Rocky Mountain States Section Air & Waste Management Association Meeting of March 27, 2008

Next Meeting on Thursday May 22, 2008
at the National Park Service offices near Wadsworth and Hampden Jeff Collett, Head of the CSU Atmospheric Chemistry Department will discuss Rocky Mountain National Park Nitrogen and Sulfur Deposition Study (RoMANS)

Roger Pielke, Sr's Climate discussion will be rescheduled for September or October

AWMA Rocky Mountain States Section 2008 Election Results

Officers:

- Chair, Dave Maxwell
- Vice Chair, Sharon Good
- Secretary, Eric Larsen
- Treasurer, Joe Miller

Board members:

- Gale Biggs
- Tom Hormel
- Andrea Hyatt
- Bob King
- Denise Onyskiw
- Katrina Winborn
- Peg Young
- Kip Carrico

Real environmental improvements: Independent scientific analysis & stakeholder involvement

Air & Waste Management Association
Denver, March 27, 2008
Rocky Mountain States Section

Carol E. Lyons, Executive Director, Institute for Environmental Solutions (IES)

Gale Biggs, Board Member, IES

Kristen Bertuglia, Senior Research Associate, IES

Desiree Thorp, Research Associate, IES

www.I4ES.org

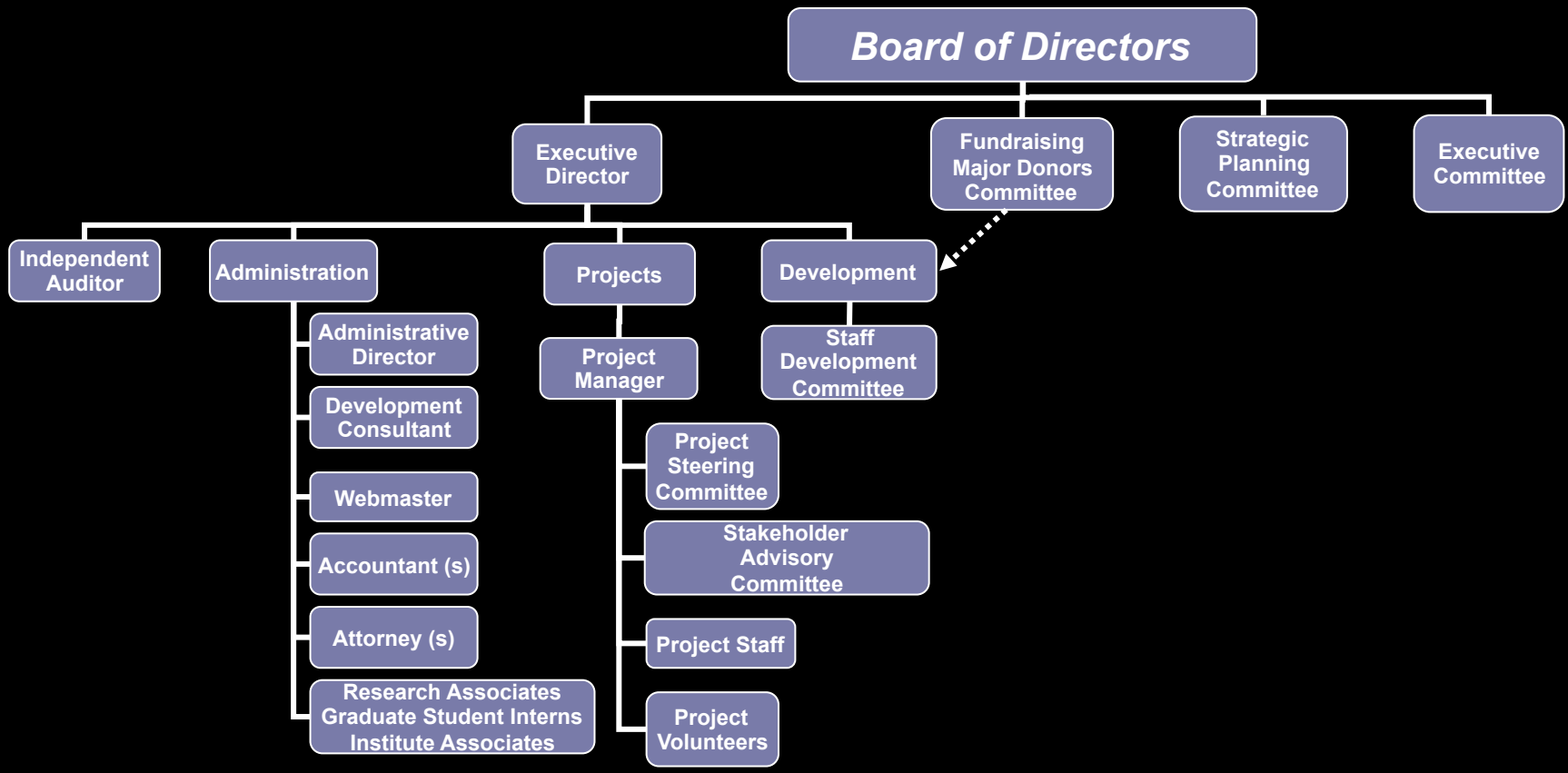
Institute for Environmental Solutions

An innovative approach to solving environmental problems, based on independent scientific analysis and stakeholder involvement

Mission:

To deliver proactive technically sound solutions to complex environmental and natural resource problems - without unwanted side effects.

Who we are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Projects
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Administrative Director
Development Consultant
Webmaster
Accountant (s)
Attorney (s)
Research Associates
Graduate Student Interns
Institute Associates
Project Manager
Project Steering Committee
Stakeholder Advisory Committee
Project Staff
Project Volunteers
Staff Development Committee

The IES approach

- Stakeholder involvement
  - Uniting businesses, government, academia and communities
- Scientific integrity
  - Independent
  - Transparent
  - Multidisciplinary

Key elements

- Independence and objectivity
- No assumptions or agenda – just proven science
- Involvement of stakeholders in project design and implementation – the secret to success (and headaches)
- Defined (and limited) scope

Why?

Traditional, problem-solving approaches have limited effectiveness

Science provides accurate solutions free of emotion or bias with broad stakeholder involvement and independent and objective analysis

Calculating Environmental Tradeoffs in the Front Range

The Tree Project: Integrated Urban Environmental Improvement Through Tree Selection and Management

The Tree Project: Phase 1, 2006

Goal: To identify how trees can optimize:

- Air quality
- Water conservation
- Energy conservation
- Carbon sequestration

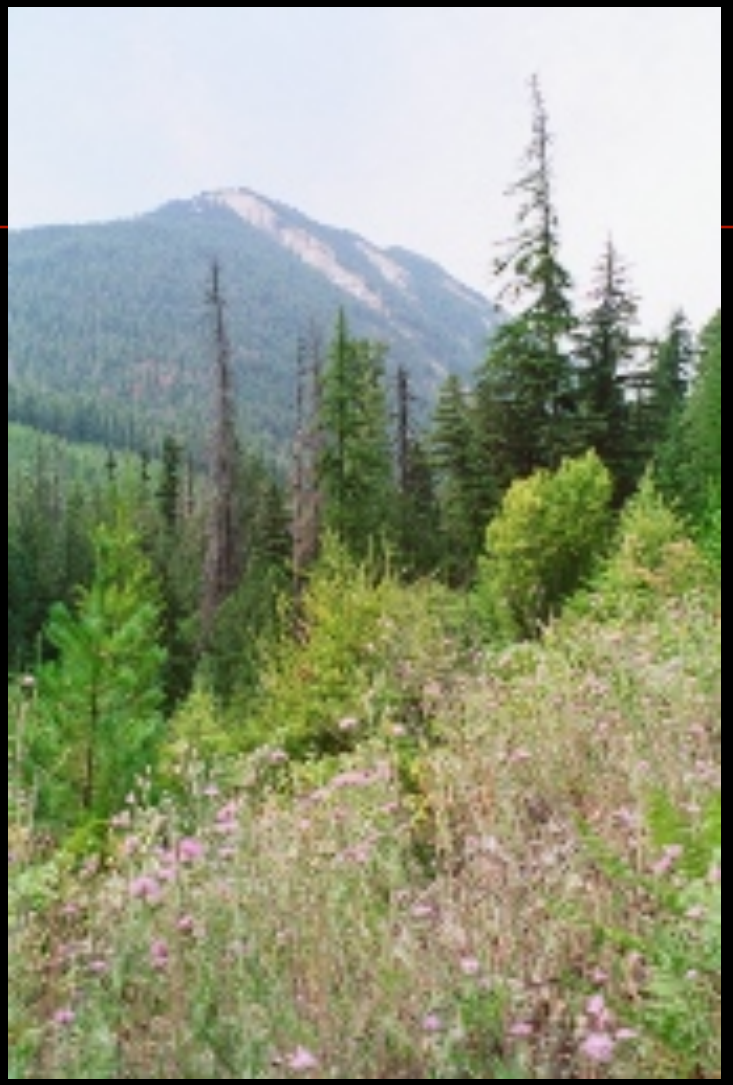
Background research

Steering Committee

Stakeholder tutorials

Stakeholders

- Utilities
- Academia
- Government agencies
- Communities
- Developers
- Municipalities
- Industry



The Tree Project: Phase 2, 2007

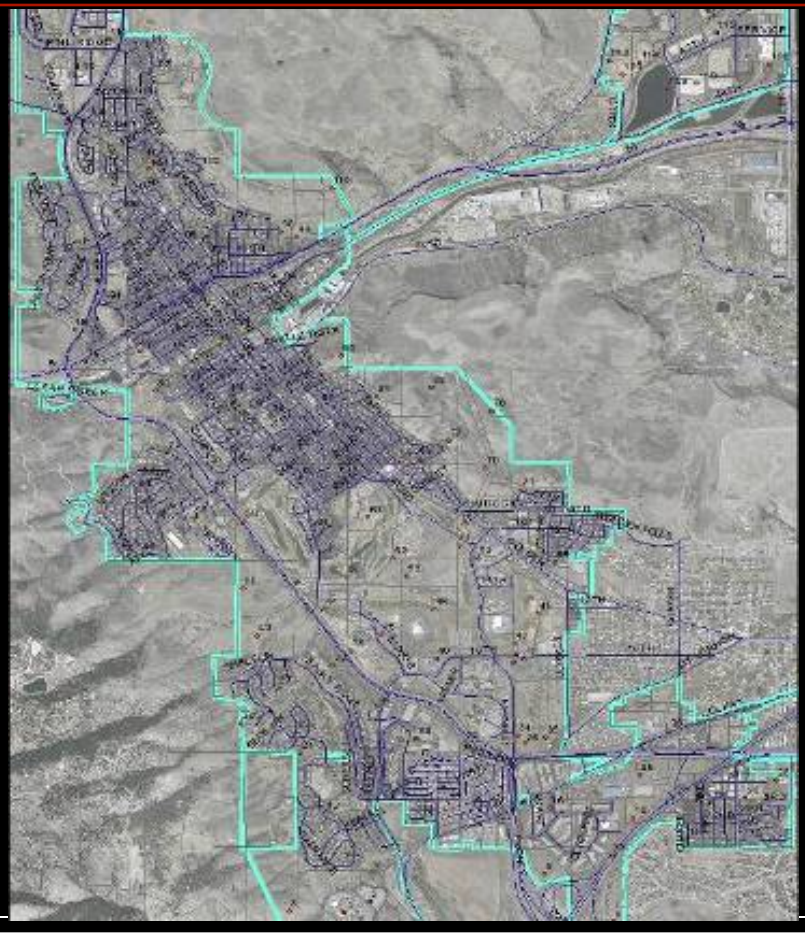
1. Stakeholder workshops

2. Scientific study
   - Air/Carbon
   - Energy
   - Water
   - Social

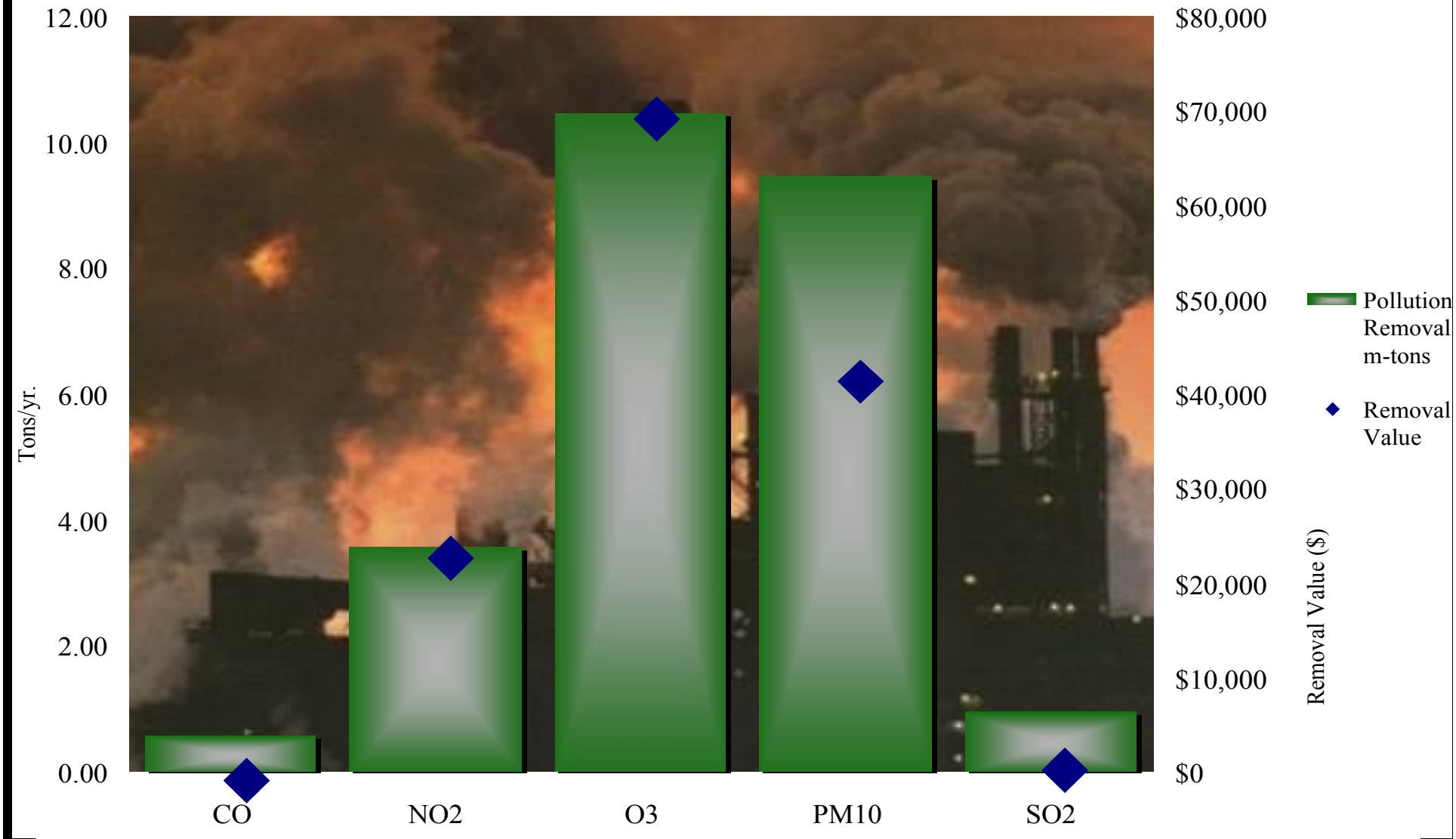
3. Phase 2 Report

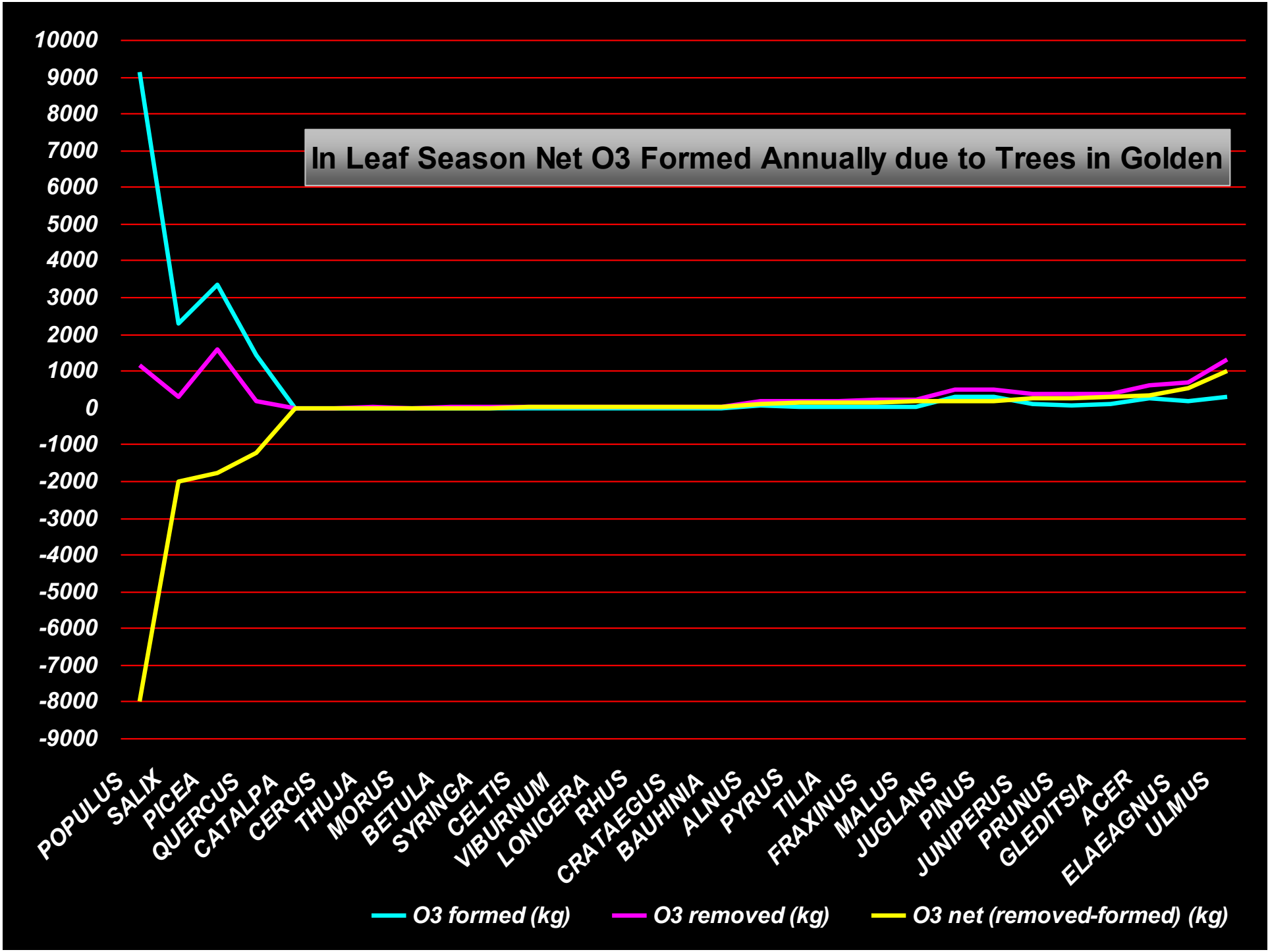
i-Tree urban forestry analysis tool

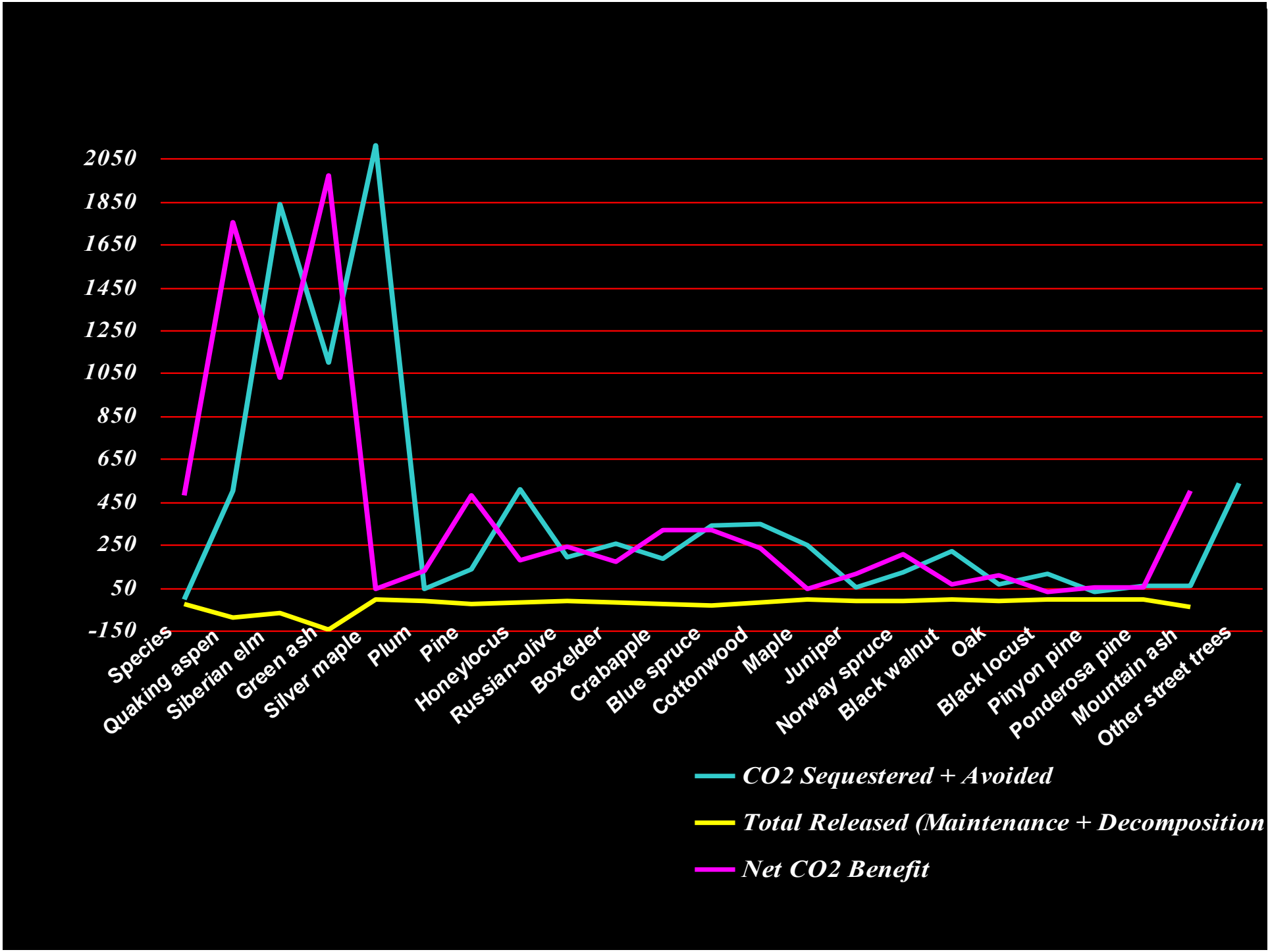
- 3-day field program
- 119 sample plots
- Determined:
  - Carbon sequestration
  - Air quality
  - VOC emissions
  - Energy



Annual Pollution Removal by Golden's Urban Forest




In Leaf Season Net O3 Formed Annually due to Trees in Golden
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
-1000
-2000
-3000
-4000
-5000
-6000
-7000
-8000
-9000
POPULUS
SALIX
PICEA
QUERCUS
CATALPA
CERCIS
THUJA
MORUS
BETULA
SYRINGA
CELTIS
VIBURNUM
LONICERA
RHUS
CRATAEGUS
BAUHINIA
ALNUS
PYRUS
TILIA
FRAXINUS
MALUS
JUGLANS
PINUS
JUNIPERUS
PRUNUS
GLEDITSIA
ACER
ELAEAGNUS
ULMUS
O3 formed (kg)
O3 removed (kg)
O3 net (removed-formed) (kg)


2050
1850
1650
1450
1250
1050
850
650
450
250
50
-150
Species
Quaking aspen
Siberian elm
Green ash
Silver maple
Plum
Pine
Honeylocus
Russian-olive
Boxelder
Crabapple
Blue spruce
Cottonwood
Maple
Juniper
Norway spruce
Black walnut
Oak
Black locust
Pinyon pine
Ponderosa pine
Mountain ash
Other street trees
CO2 Sequestered + Avoided
Total Released (Maintenance + Decomposition
Net CO2 Benefit

Trees and Particulate Matter (PM)

Benefits

- Trees trap particulate matter on their leaves, trunk and branches.
- Evergreens are great for all year-round particulate matter interception.

Costs

- Tree maintenance equipment and activities can cause emissions from fossil fuel combustion.

Trees in Golden remove 9 tons of PM10 per year from the air, worth over $40,000.

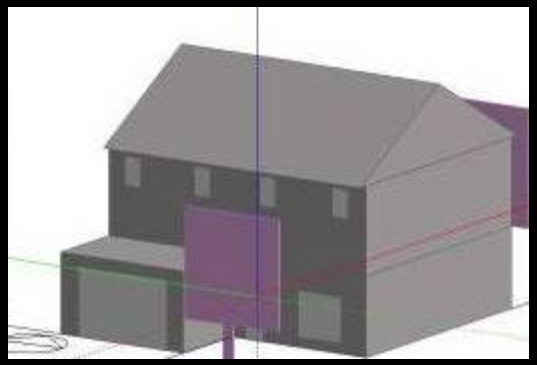
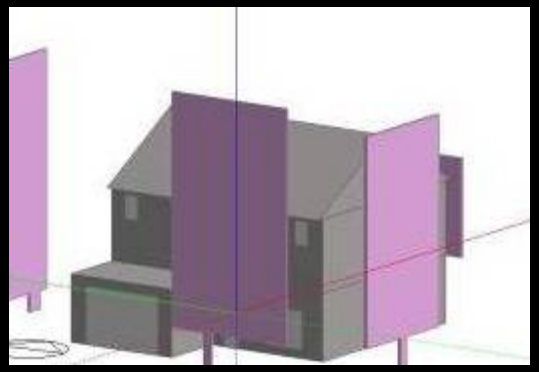
Trees and water conservation

- Do trees conserve or consume water?
- Pilot study
- Evaluating trees' impact on irrigated lawns
- 14-day field program
- 1,344 soil samples

Water results

- Results were not what we expected [that's why we do measurements].
- Soil moisture under the tree was less than the soil moisture not under the tree.
- There was a significant difference between the soil moisture content and the three different species.
- Indirect savings at power plants

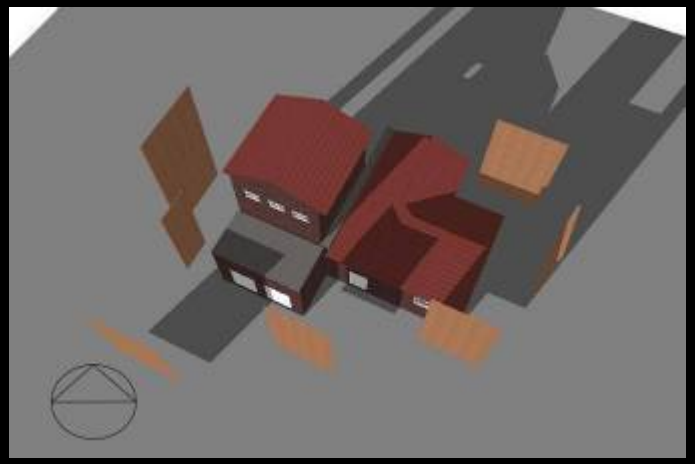
Trees and energy conservation

- Modeled real homes, comparing energy use under three landscape scenarios:
  - Existing trees
  - No trees
  - Additional trees

Energy results

- Trees impact a building's energy use.
- Trees usually increase energy use in the winter.
- Trees usually save energy use in the summer.
- Net positive benefit because energy saved in the summer is more costly per unit.



Attitudes and knowledge

- Survey data collection
- In person, at large public events
- Over 300 completed
- Revealed barriers to tree planting

Conclusions: complex tradeoffs

- Potential Benefits
  - Summer energy conservation
  - Shading/water conservation
  - Improved air quality
  - Climate change mitigation
- Potential Costs
  - Winter energy consumption
  - Increased water consumption
  - VOC emissions (ozone potential)

The Tree Project: Phase 3 2008

- Apply the scientific study's findings to educational and public outreach activities.
- Identify and develop methods to inform public policy for environmental improvement.
- Build on the results and knowledge gained in Phase 2 by expanding the project to include more communities and new questions.

Linking science and policy

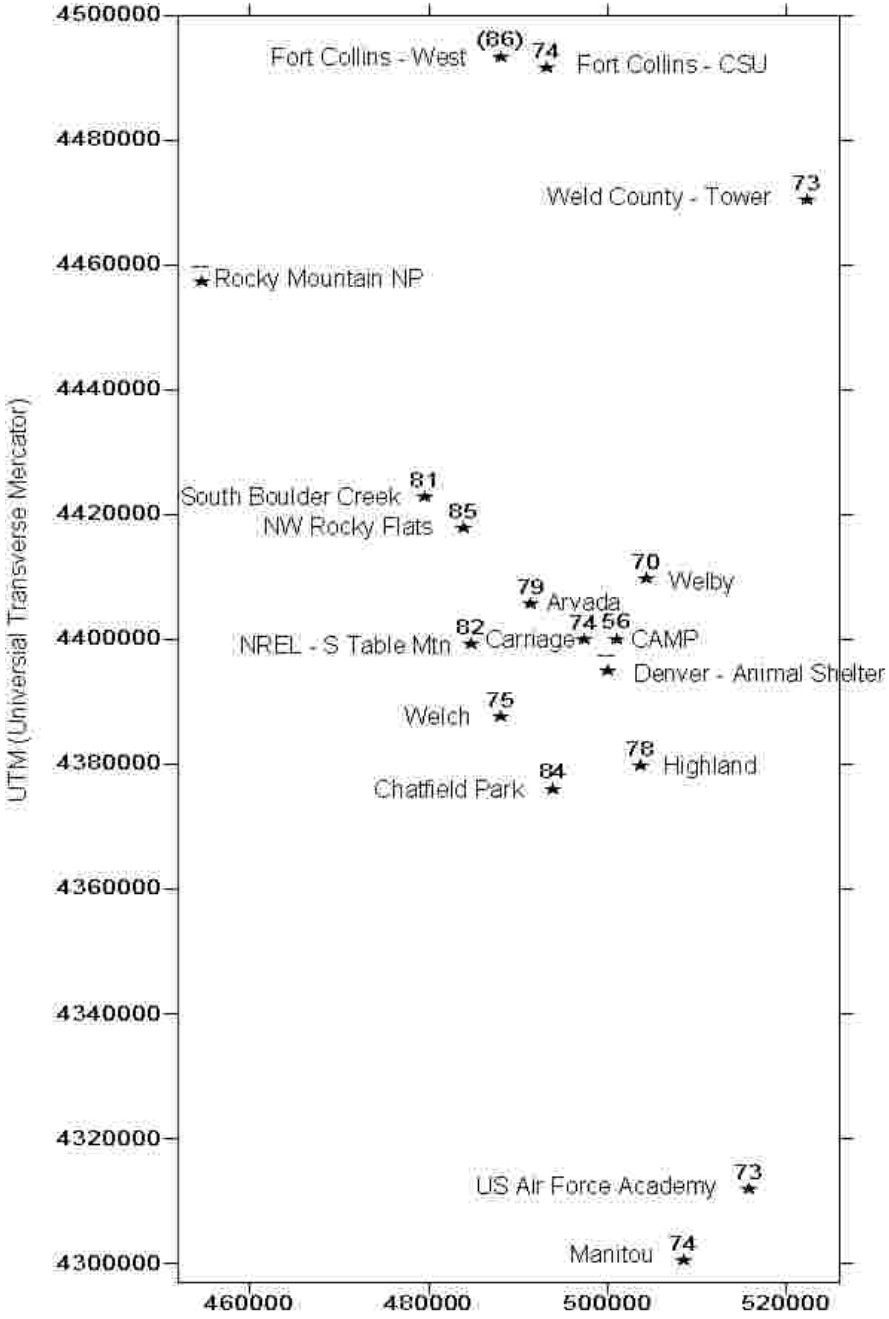
- Strategic tree planting plans
- Web tool for landscape design
- Modeling tree impacts on air quality for pollution control
- Greenhouse gas offsets

Denver's ozone

On July 20, 2007, the nine-county Denver region violated the federal health-based 8-hour standard for ground level ozone with a reading of 0.088 parts per million (CDPHE July 23rd, 2007).

November 20, 2007, Denver is designated as nonattainment for ozone (EPA 2007).

COLORADO OZONE MONITORING STATIONS
(values in parts per billion)



Trees and air quality

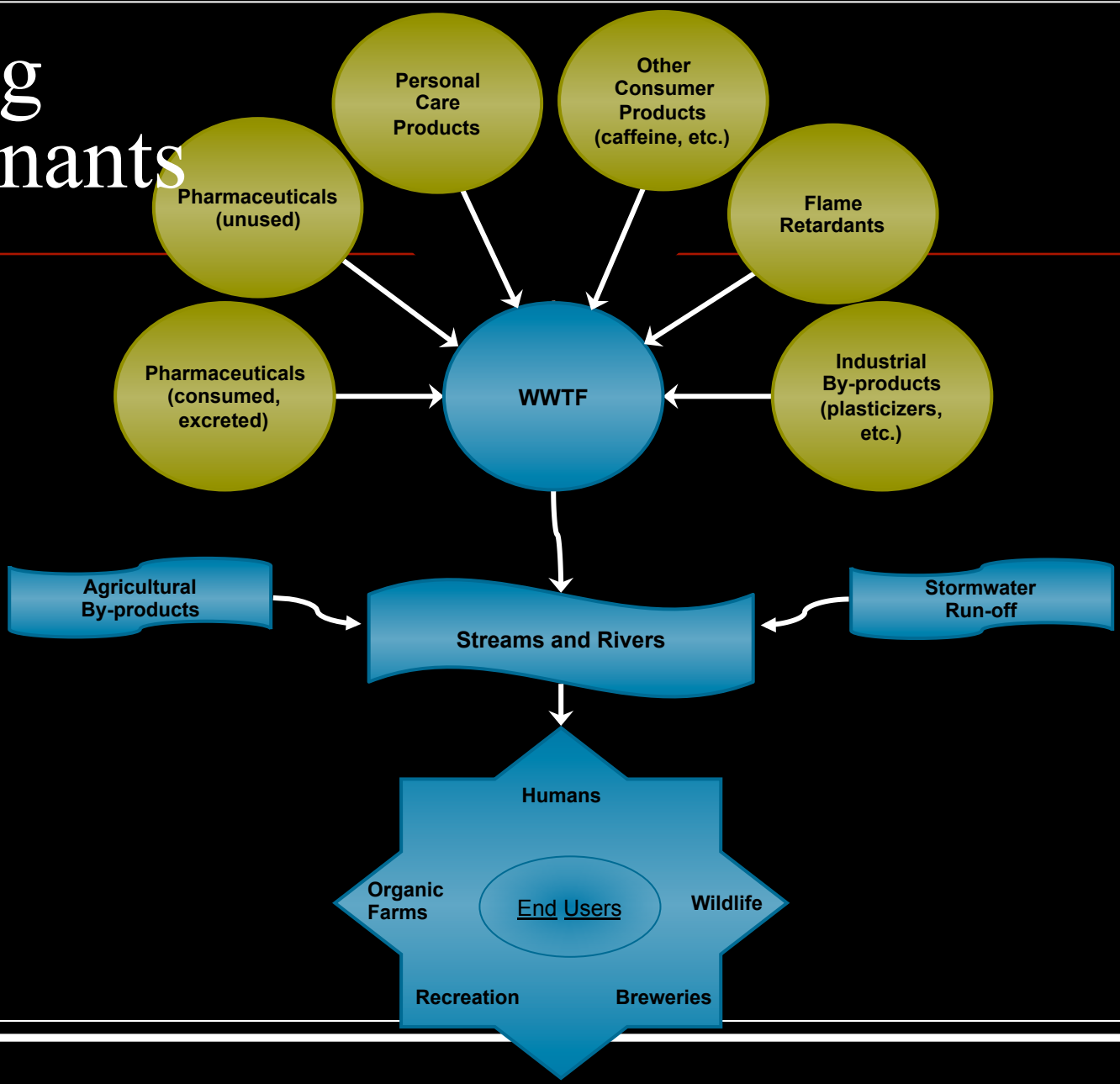
Trees can reduce the ozone concentrations as follows:

- Trees ingest ozone through their stomata
- Trees lower the ambient temperatures, thus preventing ozone from forming
- Trees undergo leaf damage from ozone, which reduces ozone concentrations
- During high temperatures and high ozone concentrations, they emit VOCs which will, in turn, destroy ozone

Lodgepole pine

- Beetles are destroying the Lodgepole pine trees in Colorado.
- The Beetle infestation is moving east towards the communities along the base of the Front Range.
- The loss of trees in the area of maximum ozone formation could exacerbate the ozone problem.

Emerging Contaminants



Issues

- Hundreds of potential chemical contaminants
- Complex effects of ECs on human and wildlife
- Difficult to link cause and effect
- Everyone is stakeholder
- Effective pollution reduction strategies need to be identified and tested
- Prevention may be key

Next steps:
Linking science to effective action

- Collaborate on new approaches
- Convene stakeholders
- Evaluate mitigation strategies
- Inform public

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EMERGING CONTAMINANTS

INSTITUTE FOR ENVIRONMENTAL SOLUTIONS

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THE TREE PROJECT
ENERGY • WATER • AIR

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