NYC Parks' Forestry Response to Superstorm Sandy

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Central Forestry & Horticulture, NYC Department of Parks & Recreation

MillionTreesNYC Lecture Series

July 16, 2013

Agenda

NYC's Urban Forest

- Fact and Figures
- Urban Forest Management

History of Parks' Storm Response

- Storms of the Past
- September 16, 2010 – tornadoes
- Tropical Storm Irene
- Superstorm Sandy

Forestry Storm Response

- Protocols
- Interagency Cooperation
- Response Tools

Greening it Forward

- Resiliency and Recovery

Conclusion & Acknowledgements

- Fitting It All Together
- Acknowledgements

New York City’s Urban Forest

NYC Parks

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**

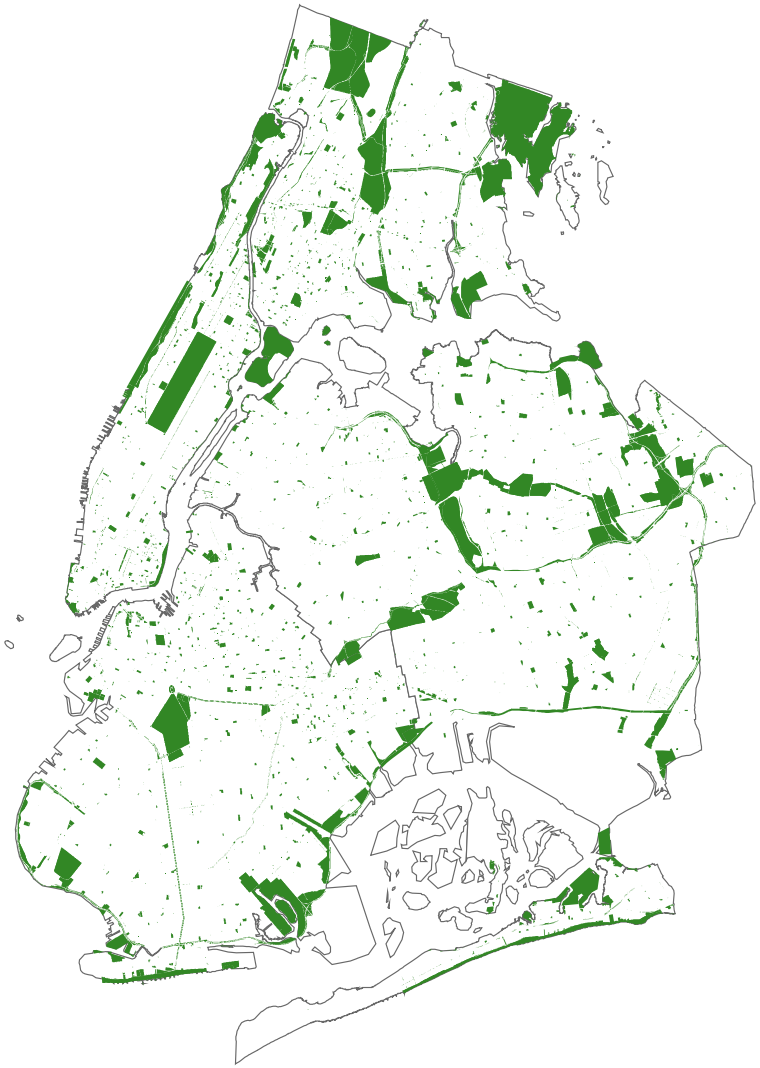
Source: http://www.nyc.gov/html/dcp/html/census/popcur.shtml

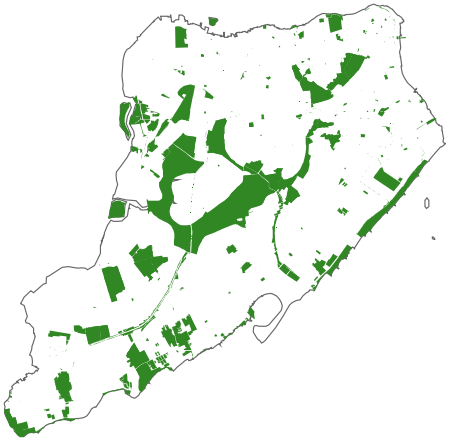
NYC Parks

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





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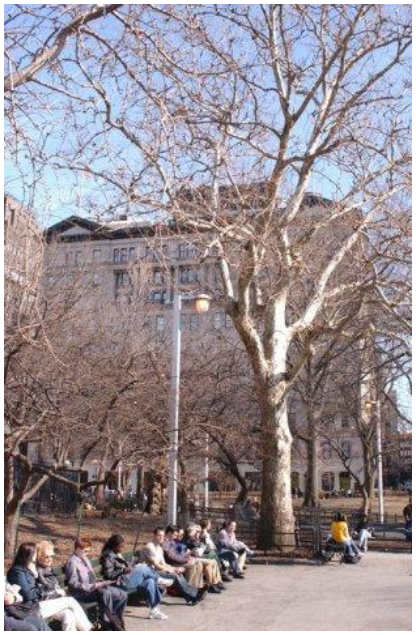
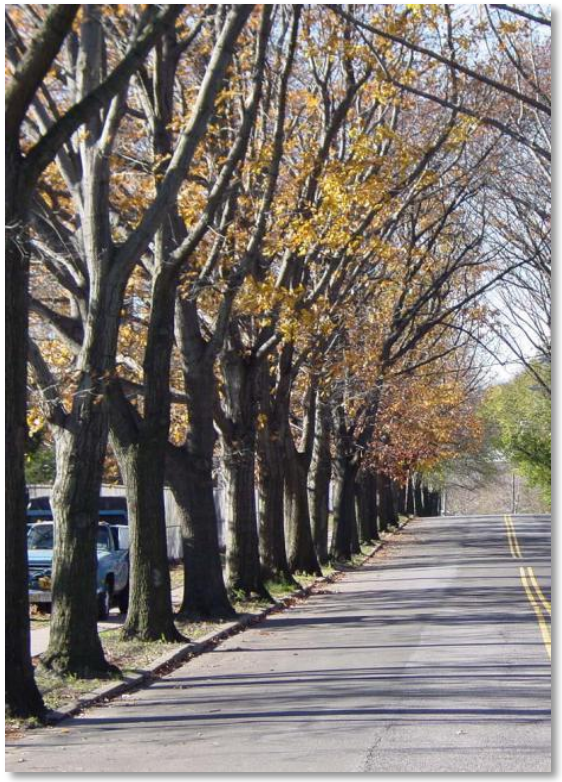
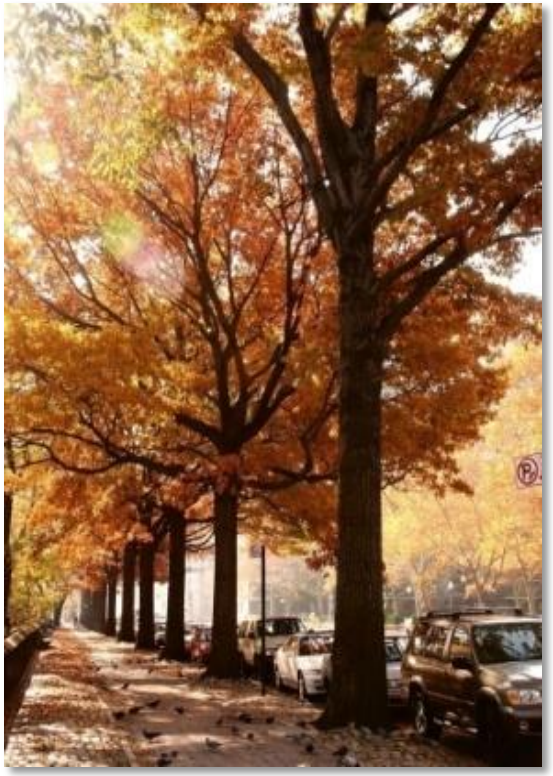
Estimated 2 million trees in landscaped parks & natural areas



NYC Parks

600,000 Street Trees





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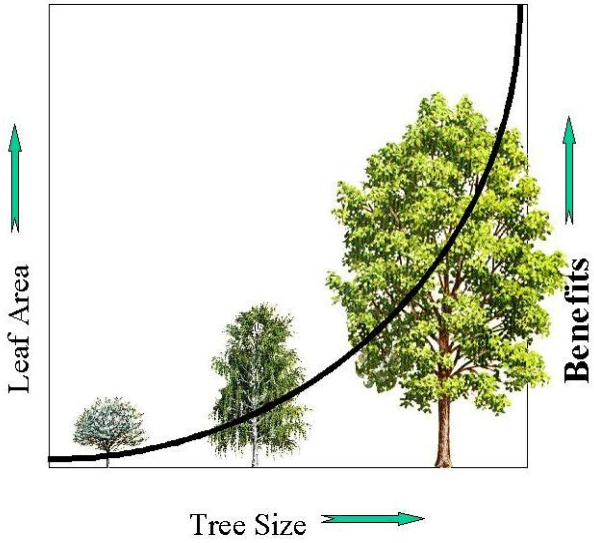
Annual Benefits of New York City Street Trees (STRATUM, 2007)

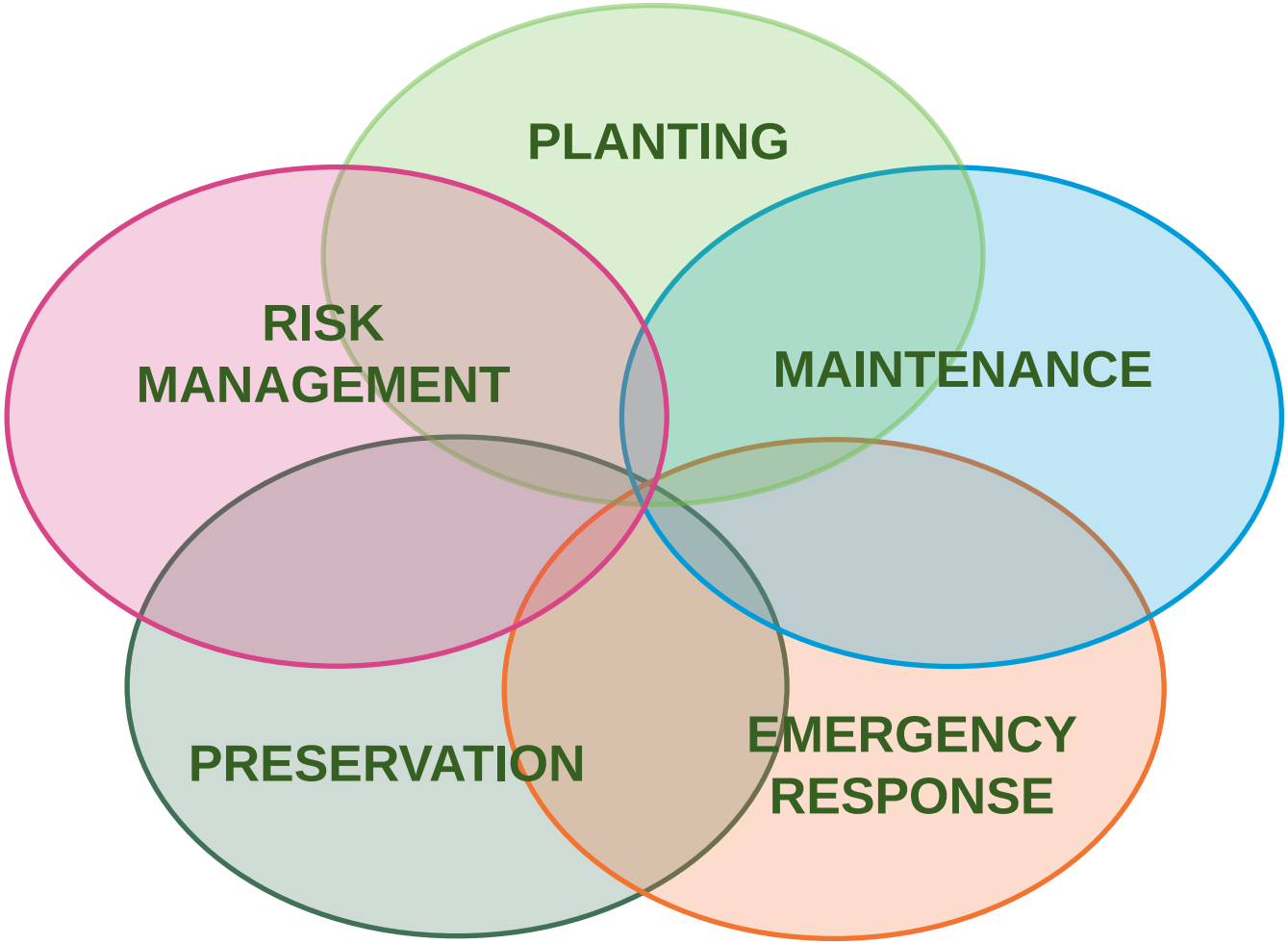
Annual Benefits	Total ($)	$/tree	$/capita
Aesthetic/Other	52,492,384	89.88	6.43
Stormwater	35,628,224	61.00	4.36
Energy	27,818,220	47.63	3.41
Air Quality	5,269,572	9.02	0.65
CO2	754,947	1.29	0.09
Total	121,963,347	208.82	14.94

Benefit cost ratio of NYC's street trees is 5:1



NYC Parks

NYC Urban Forest Management



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The History of Parks' Storm Response in NYC

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A History of Storms

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

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A History of Storms

A comparative analysis of the damage to trees in the storms of 1938, 1944, and 1950, is as follows:

	1938	1944	1950
STREETS:	8,000	22,000	5,000
PARKS:	4,000	11,500	5,000
	12,000	33,500	10,000

- 1938: Long Island Express – Category 3 hurricane when it made landfall on LI
- 1944: Great Atlantic Hurricane – Category 2 hurricane when it made landfall
- 1950: Great Appalachian Storm of November 1950 – nor'easter

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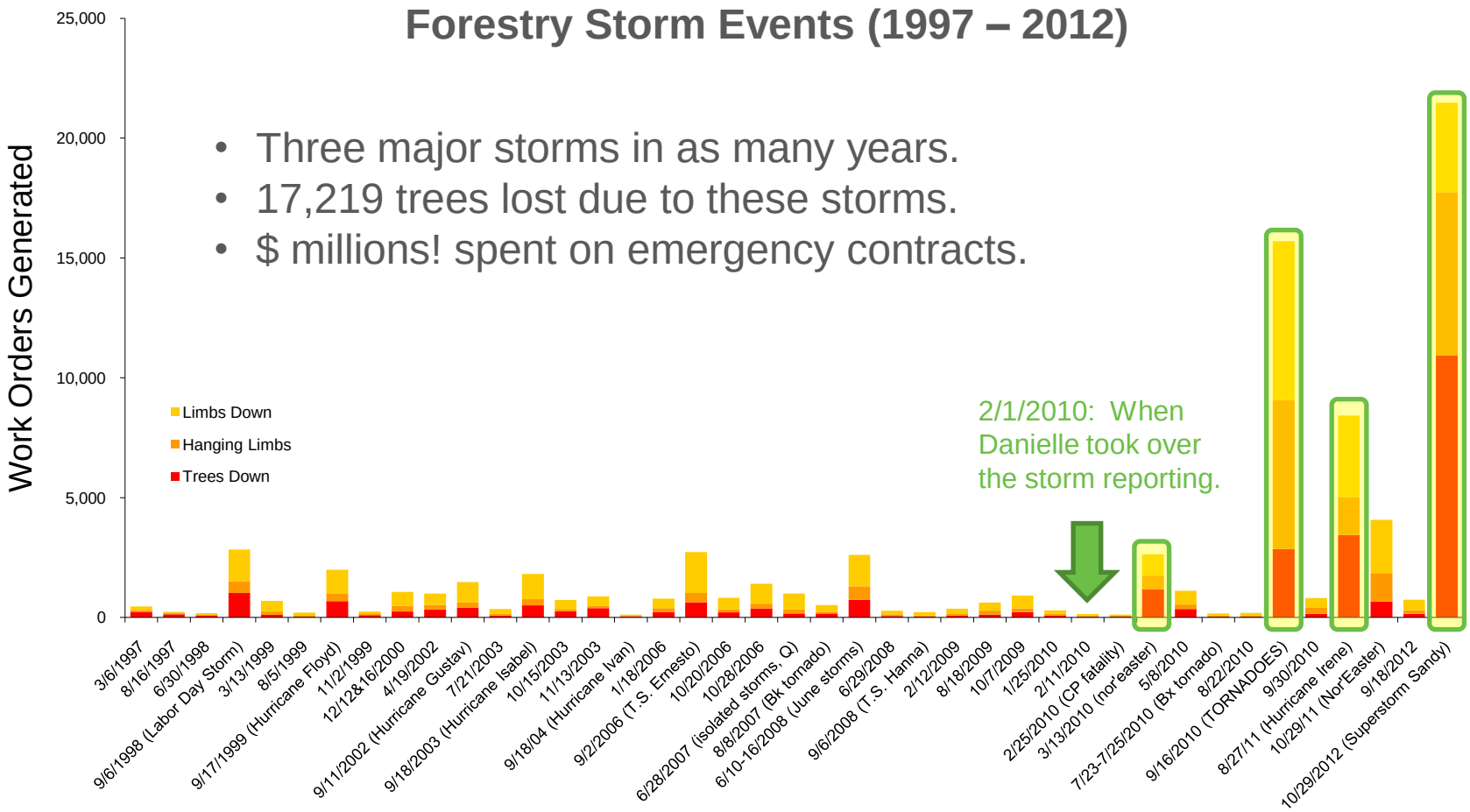
Recent Storms



- Three major storms in as many years.
- 17,219 trees lost due to these storms.
- $ millions! spent on emergency contracts.

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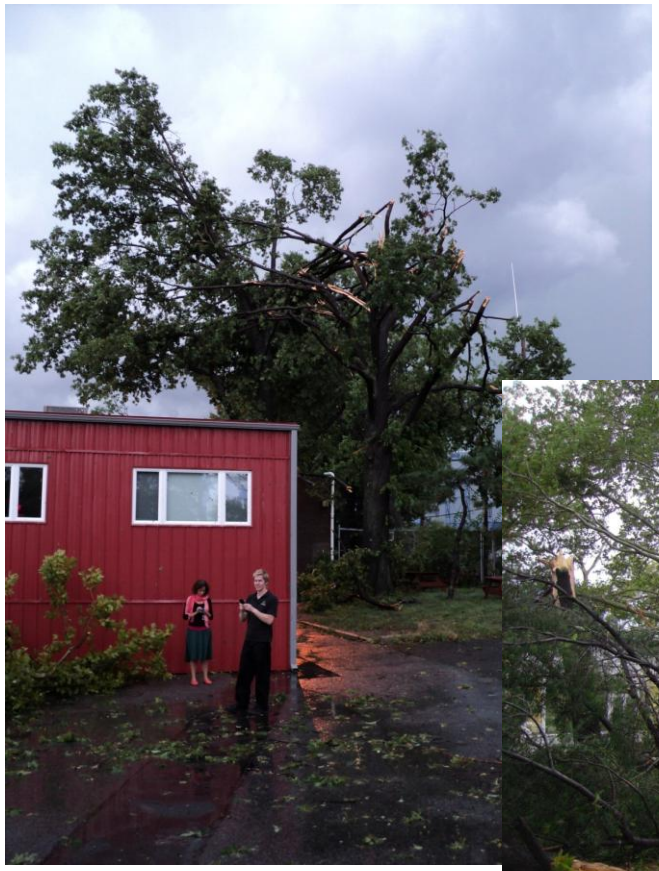
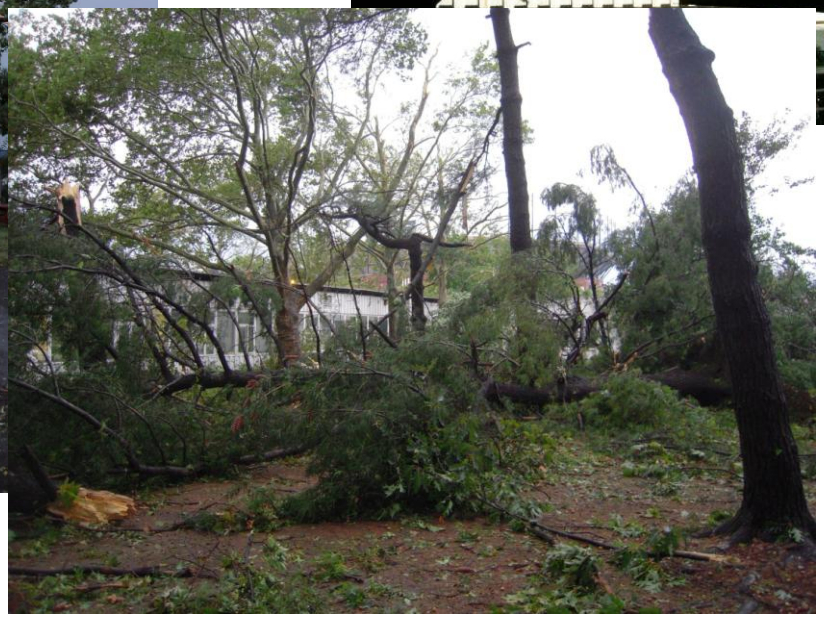
September 16, 2010 Tornadoes

NYC Parks

Tornado Damage





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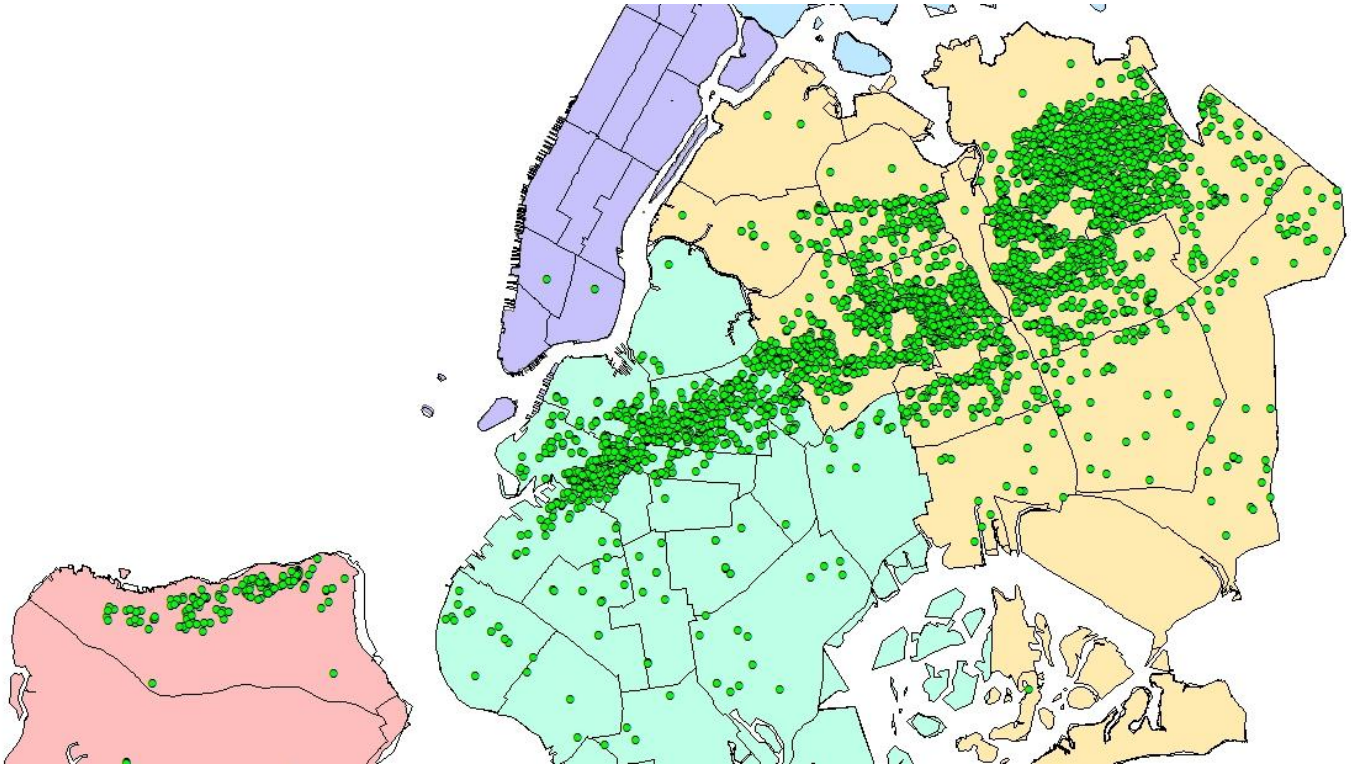
Tornado Damage

NYC Parks

Tornado Damage

NYC Parks

September 16th, 2010 Tornadoes



Day 3 (9/18/2010) – 5,506 Service Requests

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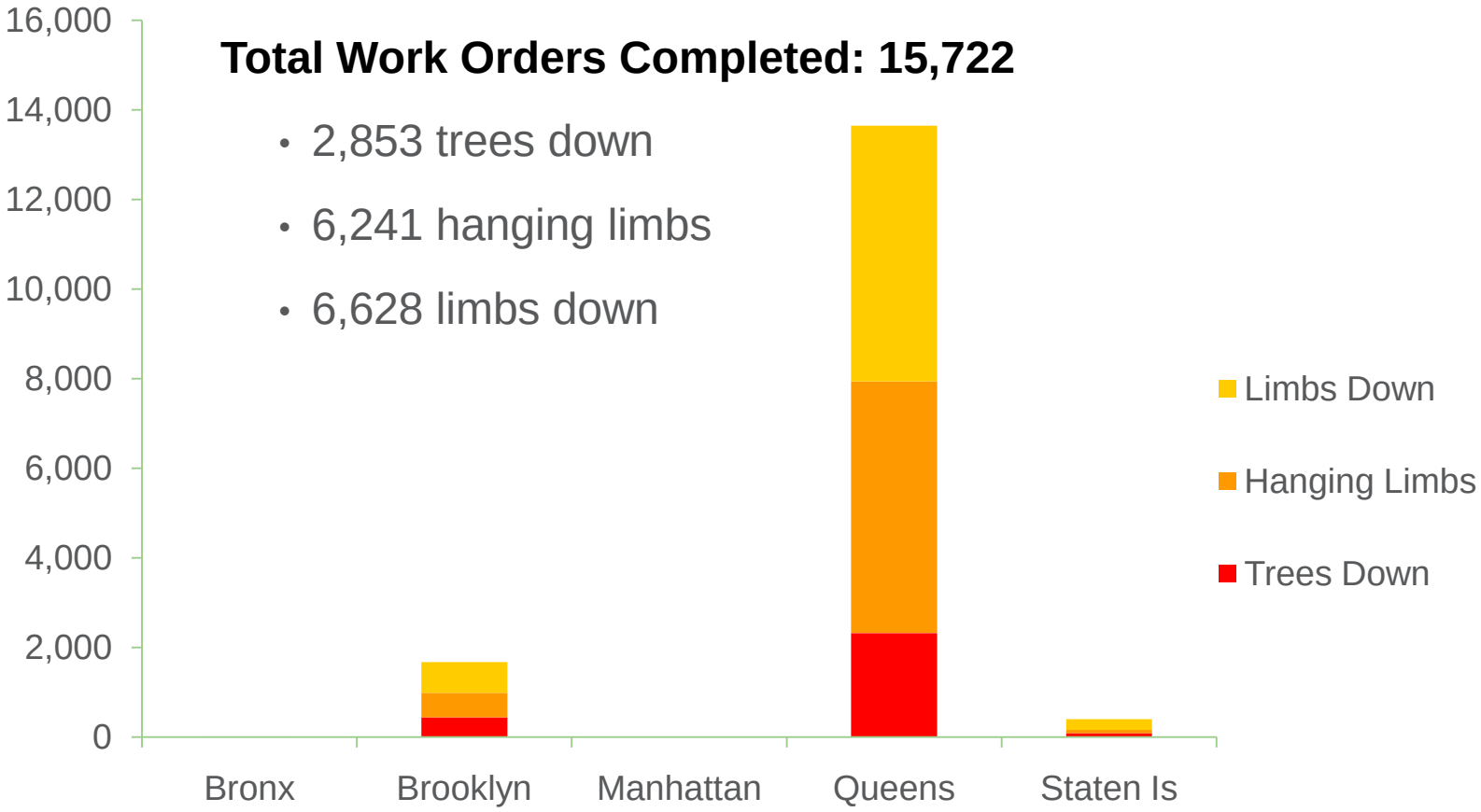
Two Tornadoes and a Macroburst vs NYC Trees

Total Service Requests: 9,860

Total Work Orders Completed: 15,722

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



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Tropical Storm Irene
August 28, 2011

NYC Parks

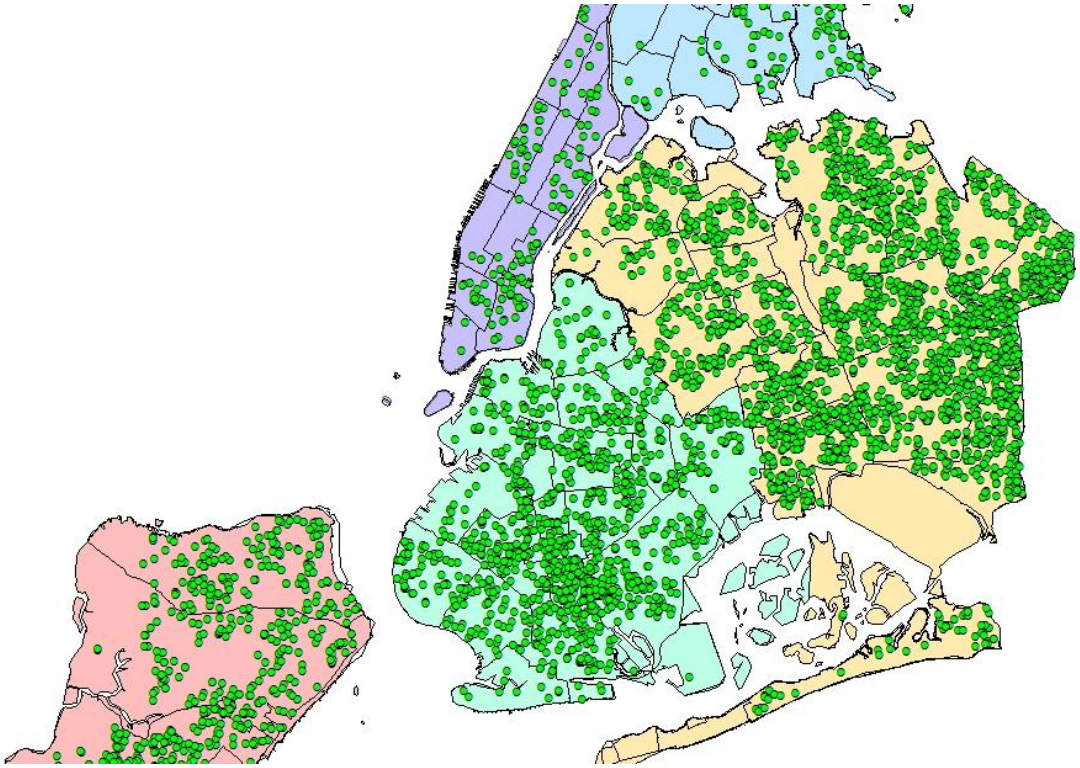
Irene Damage

NYC Parks

Irene Damage

NYC Parks

Tropical Storm Irene



Day 2 (8/29/2011) – 5,394 Service Requests

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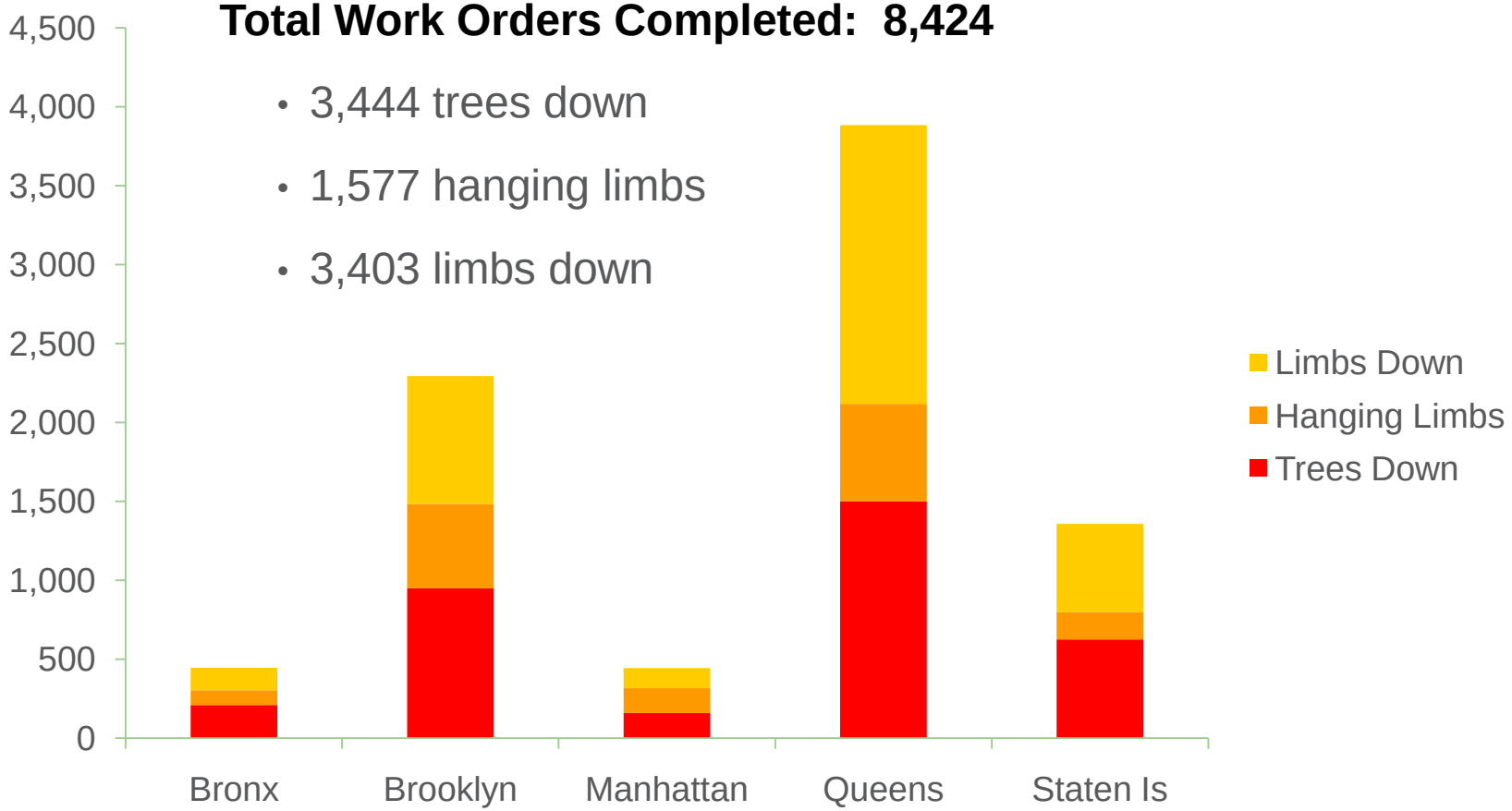
Irene vs NYC Trees

Total Service Requests: 10,030

Total Work Orders Completed: 8,424

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



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Superstorm Sandy
October 29, 2012

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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)
- Estimated $19 billion in damage to NYC
- For the first time since 1888, NYSE was closed for two days in a row
- Estimated 20,000 street and park trees lost

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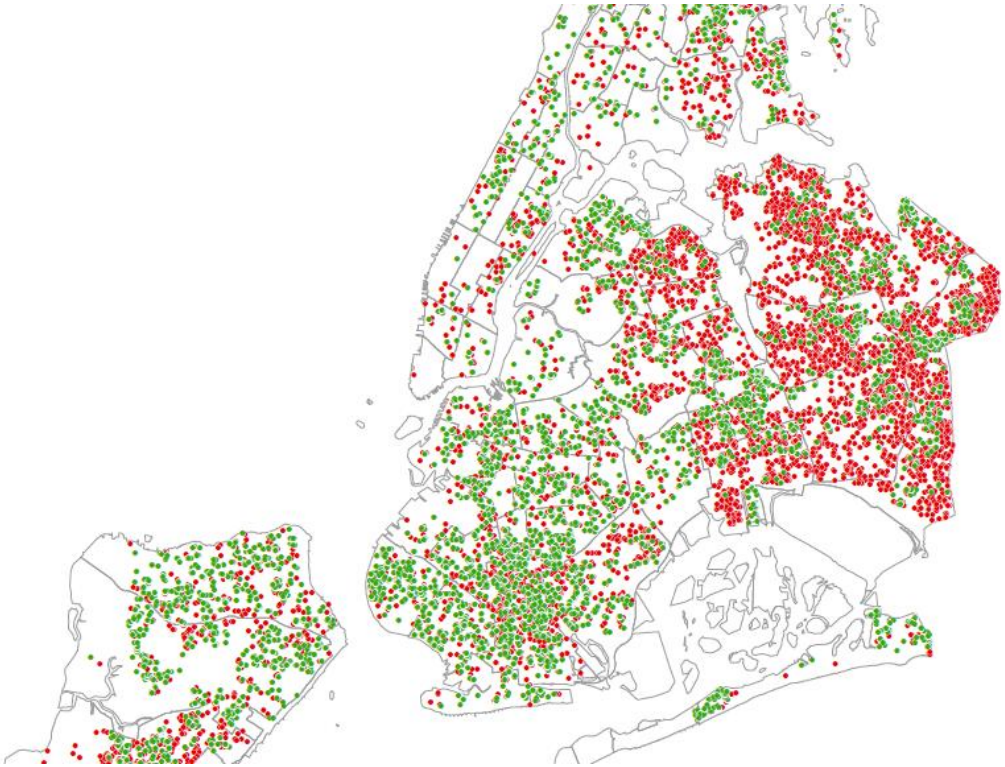
Sandy Damage

NYC Parks

Sandy Damage

NYC Parks

Superstorm Sandy



Day 4 (11/1/2012) – 12,778 Service Requests

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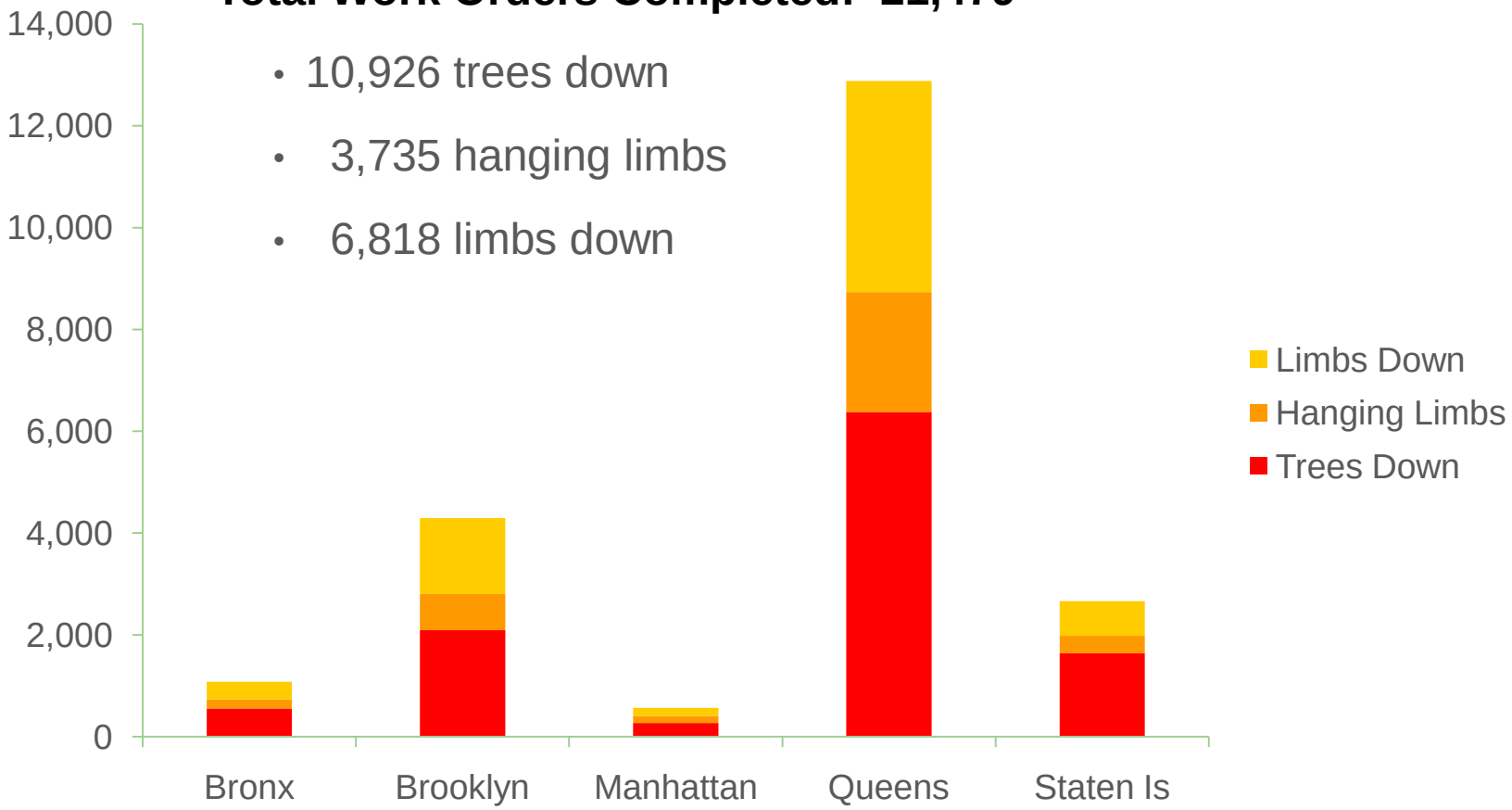
Sandy vs NYC Trees

Total Service Requests: 26,011

Total Work Orders Completed: 21,479

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



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Additional Tree Numbers

Trees Lost:

- Street: 10,926
- Parks & playgrounds: 5,407
- Natural areas: 2,441

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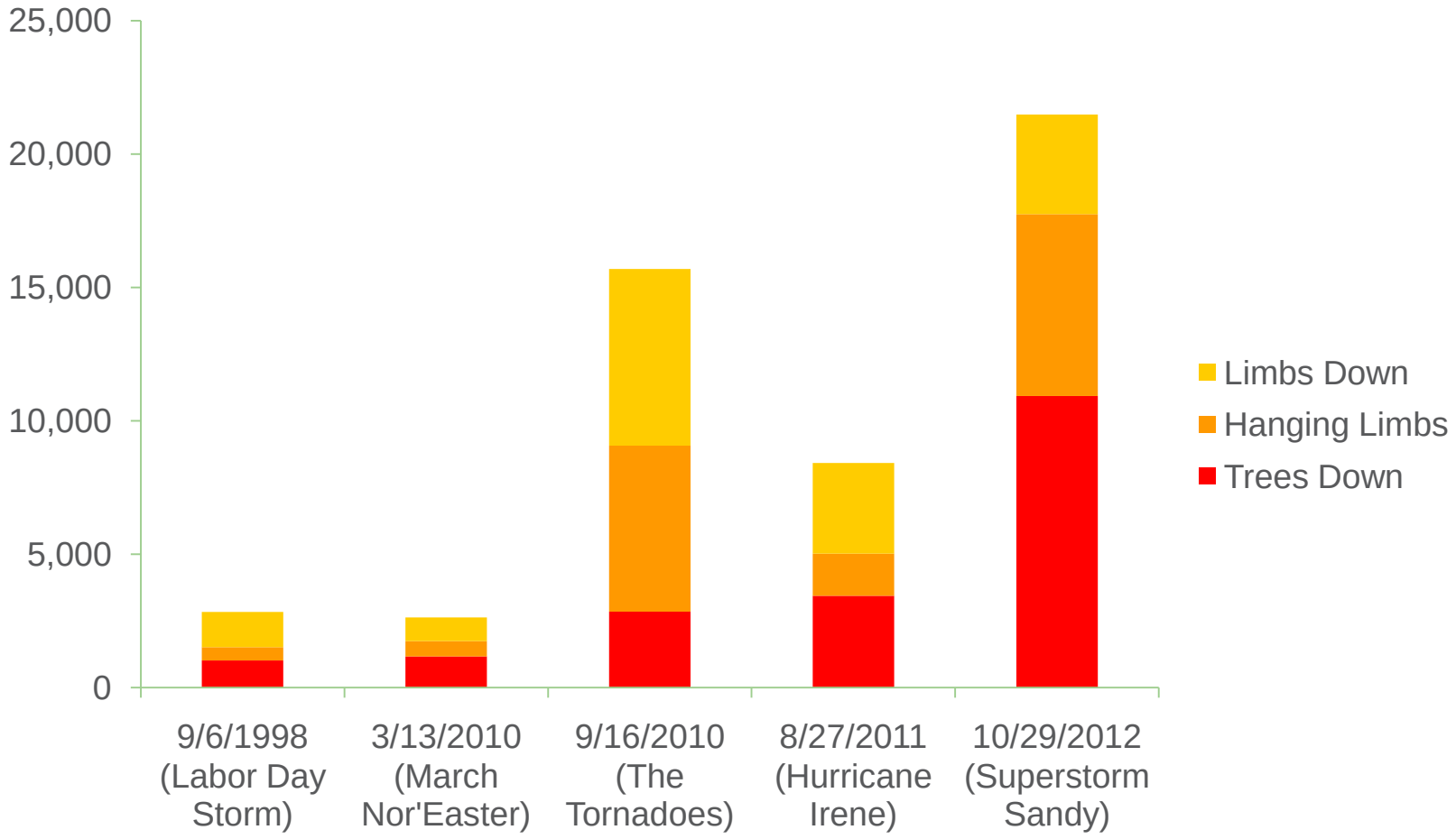
Sandy vs Historic Storms



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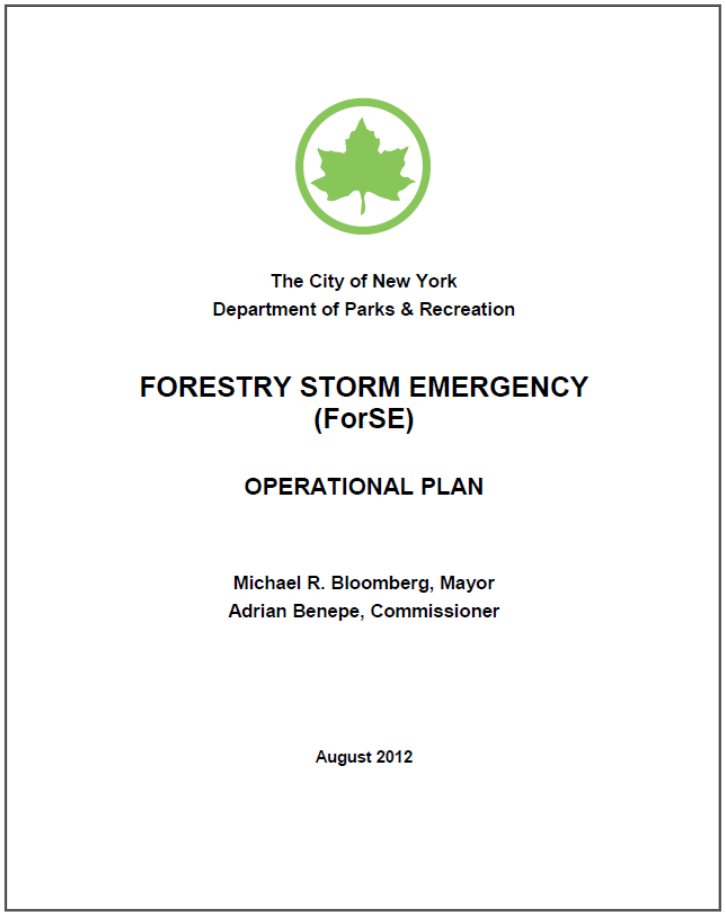
Forestry Storm Response

NYC Parks

ForSE: Forestry Storm Emergency Operational Plan

- Parks Incident Command Structure
- Incident Levels
- Emergency Response Phases



The City of New York
Department of Parks & Recreation

FORESTRY STORM EMERGENCY (ForSE)

OPERATIONAL PLAN

Michael R. Bloomberg, Mayor
Adrian Benepe, Commissioner

August 2012

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Emergency Response Phases

- Initial Response & Tactical Decision-Making
- Inspections
- Work Crew Deployment
- Wood Debris Disposal
- Sidewalk Restoration & Replanting

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Initial Response

- Remove high priority 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.

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Work Order Prioritization

Work is 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

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Wood Debris Reduction & Disposal

The approach to wood debris disposal during a ForSE event 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.

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Sidewalk Restoration & Replanting

DDC sidewalk repairs and replanting

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Office of Emergency Management's Emergency Operations Center

OEM

New York City Office of Emergency Management

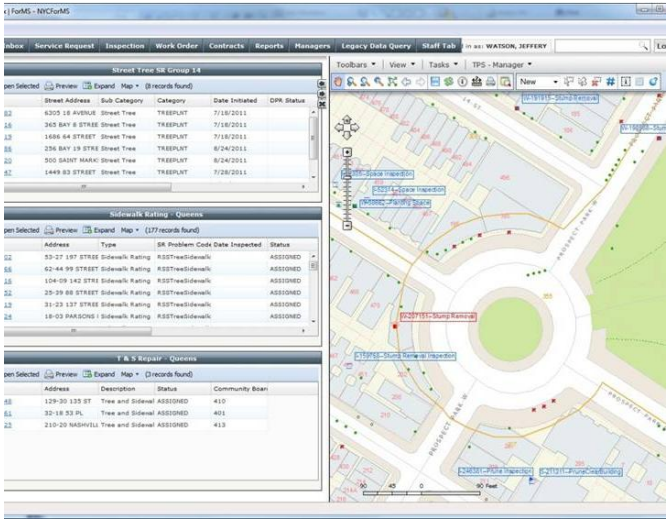
NYC Parks

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



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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

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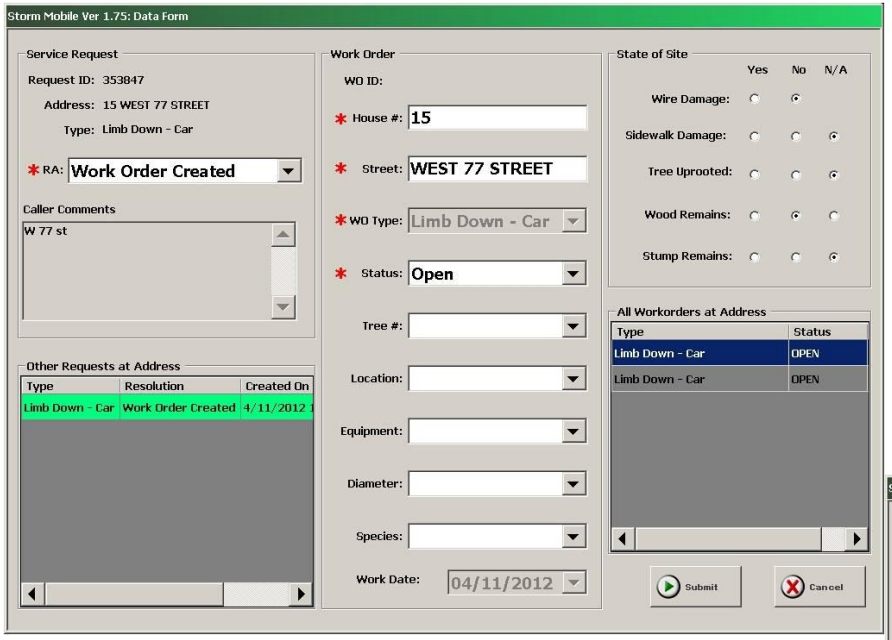
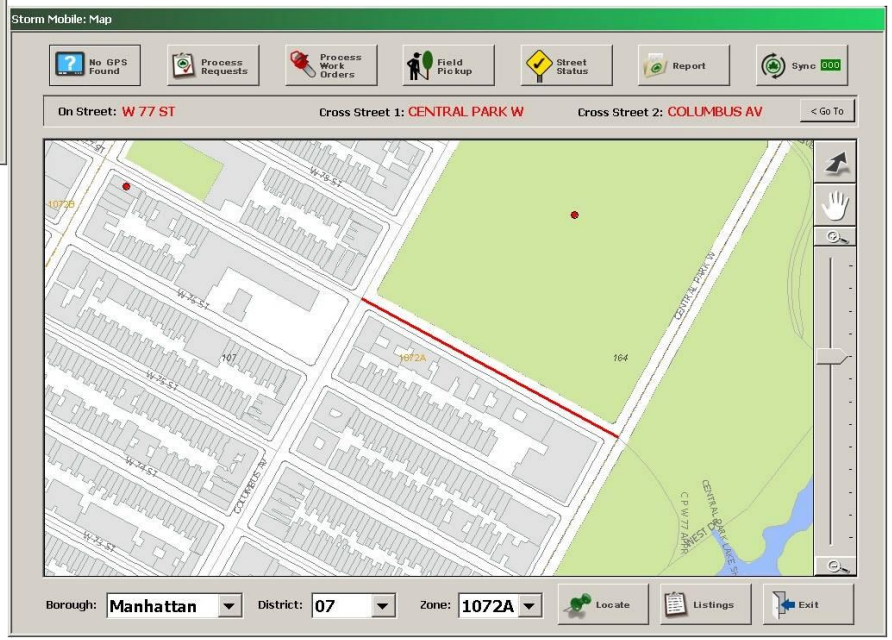
FORESTRY STORM MOBILE

Storm Mobile





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Storm Mobile

Significant reduction of paperwork

Ability to assign inspectors by zones

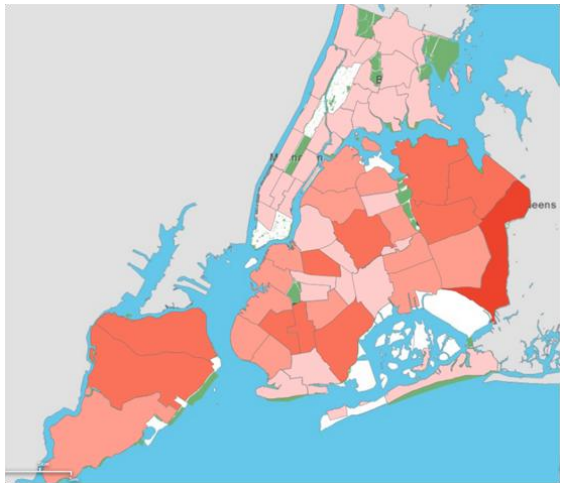
Ability to quickly see where blocked streets are located

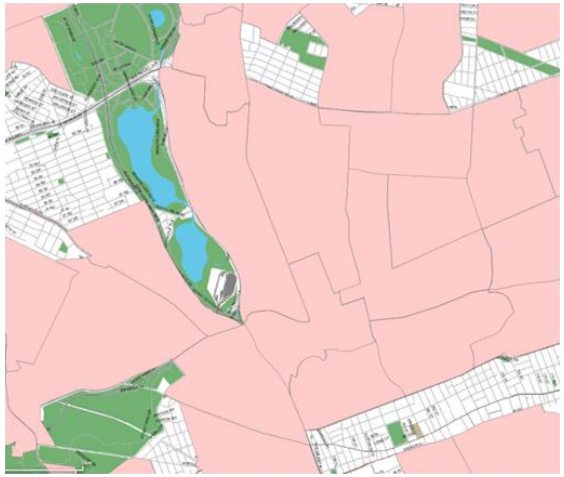
Rapid field inspection of service requests

Ability to handle duplicate service requests in the field

Streamlined generation and closure of work orders

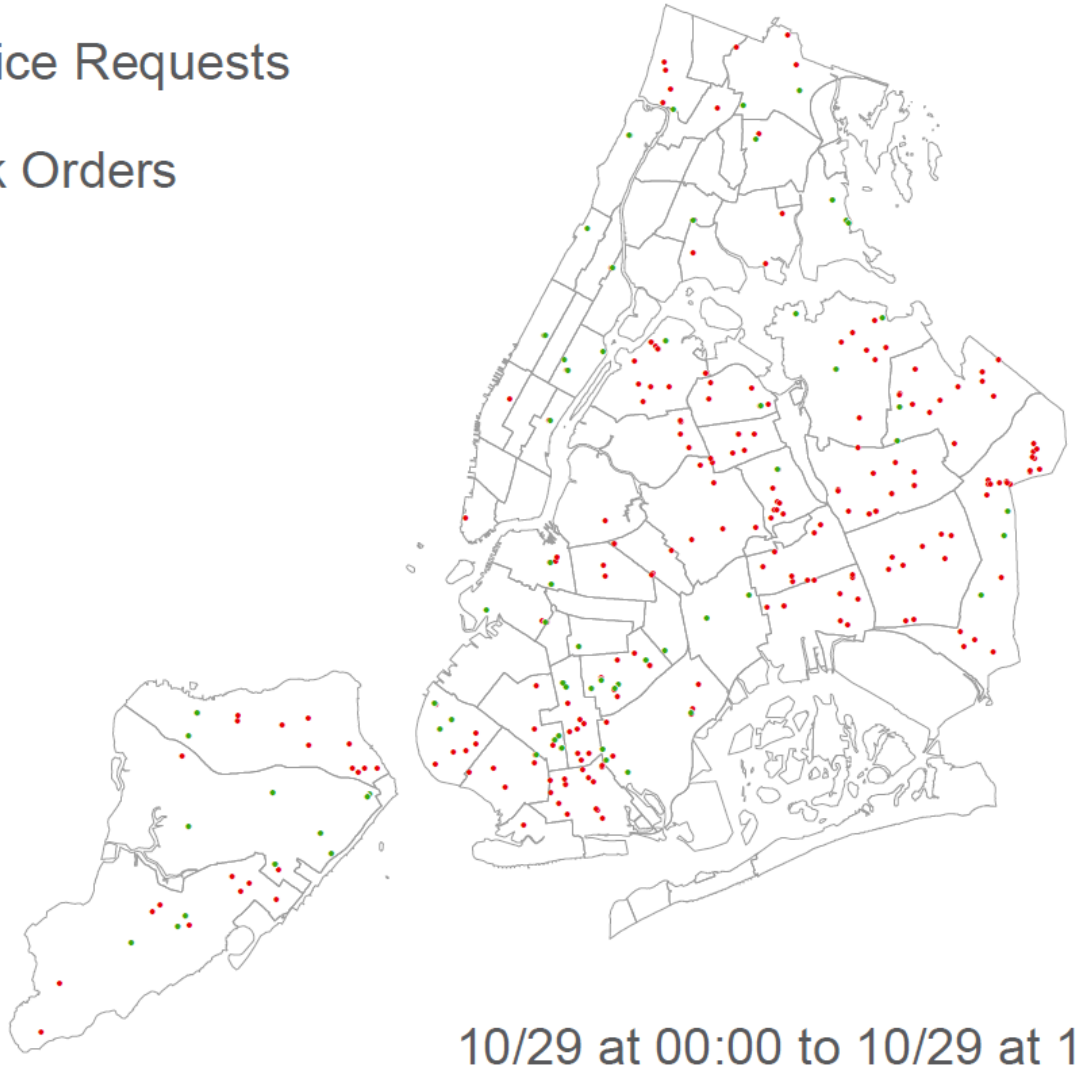
Ability to report in near real time





NYC Parks

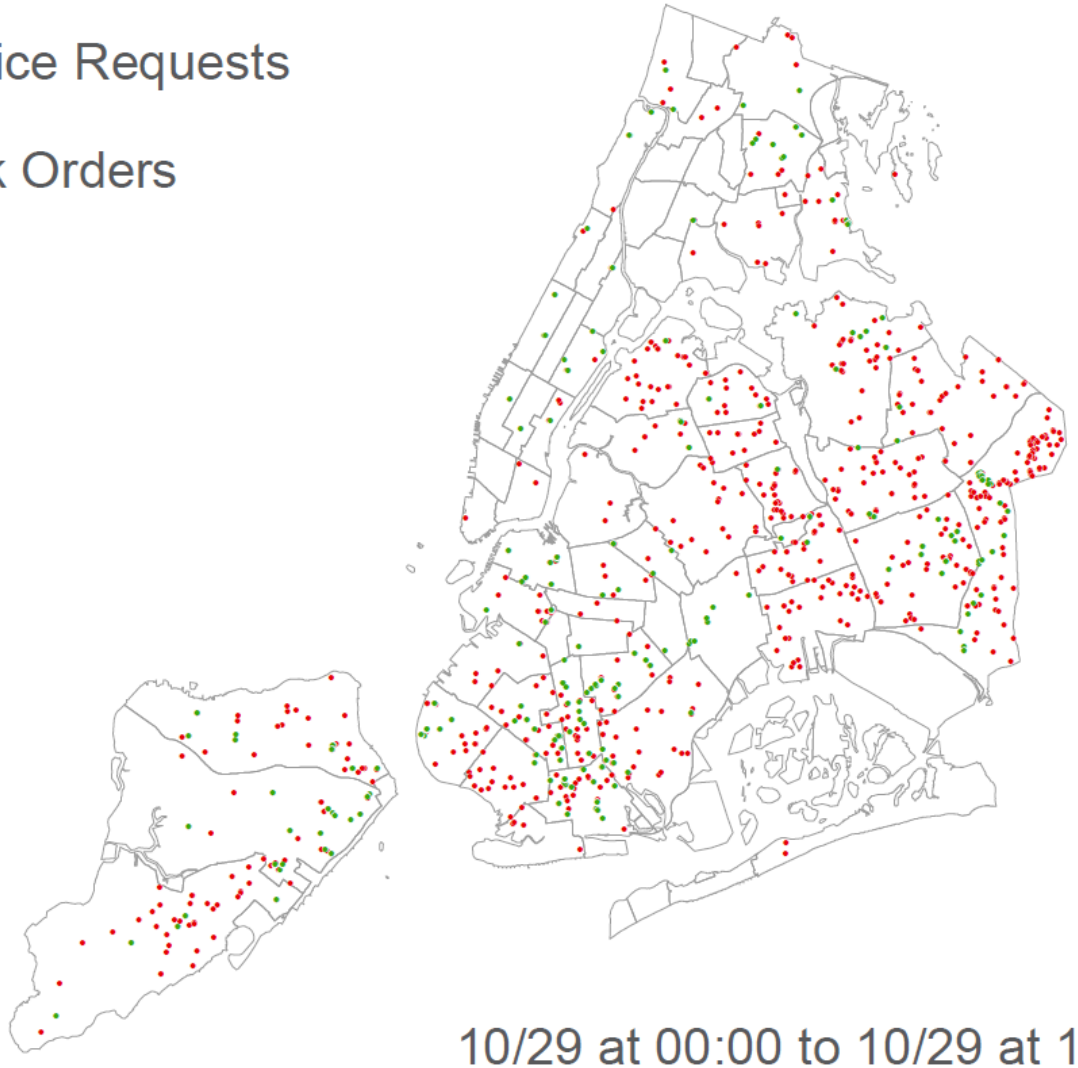
- Service Requests
- Work Orders



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

NYC Parks

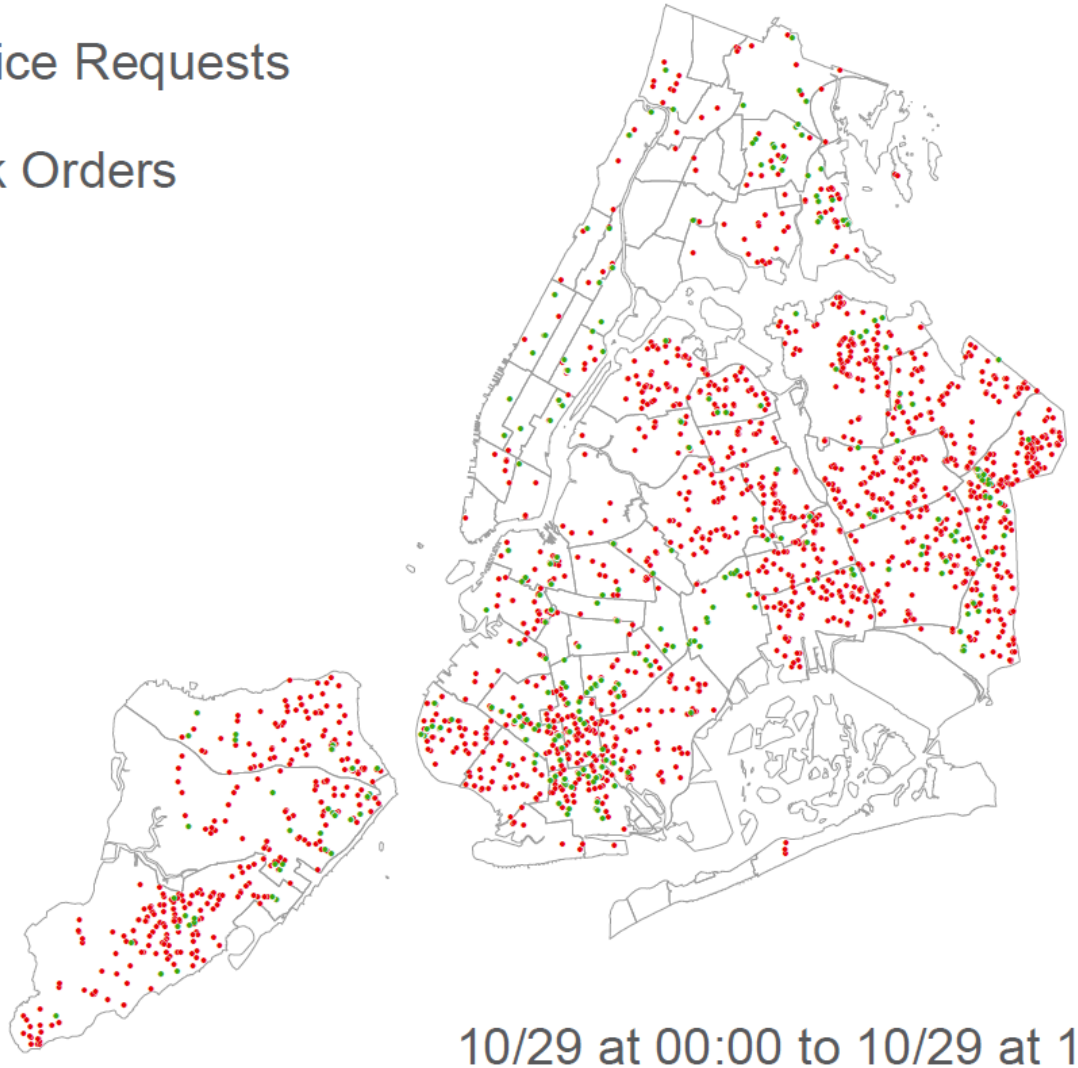
- Service Requests
- Work Orders



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

NYC Parks

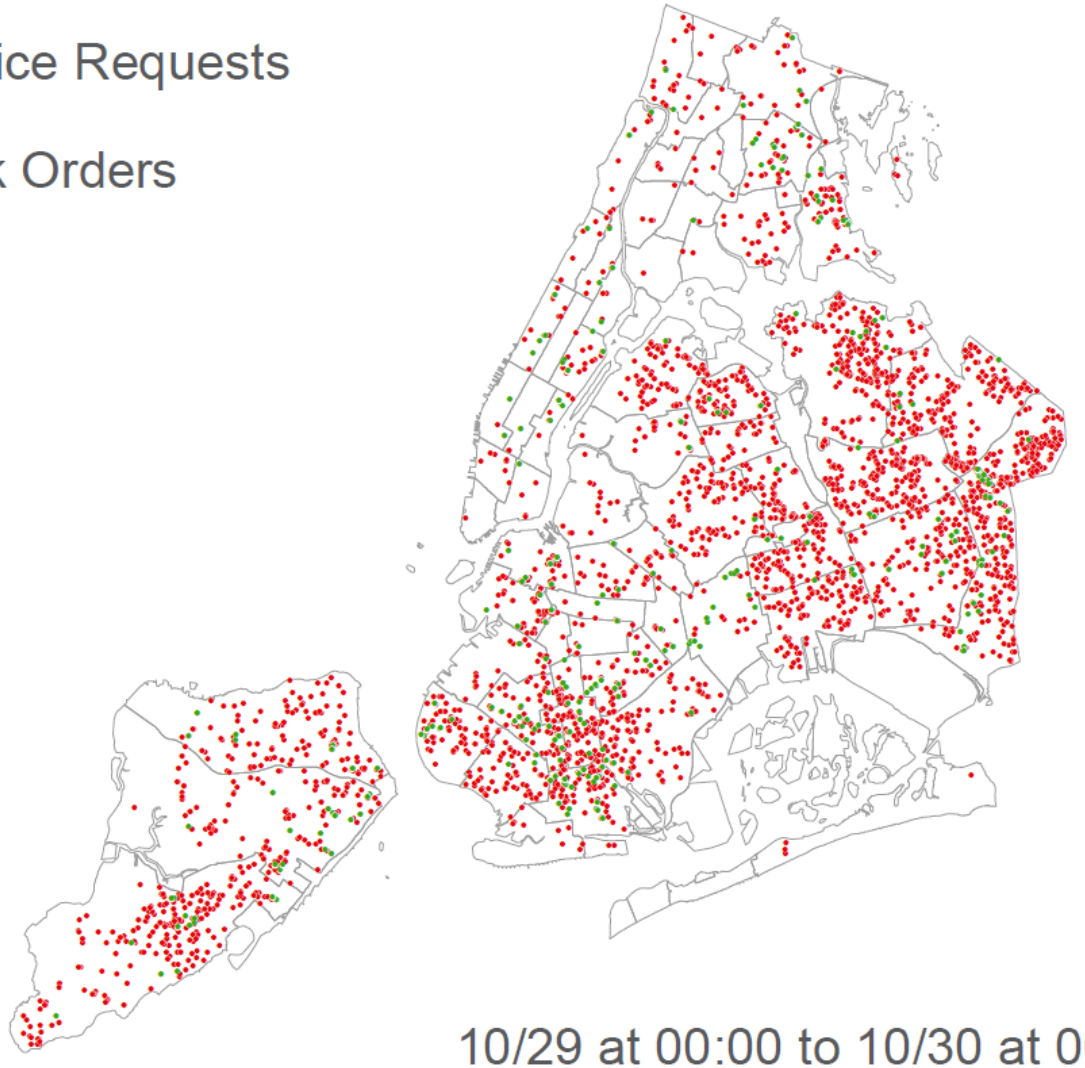
- Service Requests
- Work Orders



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

NYC Parks

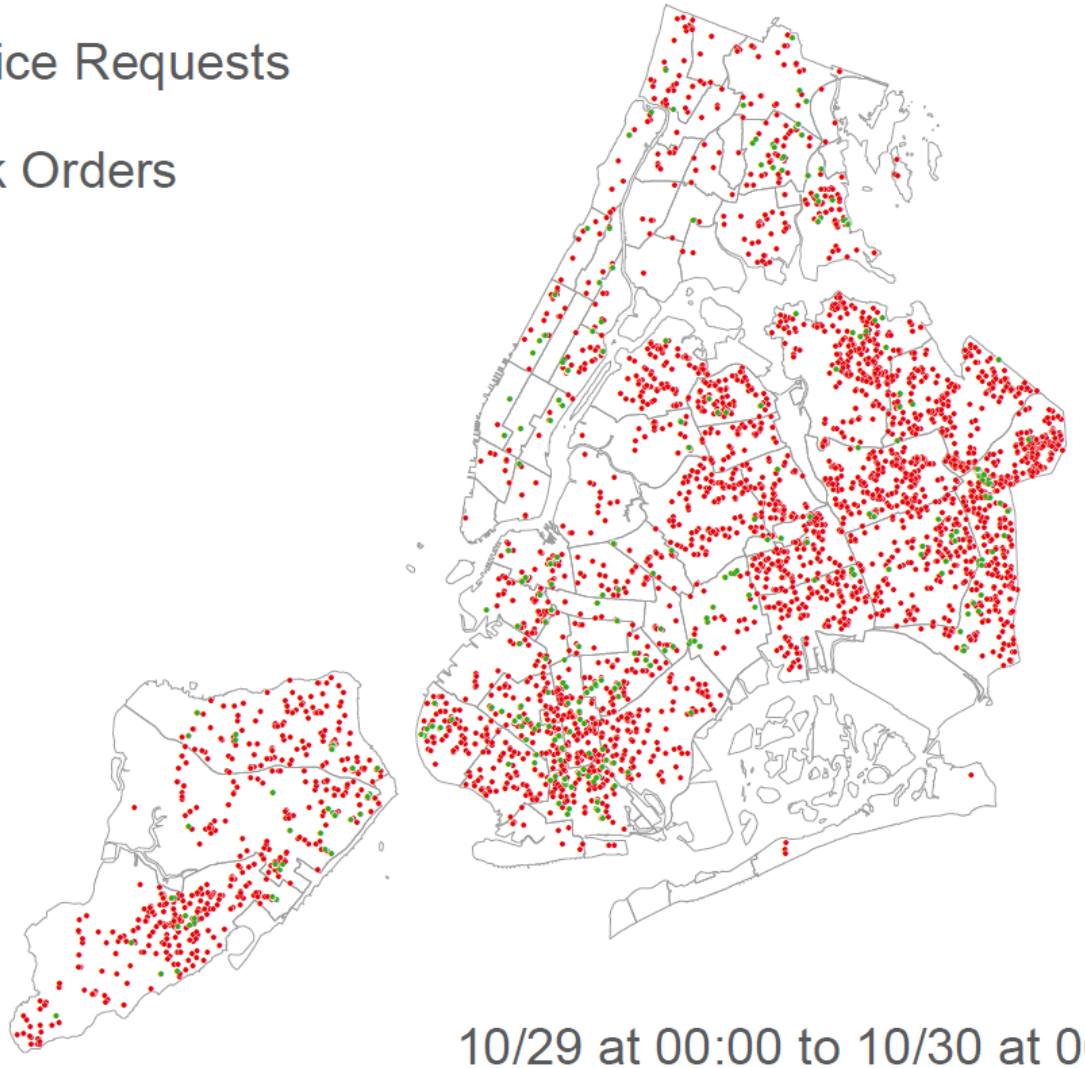
- Service Requests
- Work Orders



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

NYC Parks

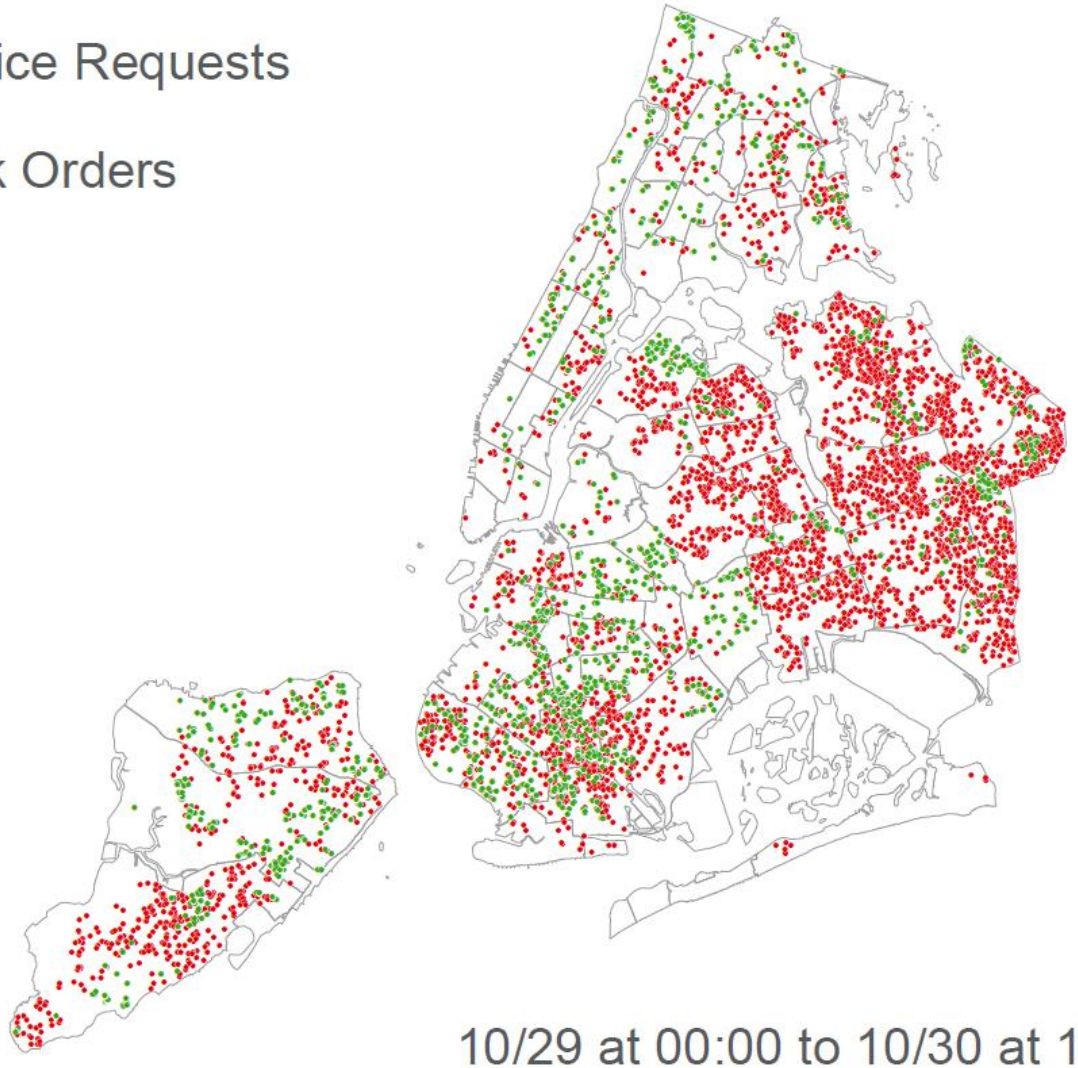
- Service Requests
- Work Orders



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

NYC Parks

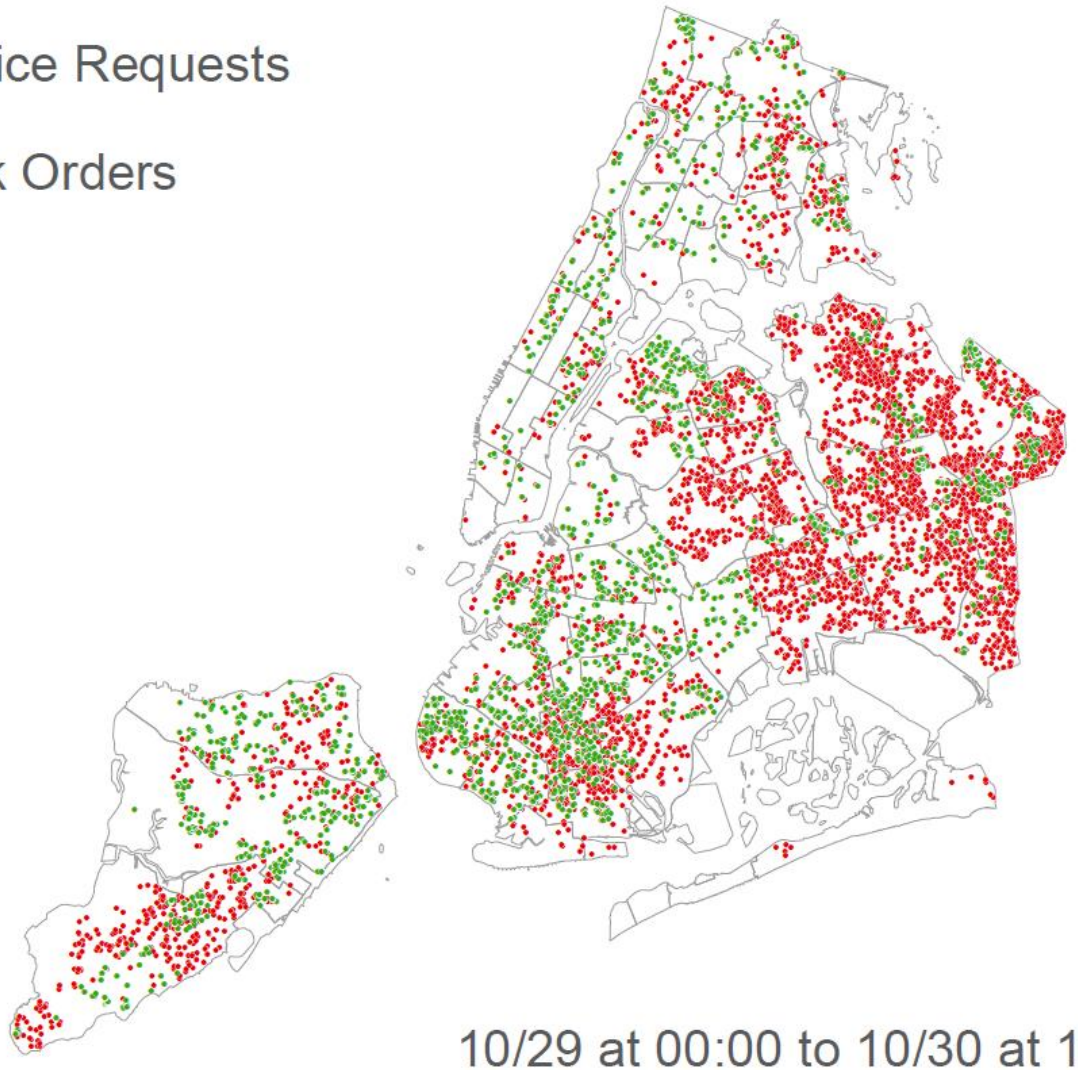
- Service Requests
- Work Orders



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

NYC Parks

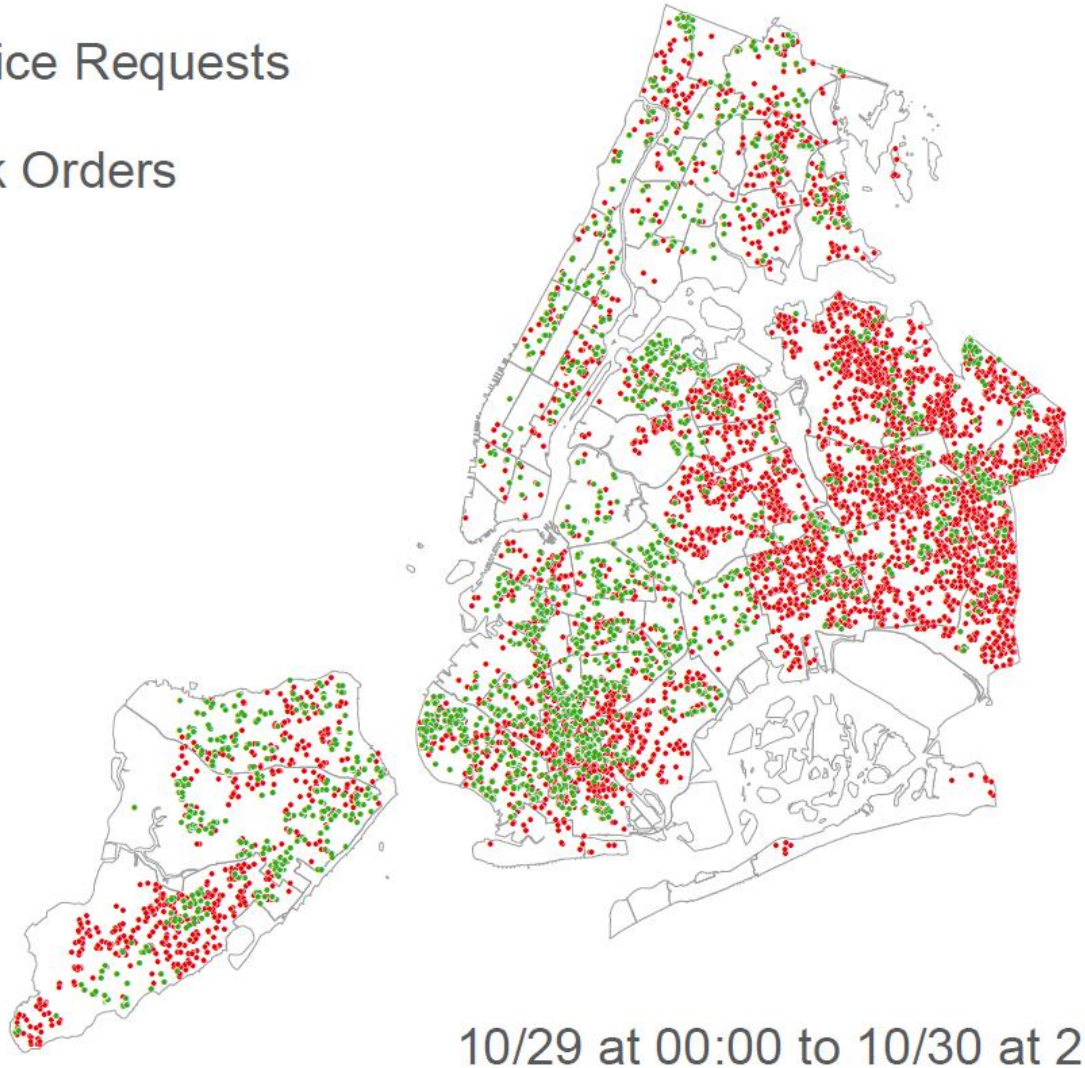
- Service Requests
- Work Orders



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

NYC Parks

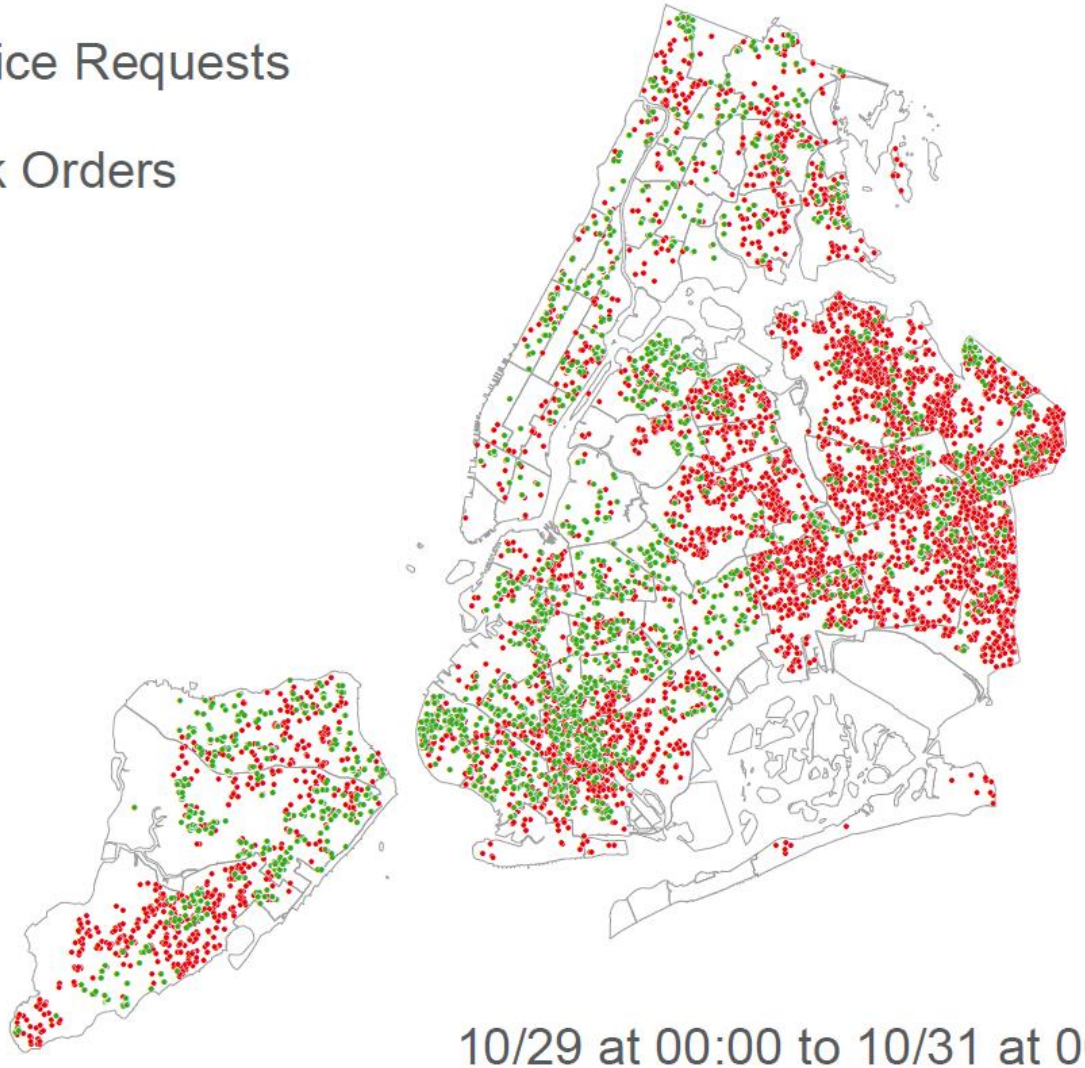
- Service Requests
- Work Orders



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

NYC Parks

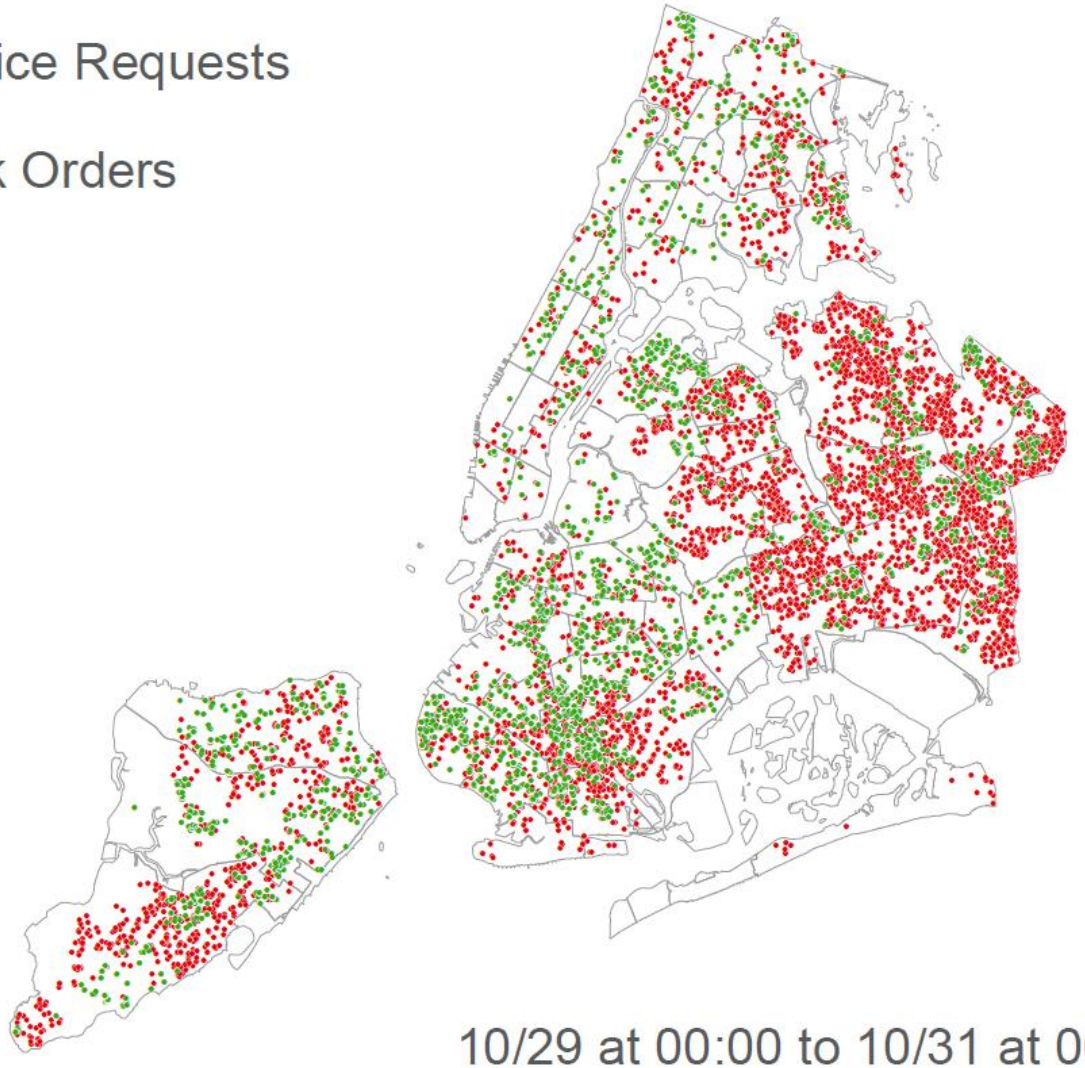
- Service Requests
- Work Orders



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

NYC Parks

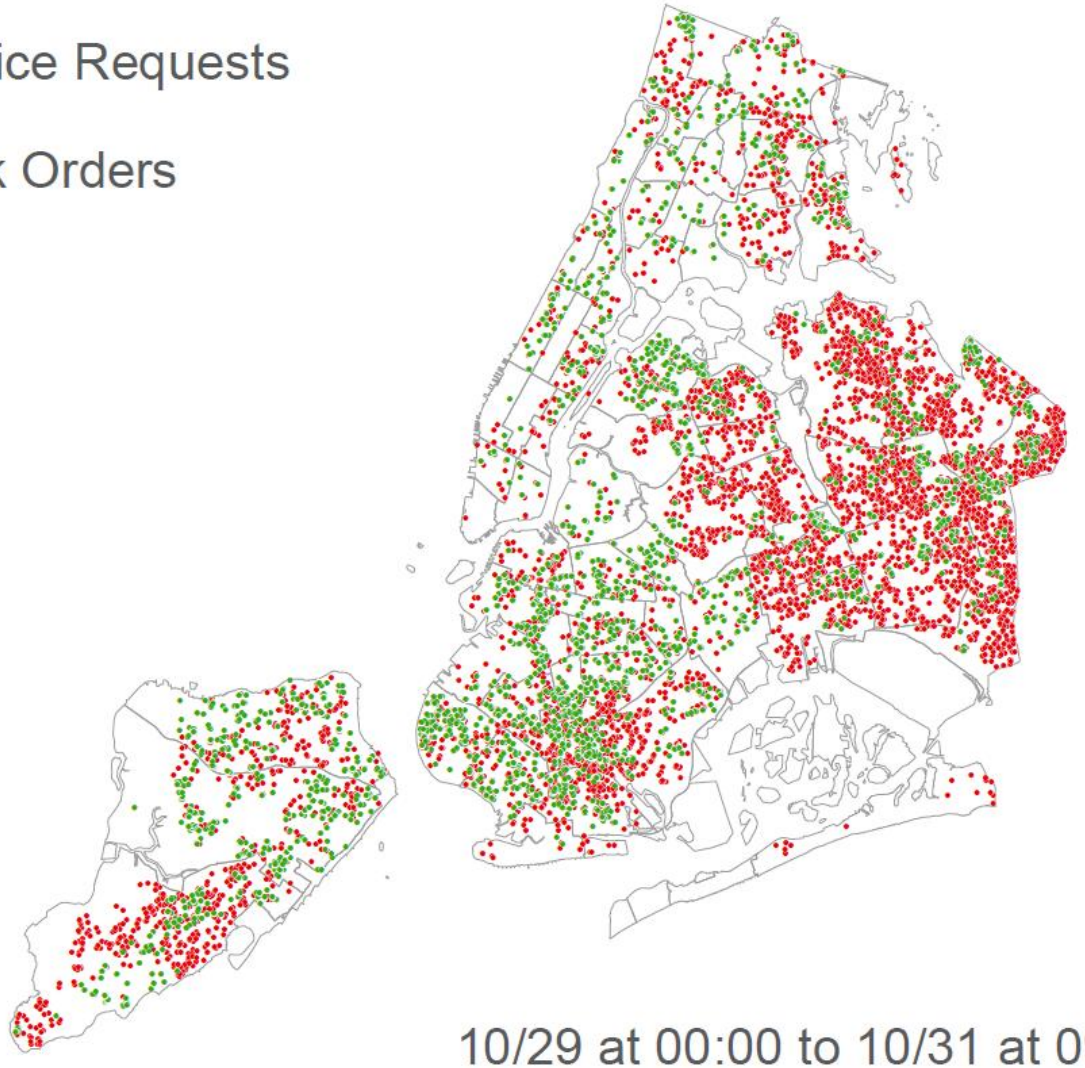
- Service Requests
- Work Orders



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

NYC Parks

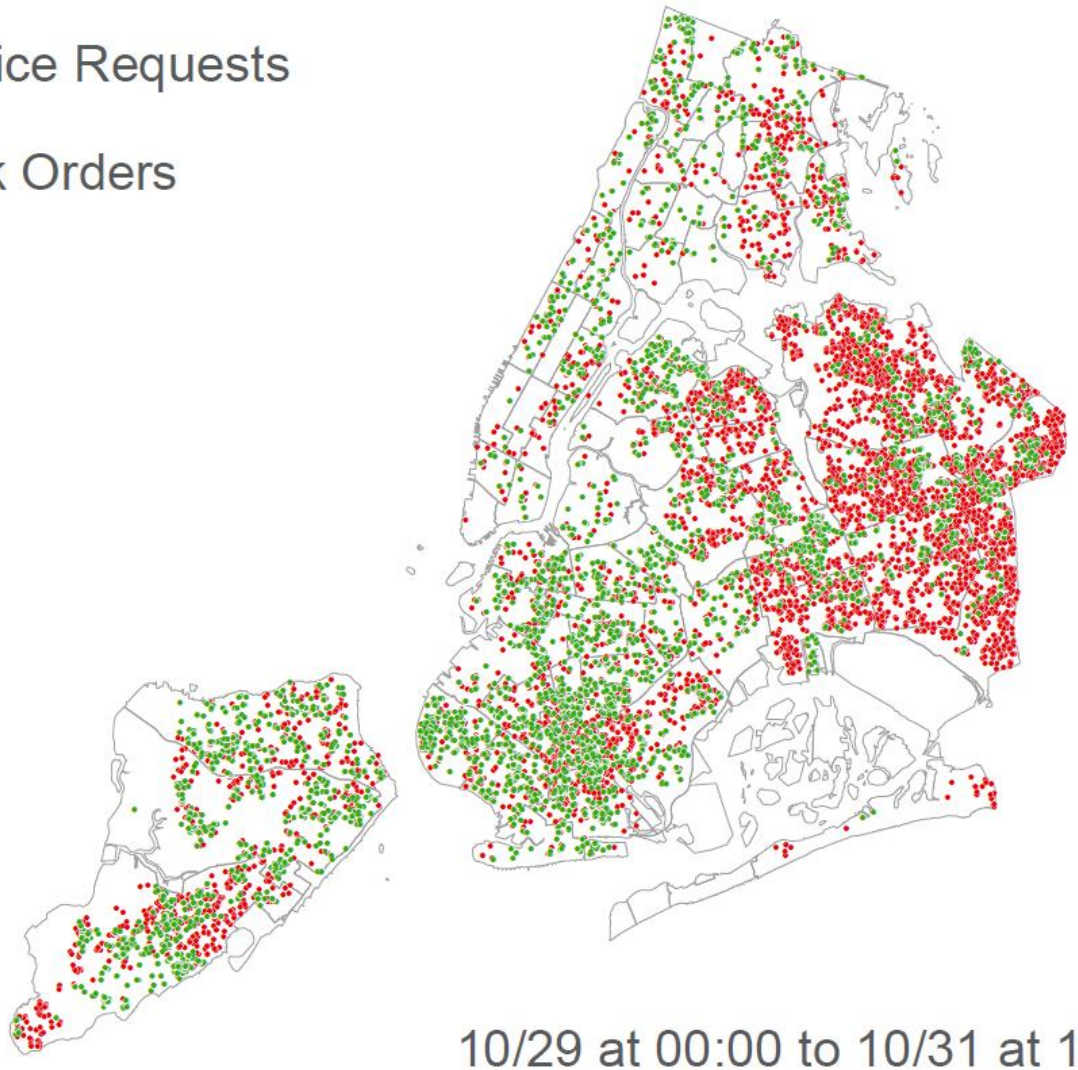
- Service Requests
- Work Orders



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

NYC Parks

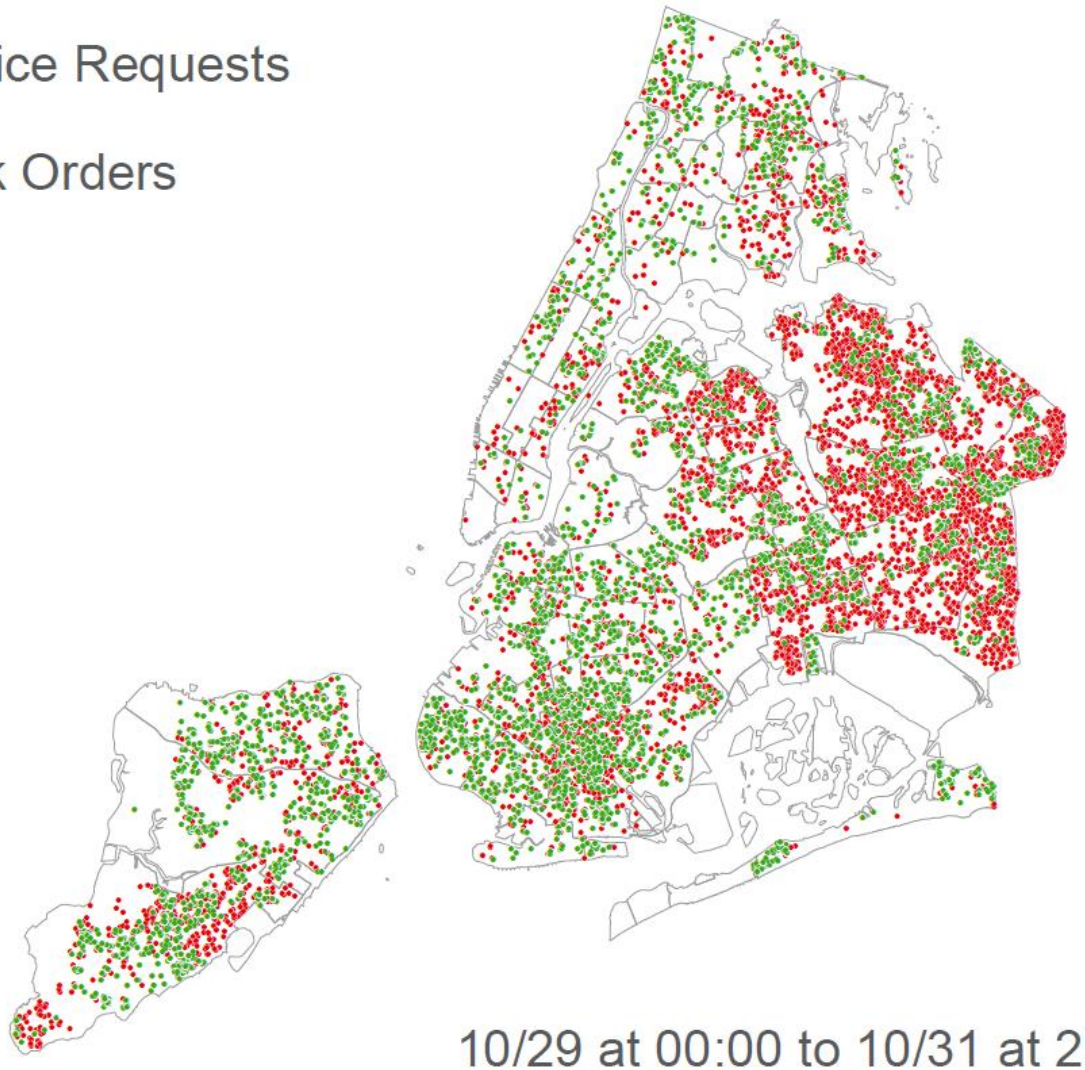
- Service Requests
- Work Orders



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

NYC Parks

- Service Requests
- Work Orders



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NYC Parks

- Service Requests
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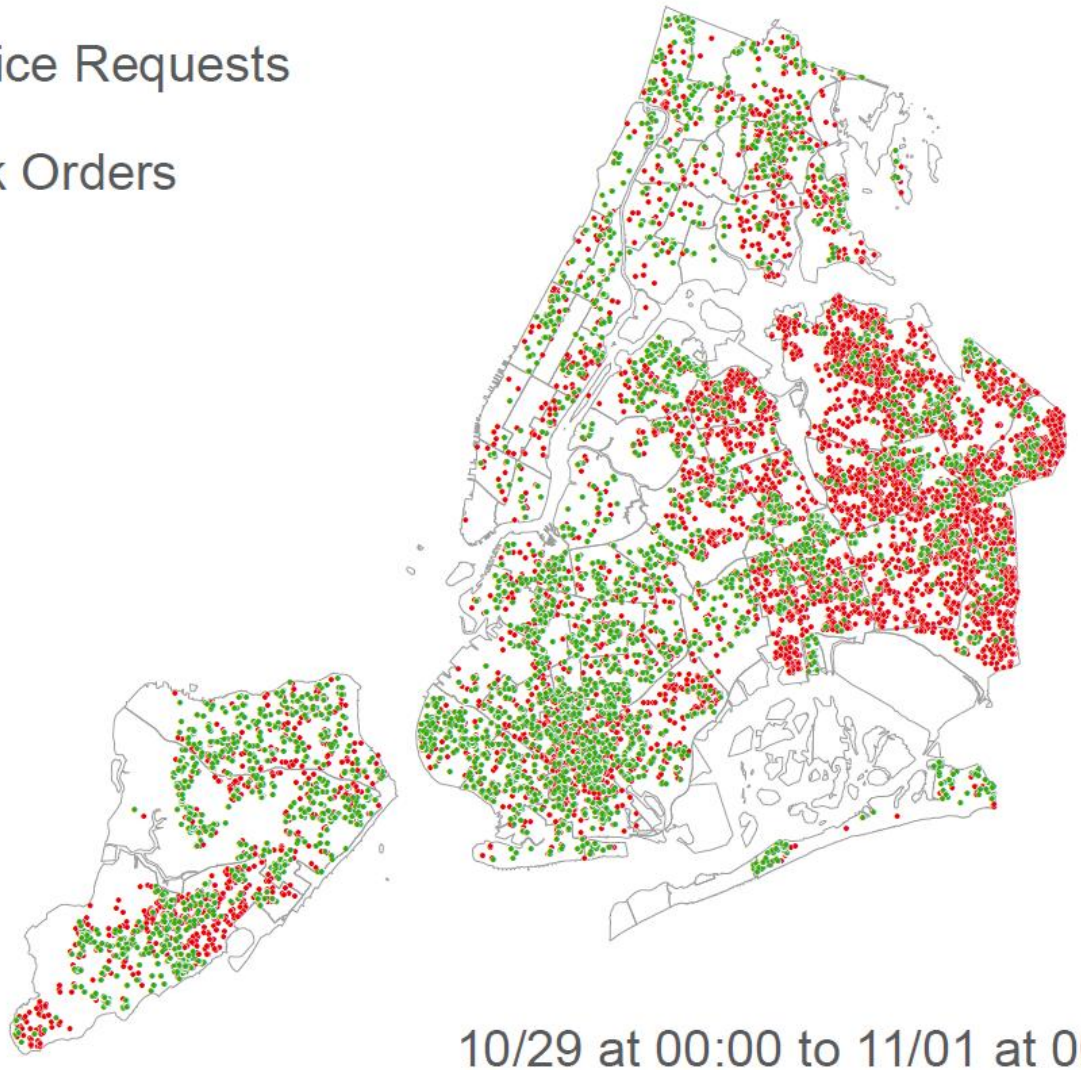


10/29 at 00:00 to 11/01 at 00:00

NYC Parks

Greening it Forward

NYC Parks

Resiliency and Recovery: Maximize Benefits of Trees – Minimize Maintenance Expense & Failure Risk

1. PlaNYC
2. Urban Forest Planning
3. Urban Forest Management
4. Green Infrastructure

NYC Parks

PlaNYC

PlaNYC – Mayor Bloomberg's comprehensive sustainability plan for NYC.

3 components that drive our programs:

- Plant 220,000 street trees
- Plant 500,000 reforestation trees
- Install 800 Greenstreets

NYC Parks

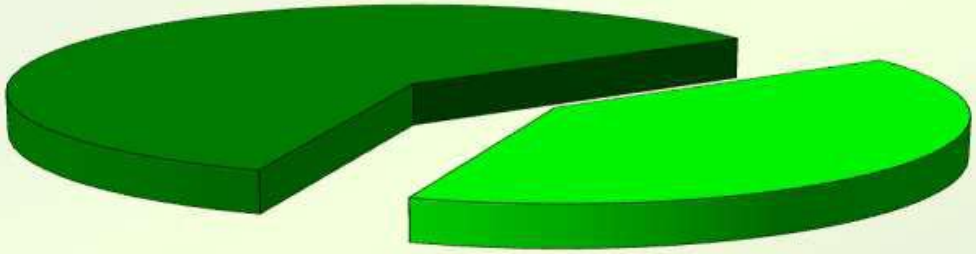
MillionTreesNYC

Mission: Plant and care for one million new trees across the City's five boroughs by 2017.

Launched in 2007, a public-private initiative with NYC Parks & New York Restoration Project.

Getting to One Million Trees
Tree Planting

700,000 Trees (70%)
NYC Parks (street trees, greenstreets, park reforestation, and new zoning)



300,000 Trees (30%)
Other public and private lands

NYC Parks

We've reached 0 7 5 7 3 8 6 trees and counting!

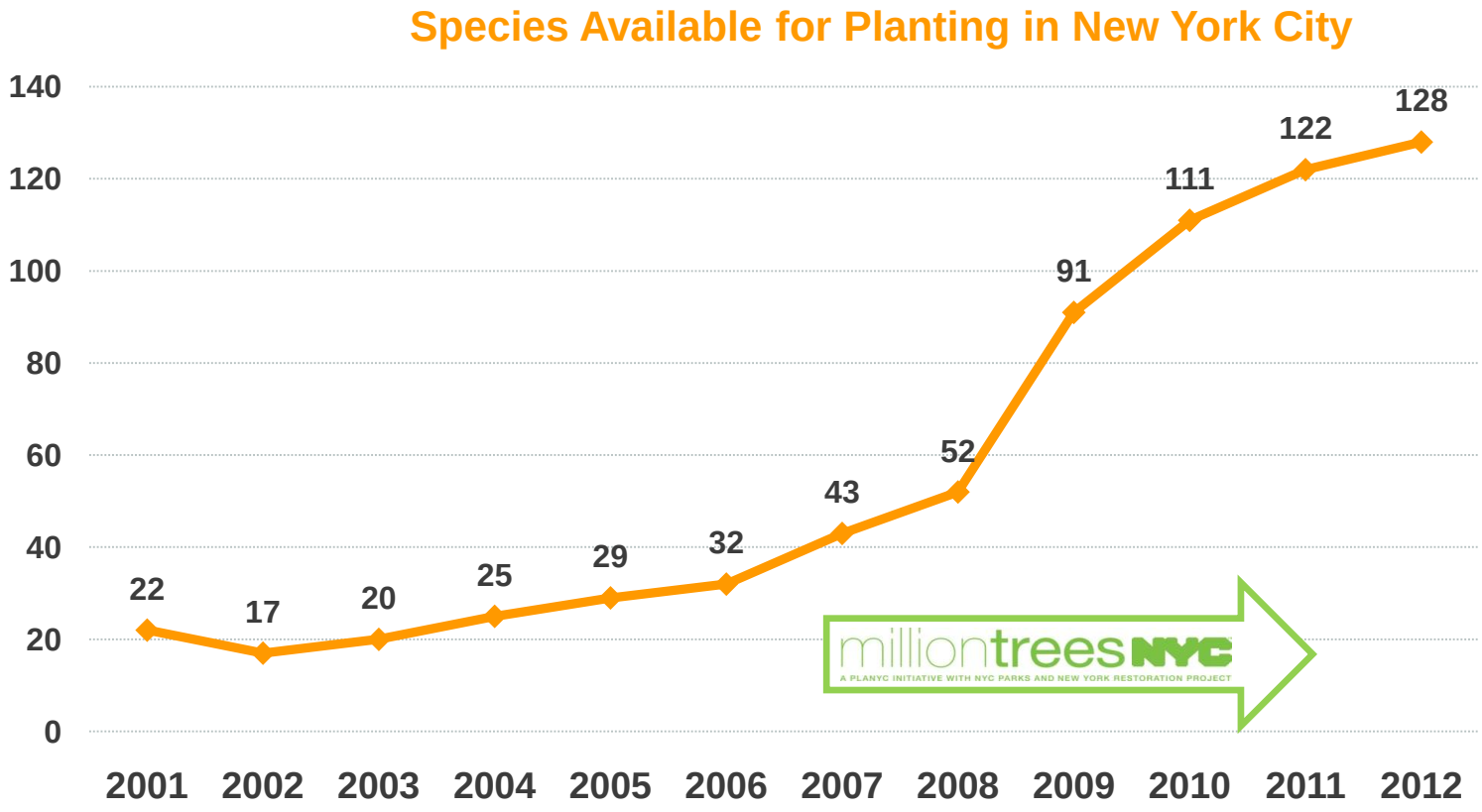
Urban Forest Planning

- Tree procurement and species diversity – the next generation

- Tree planting strategies – a fighting chance

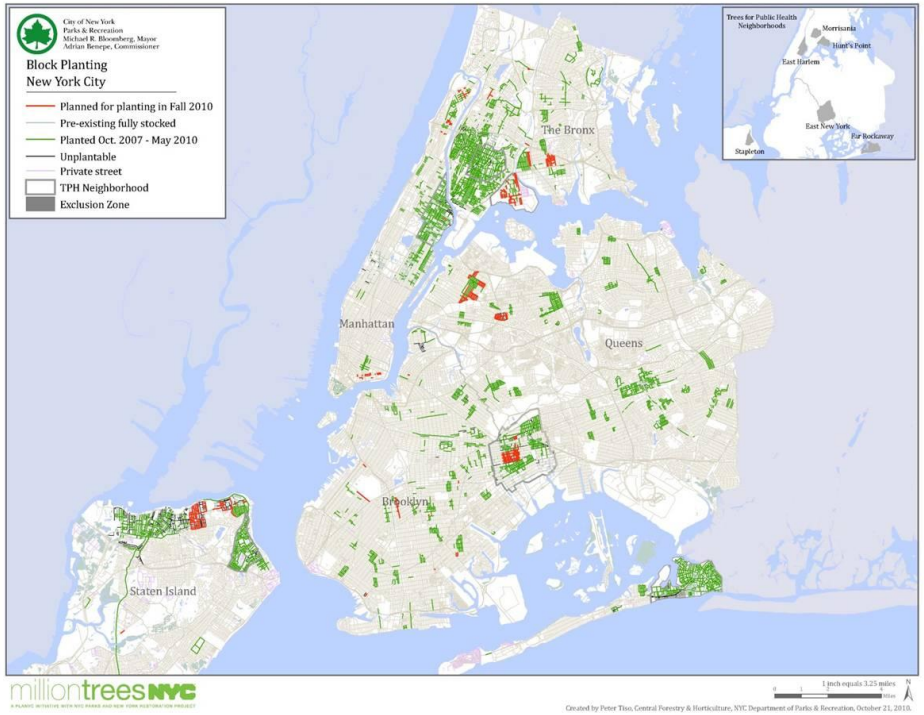
NYC Parks

Urban Forest Planning



NYC Parks

Strategic Planting



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Block Planting Survey Prioritization

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 Management

Goal – reduce the likelihood of failure down the road.

- Young Street Tree Pruning
- Soil Remediation
- Stewardship

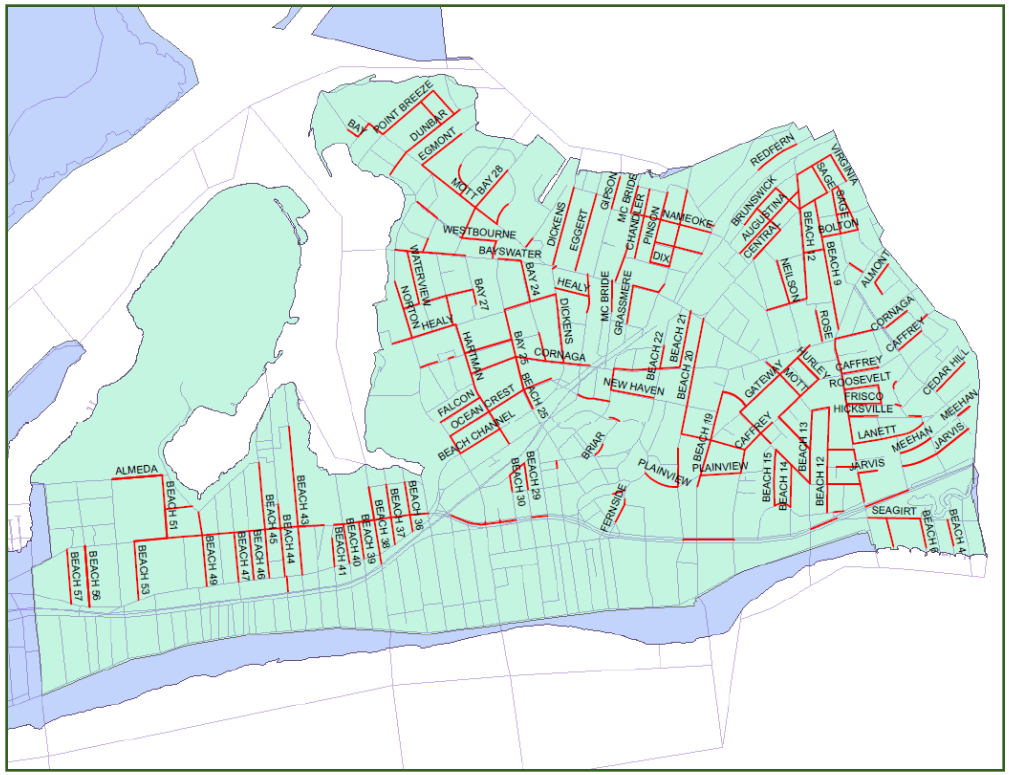
NYC Parks

Young Street Tree Pruning

- Focused on structural pruning of young street trees.
- Winter work for horticultural staff
- Volunteer opportunities through NYRP
- Pruned 9,361 trees so far

NYC Parks

Soil Remediation in the Inundated Zones



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Stewardship

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Green Infrastructure

Greenstreets – 2,536 sites citywide

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Francis Lewis Boulevard and 217th, Queens

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

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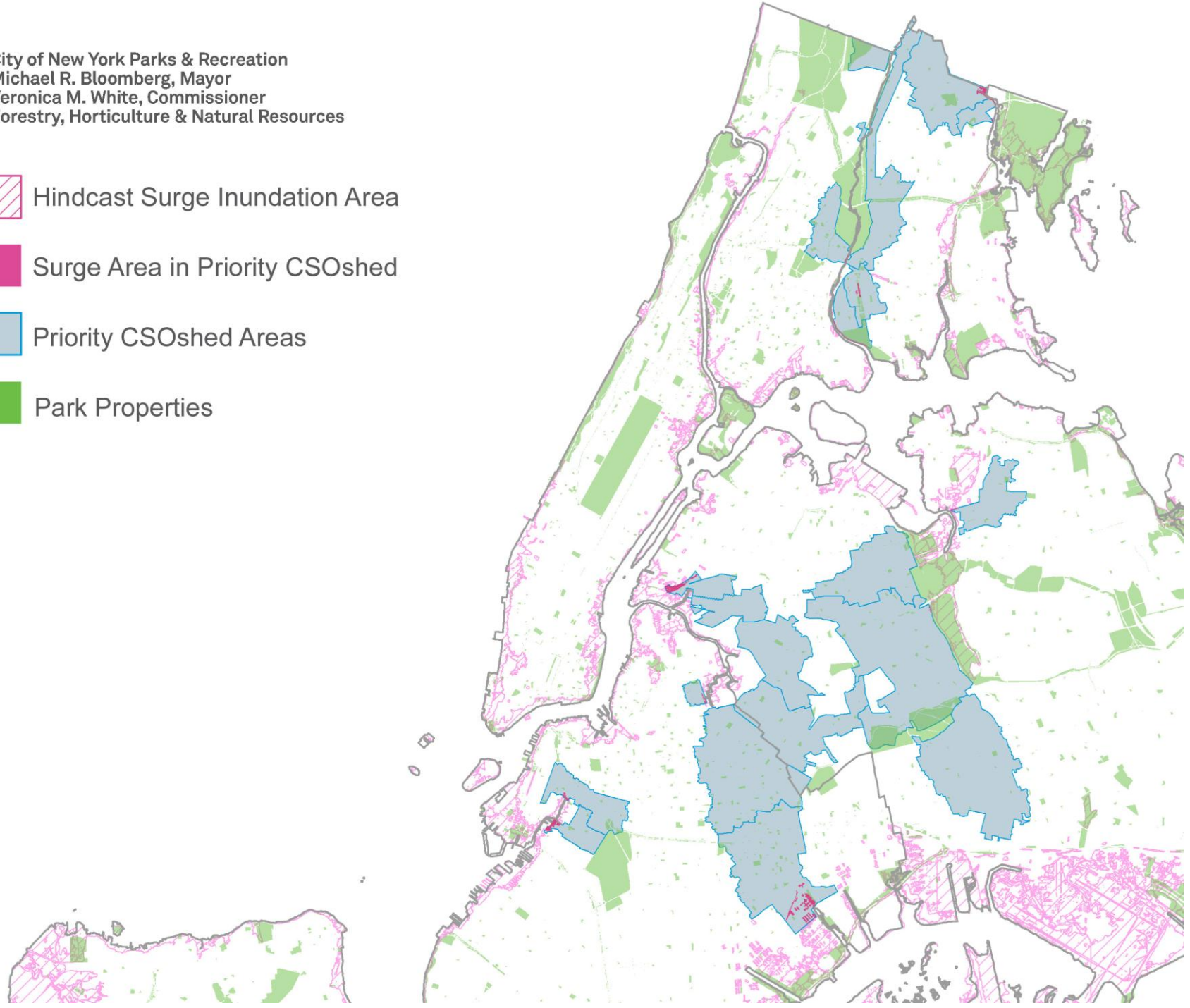
Hindcast Surge Inundation Area

Surge Area in Priority CSOshed

Priority CSOshed Areas

Park Properties



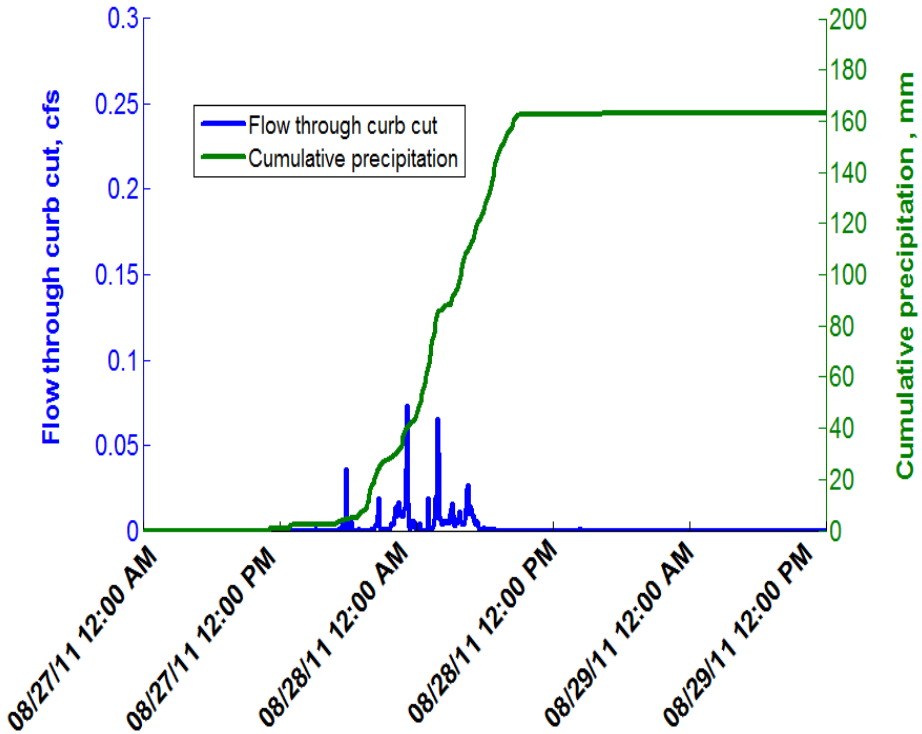
Tree Pits

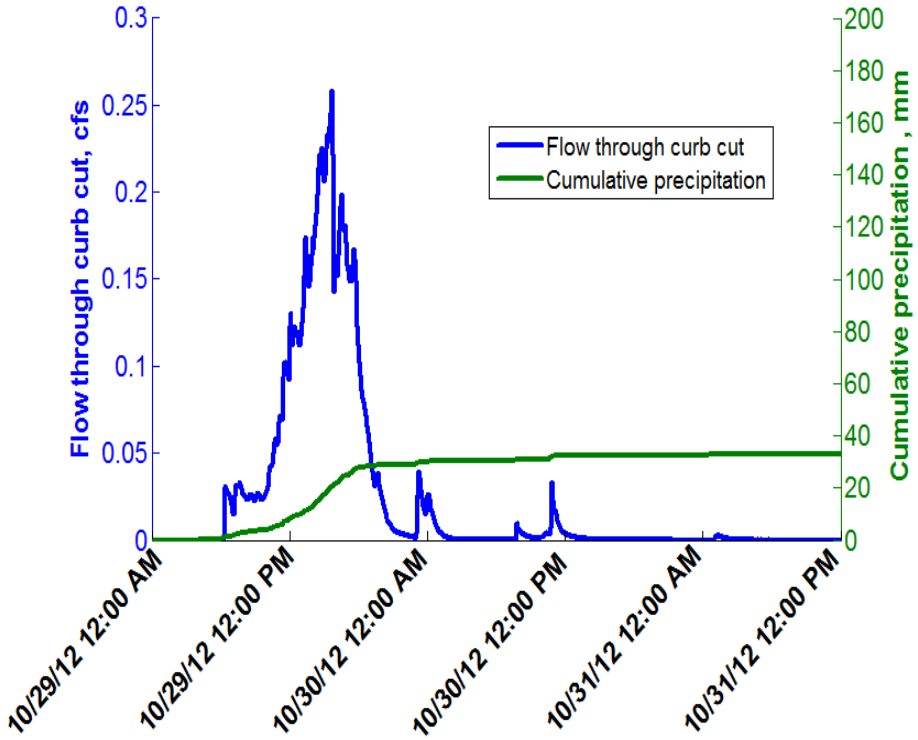
Bioswales

NYC Parks

Nashville and 116th St, Queens

Hurricane Irene & Superstorm Sandy





Irene:

The total volume of precipitation falling on Nashville was 6.4” of rain, totaling 5,382 gallons over an area of 1,560 square feet. A total of 2,166 gallons of water entered through the curb cut.

Sandy:

The total volume of precipitation falling on Nashville was 1.3” of rain, totaling 1,083 gallons over an area of 1,560 square feet. A total of 38,806 gallons of water entered through the curb cut. Inflow from the street was thus approximately 31 times as much as direct precipitation on the site.

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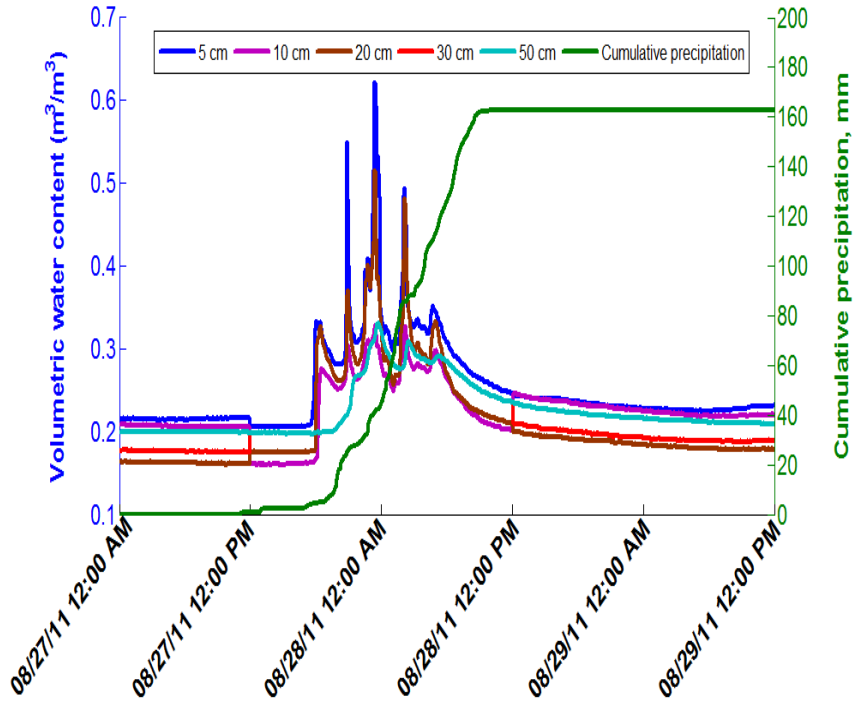
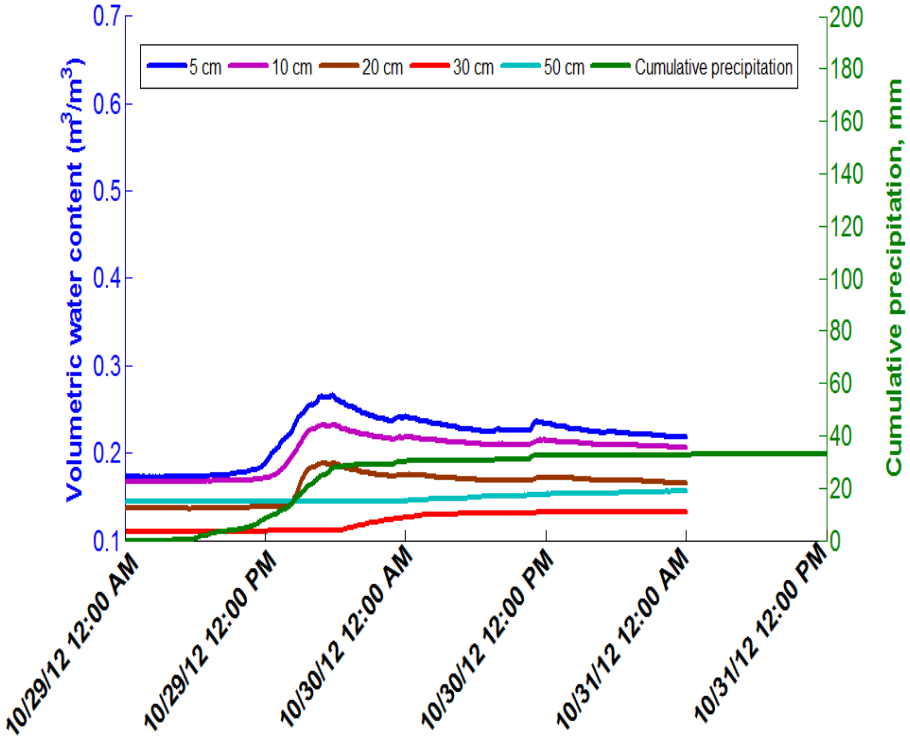
Hurricane Irene & Superstorm Sandy





Though large quantities of precipitation and runoff were infiltrated at Nashville, neither storm appears to have resulted in more than a 20 cm temporary increase in the water table elevation. The soils were wetter during Irene than during Sandy, but in both cases returned to near their pre-storm values within about 24 hours of the most intense precipitation

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Overall Performance

- Inflow from the street was approximately 31x direct precipitation on the site.
- Approximately 40,000 gallons of water deposited by Sandy either infiltrated or evaporated

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Conclusion and Acknowledgments

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NYC's Urban Forest – Fitting Together

- Roads
- Sidewalks
- Buildings
- Parkland
- River

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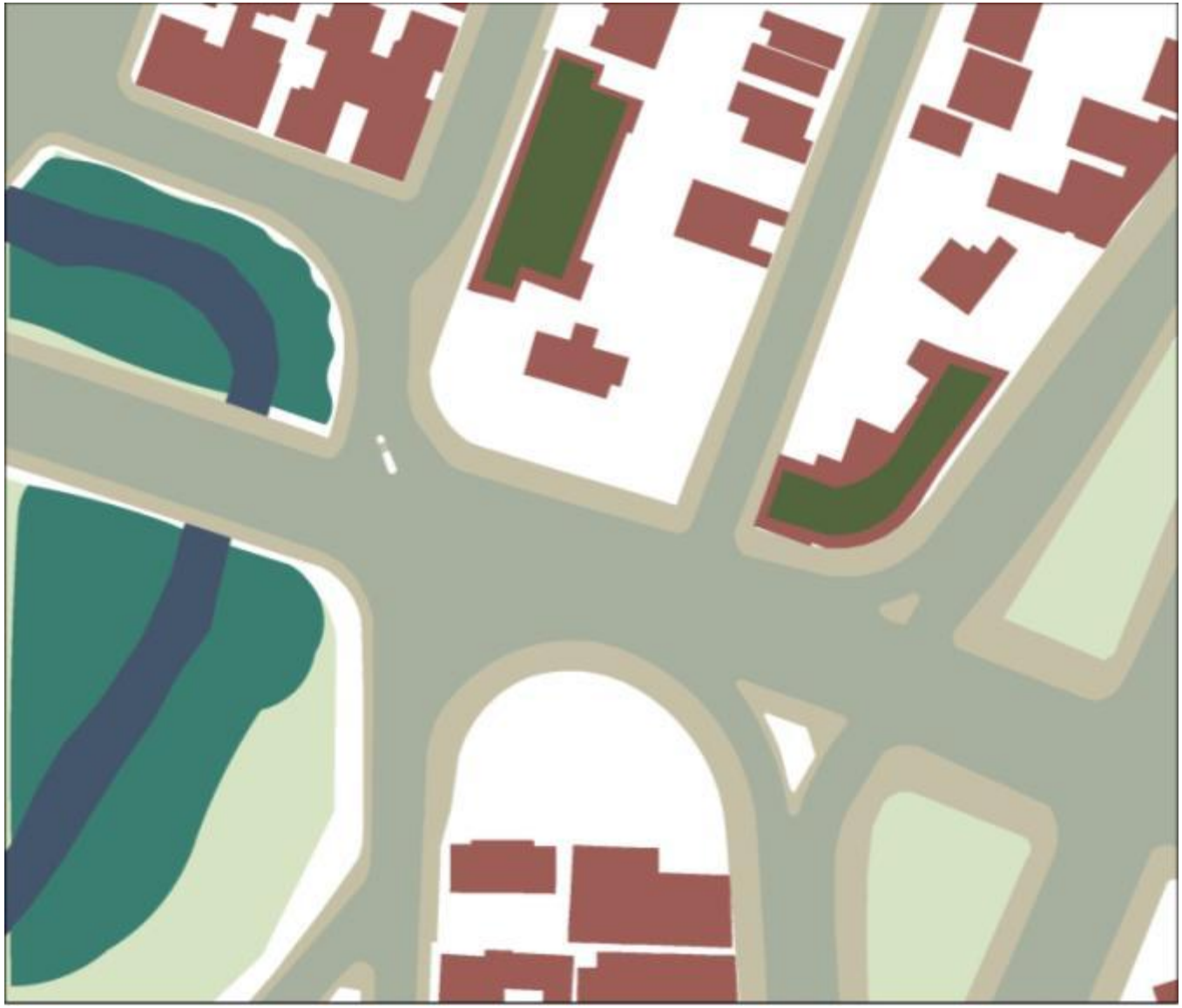
NYC's Urban Forest

- Roads
- Sidewalks
- Buildings
- Parkland
- River

- Green Roofs
- Wetlands / Park Bioretention



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NYC's Urban Forest

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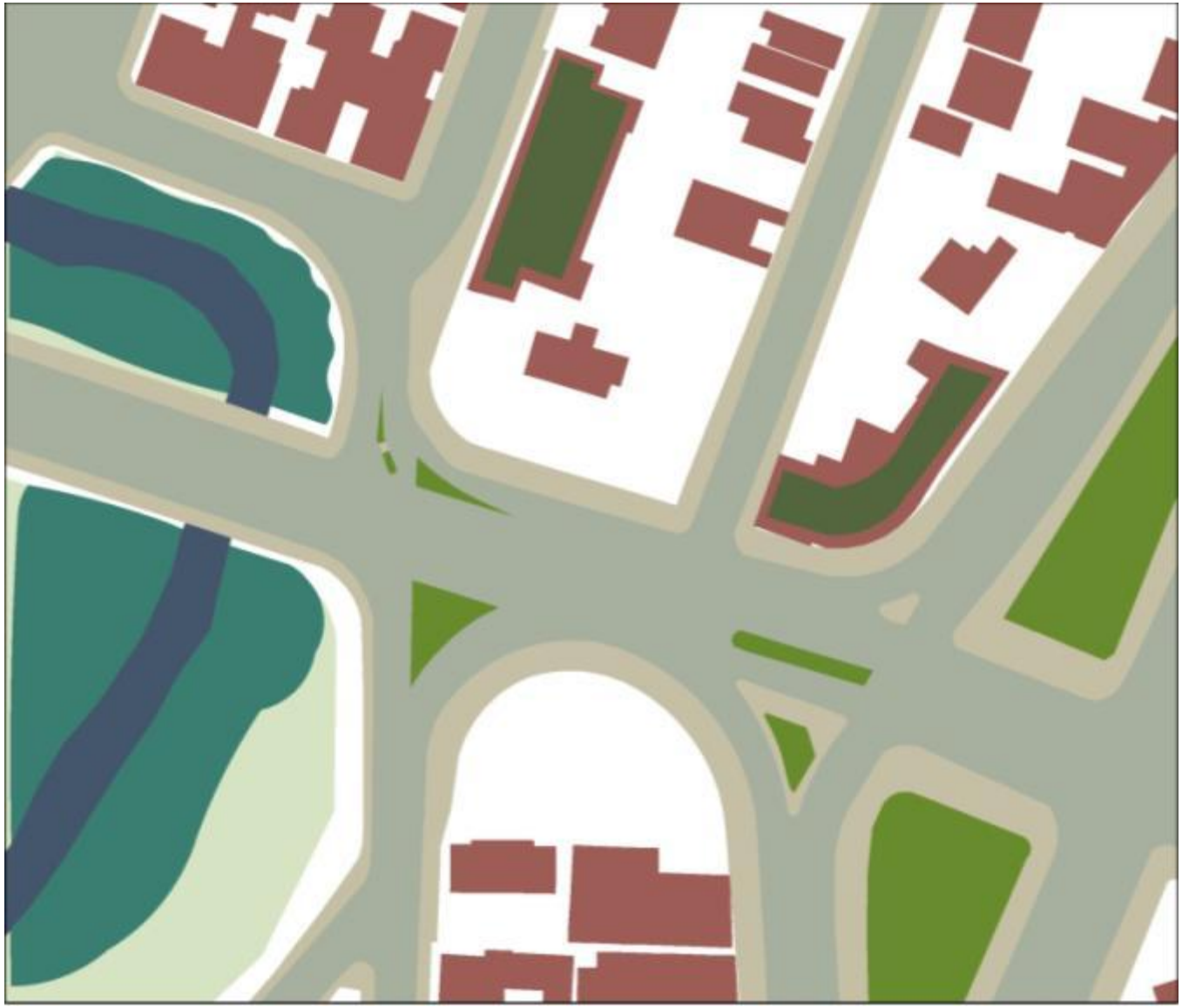

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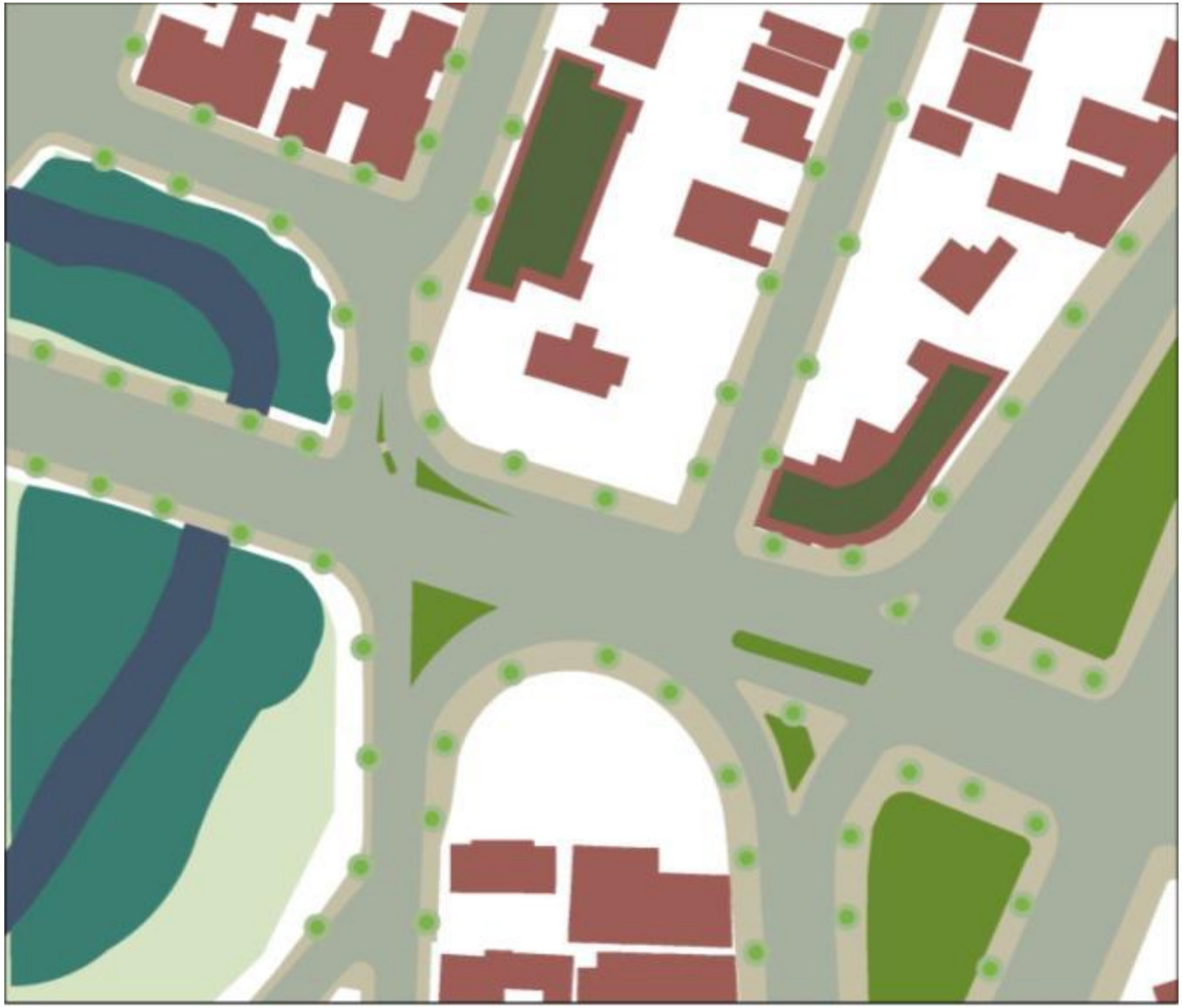

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Fall Planting Day 2013

Saturday October 19, 2013
Rockaway Community Park

NYC Parks

Fall Planting Day 2013

City of New York
Parks & Recreation
Natural Resources Group
Arsenal North, 1234 Fifth Avenue, New York, NY 10029
Michael R. Bloomberg, Mayor
Veronica M. White, Commissioner

MillionTreesNYC Reforestation Planting Site

Rockaway Community Park, Queens
Planting Sites for 2013 Fall

planYC

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Parks

Acknowledgements

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