Virginia's Street Trees: Findings from a 4-year i-Tree Study

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A partnership of Virginia Tech and Virginia State University www.ext.vt.edu

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TREES VIRGINIA
Virginia Urban Forest Council

August 15th 2012

Street Trees in Virginia ~ What We Have, What We Want, & How We Get There

Presentation Overview

- Project background
- Project methods
- Summary of findings
- Take-home messages

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Project Background

- Emerald ash borer (EAB) rediscovered in VA in 2008

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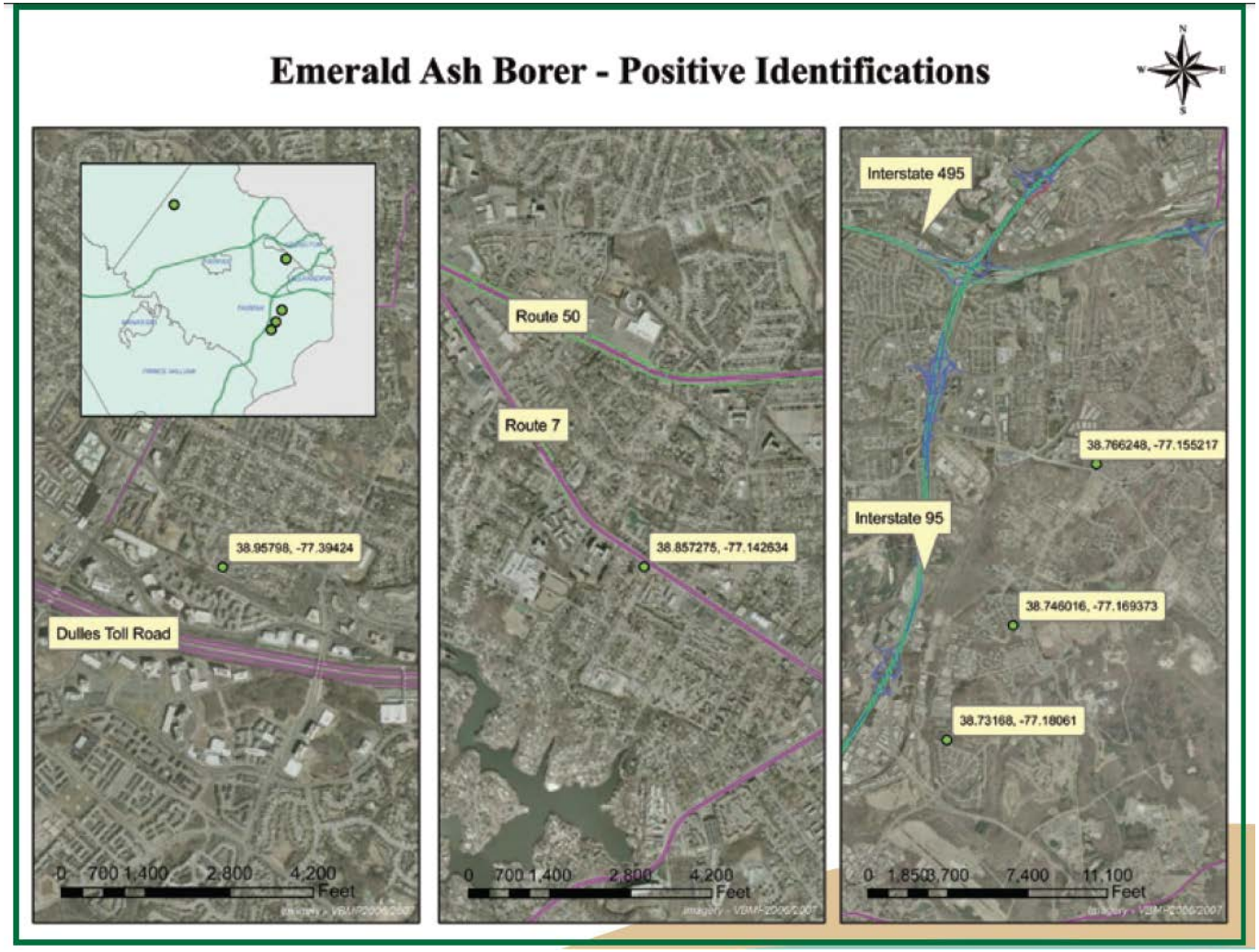
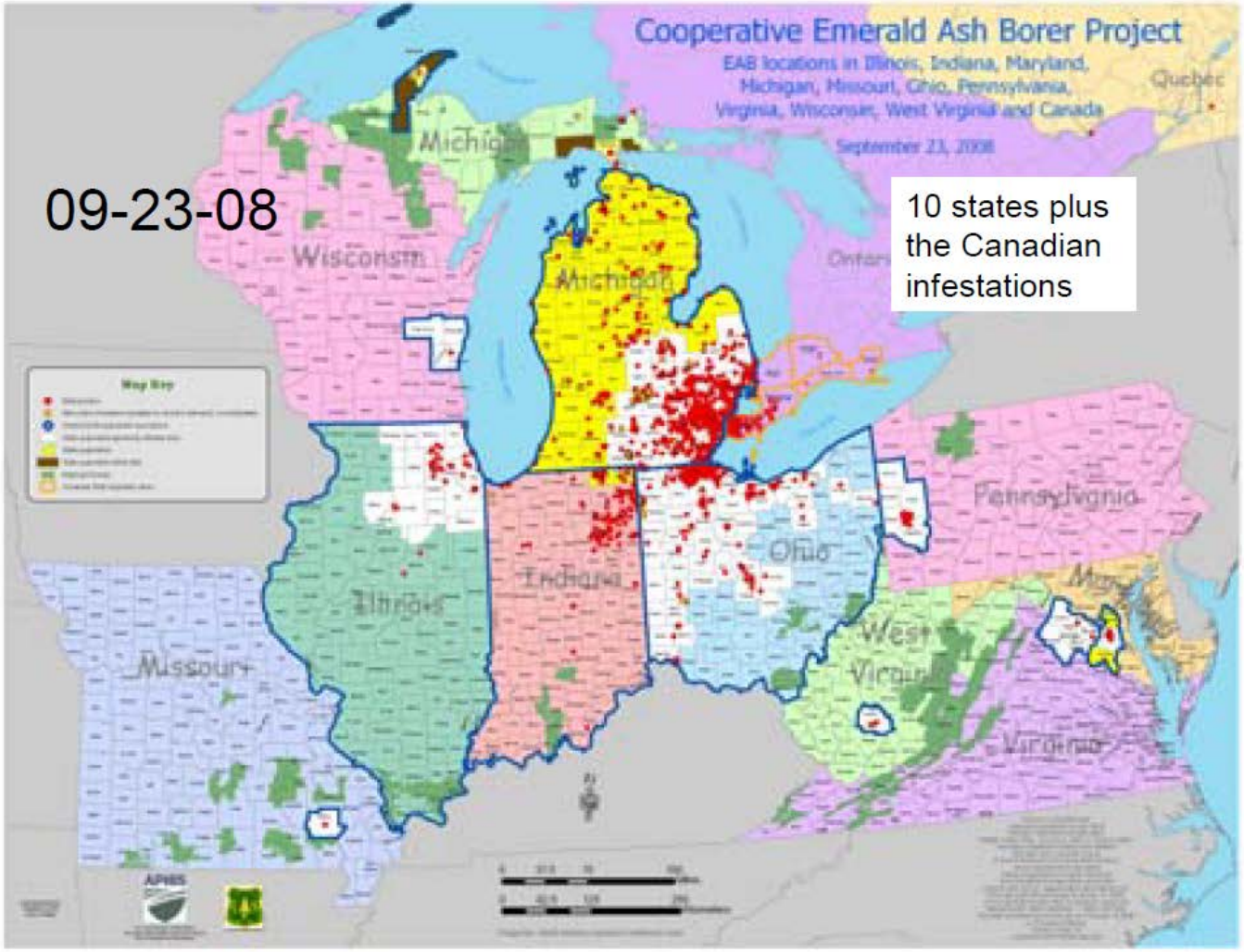


www.dof.virginia.gov/health

Project Background

- Midwestern urban forests were being devastated by EAB



SE Michigan:

- **20 million dead ash trees**
  (Anulewicz et al. 2007)

www.emeraldashborer.info

Project Background

- Midwestern urban forests were being devastated by EAB

Belvedere Dr., Toledo, OH. Left: Before EAB June 2006 | Right: Peak EAB June 2009

bioforestfech.wordpress.com

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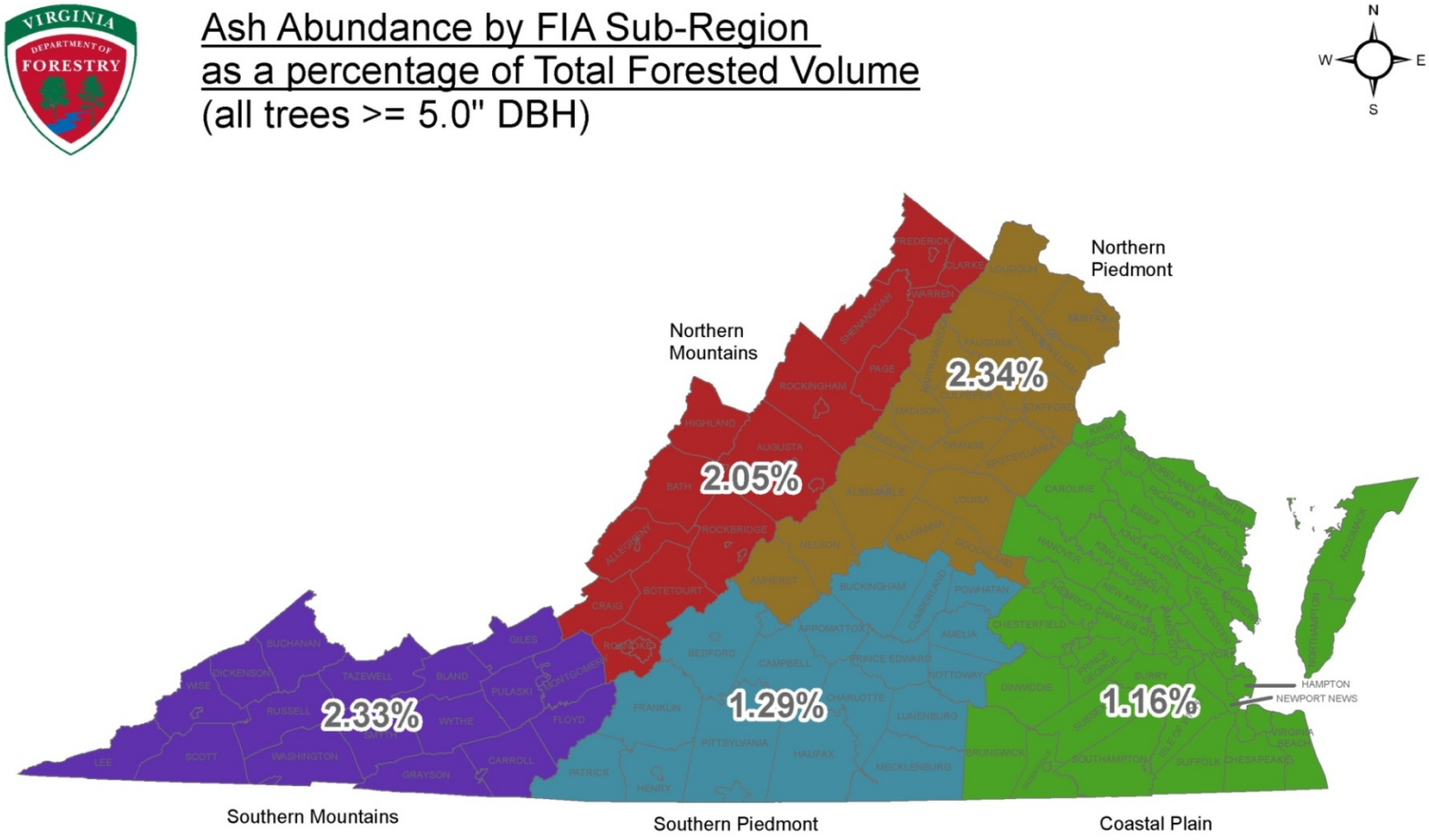
Project Background

- Native ash abundance was variable and uncertain



Project Background

- Native ash abundance was variable and uncertain

Table 2
Developed land, canopy cover, and ash (*Fraxinus* sp.) density for selected cities and regions in the eastern United States.

Areas	Developed land (ha)	Canopy cover (ha)	Ash trees per ha developed land	Ash trees per ha canopy cover
Cities				
Atlanta, GA	24,846	8418	1.57	4.62
Baltimore, MD	18,593	1219	16.03	244.44
Boston, MA	11,357	663	2.35	40.18
Chicago, IL	57,162	1338	6.77	289.37
Indianapolis, IN	72,360	8417	2.05	17.65
Livonia, MI	8859	981	2.61	23.58
Milwaukee, WI	23,142	822	4.08	114.92
Minneapolis, MN	13,733	1243	14.58	161.06
Morgantown, WV	1745	309	22.01	124.22
Palatine, IL	3300	303	7.94	86.47
Philadelphia, PA	29,854	1310	4.36	99.27
Syracuse, NY	5912	467	1.13	14.24
Troy, MI	8273	940	7.03	61.83
Urbana, IL	2477	145	3.40	58.13
Washington, DC	13,362	9797	2.40	3.27
Wilmington, DE	2522	99	1.62	41.20
Mean	18,594	2279	6.25	86.53
Regions				
MI, OH, IN[a]	919,470	85,139	6.60	71.28
MI[b]	339,773	35,118	11.06	107.04
OH[c]	673,000	59,900	6.41	72.03

K.F. Kovacs et al. / Ecological Economics 69 (2010) 569–578

Virginia and DC:

- **1.33 million ash trees on developed lands**

Project Background

- Native ash abundance was variable and uncertain

Locality	% *Fraxinus as Street Trees*	Source
34 SD localities	36	Ball et al. 2007
Minneapolis, MN	21	Minn. Parks & Rec.
Gastonia, NC	19	Raupp et al. 2006
Florence, KY	13	Raupp et al. 2006
Lincolnshire, IL	13	Raupp et al. 2006
Chicago, IL	12	Raupp et al. 2006
Kansas City, MO	10	Raupp et al. 2006
Toledo, OH	9	Raupp et al. 2006
Marion, IN	5	Raupp et al. 2006
New York, NY	4	Raupp et al. 2006

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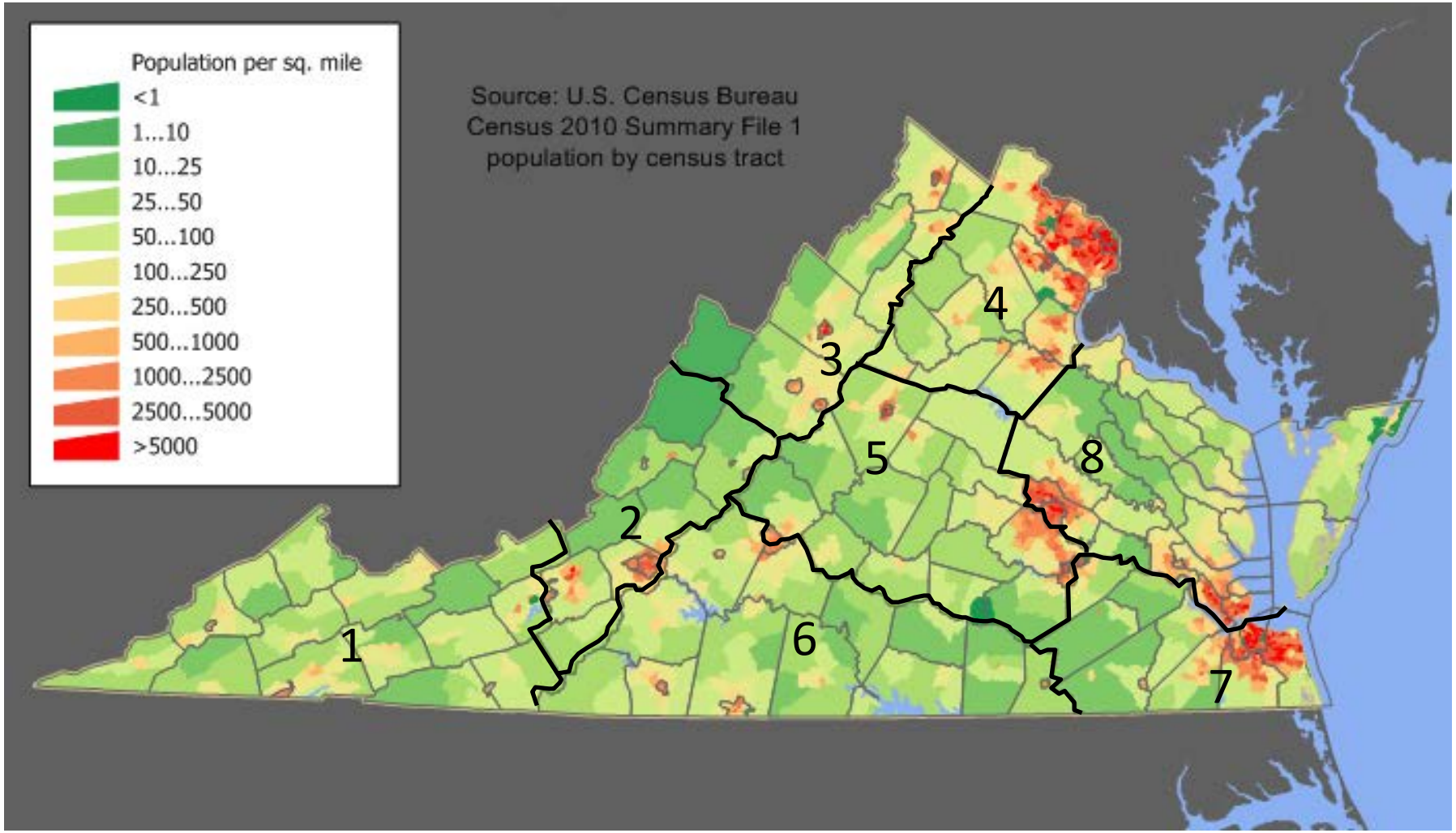
Project Methods

- Zonation of state and identification of prospect localities



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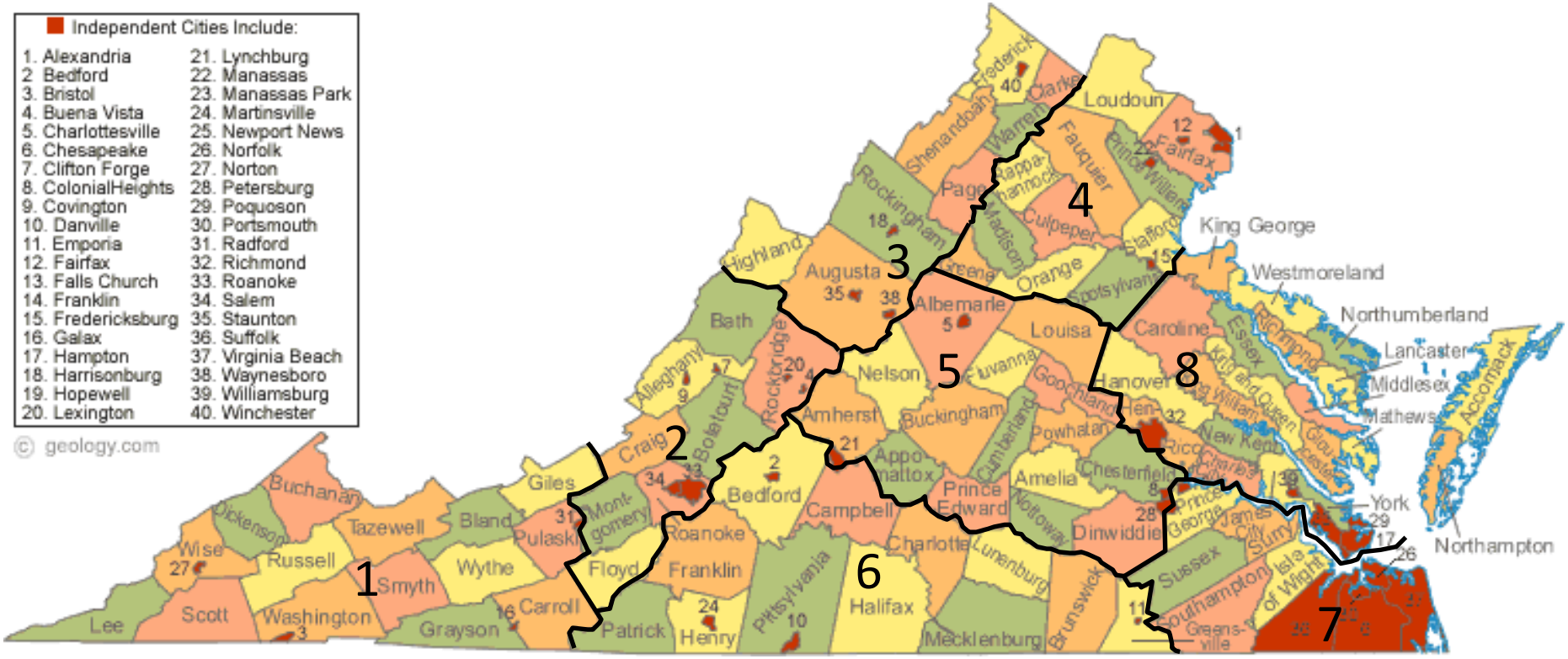

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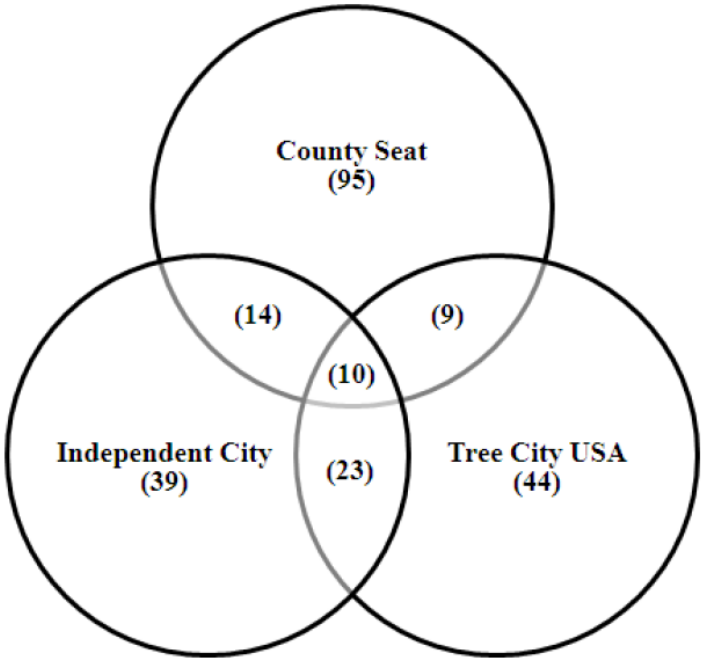


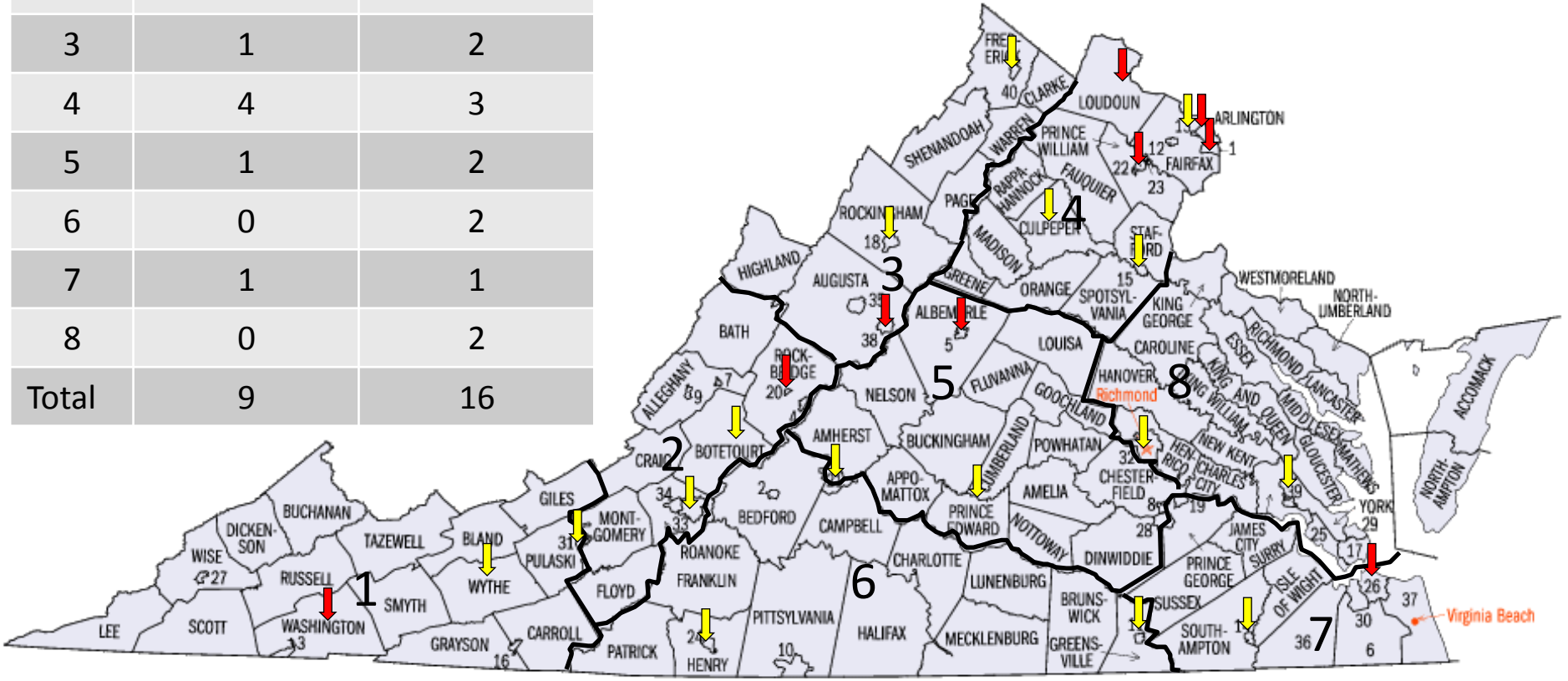
Table 3.1.1: Street tree inventory status of Virginia municipalities that are a Tree City USA (TCUSA), county seat, or independent city based on contact efforts from 2008 to 2011.

	Existing Street Tree Inventory Status			
Locality Type	Yes	No	Unknown	Total
County Seat (Not TCUSA)	0	4	68	72
Independent City (Not TCUSA)	0	6	10	16
Tree City USA				
Independent City	9	12	2	23
Not Independent City	5	16	0	21
Total	14	38	80	132

Project Methods

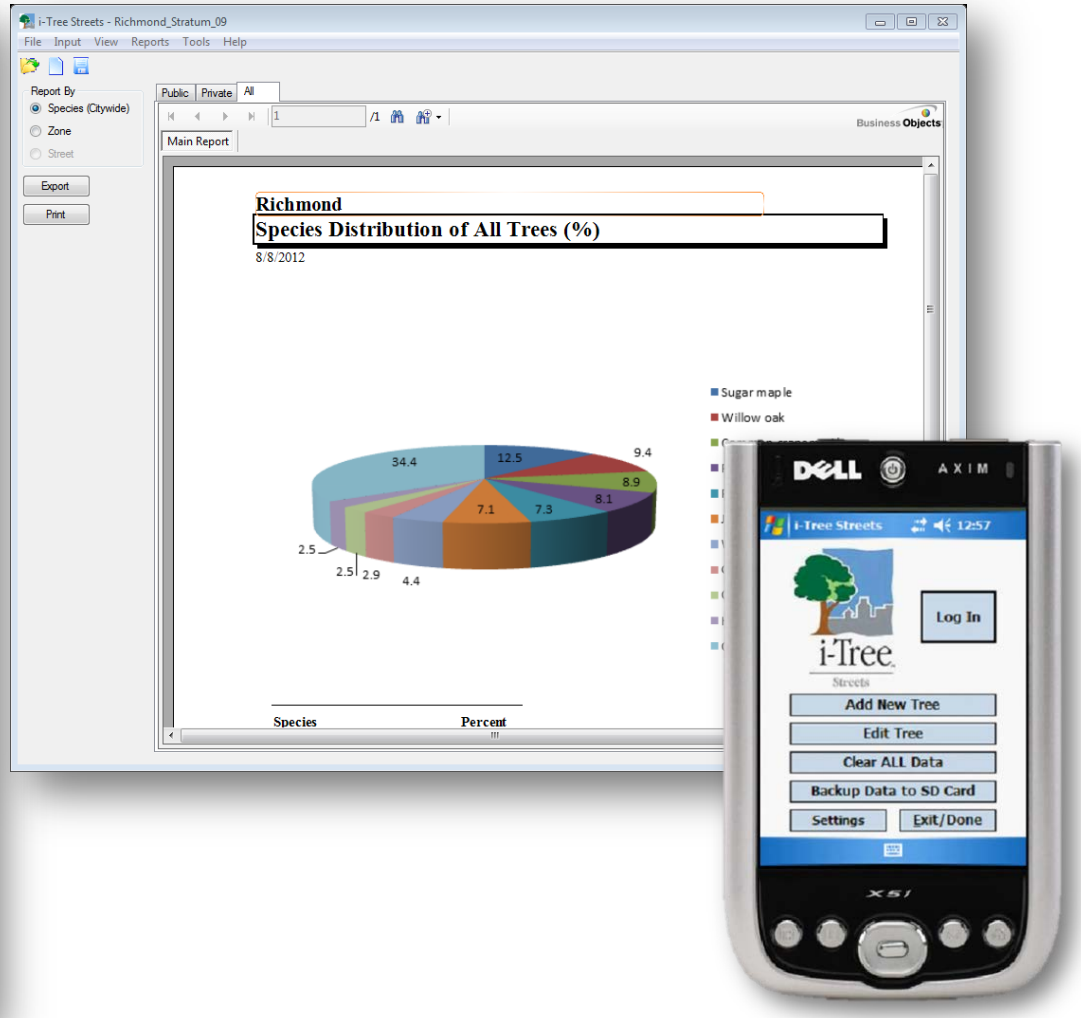
- Zonation of state and identification of prospect localities

Zone	Complete ↓	Sample ↓
1	1	2
2	1	2
3	1	2
4	4	3
5	1	2
6	0	2
7	1	1
8	0	2
Total	9	16



Project Methods

- Street tree inventory data collection



Project Methods

- Street tree inventory data collection

Sample Inventory Method

Sample Street Tree Inventories	
N	16
Sampling Intensity (% of streets sampled)	
Minimum	4% - Richmond
Median	13%
Maximum	33% - Buchanan

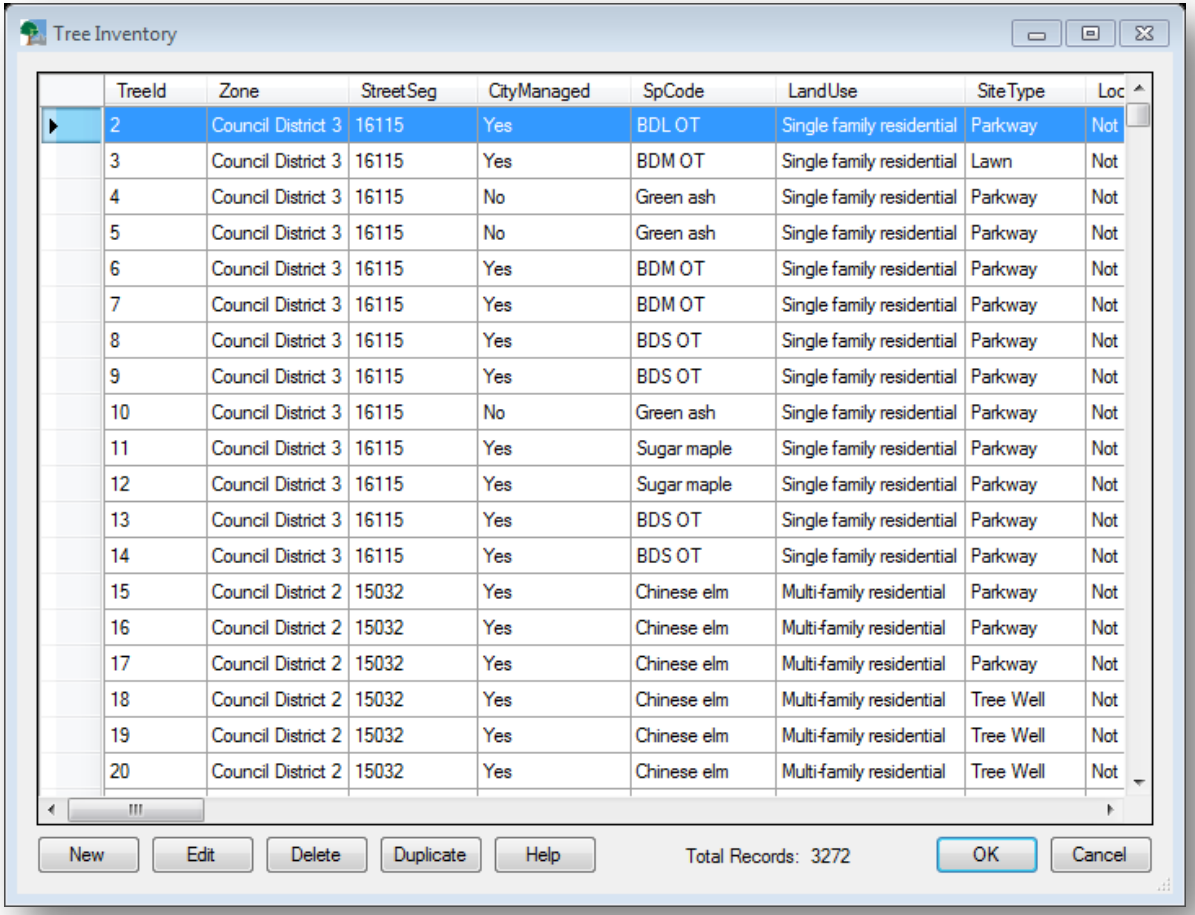
Goal:
≤10% relative standard error for total street tree population estimate

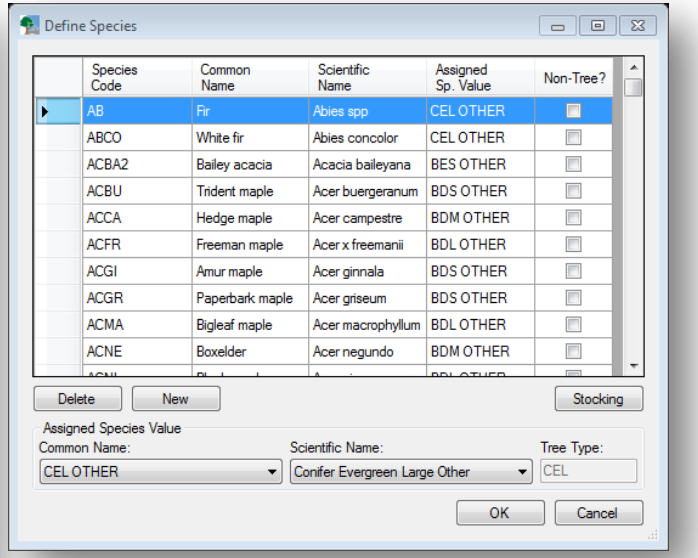
Project Methods

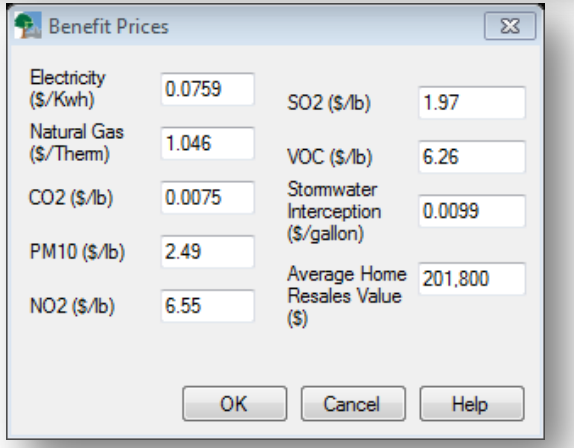
- Street tree inventory data collection

Project Methods

- Street tree inventory data preparation







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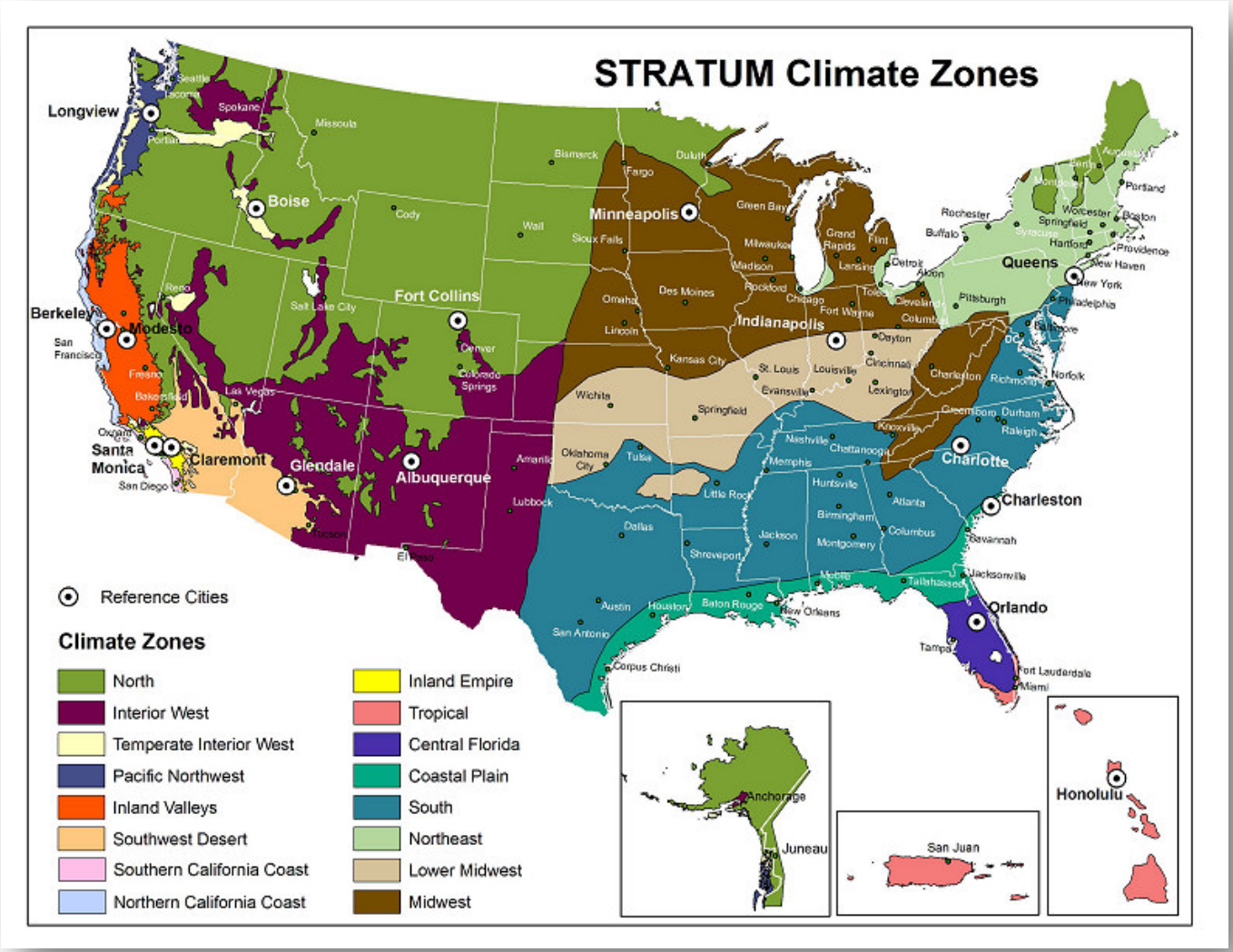
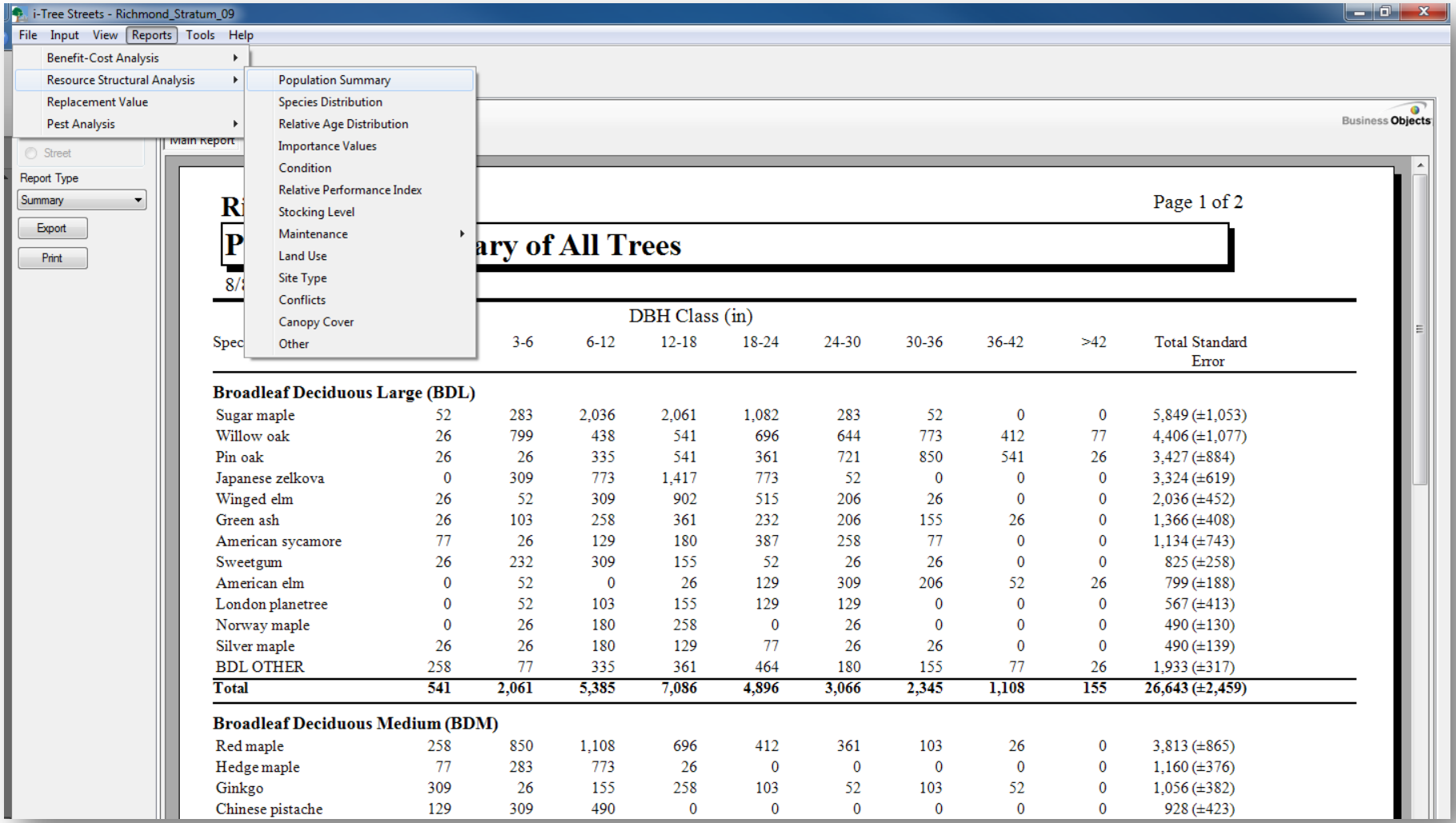


Project Methods

- Street tree inventory data analysis



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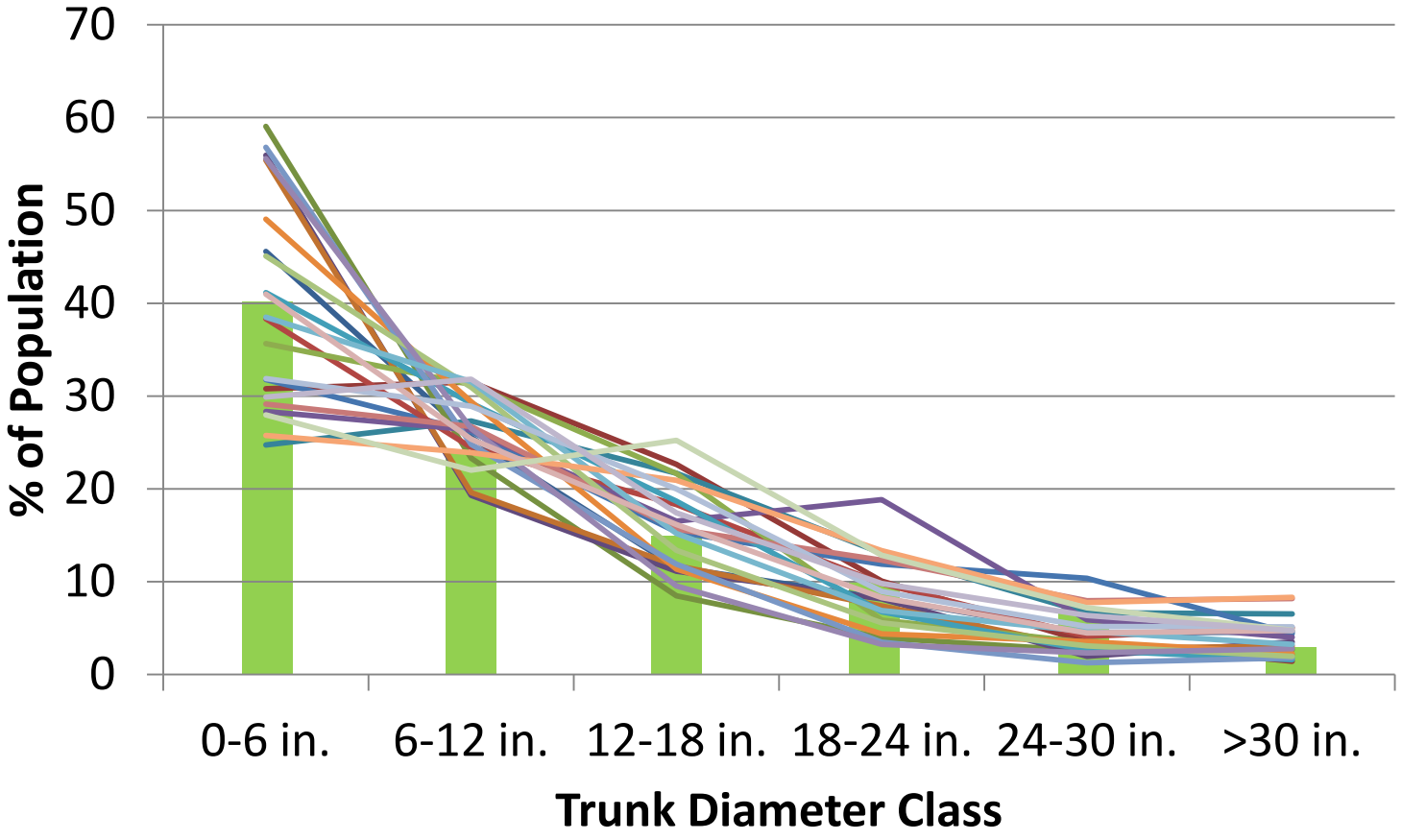
Summary of Findings

- Street Tree Abundance

N = 22	Total Street Trees (#)	Street Tree Density (#/sq. mi.)	Street Trees per Capita
Minimum	771 Buchanan	144 Abingdon	0.05 Alexandria
Median	5,814	510	0.23
Maximum	46,792 Richmond	1,980 Fredericksburg	0.90 Fredericksburg
Interquartile Range	2,072 – 11,791	312 – 782	0.15 – 0.47
Total	233,240		

Summary of Findings

- Street Tree Abundance



Summary of Findings

- Street Tree Composition

N = 22	% Small Stature Spp. (<25')	% Medium Stature Spp. (25'-45')	% Large Stature Spp. (>45')
Minimum	18 Wytheville	9 Franklin City	27 Martinsville
Median	29	24	45
Maximum	50 Franklin City	33 Alex., F'burg, M'ville	60 Richmond
Interquartile Range	23 – 271	1.2 – 2.6	1.4 – 3.7
Goal	10	27	63

Summary of Findings

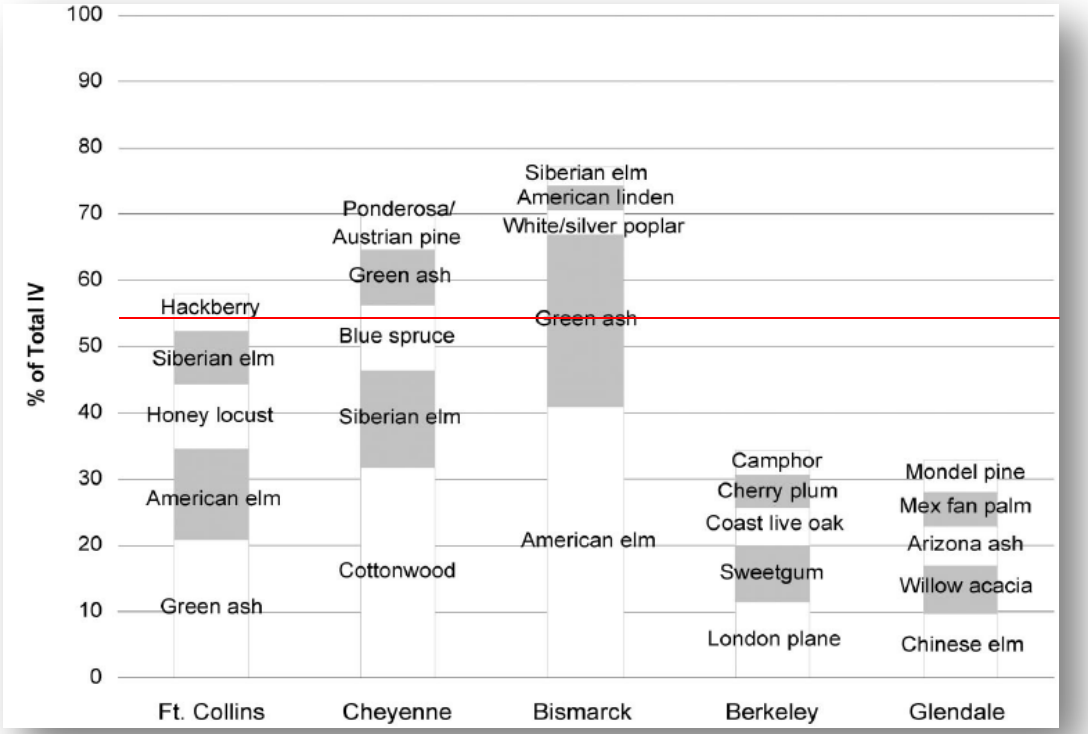
- Street Tree Composition

N = 22	Native Ash Trees (#)	Relative Abundance (%)	Relative Importance (%)
Minimum	0* Buchanan, Franklin	0* Buchanan, Franklin	0* Buchanan, Franklin
Median	84	1.8	2.7
Maximum	1,391 Richmond	6.0 Wytheville	11.3 Abingdon
Interquartile Range	23 – 271	1.2 – 2.6	1.4 – 3.7
Total	5,280		

Summary of Findings

- Street Tree Composition

N = 22	Sum of Relative Importance of Top-5 Species
Minimum	25.8% Harrisonburg
Median	40.8%
Maximum	64.4% Franklin City
Interquartile Range	33.4% – 47.9%



Municipal forest benefits and costs in five US cities
G MCPHERSON, JR SIMPSON, PJ PEPER... - Journal of forestry, 2005

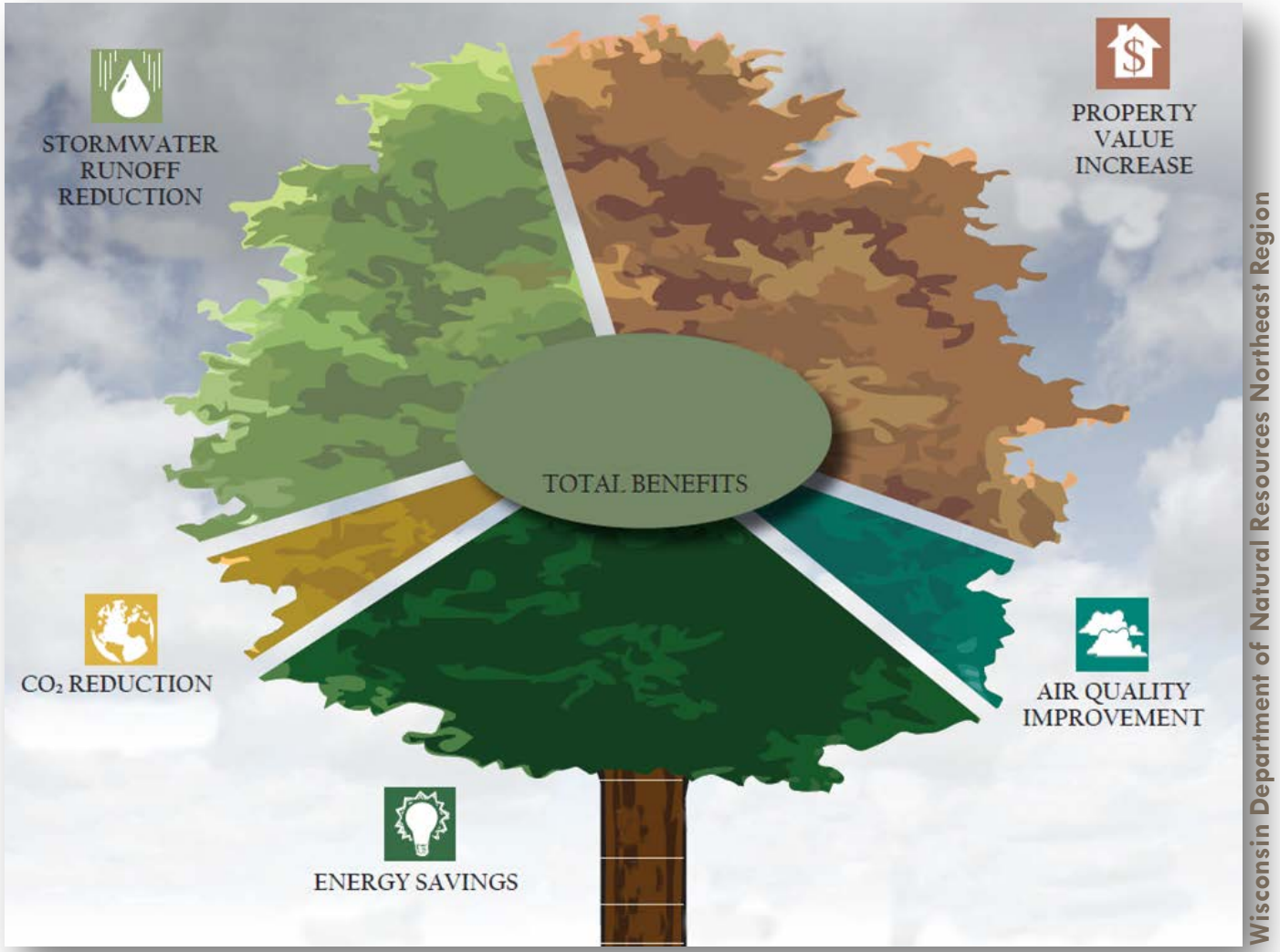
Summary of Findings

- Street Tree Composition

N = 22	Freq. in Top-5 of Relative Importance	Med. Relative Import. (%)	Max. Relative Import. (%)
Acer	21	16.3	33.5 Winchester
Quercus	13	9.8	30.2 Richmond
Pinus	11	9.4	28.7 Emporia
Cornus	7	5.6	8.1 Martinsville
Fraxinus	2	7.6	10.4 Abingdon

Summary of Findings

- Street Tree Benefits & Value



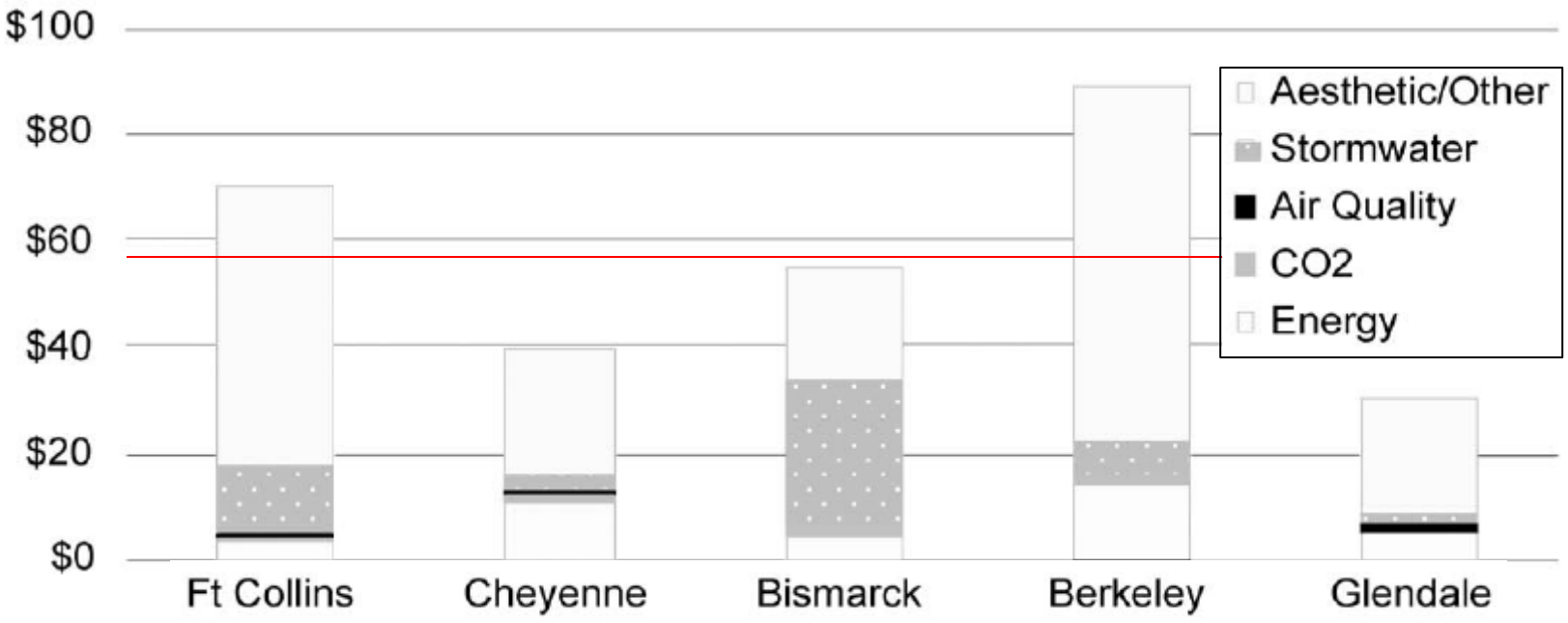
Summary of Findings

- Street Tree Benefits & Value

N = 22	Gross Annual Benefits ($)		Replacement Value ($)	
	Total	Per Tree	Total	Per Tree
Minimum	34,380 Buchanan	32.62 Martinsville	1,467,544 Buchanan	763 Roanoke
Median	452,387	67.79	17,159,802	2,594
Maximum	4,938,852 Richmond	170.02 Falls Church	211,889,829 Richmond	5,229 Franklin City
Interquartile Range	100,231 – 1,030,551	54.27 – 99.67	5,606,673 – 33,004,551	2,000 – 3,716
Total	18,845,893		617,578,471	

Summary of Findings

- Street Tree Benefits & Value



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Take-home Messages

- Inventory and assessment reveals assets, liabilities, and opportunities for improving street tree function and value
- Virginia's communities generally have well-structured street tree populations
- Vulnerability to EAB is low in Virginia's street trees, but other potential vulnerabilities exist
- Plant diverse, large-stature trees whenever possible

Questions?