Every Tree Counts: A Portrait of Toronto's Urban Forest
Parks, Forestry & Recreation • **Urban Forestry**

Study Rationale

- 2005 PF&R "*Our Common Grounds*" articulated goal to expand Toronto's tree canopy

- Previous estimates = 17-20%

- Long-term goal = 30-40%

- Needed more data to develop strategic forestry plan
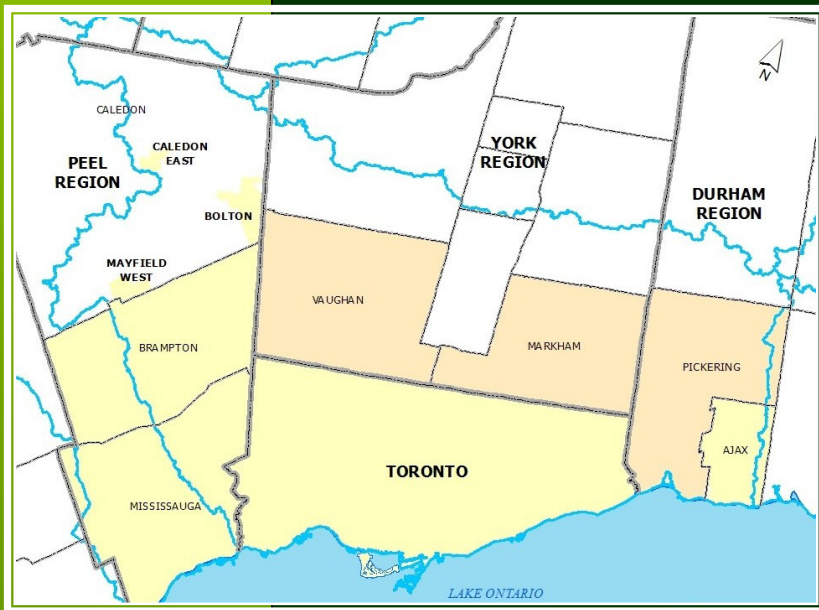
Study Elements

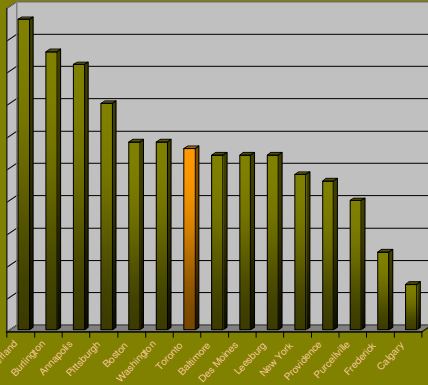1. Field data collection
2. Data analysis
3. Hydro analysis

plus

4. Change analysis
5. Digital land cover map

TRCA Collaboration area

UFORE provides:

- science-based evaluation of forest structure, function and value
- framework to monitor change

Tree canopy is approximately 20%
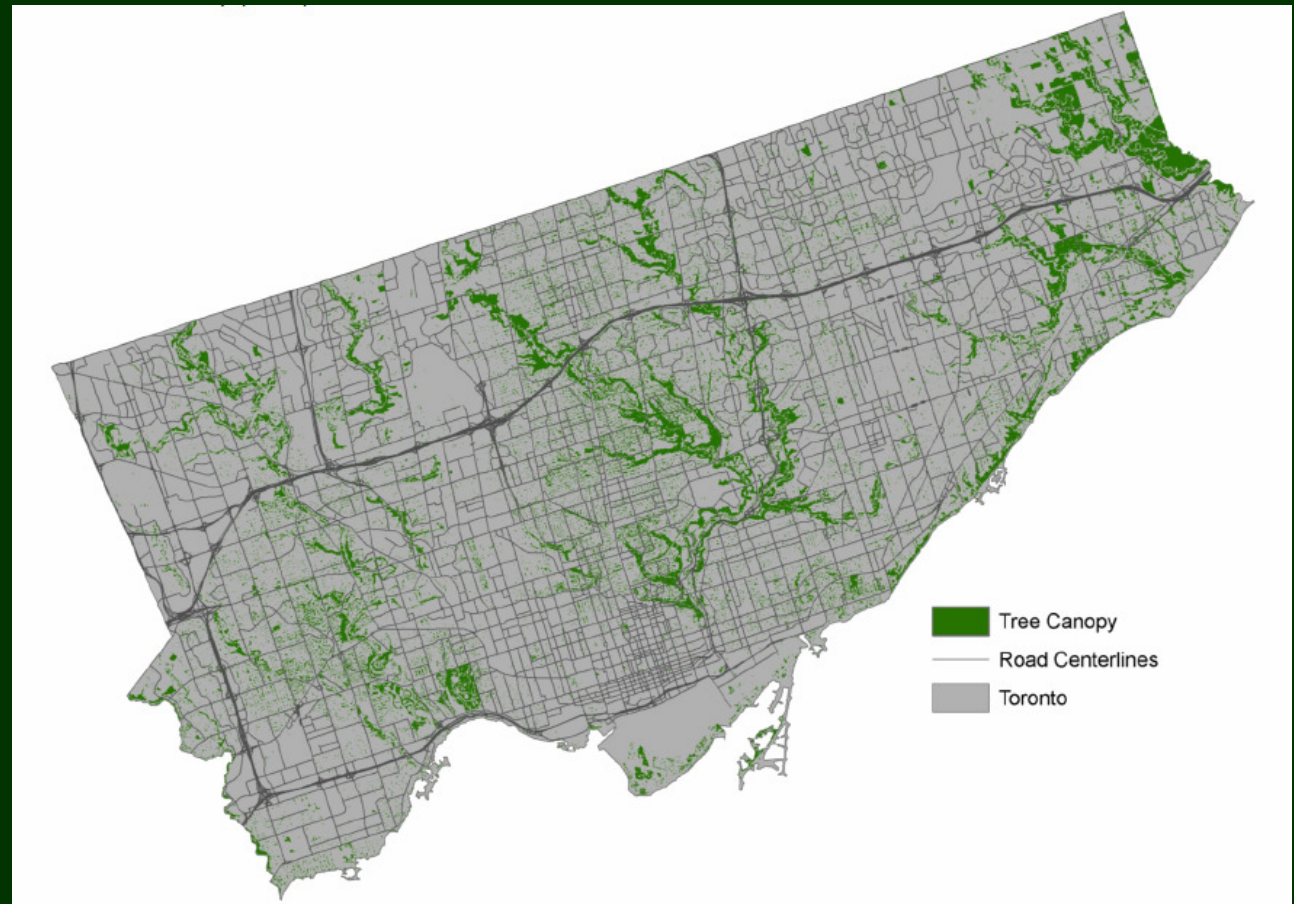
Goal: Achieve & maintain between 30-40%

Toronto's tree cover is average compared to cities of similar size.

Tree Canopy
Road Centerlines
Toronto

Toronto's urban forest is a vital city asset with a replacement value of $7 billion.

Tree Canopy Location

City 40%

Private 60%

60% located on private property

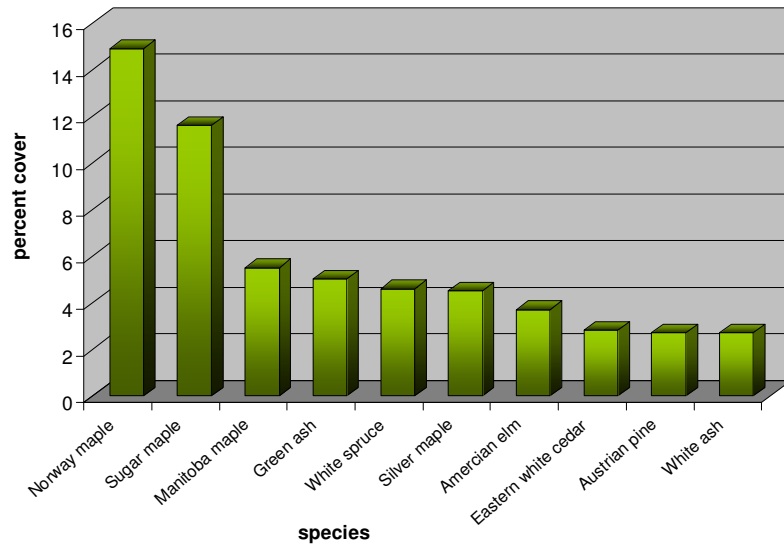34% located in City parks and natural areas
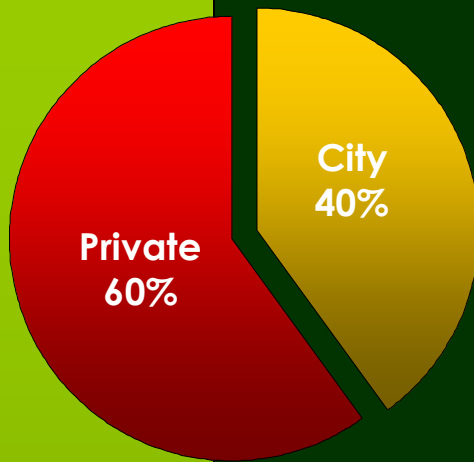
6% located in City road allowances

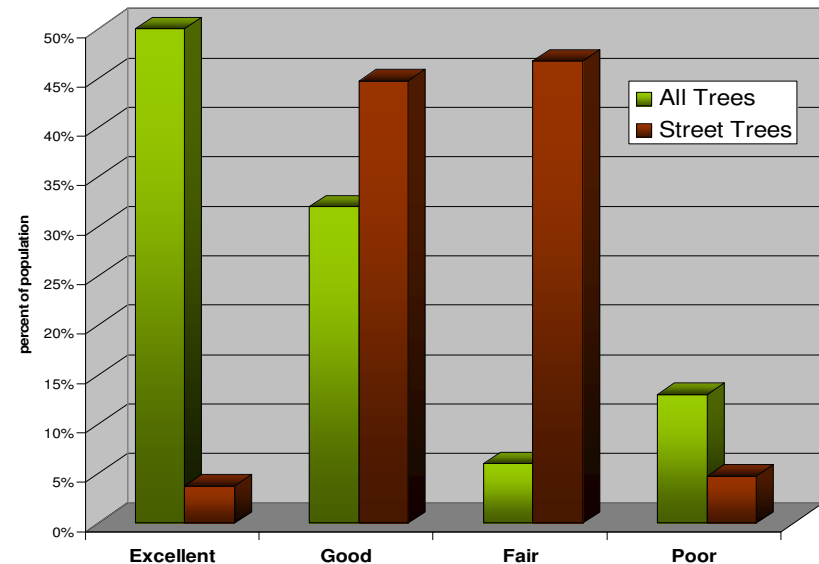Private property owners control a majority of the City's existing and possible tree canopy.

TORONTO

Forest Composition & Condition
Goal: High diversity, appropriate species, healthy trees

Top tree species by leaf area (m^2)

y-axis: percent cover (0 to 16)
x-axis: species — Norway maple, Sugar maple, Manitoba maple, Green ash, White spruce, Silver maple, Amercian elm, Eastern white cedar, Austrian pine, White ash

Average tree condition (% of population)

y-axis: percent of population (0% to 50%)
x-axis: Excellent, Good, Fair, Poor
Legend: All Trees, Street Trees
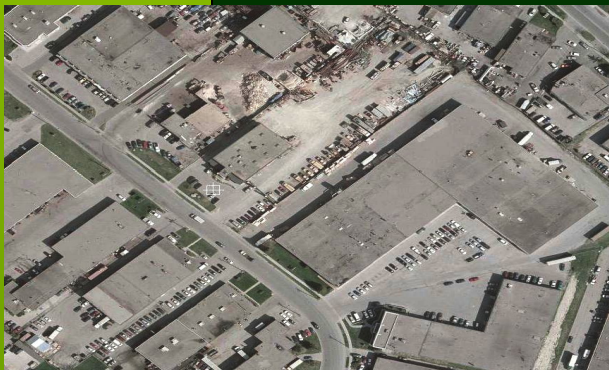
- Good species diversity overall - 144 species
- Exception - maple & ash (41%)
- Majority of trees are in good condition (exception: street trees)

TORONTO

Land Use Affects Tree Canopy
Goal: Improve distribution & quality of tree cover

Generalized Land Use	% Tree Cover	% of City's land area
Parks	44%	11%
Open Space	27%	6%
Residential Single	24%	41%
Residential Multi	16%	6%
Institutional	15%	7%
Other (vacant)	14%	7%
Utility & Trans	12%	4%
Commercial	5%	7%
Industrial	4%	11%

Land use affects
- *Distribution of forest cover*
- *Species composition & diversity*
- *Average tree size*

TORONTO

Forest Size Class Structure
Goal: Maintain regeneration, reduce mortality, increase mid- to large-size trees

Size class distribution compared to ideal

- Number of large trees is low relative to small
- Have good regeneration, but
- Large trees provide maximum benefits

# Green House Gas Reductions & Climate Change Mitigation

Annual contributions

- Carbon storage = 1.1 million tonnes or $31.6 million

- Carbon sequestration = 46,700 tonnes or $1.3 million/yr

- Building energy reduction = 41,200 MWH or $9.7 million

- Avoided carbon emissions = 17,000 tonnes or $483,600

The urban forest provides over **$60 million per year** in measurable environmental services plus other storm water management and socio-economic benefits.

TORONTO

Land Cover Mapping
City-wide digital land cover map
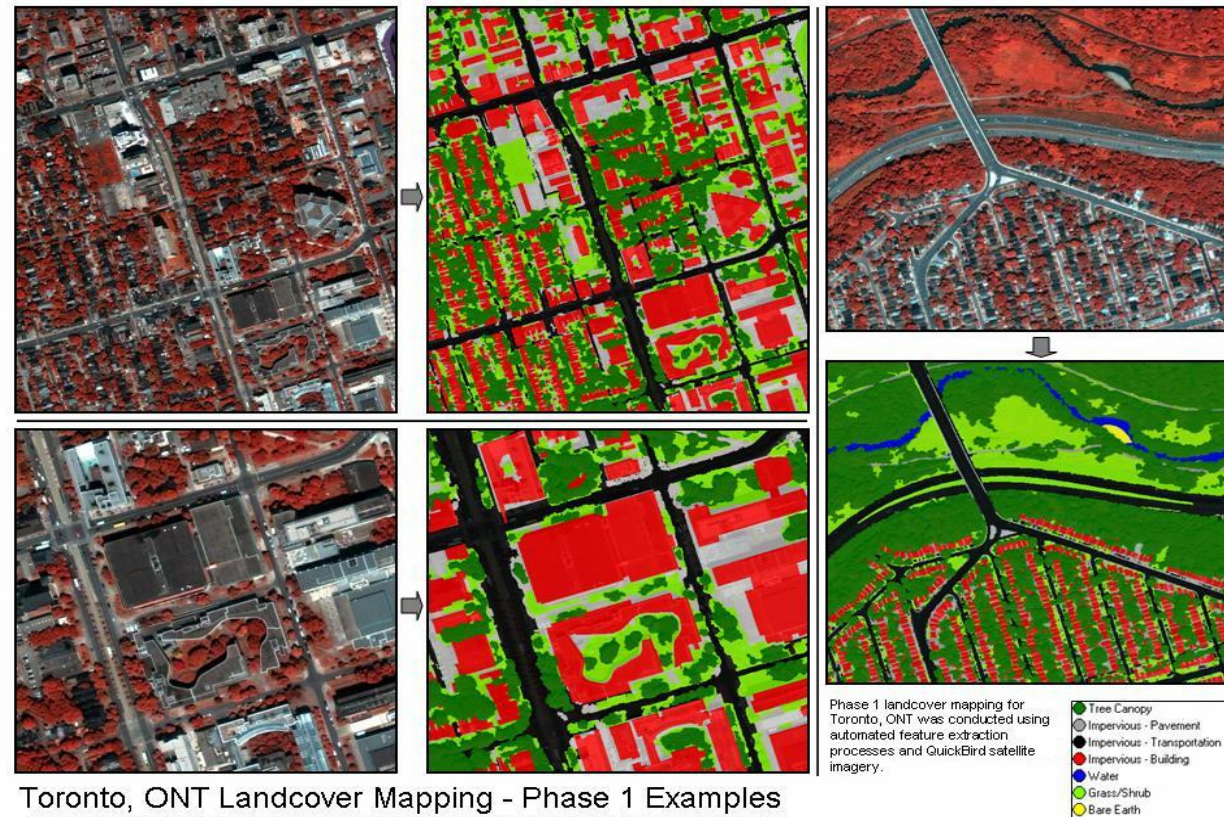
Toronto, ONT Landcover Mapping - Phase 1 Examples

UVM Spatial Analysis Laboratory | Contact: Keith Pelletier (kpelleti@uvm.edu) or Jarlath O'Neil-Dunne (joneildu@uvm.edu)

Phase 1 landcover mapping for Toronto, ONT was conducted using automated feature extraction processes and QuickBird satellite imagery.

Tree Canopy
Impervious - Pavement
Impervious - Transportation
Impervious - Building
Water
Grass/Shrub
Bare Earth

- Can use for spatial analyses & planning – by watershed, ward, neighbourhood, project

Distribution of Tree Cover
Goal: More even/equitable distribution of tree cover

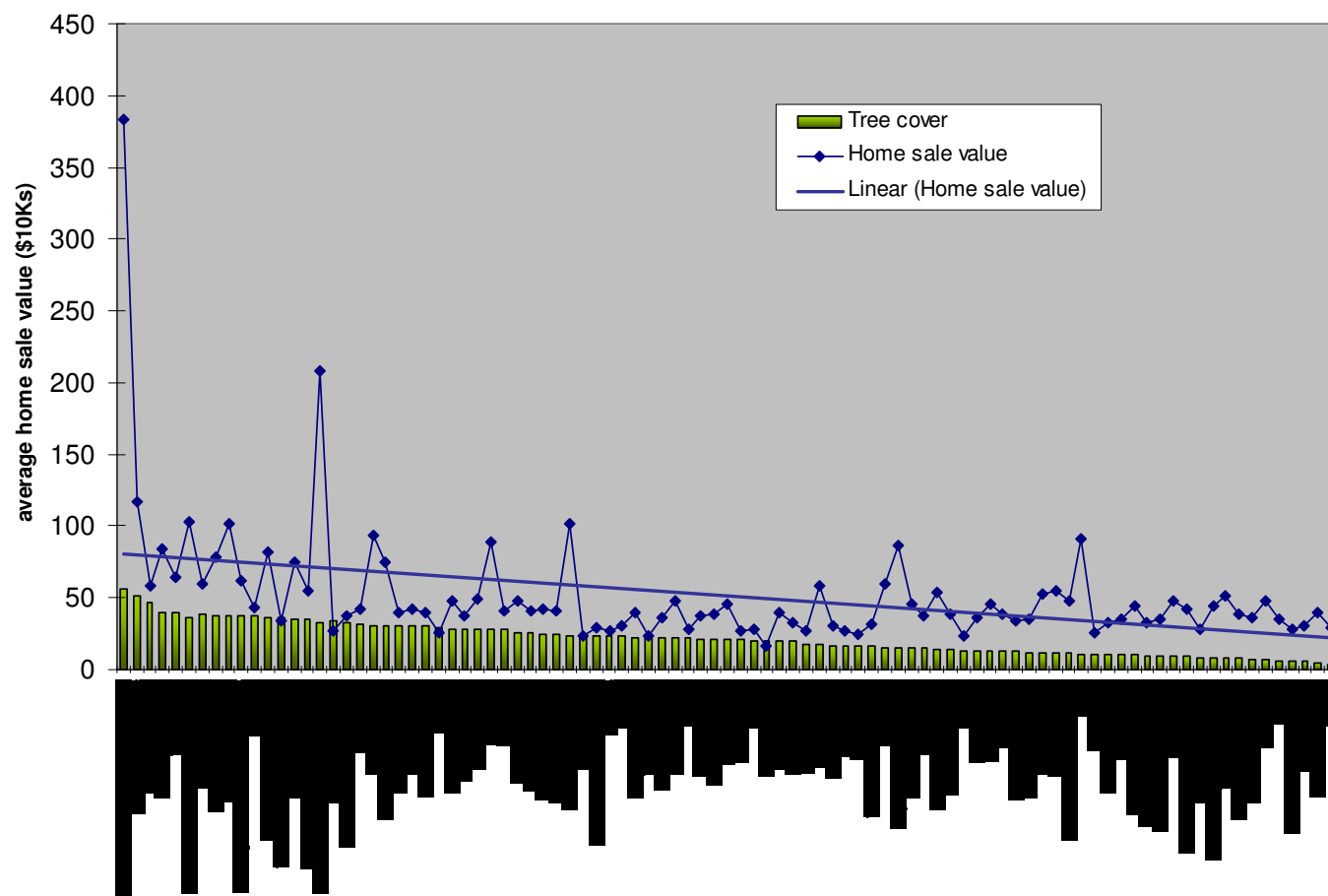**Average tree cover by ward**
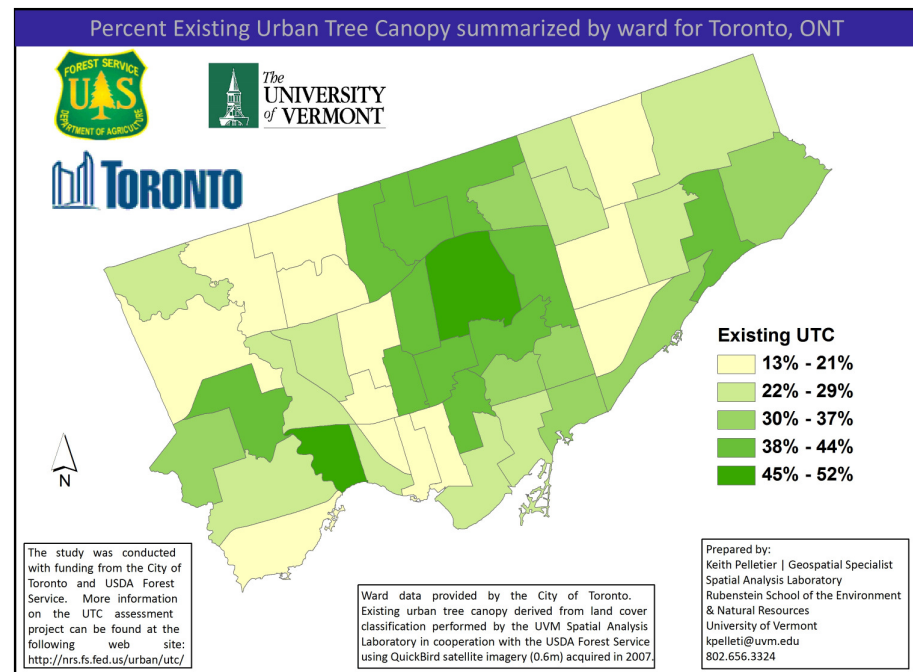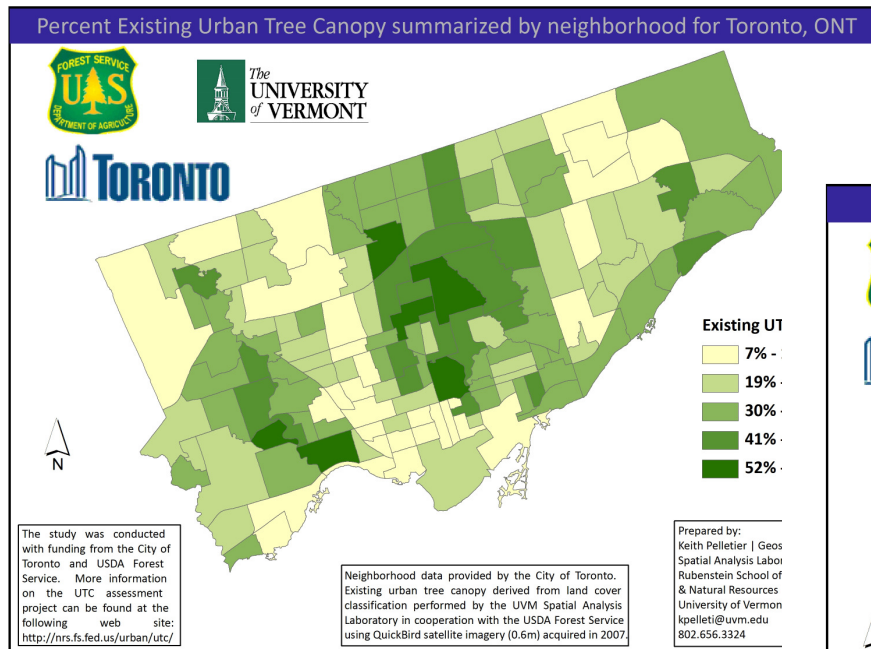
Average tree cover by neighbourhood

- Distribution of tree cover is uneven
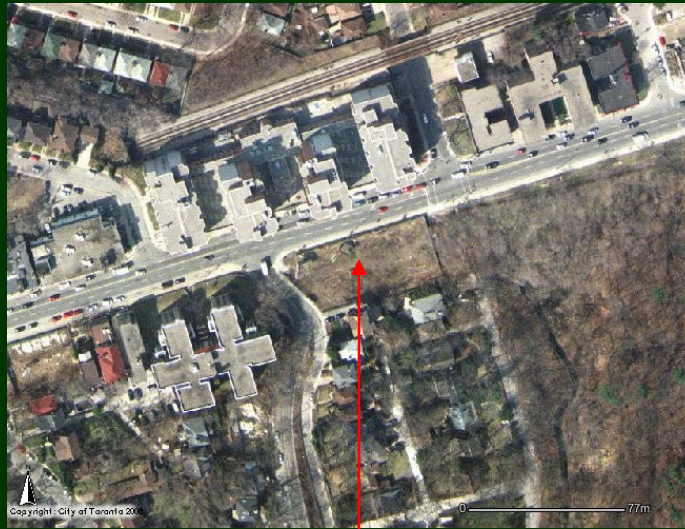- Data can be used to prioritize planting areas

Forest Cover and Real Estate Value

Average home sale value compared to tree cover in Toronto neighbourhoods

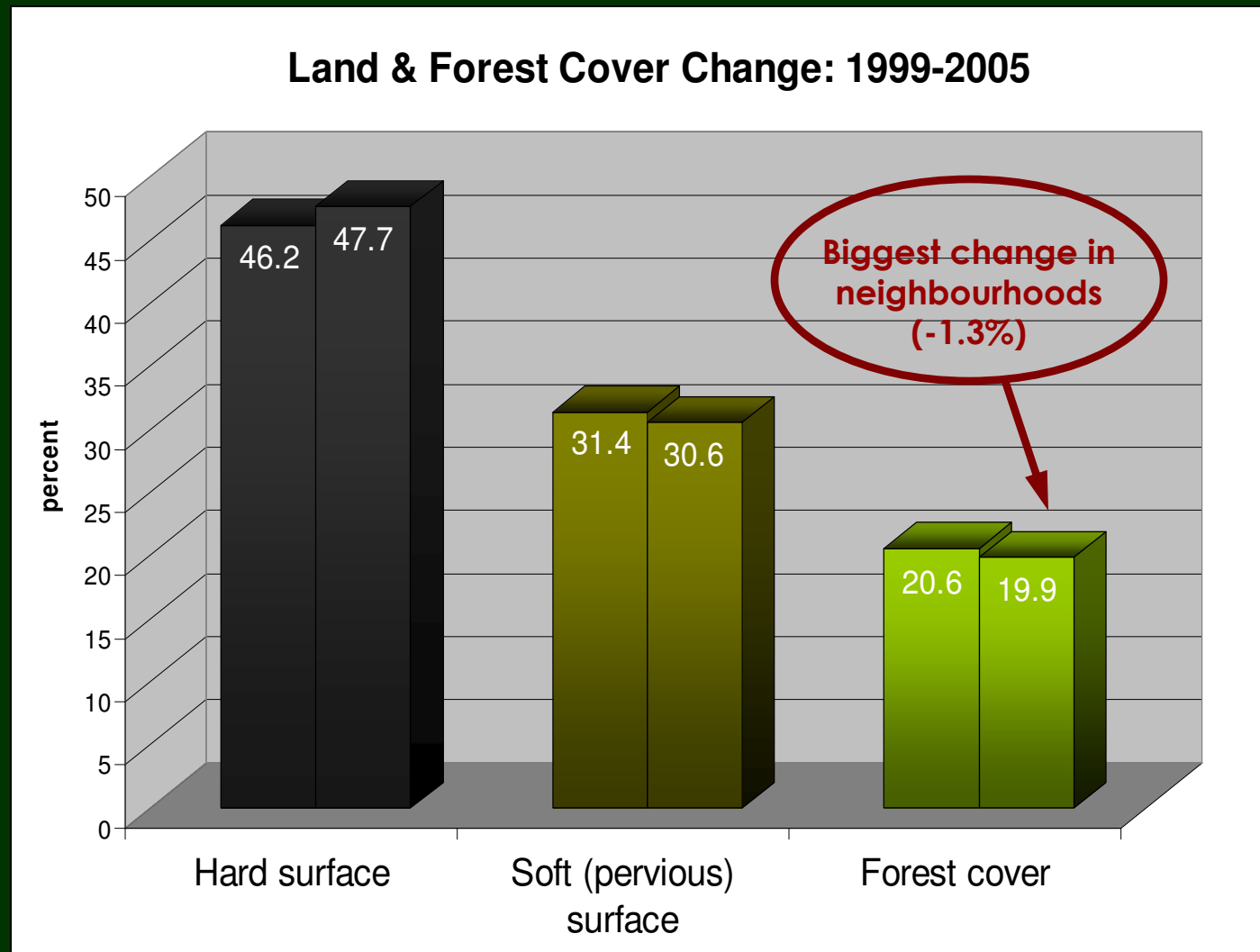# Monitoring Forest and Land Cover Change

1999: tree

2005: building

Compared 1999 and 2005 aerial photography

- Assessed land cover change, including tree canopy
- Cost-effective, easily replicable, known standard error

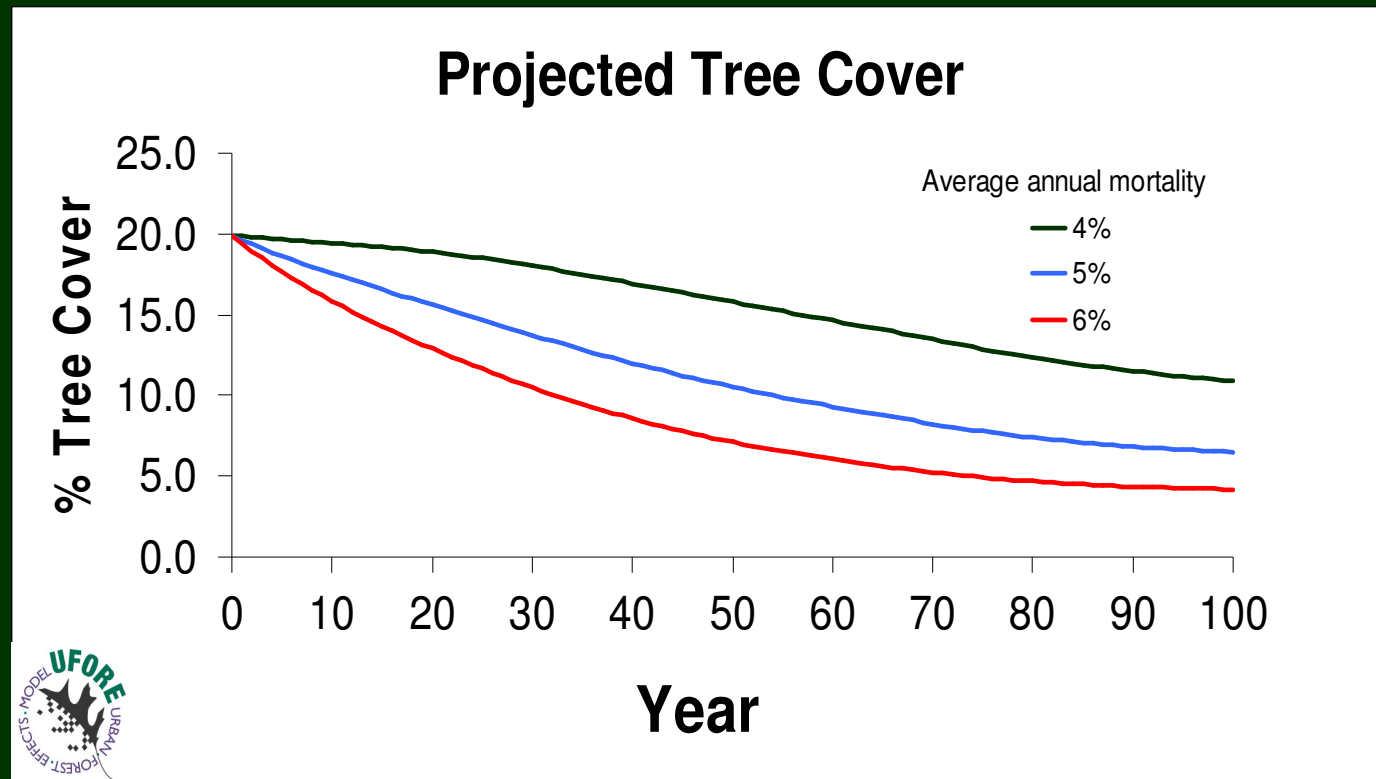This method will be used by Urban Forestry to monitor changes in forest cover and assess progress.

TORONTO

Land/Forest Cover Change (*preliminary)

Land & Forest Cover Change: 1999-2005

Chart showing percent values for three categories (1999 and 2005):
- Hard surface: 46.2, 47.7
- Soft (pervious) surface: 31.4, 30.6
- Forest cover: 20.6, 19.9

Biggest change in neighbourhoods (-1.3%)

TORONTO

Forecasting Canopy Cover

Scenario: No more tree planting

Projected Tree Cover

% Tree Cover (y-axis: 0.0, 5.0, 10.0, 15.0, 20.0, 25.0)

Year (x-axis: 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100)

Average annual mortality
- 4%
- 5%
- 6%

UFORE
URBAN FOREST EFFECTS · MODEL

- Need to plant 55K – 200K per year at 2-3% mortality
- Averaged 84K trees per year from 2005-2009

TORONTO

High Level Assessment of "Possible" Urban Tree Canopy- UTC

Possible UTC   Pervious

Possible UTC   Impervious

Percent possible urban tree canopy by land area (pervious and impervious)
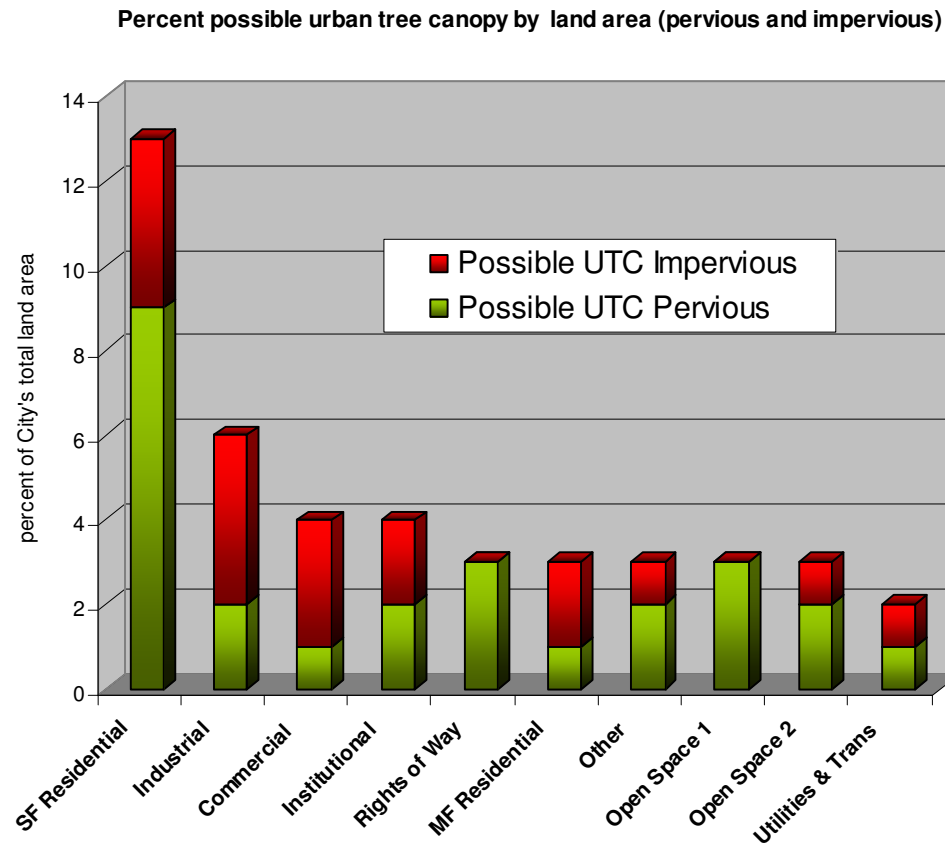
* Estimates do not consider land use constraints eg. sports fields in parks, site suitability in ROWs, redevelopment of private property

Summary

1. Study gives us baseline information that informs our understanding of the urban forest:

    - where it is, what is the size distribution of trees, what species make up the forest, what are the greatest pressures

2. Confirms the need to keep doing what we have been doing, as described in UF Service Plan

    - Plant, Protect and Maintain the existing urban forest

3. 60% of the urban forest is on private property

    - Need policy and programs that support initiatives on private property

    - Information & maps will help local interest groups to pursue initiatives to protect and renew neighbourhood trees

4. Study provides the information platform that we need to continue engaging other operating divisions

    – Harmonize programs & policies to support both the City's planning objectives as well as its tree canopy goals

TORONTO

Contact: Richard Ubbens, Director
Urban Forestry

TORONTO