

USDA Forest Service

# URBAN FOREST CONNECTIONS

*webinar series*

Second Wednesdays | 1:00 – 2:15 pm ET

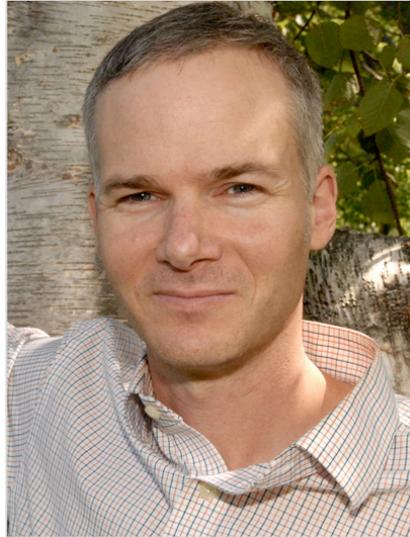
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# THE EFFECT OF URBAN TREE CANOPY ON MICROCLIMATE AND HEAT ISLANDS



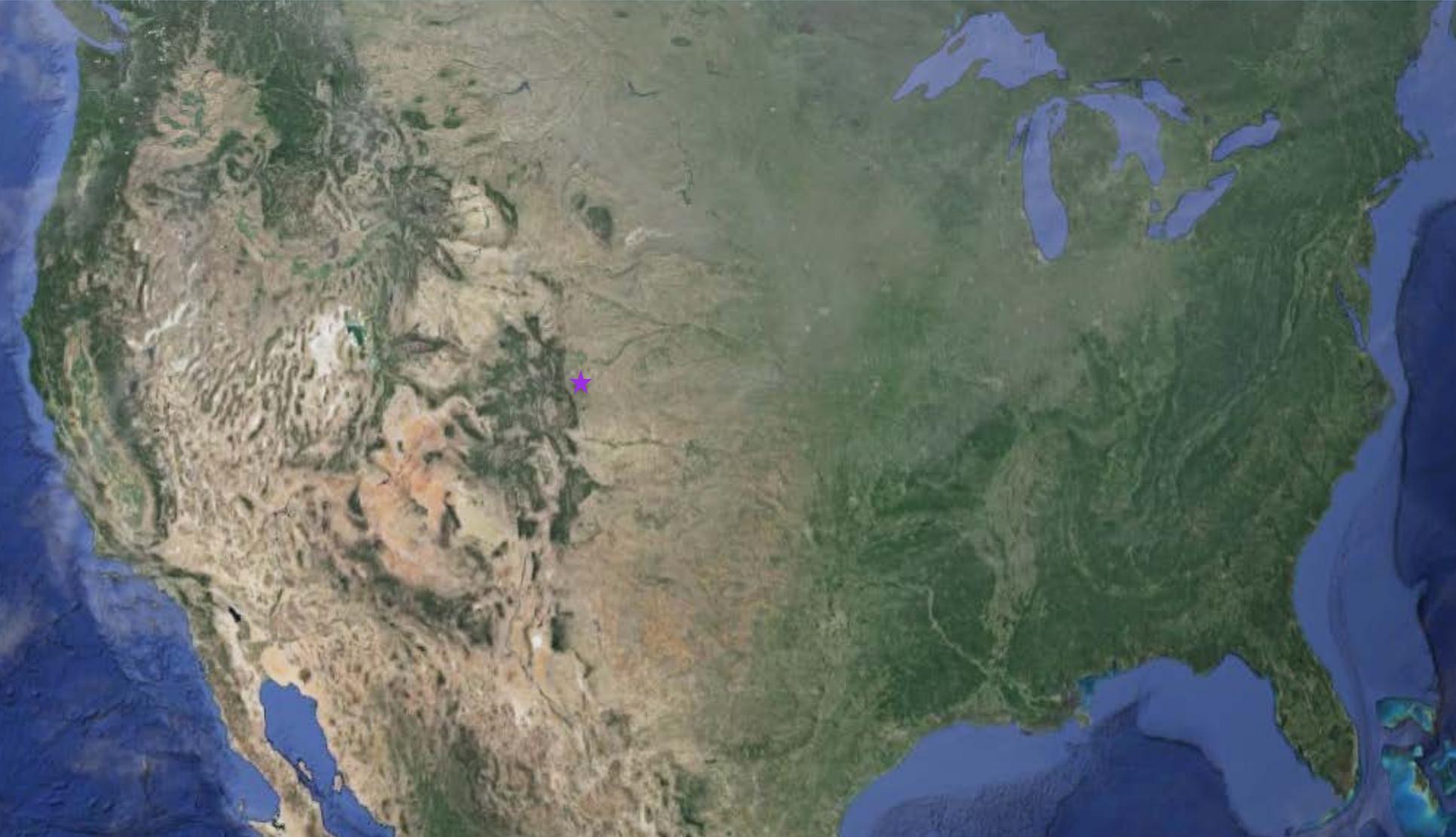
**Austin Troy**

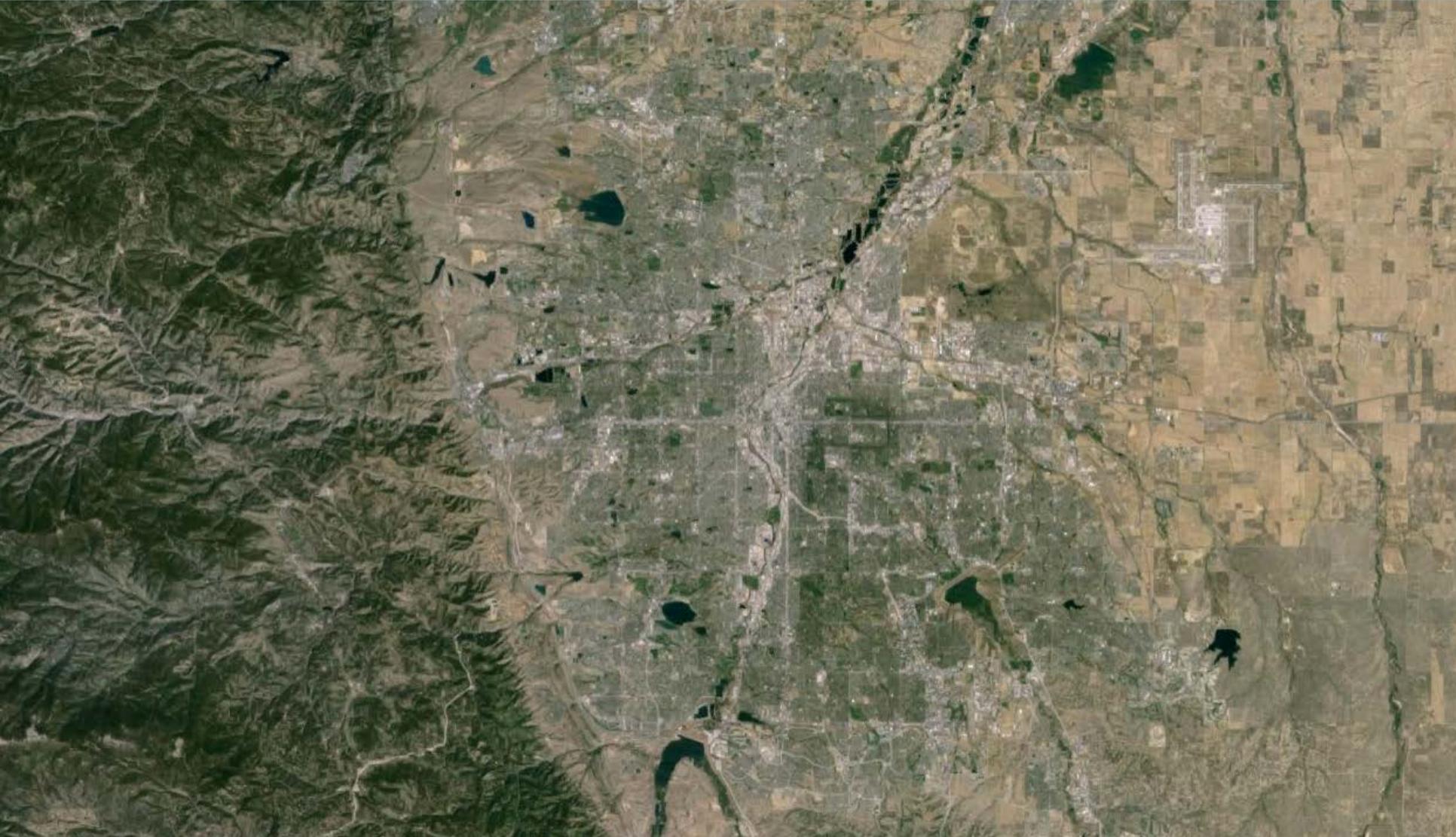
*Professor and Chair, Department of  
Planning and Design  
University of Colorado Denver*



**Sara Davis**

*Urban Forestry Program Manager  
City and County of Denver*





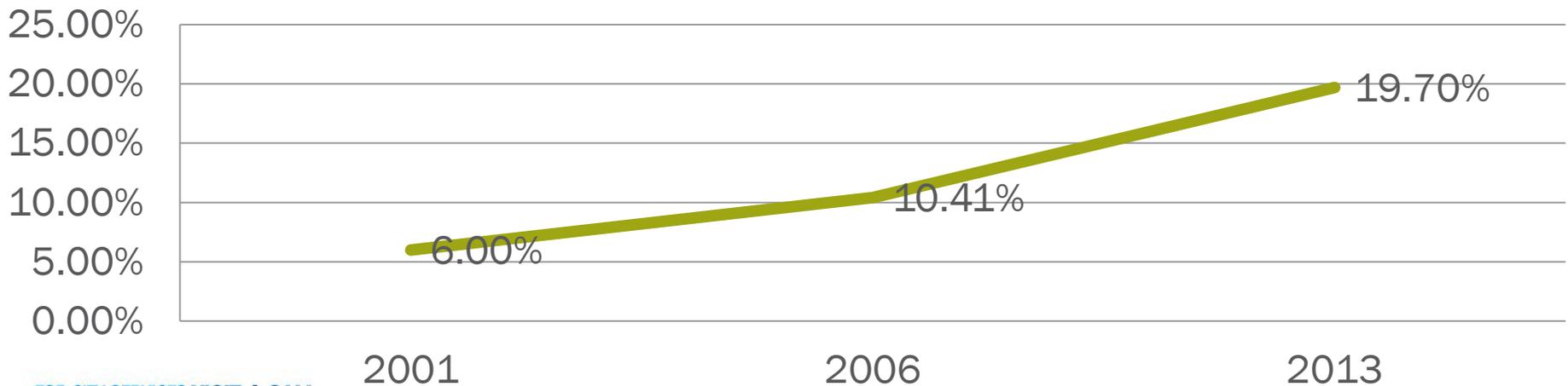


# Denver's Urban Tree Canopy

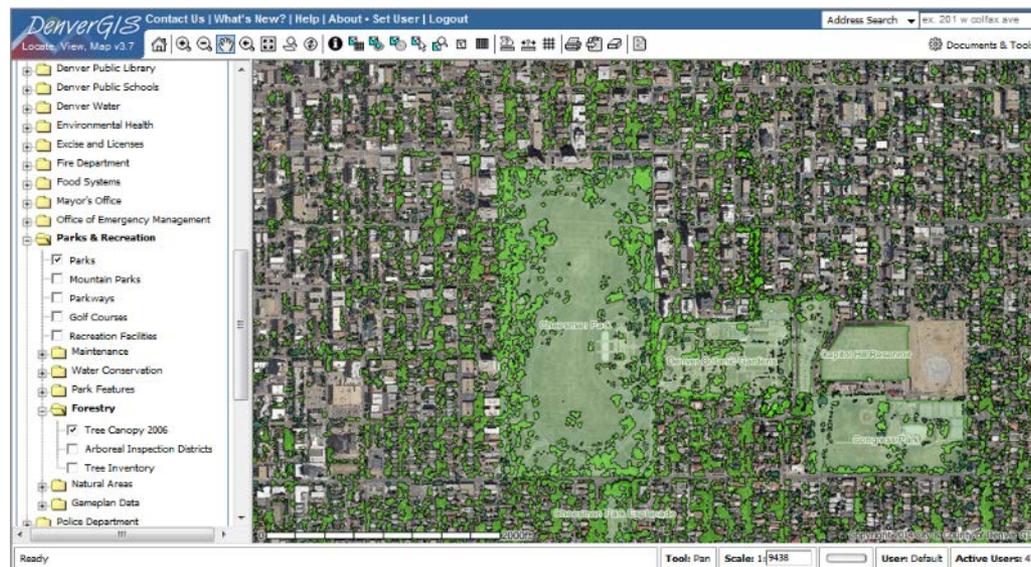


- 2001 – 6% canopy cover *American Forests*
- 2006 – 10.41% canopy cover *NCDC*
- 2013 – 19.7% *US Forest Service & UC, Davis*

### Denver's Canopy Cover Between 2001 and 2013



- 1993 Street tree inventory – Colorado State Forest Service
- 2001 Canopy assessment – American Forests
- 2006 Canopy assessment – NCDC
- 2008 STRATUM analysis – volunteers
- 2013 Canopy assessment – USFS & UC, Davis



## Metro Denver Urban Forest Assessment

Final report, March 28, 2013

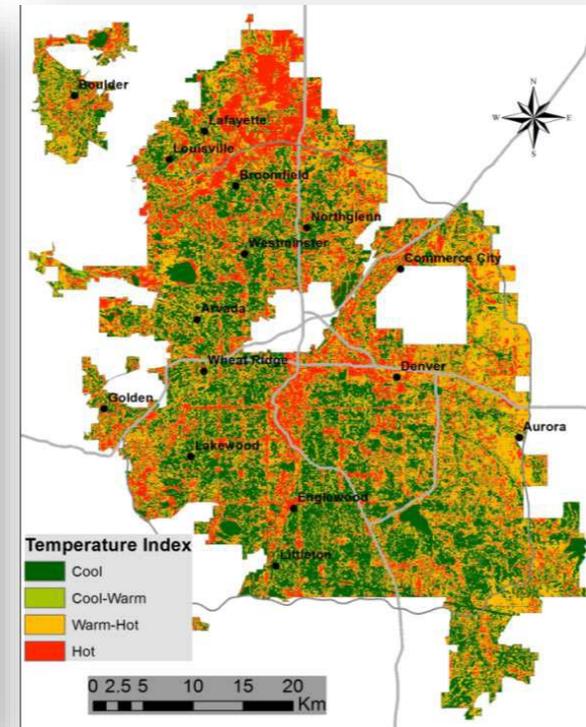
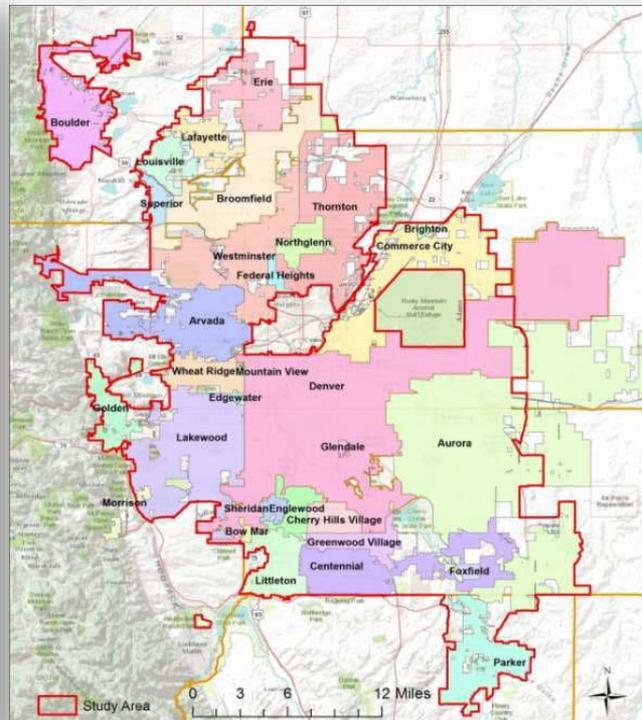
Submitted to: Sara Davis, Program Manager, Parks and Recreation Department, City and County of Denver, Colorado

Submitted by: Dr. E. Gregory McPherson, USDA Forest Service, Pacific Southwest Research Station, Urban Ecosystems and Social Dynamics

Dr. Qingfu Xiao, Chelsea Wu, and Julia Bartens, Department of Land, Air, and Water Resources, University of California Davis



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- 2.2 million trees
  - 3.7 trees per capita
- Asset value of \$2.9B
- \$122 million in annual benefit from property value and ecosystem services
  - \$95M property value
  - \$18M storm water
  - \$6M summer cooling
  - \$530K CO<sub>2</sub> storage

## Metro Denver Urban Forest Assessment

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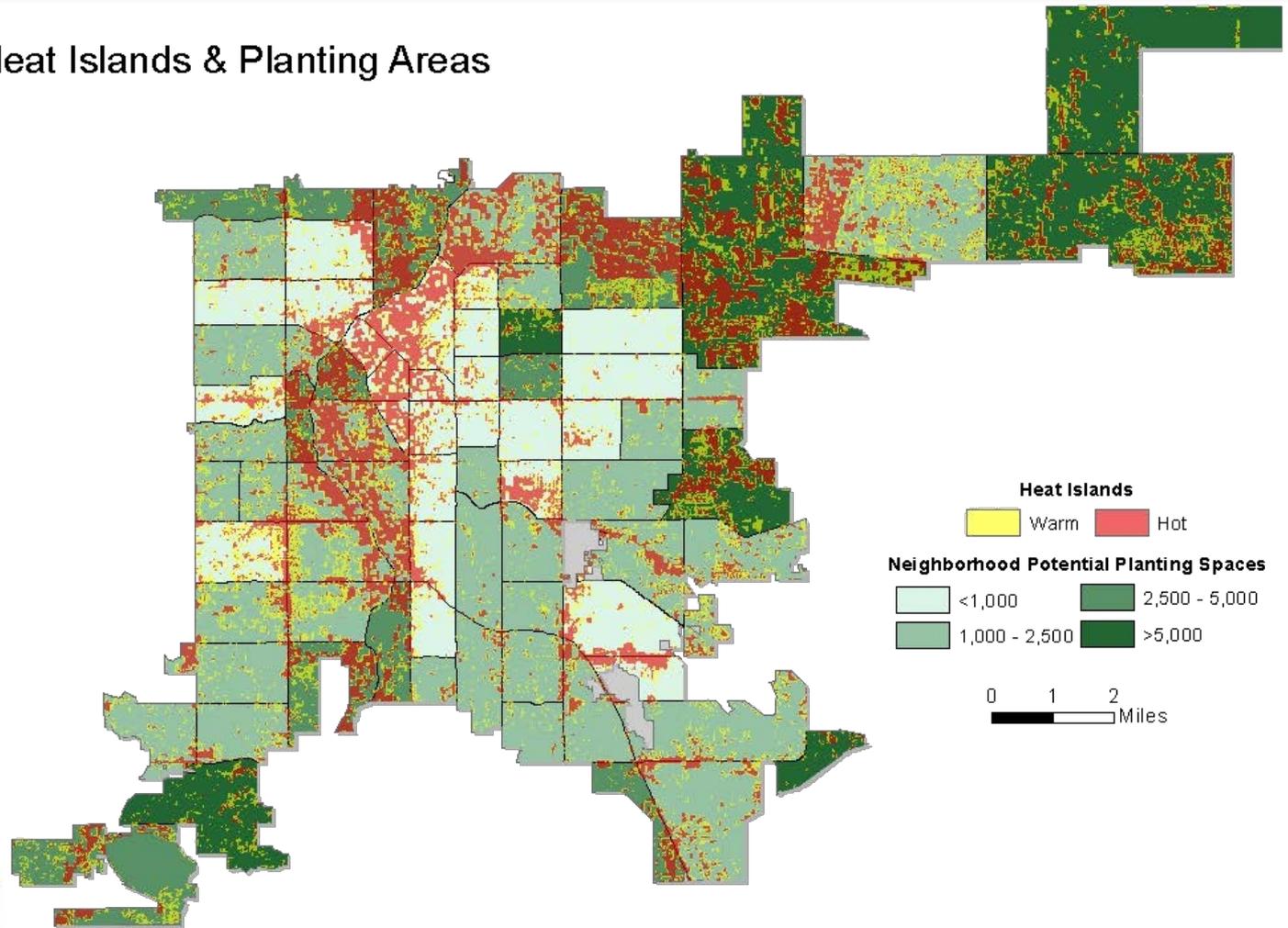
Submitted to: Sara Davis, Program Manager, Parks and Recreation Department, City and County of Denver, Colorado

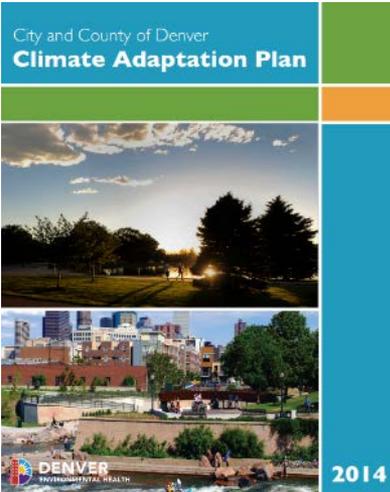
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## Heat Islands & Planting Areas





## 4.1.4 Urban Natural Resources Sector

Table 4.4 identifies short-term adaptation activities associated with Urban Natural Resources Sector; the principal agencies are DPR and DPW.

**Table 4.4:** Summary of Short-Term Adaptation Activities for Urban Natural Resources

Climate Impact	Vulnerability	EMS Activities	Responsible Agency	Agency Plan
Increase in temperature and urban heat island effect	Stress on trees and urban landscaping	1) Publish and begin the outreach of the Metro Denver Urban Forest Assessment 2) Initiate a contract to inventory existing trees within the City in preparation for a Tree and Shade Master Plan 3) Update the right-of-way tree list that focuses on trees that can thrive in future climates	Department of Parks and Recreation	Metro Denver Urban Forest Assessment  Tree and Shade Master Plan  Right-of-Way Tree List Storm
	Stormwater management and flood control	Include a discussion section on climate adaptation and mitigation in the Storm Drainage Master Plan documentation update currently underway by DPW planning staff		Department of Public Works
Higher frequency of extreme weather events	Contaminant loading from increased flooding and heavy rain spells	Include climate adaptation and mitigation in discussion and documentation related to 6 year Water Quality Strategic Implementation Plan currently underway by DPW planning staff		

# Attack of the Green Reaper



No EAB Were Harmed During Filming (photo by Russell Carr)

# Canopy Services and Potential Losses

	Annual Benefit	15% reduction	Service Loss
Air Quality	\$1,554	\$1,321	\$233
CO2 Storage and avoidance	\$535,772	\$455,406	\$80,366
Rain fall interception	\$18,935,911	\$16,095,524	\$2,840,387
<b>Property value</b>	\$95,731,364	\$81,371,659	<b>\$14,359,705</b>
Energy saved	\$6,776,570	\$5,760,085	\$1,016,486
Totals	\$121,981,171	\$103,683,995	\$18,297,176



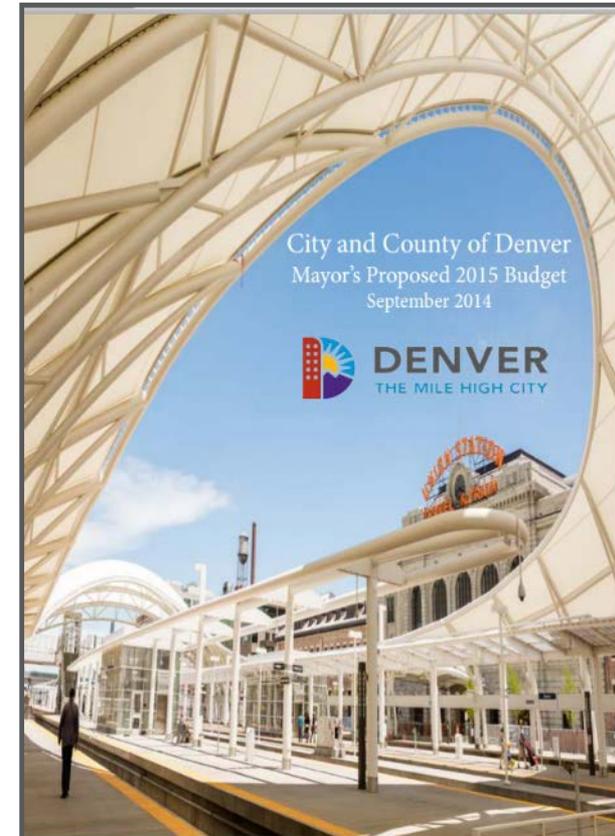
# How much is all this going to cost?



## Results

- 2014 Park tree inventory
- 2015 Forestry crew for street tree inventory
- 2015 Public awareness (5 years of funding)
- 2015 Debris reduction
- 2015 Park tree planting

**\$2.24 MILLION**



# How much is all this going to cost?

Full park system inventory - 76K trees

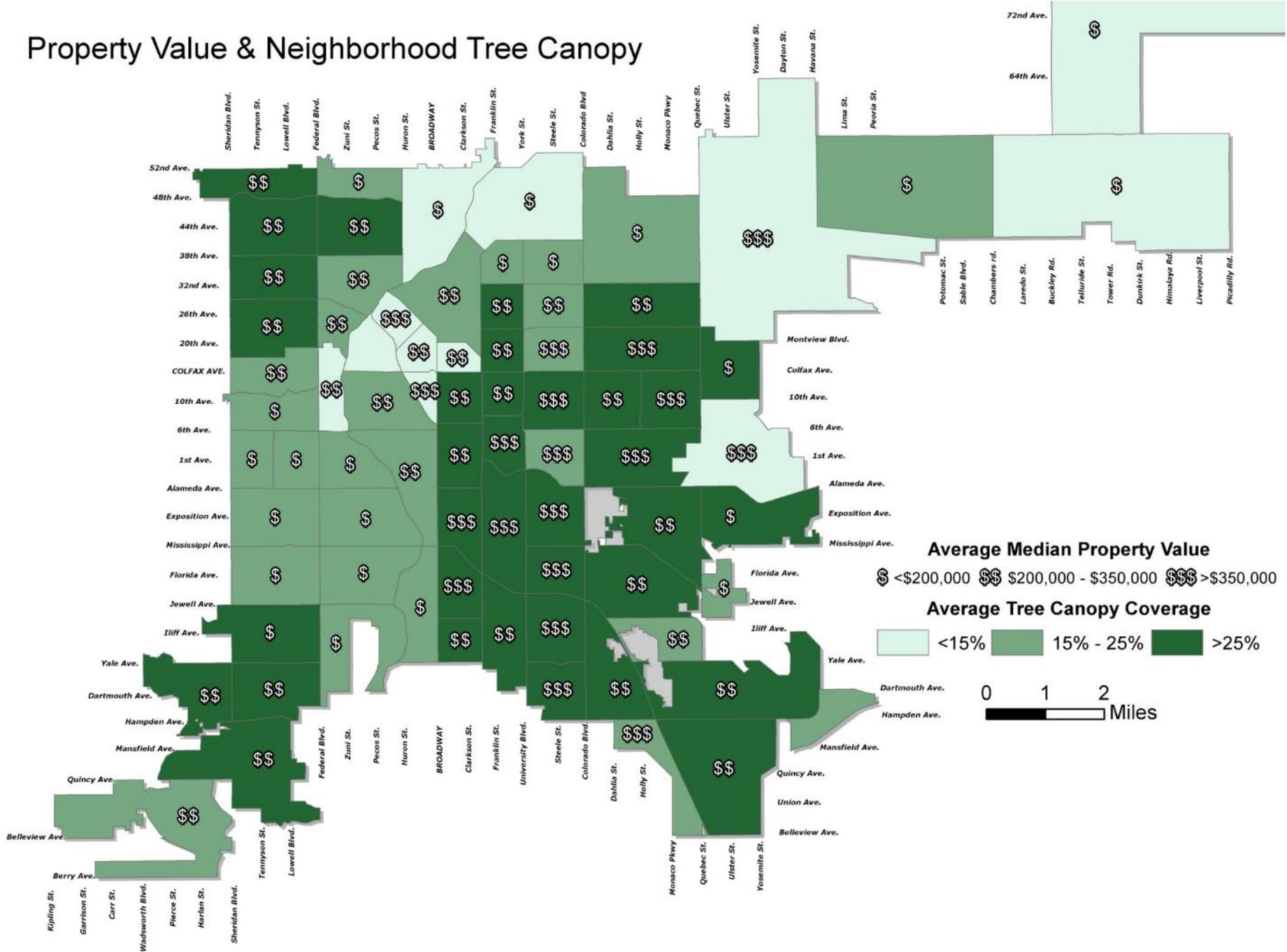
Street trees in inventory - ~218K trees

2016 Budget expansion

- 10 new forestry staff members in 2 years
- Aggressive and proactive EAB program
  - \$1M for treatments annually
  - \$765k for proactive planting annually
  - \$250K for outreach and education annually

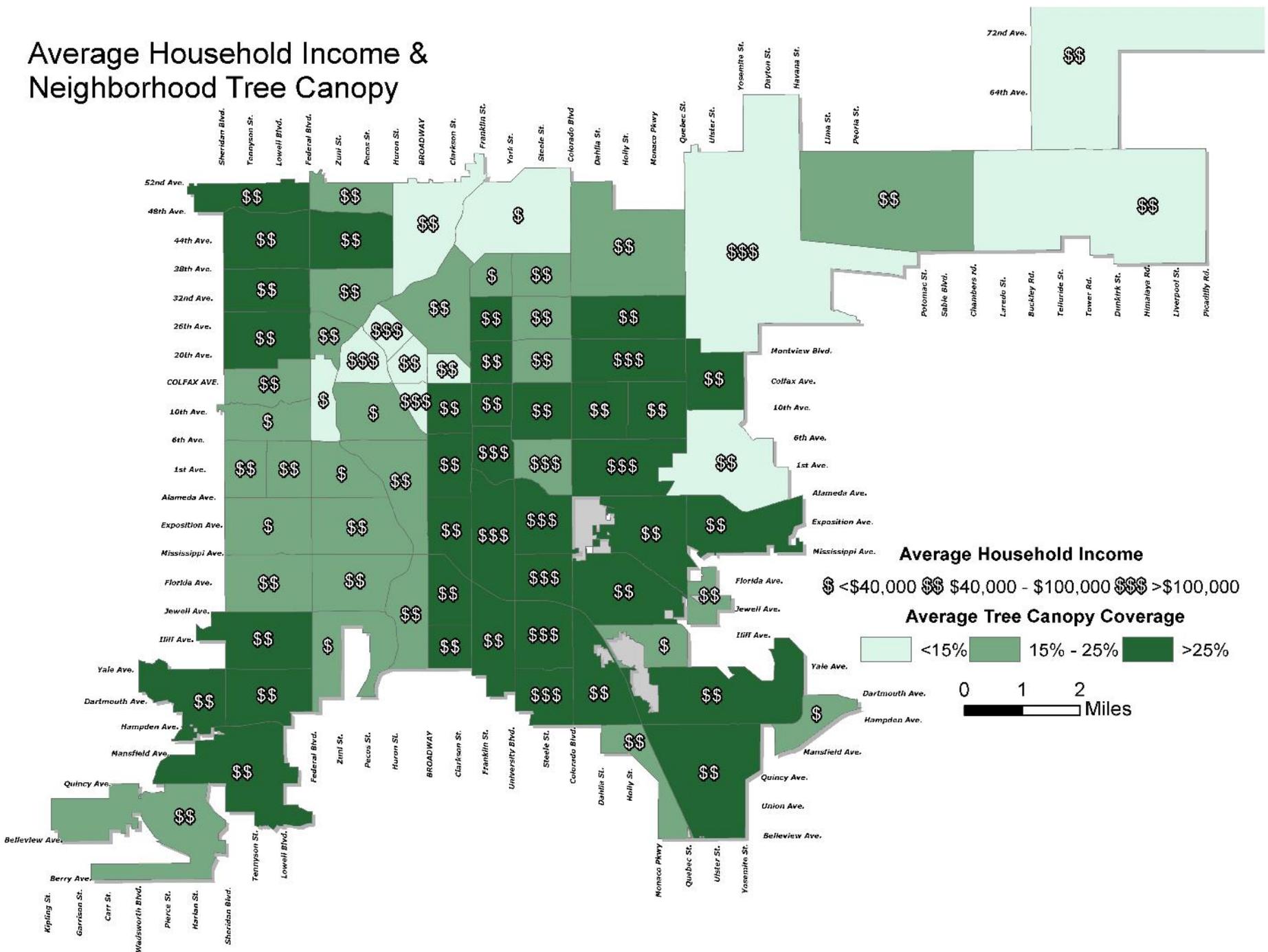
# \$2.97 MILLION

# Property Value & Neighborhood Tree Canopy



Sheridan Blvd., Tennyson St., Lowell Blvd., Federal Blvd., Zuni St., Pecos St., Huron St., BROADWAY, Clarkson St., Franklin St., York St., Steele St., Colorado Blvd., Dahlia St., Holly St., Monaco Pkwy, Quebec St., Ulster St., Yosemite St., Dayton St., Havana St., 52nd Ave., 48th Ave., 44th Ave., 38th Ave., 32nd Ave., 26th Ave., 20th Ave., COLFAX AVE., 10th Ave., 6th Ave., 1st Ave., Alameda Ave., Exposition Ave., Mississippi Ave., Florida Ave., Jewell Ave., Iliff Ave., Yale Ave., Dartmouth Ave., Hampden Ave., Mansfield Ave., Quincy Ave., Belleview Ave., Berry Ave., Kipling St., Garrison St., Carr St., Wadsworth Blvd., Pierce St., Harlan St., Sheridan Blvd., Tennyson St., Lowell Blvd., Federal Blvd., Zuni St., Pecos St., Huron St., BROADWAY, Clarkson St., Franklin St., University Blvd., Steele St., Colorado Blvd., Dahlia St., Holly St., Monaco Pkwy, Quebec St., Ulster St., Yosemite St., Montview Blvd., Colfax Ave., 10th Ave., 6th Ave., 1st Ave., Alameda Ave., Exposition Ave., Mississippi Ave., Florida Ave., Jewell Ave., Iliff Ave., Yale Ave., Dartmouth Ave., Hampden Ave., Mansfield Ave., Quincy Ave., Union Ave., Belleview Ave., Potomac St., Sable Blvd., Chambers rd., Larado St., Buckley Rd., Telluride St., Tower Rd., Dunkirk St., Himalaya Rd., Liverpool St., Picadilly Rd., 72nd Ave., 64th Ave.

# Average Household Income & Neighborhood Tree Canopy



- Water research
- Trust for Public Land Climate Smart Cities
- Streetscape design
- Updating the Game Plan