Urban Forest GHG Accounting & Assessment

Forest Inventory Symposium
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Sacramento, CA

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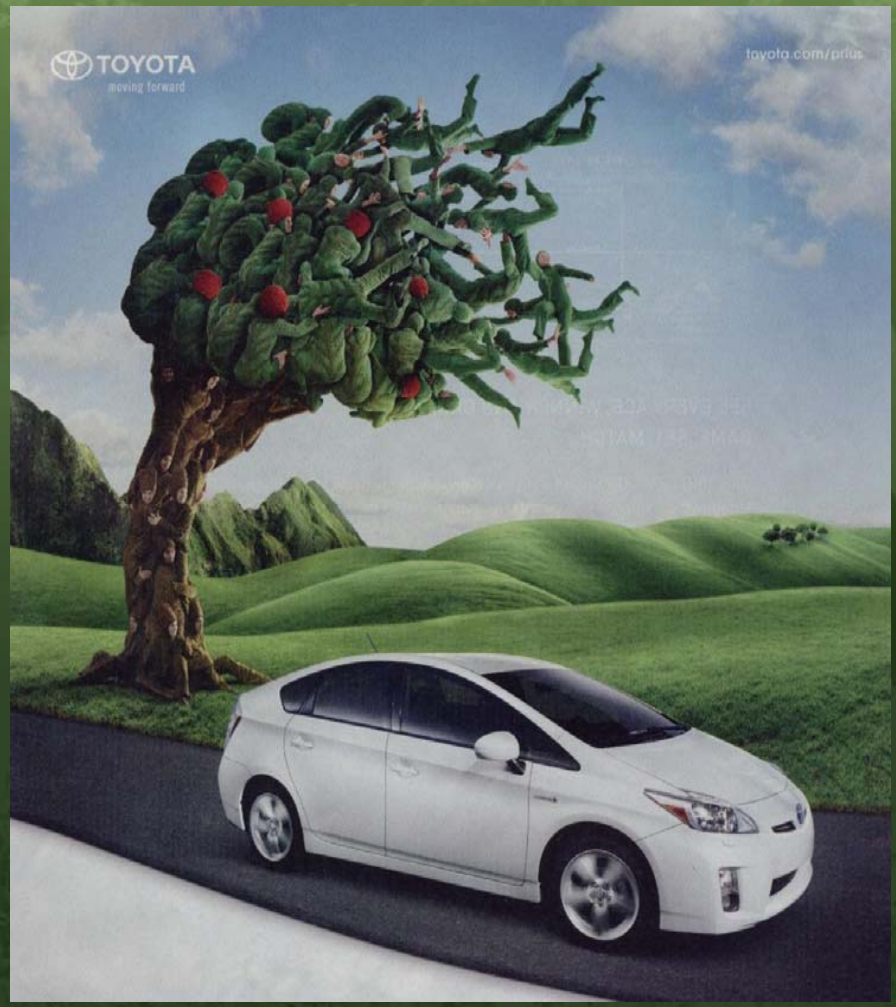
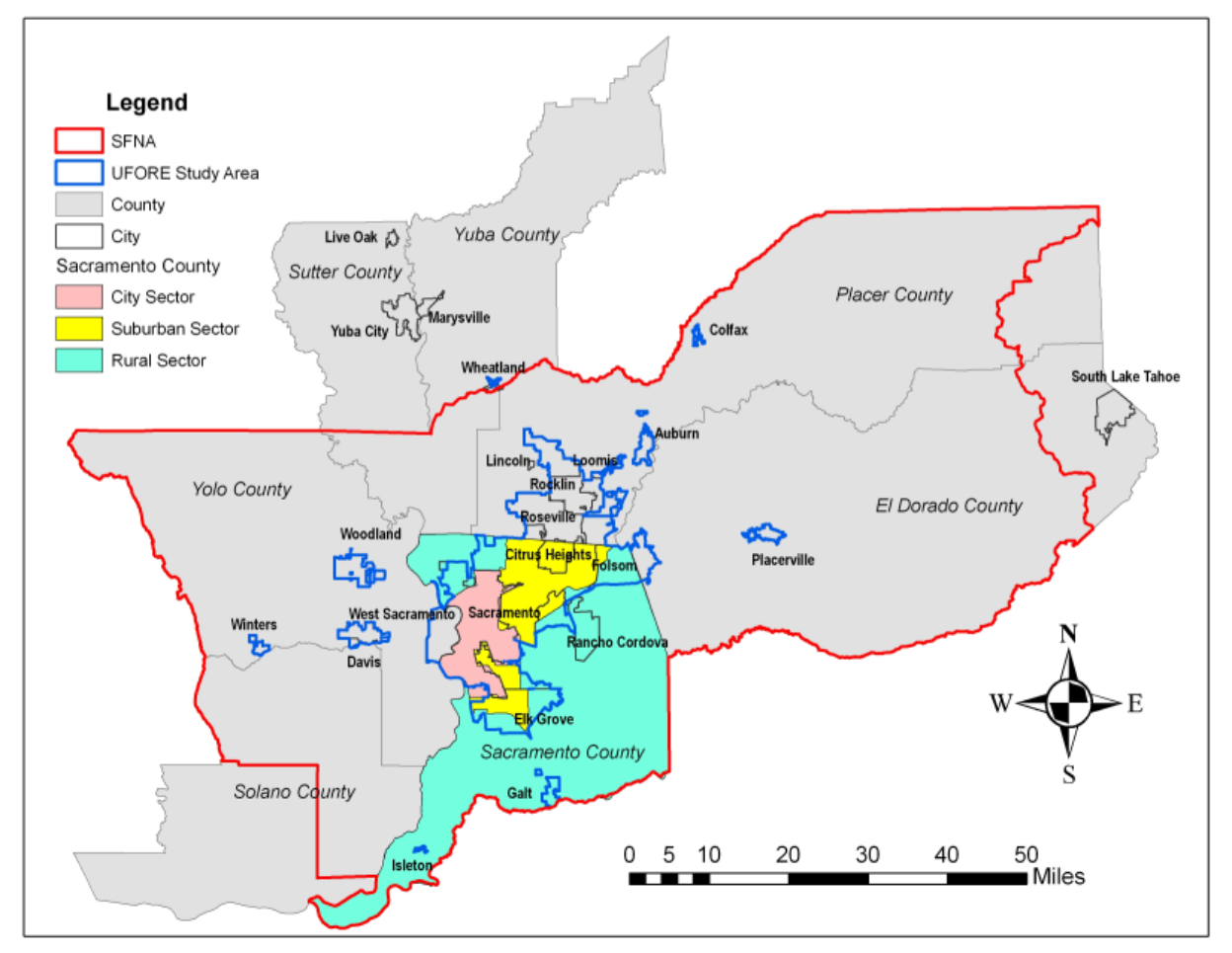


Today

Today

Today

- Intro
- What do we have now?
- What did we have in 1990?
- What will we have in 2020?
- Research questions

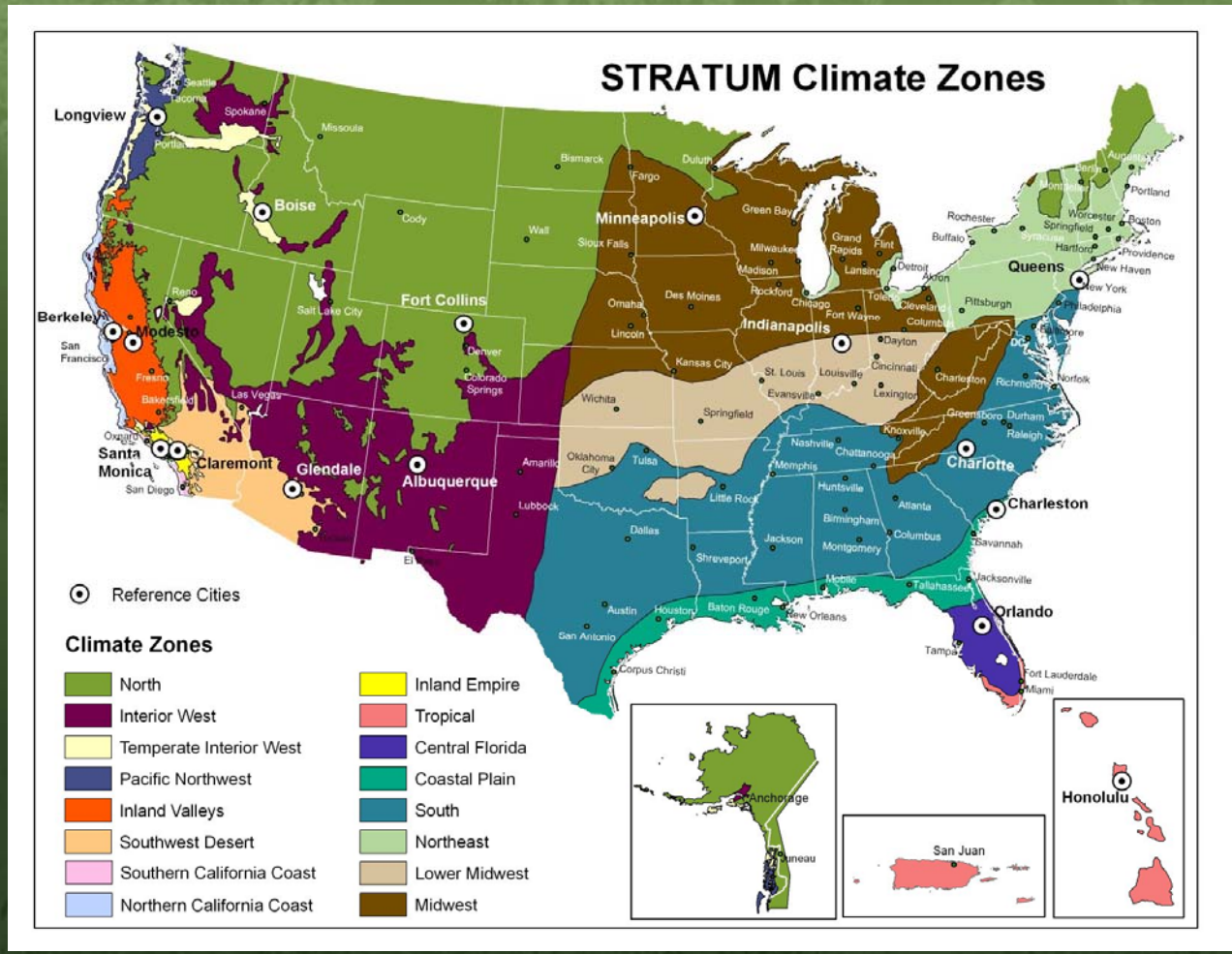


Carbon Storage

- Biomass equations
  - Open growing trees
  - Reduction factors (0.8)
  - Species assignments
- Vary by species and size

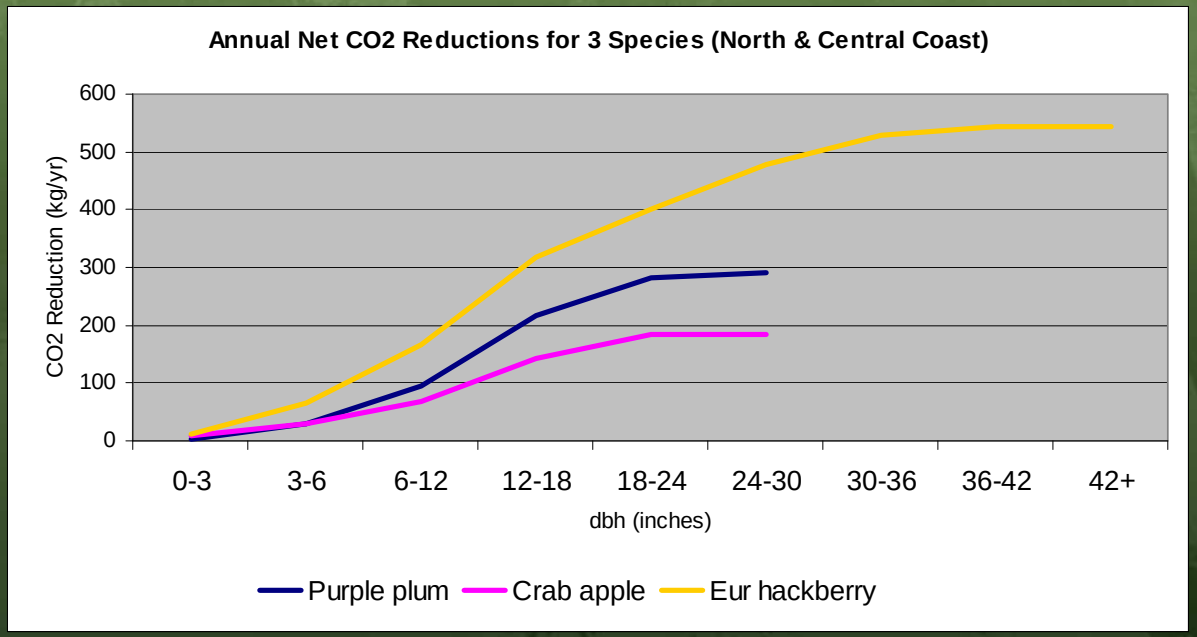
Carbon Sequestration

- Regional tree growth rates
- Regress dbh on age
- Regress ht on dbh
- Top 20 species



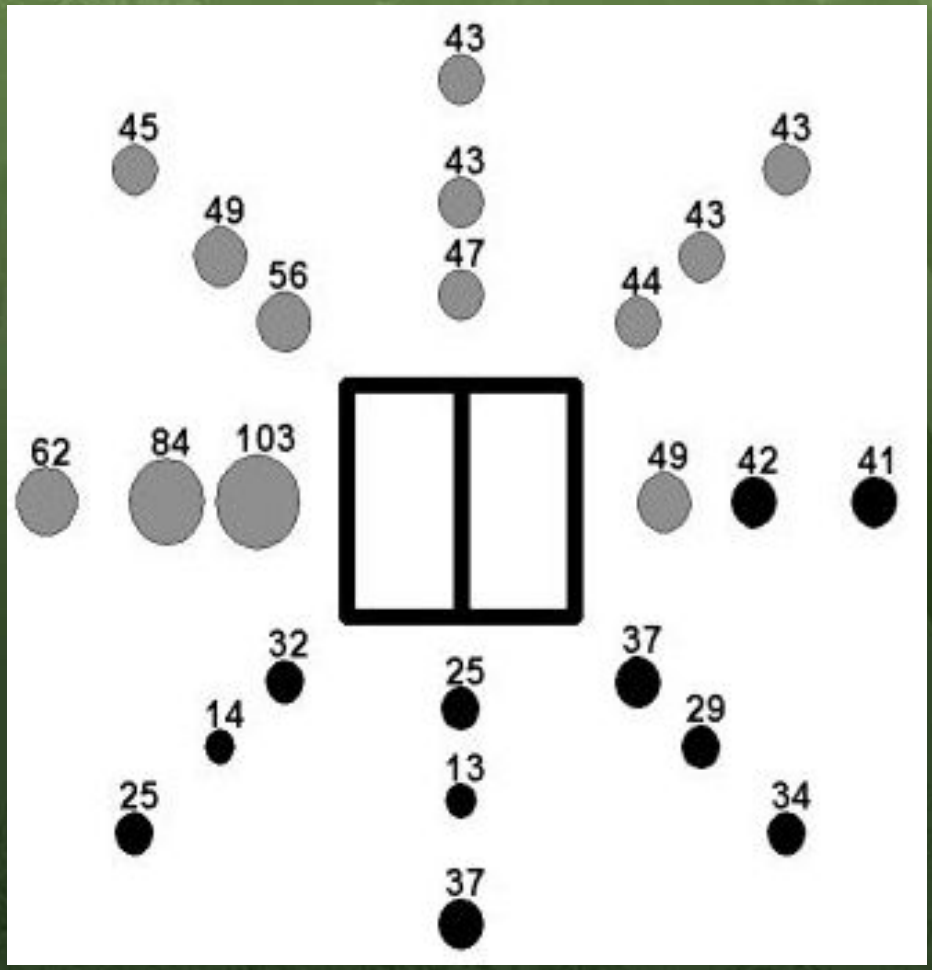
Carbon Sequestration

- Regional tree growth rates
- Vary by region
  - Species
  - Mature size
  - Growth rate
- Sequestered/yr
  - 20 to 100 kg
  - 50 to 220 lb



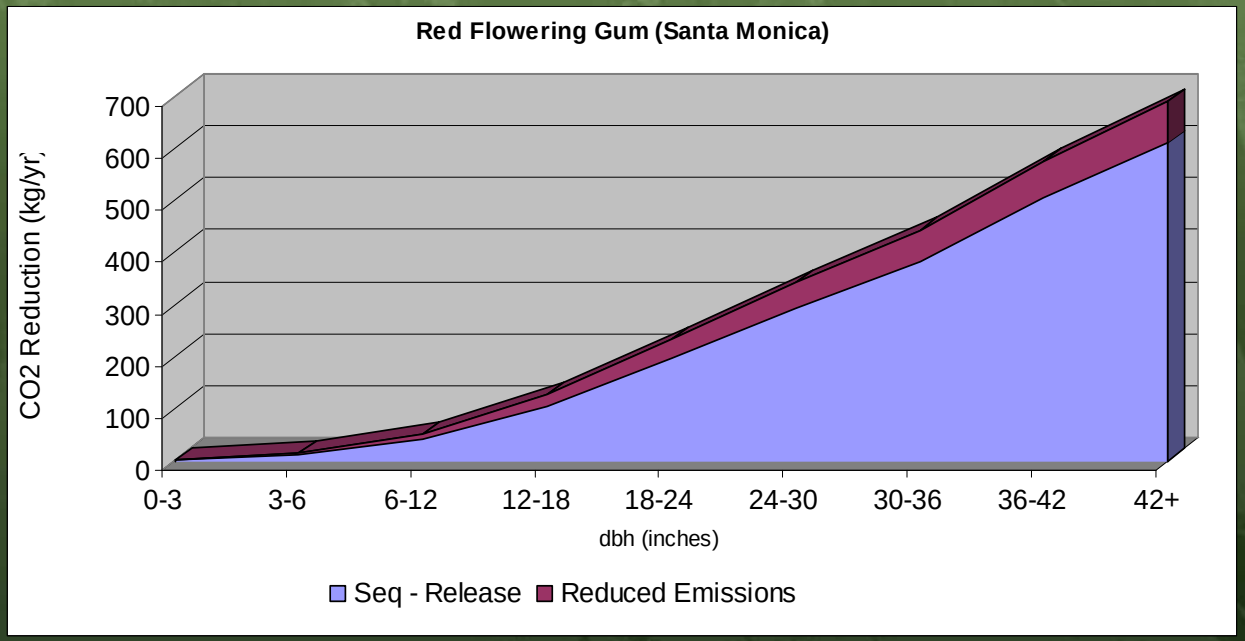
Energy Conservation Reduced GHG Emissions

- Building Energy Performance Simulations
  - Tree size, type, location
  - Climate
  - Building
  - Utility



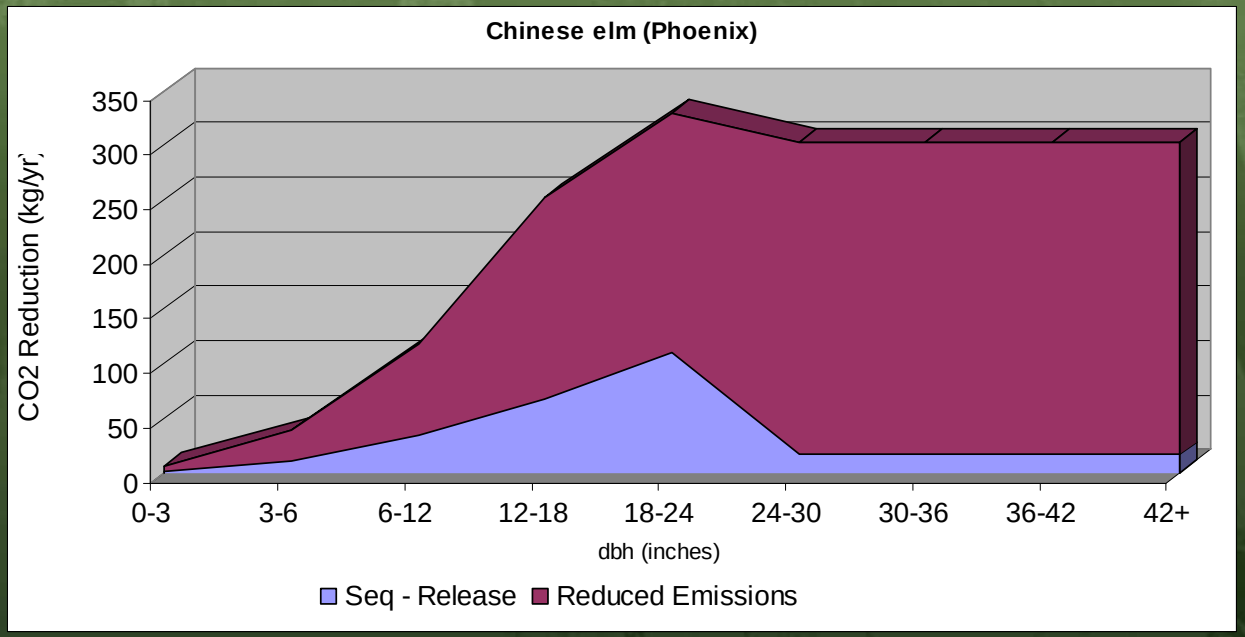
Energy Conservation Reduced GHG Emissions

- Climate
- Building
- Utility
- Tree



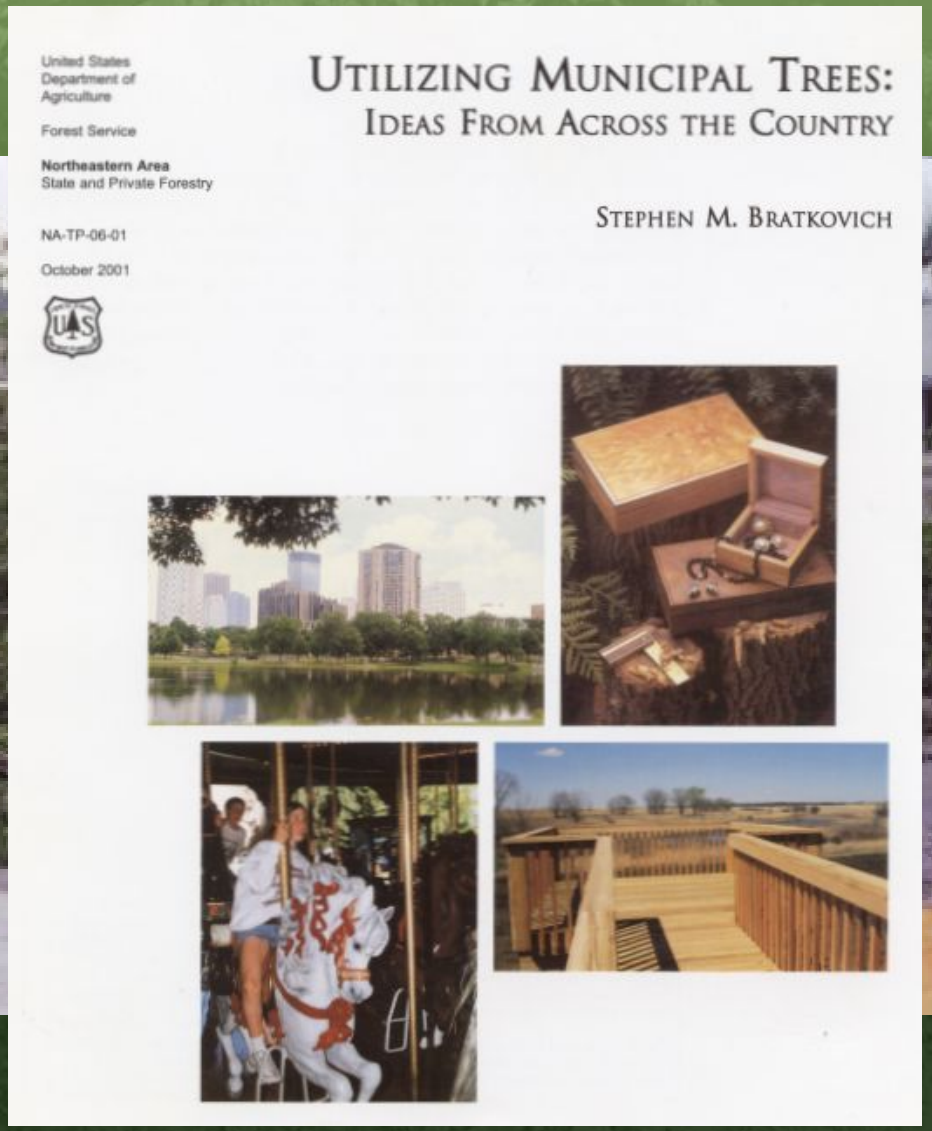
Energy Conservation Reduced GHG Emissions

- Climate
- Building
- Utility
- Tree
- Reduced/yr
  - 0 to 140 kg
  - 0 to 300 lb



Other GHG Benefits

- Fuel for biopower
- Wood products
- Biomass/yr
  - 10 to 45 kg
  - 25 to 100 lb
- Tree Carbon Calculator
  - http://www.fs.fed.us/ccrc/topics/urban-forests/

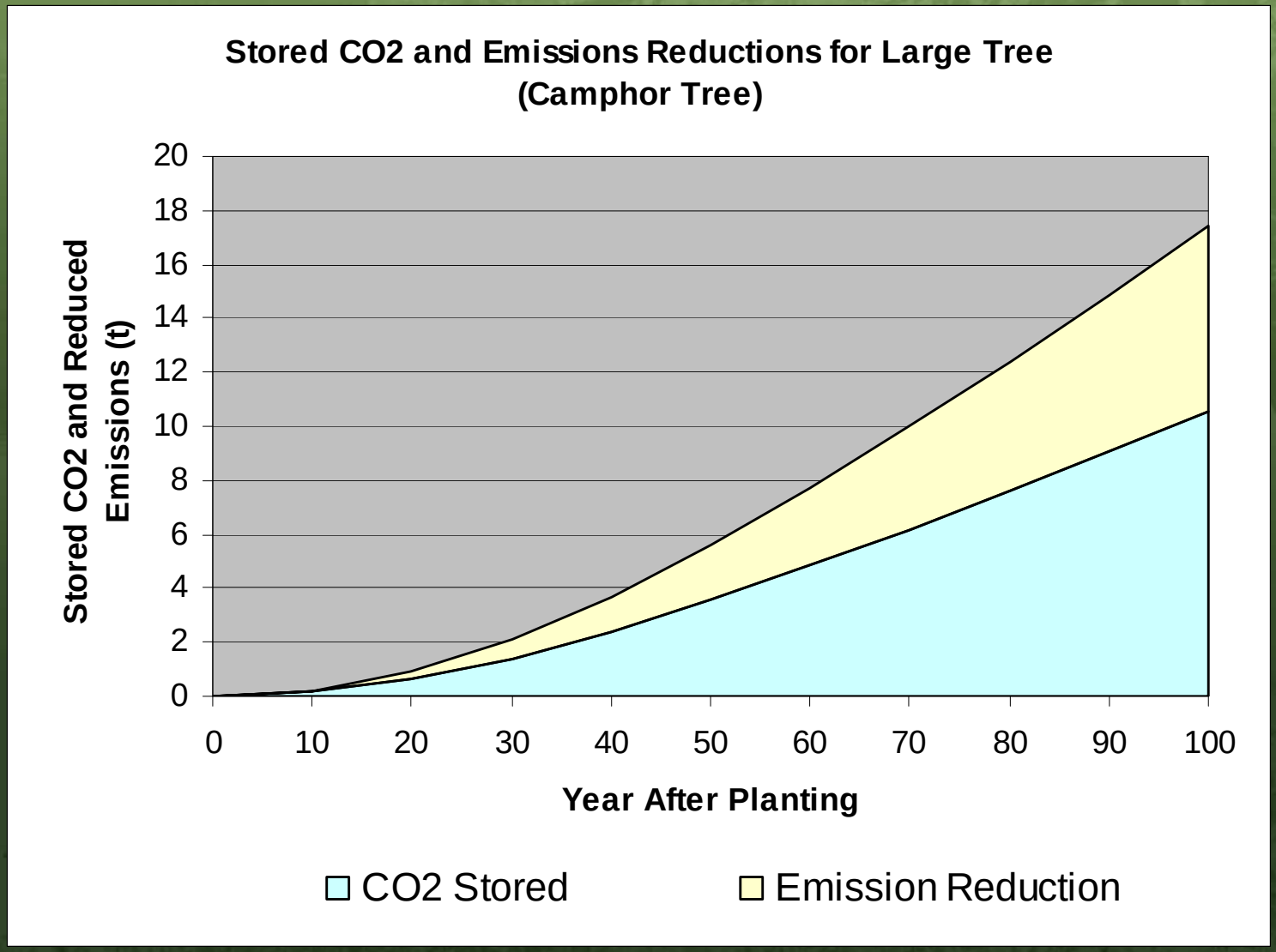


Emissions from Tree Care

- Vehicles
- Equipment
  - Aerial lift
  - Chipper
  - Chain saw
- Other
- Emissions/yr
  - 5 to 25 kg
  - 10 to 50 lb

Santa Monica

Large tree – West-facing , 20-40ft



What do we have now?

- Field Survey
  - UFORE /FIA Plots
  - Species, size, canopy cover, condition, location
- Storage
- Sequestration
- Energy Conservation
- Emissions survey

What do we have now?

- Remote Sensing
  - Tree canopy cover
  - Potential tree planting sites
  - Land use
- Scale-up storage
  - t/m2 of plot area
  - t/m2 of tree canopy
  - t/m2 by land use
- Sequestration & Emissions

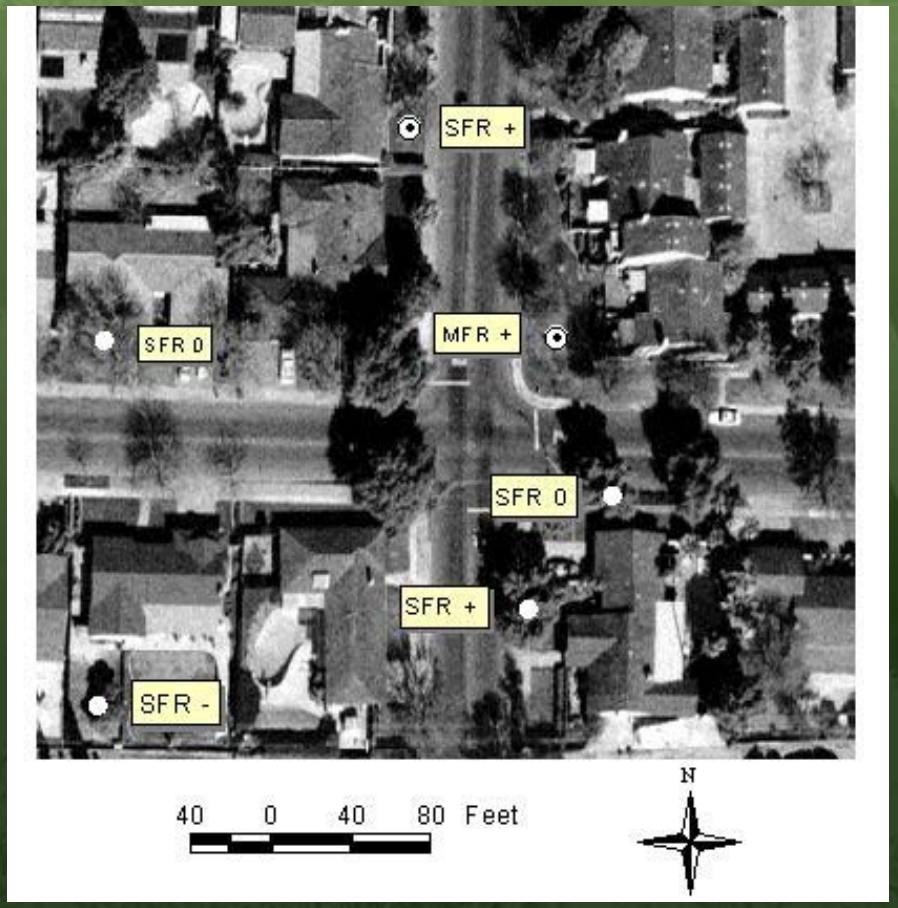
What did we have?

- Field Surveys
  - SUFES Plots 1995
  - Other biomass data
- Remote Sensing
  - 21 Calif. Cities, 1988-92

Aerial Photos & Energy Simulations

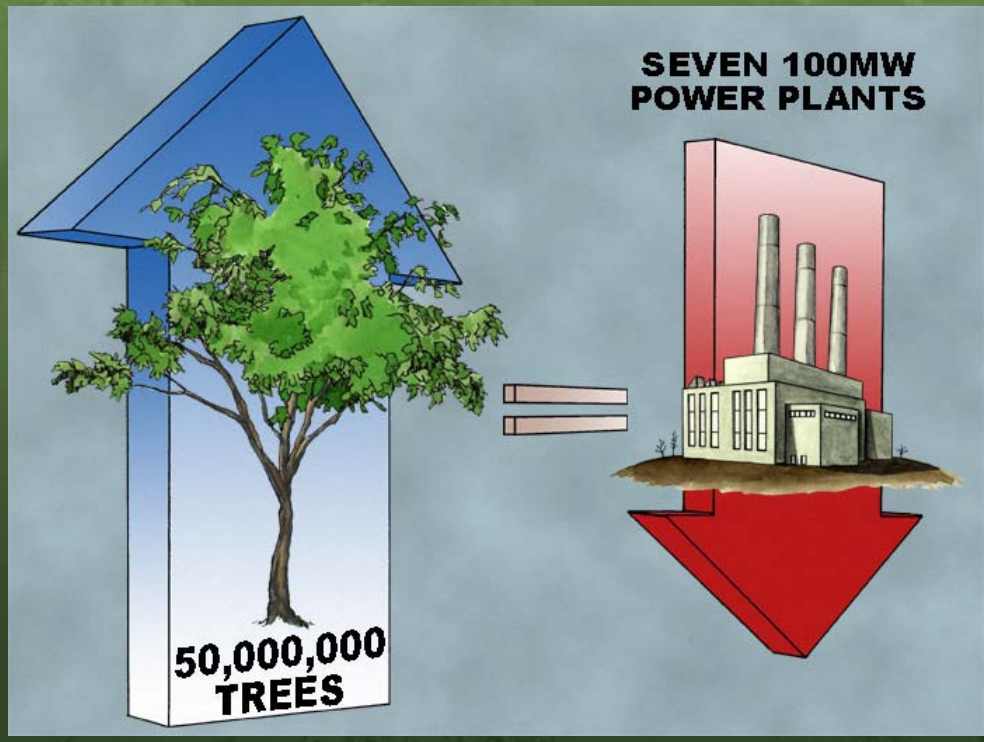
- 177 million trees
- 5 trees per capita
- 242 million empty sites
- 120 million plantable

- 6,400 GWh AC savings



What will we have?

- 50 million trees, 15 yr
- 6,400 GWh/yr, $485M
- Reduced emissions 1.8 Mt/yr
- Sequester 4.5 Mt/yr
- Total 6.3 Mt/yr



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- 6,400 GWh/yr, $485M
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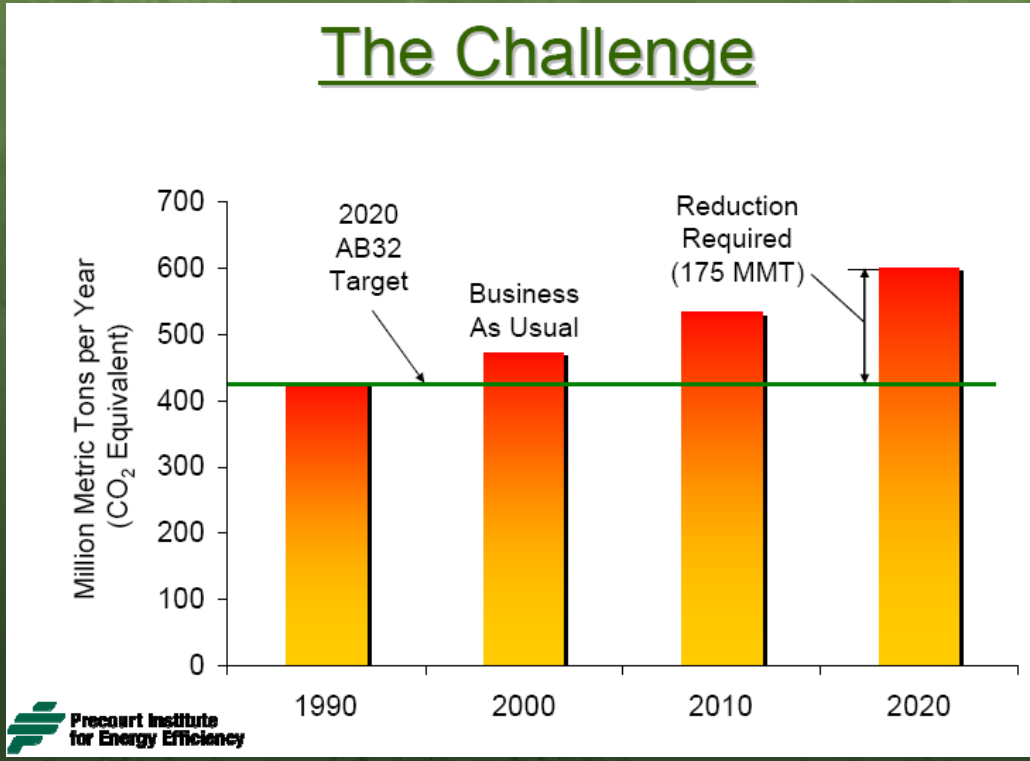
- Sequester 4.5 Mt/yr
- Total 6.3 Mt/yr
- 4% of CAT target



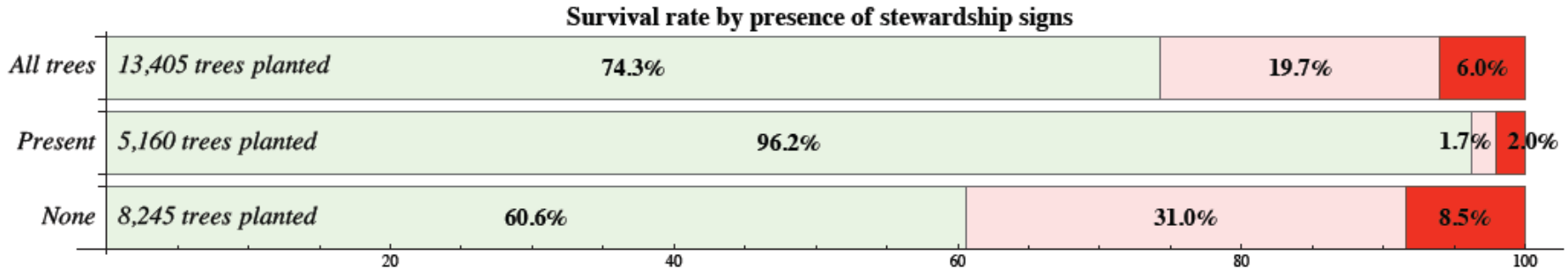
What will we have?

- Baseline: existing urbanized
  - Trend from 1990 to present
  - Replacements
  - Planting new sites
- Baseline: new urbanized
  - Tree density by land use
  - Replacements
  - Planting new sites
- Planting scenarios
  - Tree mix, location, density
  - Energy & emissions

What will we have?

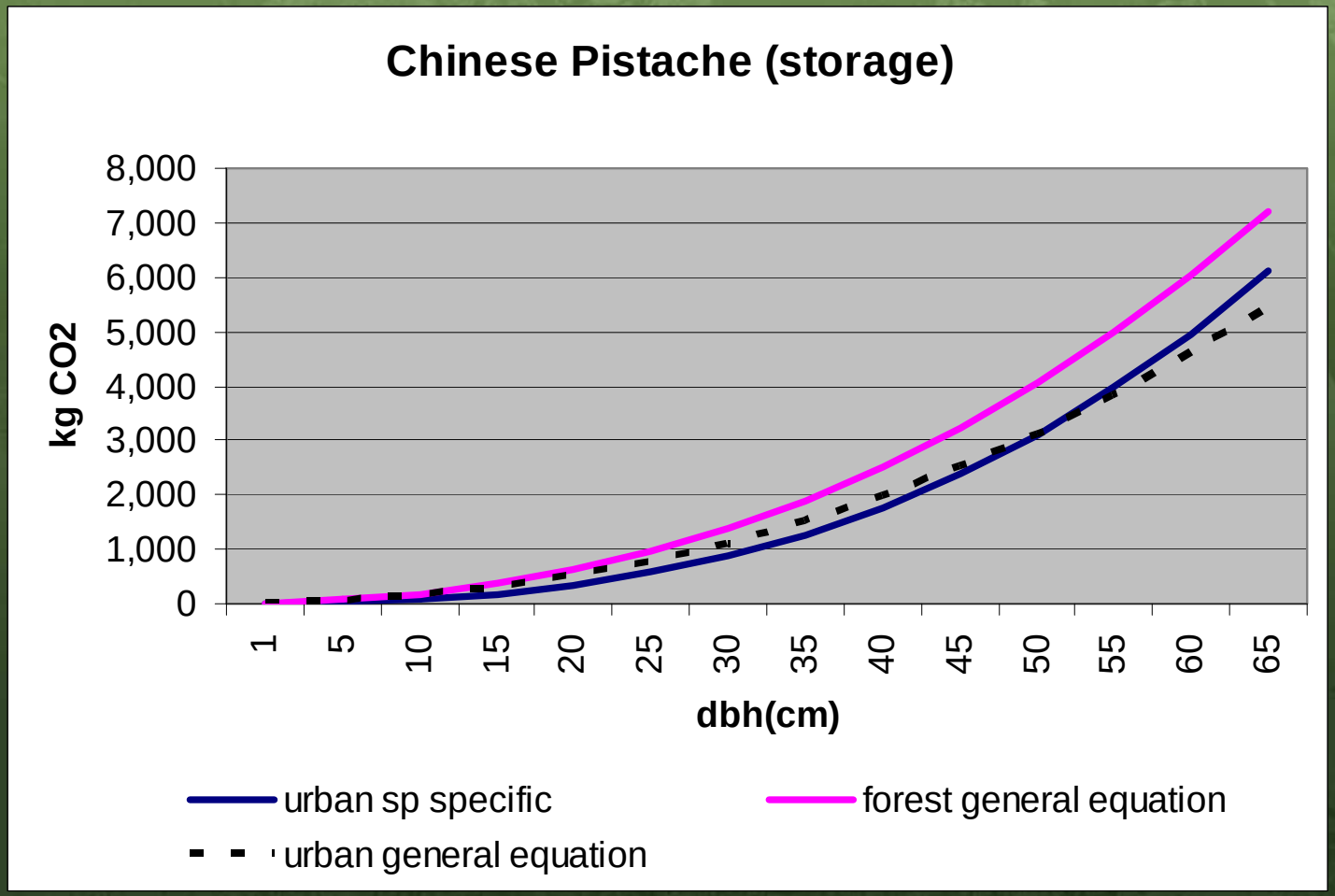
- Baltimore: 4% loss/yr
- Sacramento: 5% loss/yr
- NYC: 4% loss/yr

Signs of stewardship include: presence of signage on or around the tree; clean recent pruning cuts; plantings in the street tree pits; mulch placed in pit and evidence of weeding.



Stewardship

Results


Chinese Pistache (storage)
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
kg CO2
1
5
10
15
20
25
30
35
40
45
50
55
60
65
dbh(cm)
urban sp specific
forest general equation
urban general equation

Key Research Questions

- Accuracy of remote sensing alone for current forest
  - General equations
- Accuracy of remote sensing for backcast
  - Tree canopy cover
- Accuracy of forecast
  - 1994 to 2006
- Urban tree biometrics
- Energy conservation
- Life-cycle analysis

Discussion

www.fs.fed.us/psw/programs/cufr