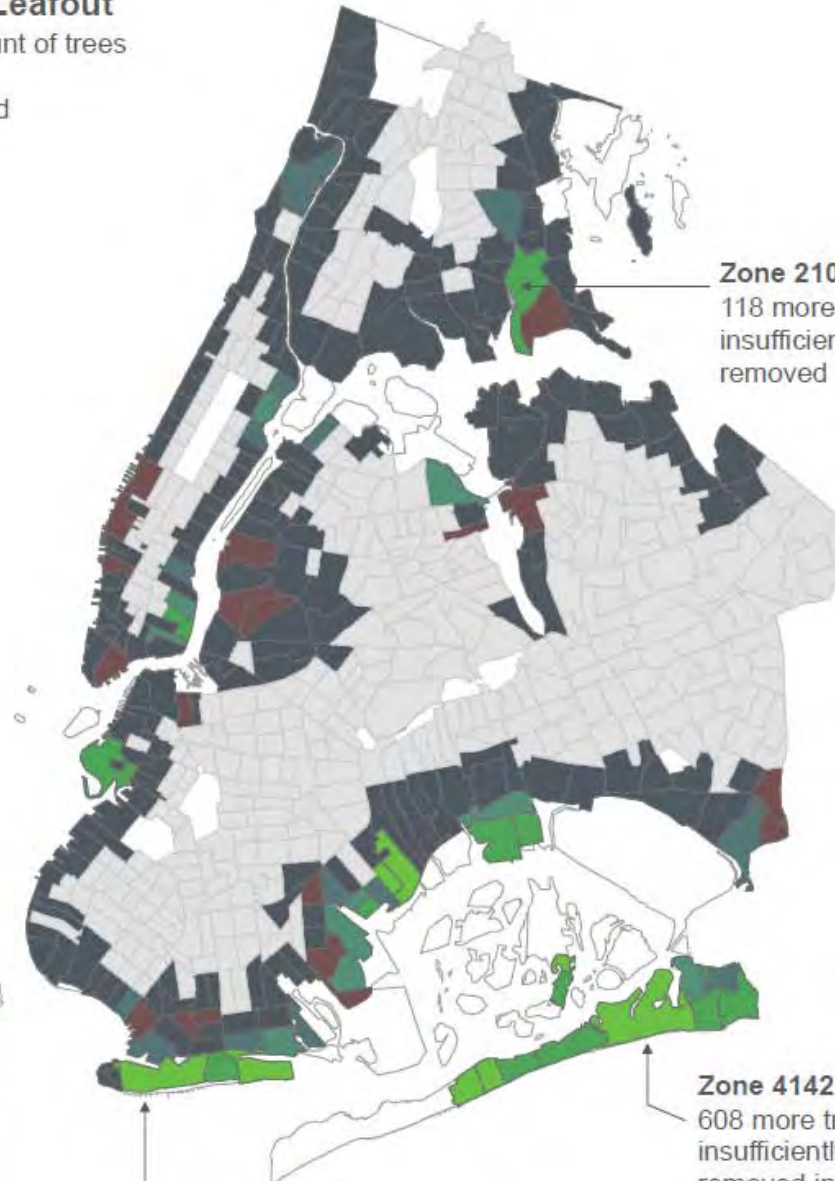
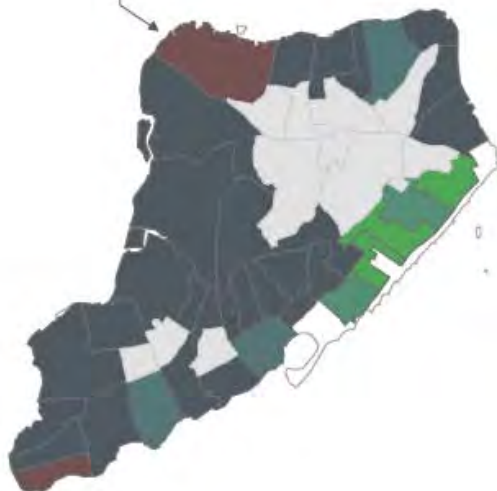


Non-Inundated Zones

Negative numbers indicate zones where more trees were removed in an average year than are identified as insufficiently leafed out in post-hurricane surveys.

Zone 5014C

1 fewer trees were identified as insufficiently leafed out than are removed in an average year.



Zone 2103D

118 more trees were identified as insufficiently leafed out than are removed in an average year.

Zone 4142E

608 more trees were identified as insufficiently leafed out than are removed in an average year.

Zone 3132B

622 more trees were identified as insufficiently leafed out than are removed in an average year.



NYC Parks

HONDA

Once is an honor.
Twice is an achievement ...

Expand

FALLING LIMBS

Neglected, Rotting Trees Turn Deadly



Suzanne DeChillo/The New York Times

Trees along Literary Walk in Central Park, where Elmaz Qyra, 46, was killed in February 2010 when a branch snapped on a tree designated for removal.

By WILLIAM GLABERSON and LISA W. FODERARO

Published: May 13, 2012 | 175 Comments

The sharp and sudden crack! broke the summer calm.

f FACEBOOK

HONDA

Car and Driver's
10Best 29 times.

10Best
CAR-DRIVER
2015

Learn More



Capital Tree Removal Contracts

Outstanding Tree Removals - by survey type	Bronx	Brooklyn	Manhattan	Queens	Staten Is	Total
ForMS WO (LLO 2013)	0	60	0	116	-102	74
Late Leaf Out Surveys	81	1,256	256	283	296	2,172
Park Priority Surveys	1,016	1,818	81	1,293	207	4,415
Total Outstanding Tree Removals	1,097	3,134	337	1,692	401	6,661

Sites Received from Boroughs

ForMS (LLO 2013)	0	490	0	428	558	1,476
Late Leaf Out Surveys	0	3,124	340	1,645	641	5,750
Park Priority Surveys	1,796	0	561	444	75	2,876
Add Ons	45	33	51	112	0	241
Total Trees Received	1,841	3,647	952	2,629	1,274	10,343

Capital Removal Contracts - Marked Trees

ForMS (LLO 2013)	0	464	0	317	317	1,098
Late Leaf Out Surveys	0	1,625	158	1,112	463	3,358
Park Priority Surveys	1,709	0	221	357	39	2,326
Add Ons	45	33	51	112	0	241
Total Trees Marked for Removal	1,754	2,122	430	1,898	819	7,023

Capital Removal Contracts (FYTD) - Completed

ForMS (LLO 2013)	0	442	0	302	219	963
Late Leaf Out Surveys	0	946	80	745	364	2,135
Park Priority Surveys	1,593	0	103	247	31	1,974
Add Ons	45	33	38	37	0	153
Total Trees Removed	1,638	1,421	221	1,331	614	5,225
<i>Total Trees to Be Removed - Projected</i>	<i>1,800</i>	<i>2,800</i>	<i>1,200</i>	<i>2,800</i>	<i>900</i>	<i>9,500</i>
% Complete - Completed Removals v Projected	91%	51%	18%	48%	68%	55%

Total Trees Planted (FYTD)	0	351	79	287	66	783
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“You have to be able to
take a punch.”

– Don Lucia



Resiliency and Recovery:

On Earth Day 2007, Mayor Bloomberg unveiled a comprehensive sustainability plan for NYC.

Parks Primary Components:

Million Trees

- Plant 220,000 street trees
- Plant 500,000 reforestation trees

Green Infrastructure

- Construct Green Infrastructure Sites



City-Wide Plans

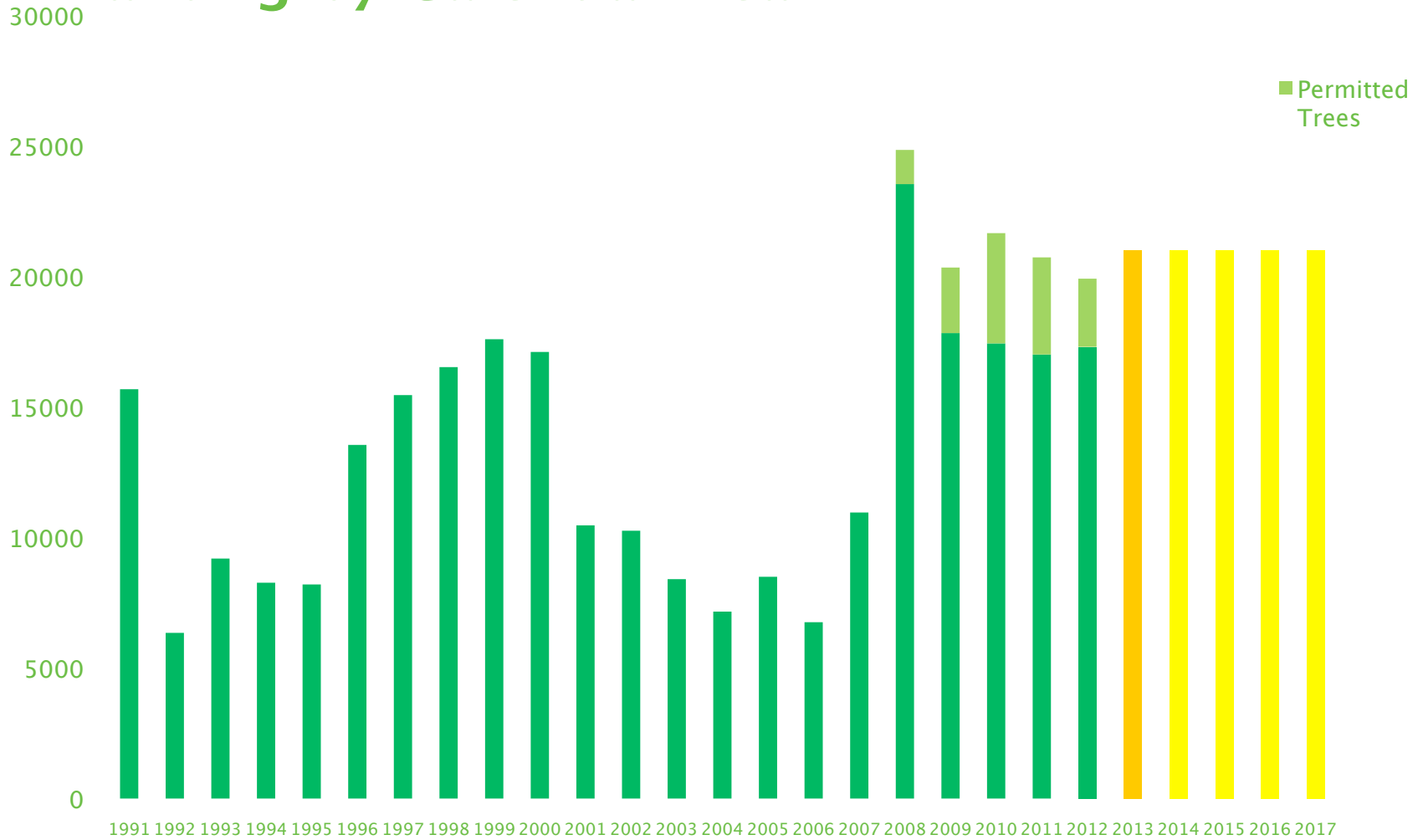


milliontrees **NYC**TM

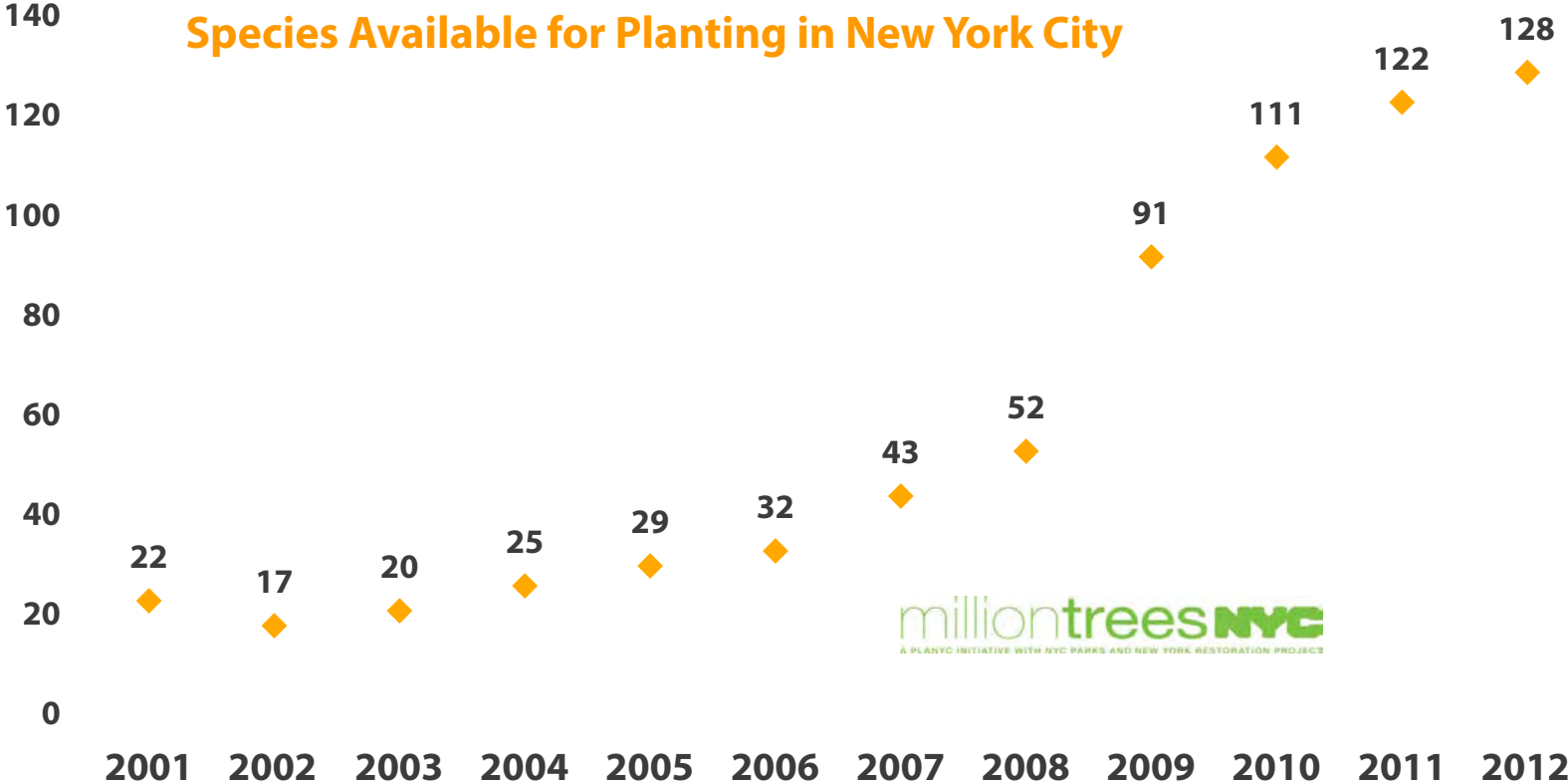
A PLANYC INITIATIVE WITH NYC PARKS AND NEW YORK RESTORATION PROJECT



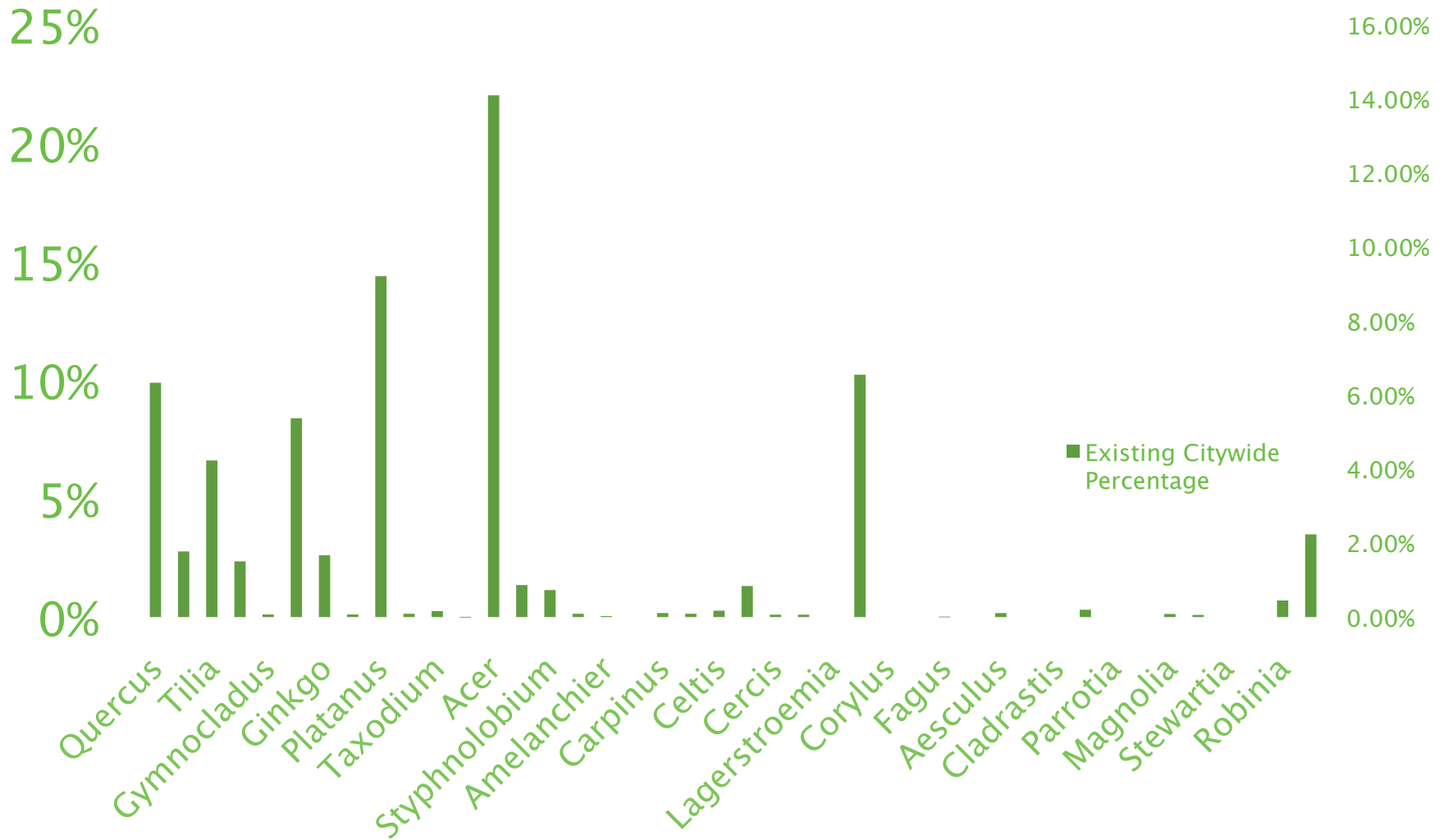
Urban Forest Planning – Street Tree Planting by Calendar Year



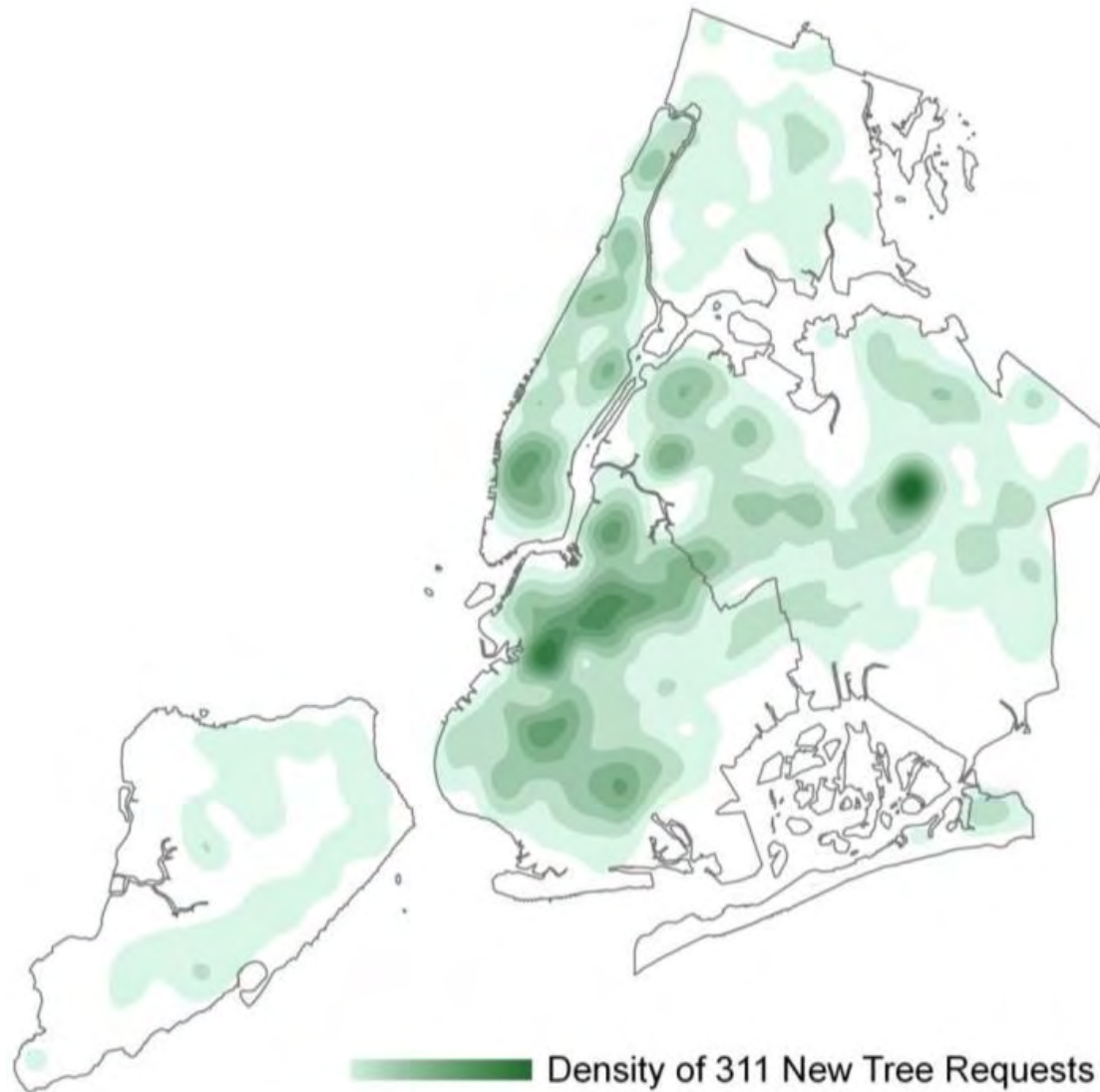
Urban Forest Planning – Species Diversity



Urban Forest Planning – Species Diversity



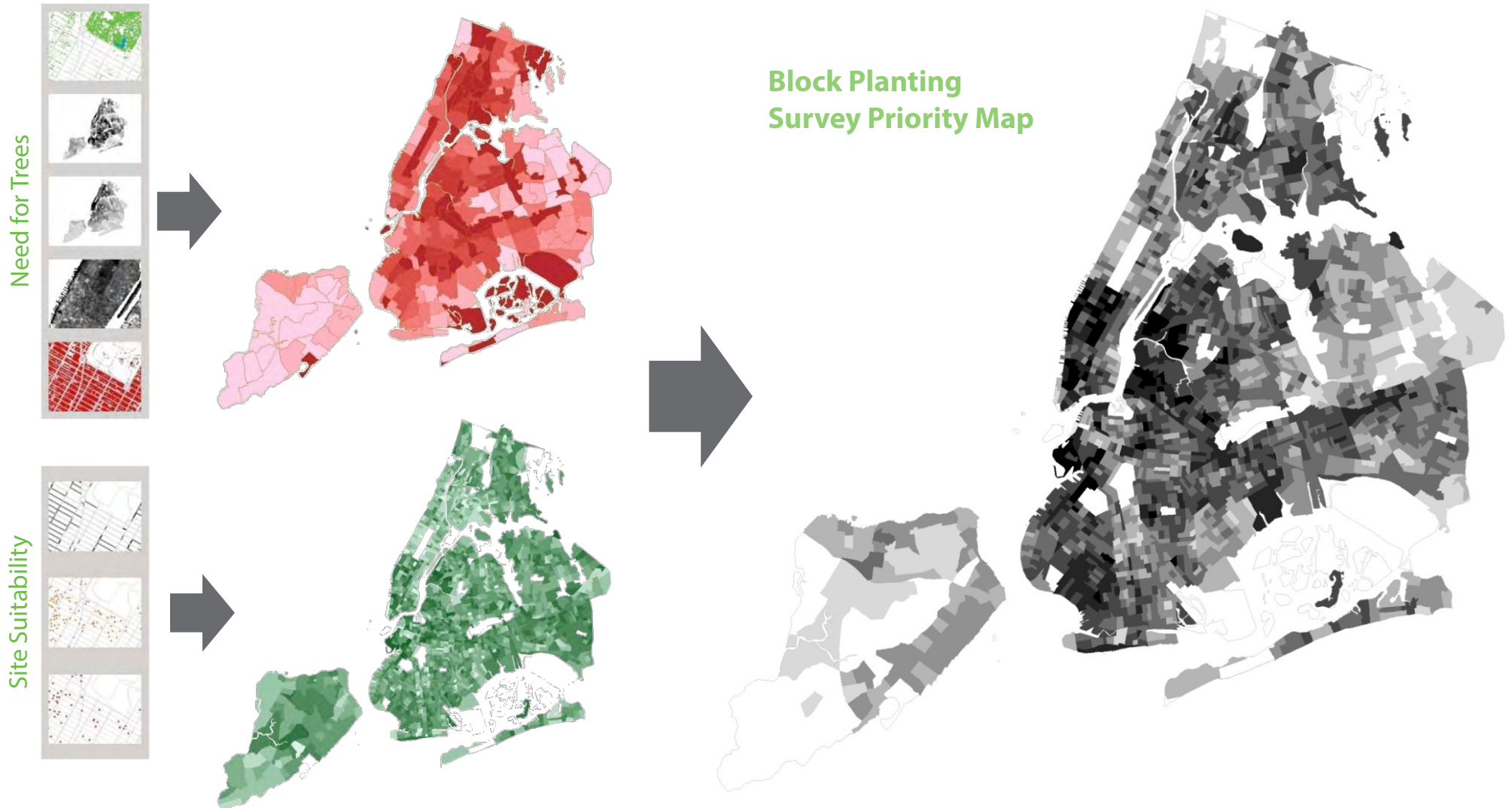
Urban Forest Planning – Street Tree Planting Strategy



Urban Forest Planning – Street Tree Planting Strategy

Based on environmental need combined with site suitability

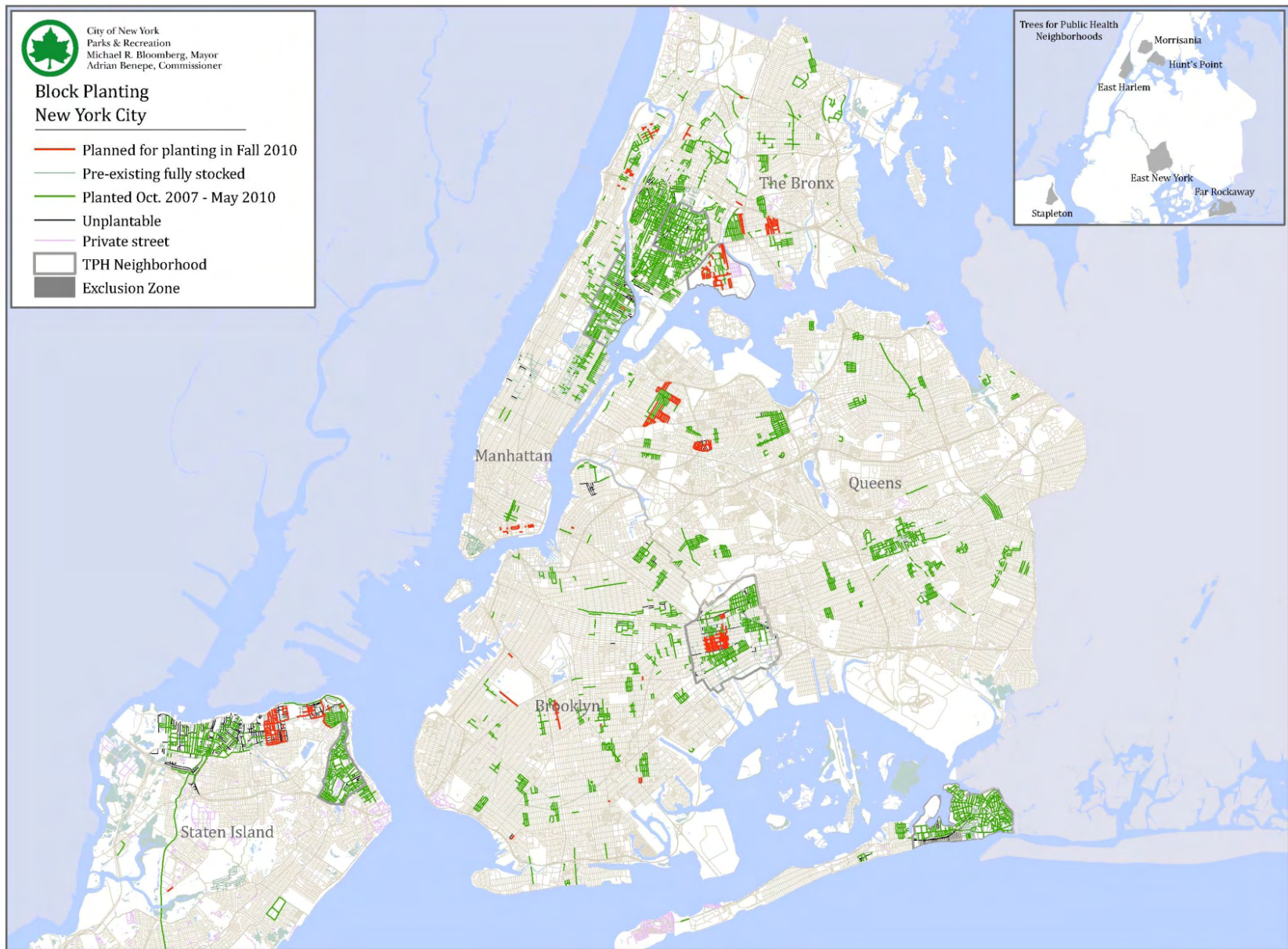
- Need variables: low tree canopy cover, population, particulate matter, surface temperature and impervious surface cover



Urban Forest Planning – Street Tree Planting Strategy



Urban Forest Planning – Street Tree Planting Strategy



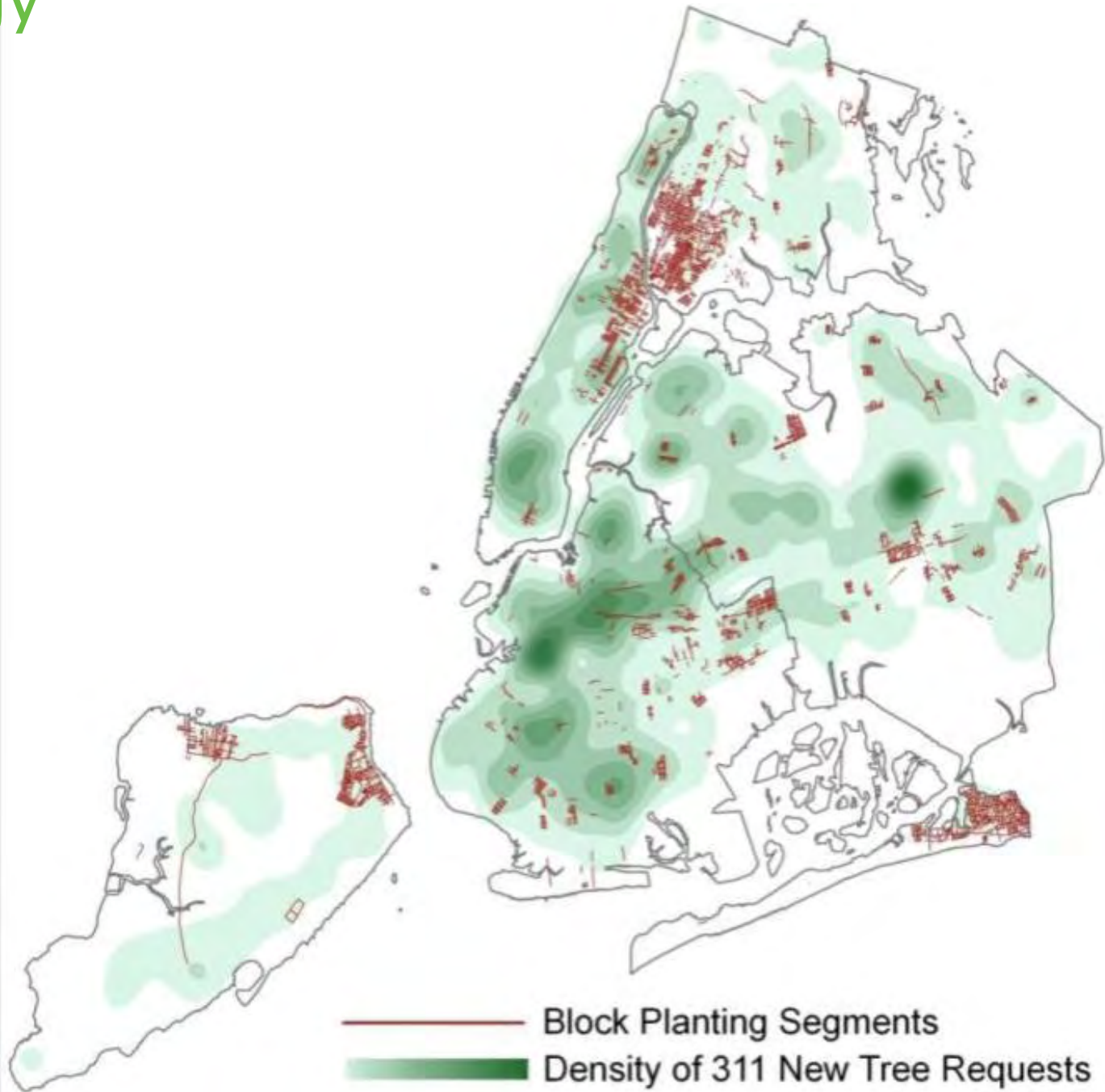
NYC Parks

milliontreesNYC
A PLANYC INITIATIVE WITH NYC PARKS AND NEW YORK RESTORATION PROJECT

0 1 2 4 Miles
1 inch equals 3.25 miles
N

Created by Peter Tiso, Central Forestry & Horticulture, NYC Department of Parks & Recreation, October 21, 2010.

Urban Forest Planning – Street Tree Planting Strategy



Urban Forest Planning – Street Tree Planting Strategy



Urban Forest Planning – Street Tree Planting Strategy

Maximize Tree Pit Size

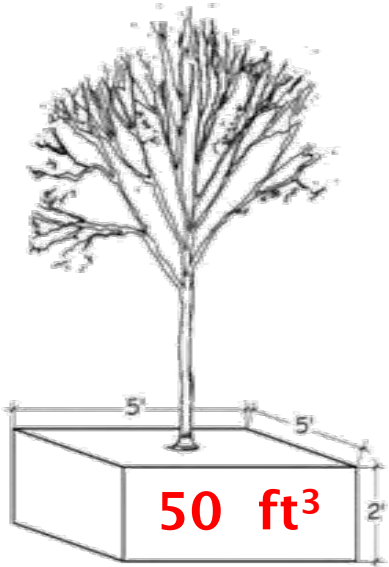
Increased soil volume

Increased water holding capacity

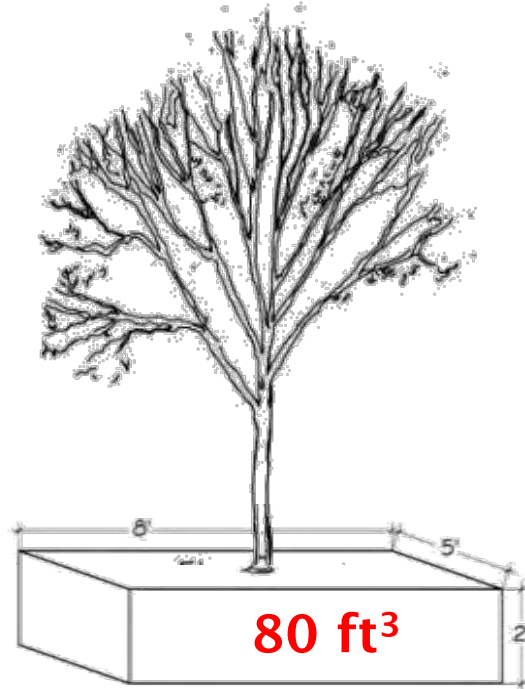


larger, healthier trees

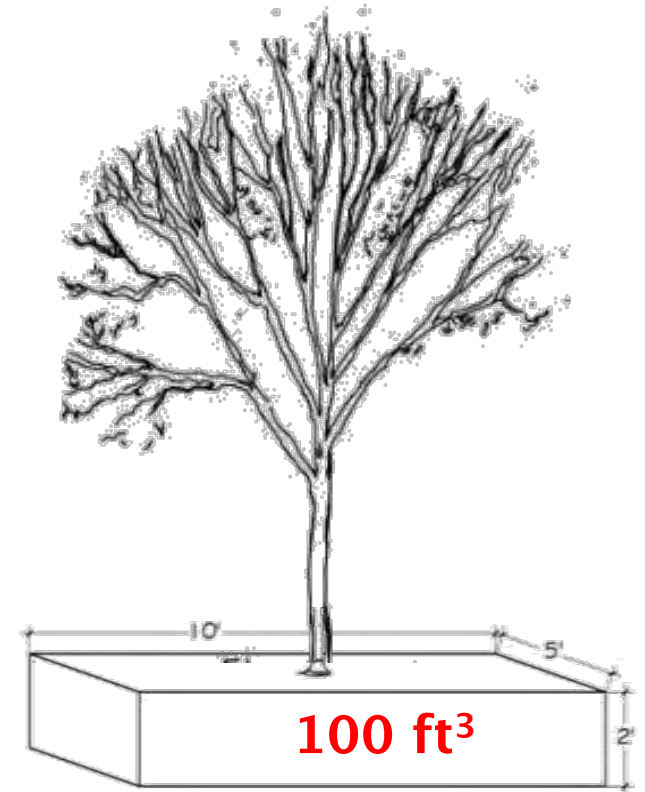
Increased rooting space



TREE PIT A: 5' x 5'



TREE PIT B: 8' x 5'



TREE PIT C: 10' x 5'



Urban Forest Planning – Street Tree Planting Strategy

Maximize Tree Pit Size



Urban Forest Planning – Street Tree Planting Strategy

Maximize Tree Pit Size



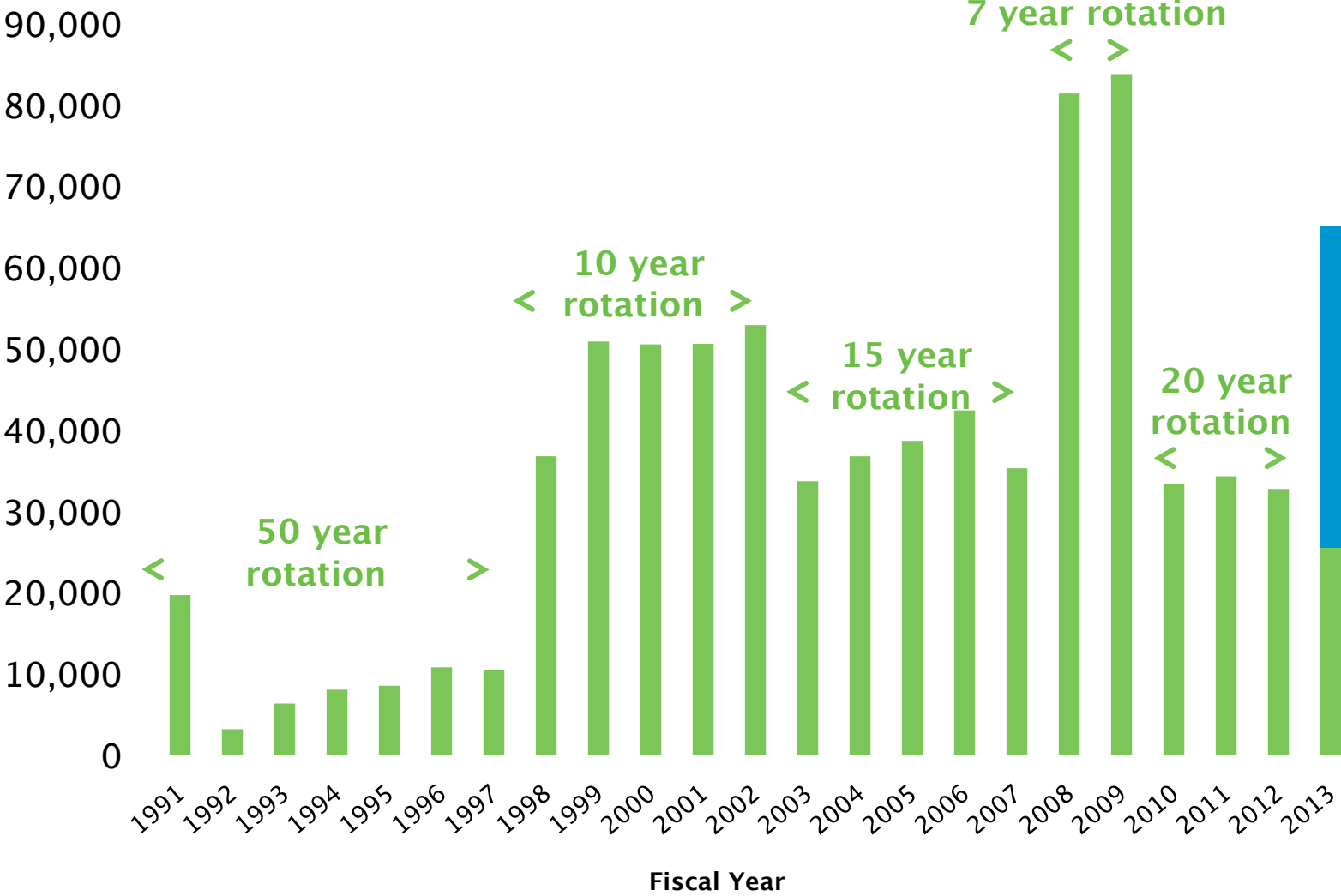
Urban Forest Management – Block Pruning



NYC Parks

NYC Parks Urban Forestry Program

Urban Forest Management – Block Pruning



Urban Forest Management – Young Street Tree Pruning

Goal – reduce the likelihood of tree and limb failure in the future.

- Focused on structural pruning of young street trees.
- Winter work for horticultural staff
- Volunteer opportunities through NYRP
- Pruned more than 30,000 trees in the past 3 years



Green Infrastructure

Greenstreets –
2,536 sites citywide



Francis Lewis Boulevard and 217th, Queens



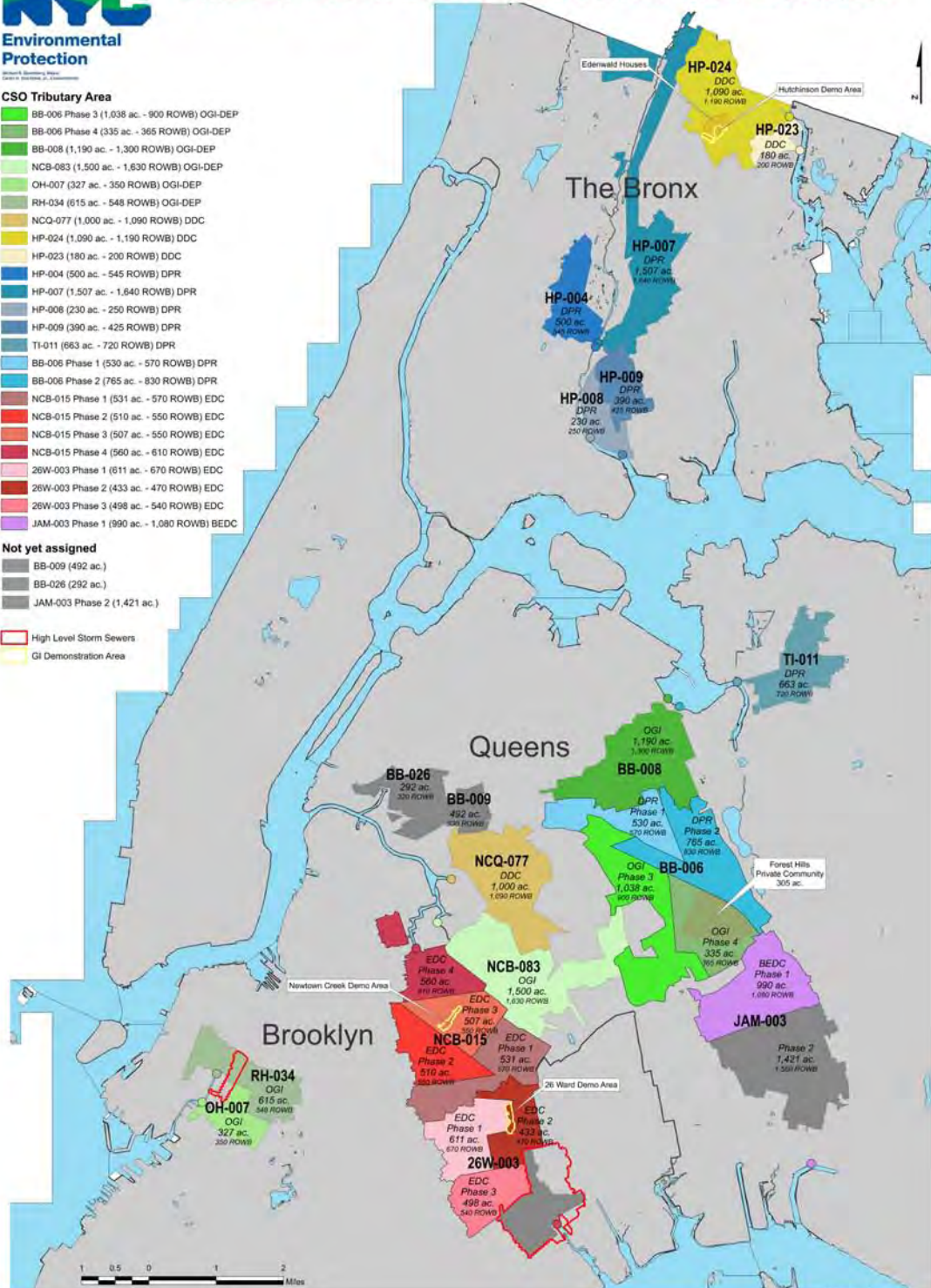


Office of Green Infrastructure Area-wide Contracts

- CSO Tributary Area**
- BB-006 Phase 3 (1,038 ac. - 900 ROWB) OGI-DEP
 - BB-006 Phase 4 (335 ac. - 365 ROWB) OGI-DEP
 - BB-008 (1,190 ac. - 1,300 ROWB) OGI-DEP
 - NCB-083 (1,500 ac. - 1,630 ROWB) OGI-DEP
 - OH-007 (327 ac. - 350 ROWB) OGI-DEP
 - RH-034 (615 ac. - 548 ROWB) OGI-DEP
 - NCQ-077 (1,000 ac. - 1,090 ROWB) DDC
 - HP-024 (1,090 ac. - 1,190 ROWB) DDC
 - HP-023 (180 ac. - 200 ROWB) DDC
 - HP-004 (500 ac. - 545 ROWB) DPR
 - HP-007 (1,507 ac. - 1,640 ROWB) DPR
 - HP-006 (230 ac. - 250 ROWB) DPR
 - HP-009 (390 ac. - 425 ROWB) DPR
 - TI-011 (663 ac. - 720 ROWB) DPR
 - BB-006 Phase 1 (530 ac. - 570 ROWB) DPR
 - BB-006 Phase 2 (765 ac. - 830 ROWB) DPR
 - NCB-015 Phase 1 (531 ac. - 570 ROWB) EDC
 - NCB-015 Phase 2 (510 ac. - 550 ROWB) EDC
 - NCB-015 Phase 3 (507 ac. - 550 ROWB) EDC
 - NCB-015 Phase 4 (560 ac. - 610 ROWB) EDC
 - 26W-003 Phase 1 (611 ac. - 670 ROWB) EDC
 - 26W-003 Phase 2 (433 ac. - 470 ROWB) EDC
 - 26W-003 Phase 3 (498 ac. - 540 ROWB) EDC
 - JAM-003 Phase 1 (990 ac. - 1,080 ROWB) BEDC

- Not yet assigned**
- BB-009 (492 ac.)
 - BB-026 (292 ac.)
 - JAM-003 Phase 2 (1,421 ac.)

- High Level Storm Sewers
- GI Demonstration Area



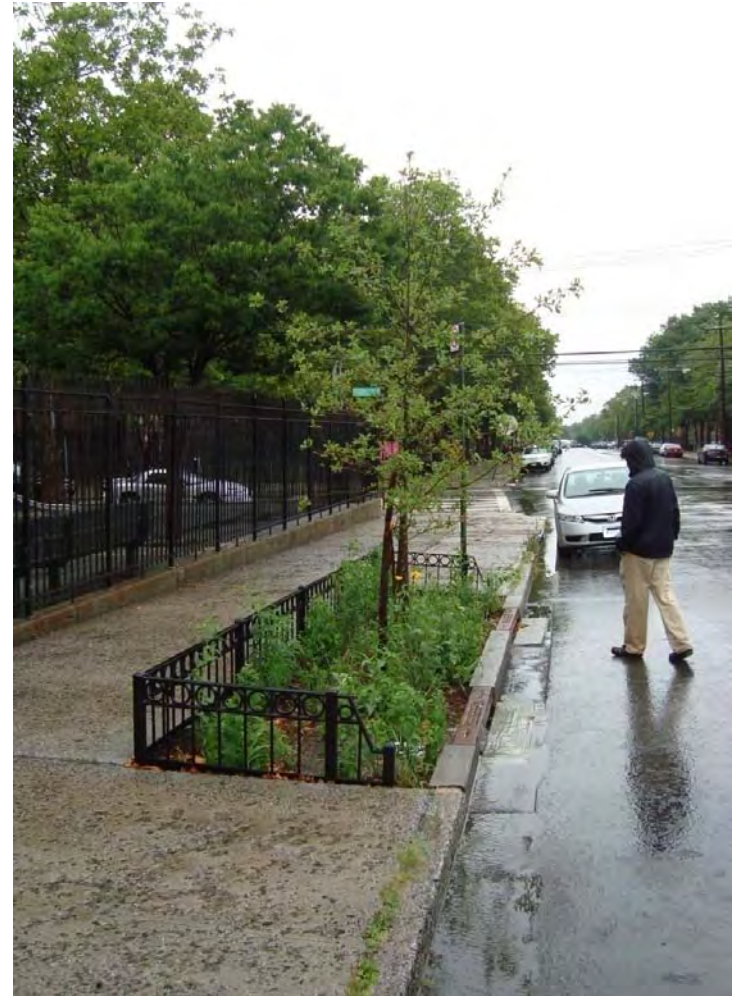
Map created January 2013



Tree Pits



Bioswales





NYC Parks

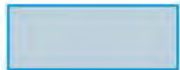
City of New York Parks & Recreation
Michael R. Bloomberg, Mayor
Veronica M. White, Commissioner
Forestry, Horticulture & Natural Resources



Hindcast Surge Inundation Area



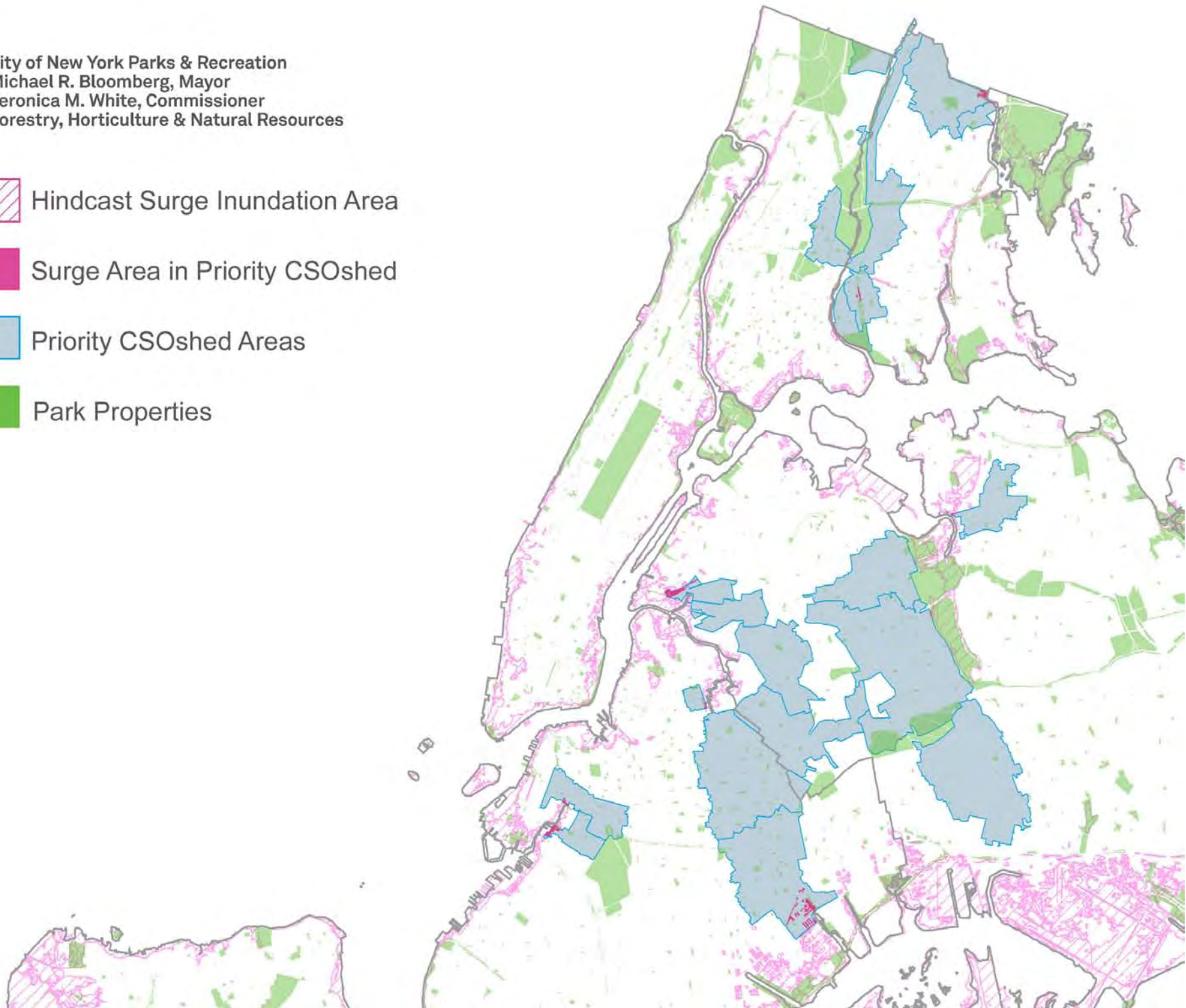
Surge Area in Priority CSOshed



Priority CSOshed Areas



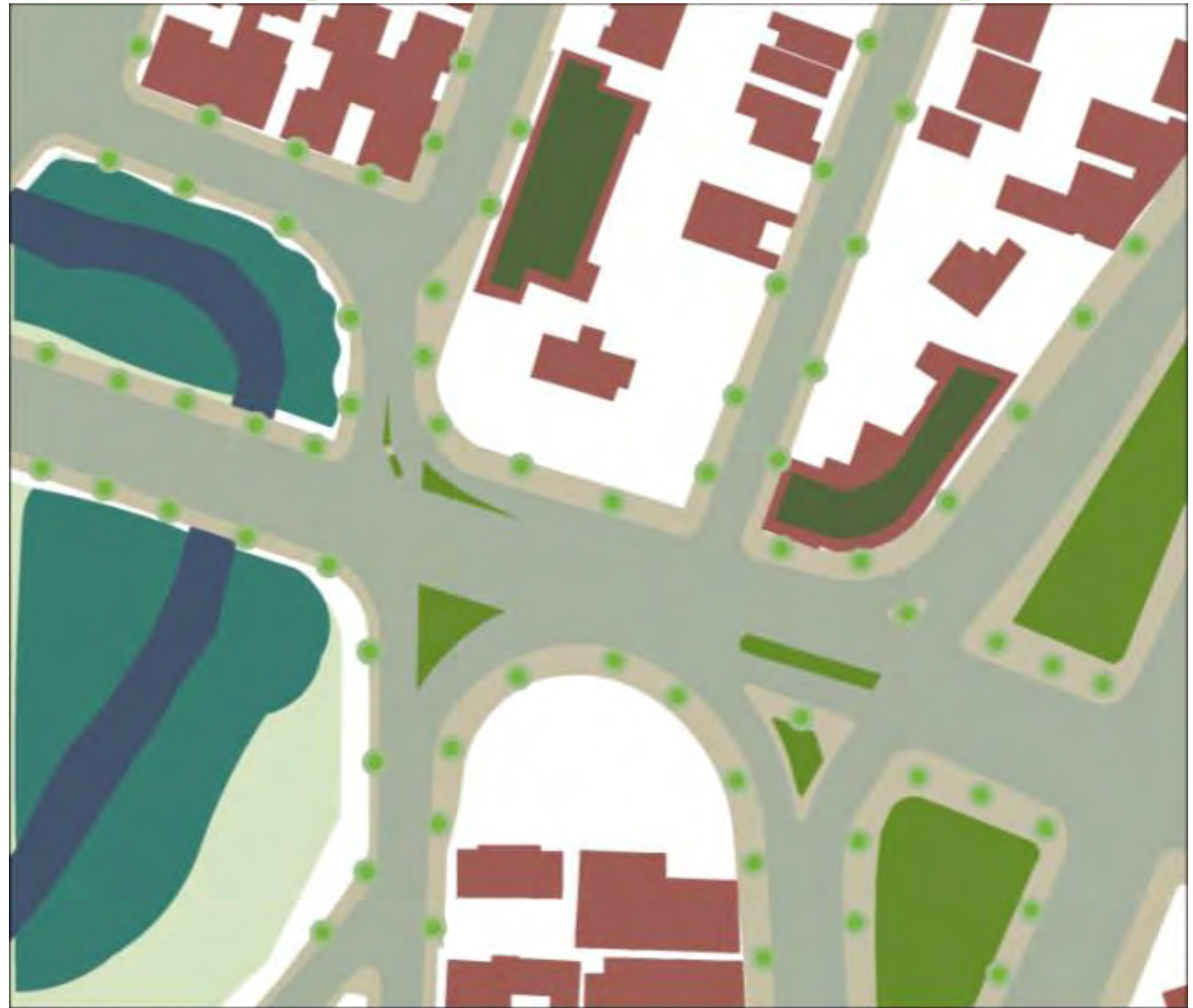
Park Properties



Nashville and 116th St, Queens



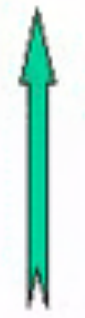
Landscape Connectivity



- Roads
- Sidewalks
- Buildings
- Parkland
- River

- Green Roofs
- Wetlands / Bioretention
- Greenstreets
- Street Trees & Bioswales






Leaf Area



Benefits

Tree Size 



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Thank You

Jeremy Barrick

Deputy Chief of Forestry, Horticulture & Natural
Resources

Jeremy.barrick@parks.nyc.gov

Parks