Review of 2014 and Discussion of 2015
Main Focus: Bay Area’s Energy Future

Four reports (Eight speakers):
• The Path Forward for the Energy Sector Toward California’s 2050 Greenhouse Goal. February – April. Complete.
• Energy and Climate Opportunities for the Bay Area. September – November. Complete.

• Annual Report (presentation) to the Board of Directors by June 2015.
Discussion of 2015
Urban Heat Island; Brief Description

S: Sensible heat flux
E: Latent heat flux (evaporation)
R: Reflection (albedo)
G: Ground absorption
**Potential areas for investigation**

*Definition:*
- Scientific description

*Impacts on:*
- Energy Use (air conditioner)
- Climate
- Air Pollution (ozone, PM2.5?)
  - Biogenic emissions
  - Ozone chemistry
- GHG Emissions
- Public Health (Example: 2006 heatwave, SF Health Department)

**Possible Mitigation Strategies:**
- Increasing areas covered with vegetation and trees
- Adopting cool roofs and pavements
- Others

*Very limited information on UHI impacts and mitigation strategies for the Bay Area.*
Discussion of 2015 (cont.)
Discussion on Possible Mitigation Strategies

Rural

Solar

\[ S \quad E \quad R \]

\[ G \]

Urban with increased tree density and coverage

Urban

Solar

\[ S \quad E \quad R \]

\[ G \]

Urban with increased cool roofs and pavements

S: Sensible heat flux
R: Reflection
E: Latent heat flux (evaporation)
G: Ground absorption
Discussion of 2015 (cont.)

Possible mitigation strategies:
Increasing areas covered with vegetation and trees

- Mitigation process: Evapotranspiration
  - Transfers a fraction of sensible heat to latent heat

<table>
<thead>
<tr>
<th>Location</th>
<th>Bowen ratio (day-time)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>4.00</td>
</tr>
<tr>
<td>Grassland</td>
<td>2.00 (non-irrigated)</td>
</tr>
<tr>
<td>Forest</td>
<td>0.60</td>
</tr>
<tr>
<td>Water</td>
<td>0.10</td>
</tr>
<tr>
<td>San Francisco</td>
<td>0.50</td>
</tr>
<tr>
<td>Oakland</td>
<td>0.75</td>
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<tr>
<td>San Jose</td>
<td>2.20</td>
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<tr>
<td>Livermore</td>
<td>2.08</td>
</tr>
<tr>
<td>Concord</td>
<td>2.38</td>
</tr>
</tbody>
</table>

Bowen ratio = $\frac{\text{Sensible heat flux}}{\text{Latent heat flux}}$
Discussion of 2015 (cont.)

**Possible mitigation strategies:**
Adopting cool roofs and pavements

- Mitigation process: Reflects solar energy (reduces heat absorption)
  - Albedo of regular roofs (0.05 – 0.20)
  - Albedo of cool roofs (0.40 – 0.80)
    - Depends on roof angle and color of roof material
  - Albedo of urban and rural areas (0.15 – 0.20); forest (0.12 – 0.15)
  - Cool roofs
  - Cool pavements
A Sample Albedo Map of San Francisco
CEC’s Building Climate Zone Map

Based on temperature and energy use

(used for various regulations and incentives; Title 24)
Discussion of 2015 (cont.)

Presentations on mitigation strategies:

• Mitigation of Urban Heat Island Effects by Increasing Areas Covered with Vegetation and Trees (January 2015).
  John Melvin, State Urban Forester
  Urban Forestry Advisor Staff
  California Department of Forestry and Fire Protection
  Sacramento

• Mitigation of Urban Heat Island Effects via adopting cool roof and cool pavement strategies (February 2015).
  Ronnen Levinson, Ph.D.
  Staff Scientist, Heat Island Group
  Lawrence Berkeley National Laboratory
  Berkeley

• Others if time permits
About me.

• B.S. in Forestry, Humboldt State University.
• ISA Certified Arborist (WE-5889A)
• CA Urban Forests Council Cert. Urban Forester #101
• Registered Professional Forester #2817
• Wildland Fire Training
• Medical and Hazmat First Responder Training
• Work experience in forestry, urban forestry, arboriculture, wildland fire, medical first response, and GIS.
What I Do

• Assist CAL FIRE upper management in developing policy and legislation in regards to urban forestry, urban greening, and climate change.

• Run day to day operations of the Urban Forestry Program. (Supervision, grant administration, budgeting, etc.)

• Public relations and advocacy within state government and externally.

• Media relations.

• Policy interpretation and decision making.

• Getting urban forestry into other policy areas.
CAL FIRE’s Urban & Community Forestry Program

- Technical assistance and advice
- Public and professional education
- Public events
- Local and regional advocacy
- Networking and partnerships
- Technology transfer
- Grants
- Conduit to national programs
Why CAL FIRE Does Urban Forestry

The California Urban Forestry Act of 1978 (PRC 4799.06-4799.12)

- Promote the use of urban forest resources for purposes of increasing integrated projects with multiple benefits in urban communities.
- Arrest the decline of our urban forest resources, facilitate the planting of trees in urban communities, and improve the quality of the environment in urban areas through the establishment and improved management of urban forest resources.
- Facilitate the creation of permanent jobs in tree maintenance and related urban forestry activities in neighborhood, local, and regional urban areas.
- Optimize the potential of tree and vegetative cover in reducing energy consumption and producing fuel and other products.
- Encourage the coordination of state and local agency activities in urban forestry and related programs and encourage maximum citizen participation in their development and implementation.
- Prevent the introduction and spread within this state of known and potentially damaging or devastating pests and diseases, including, but not limited to, Dutch elm disease, pine pitch canker, sudden oak death disease, the Asian long-horned beetle, and mistletoe.
- Reduce or eliminate tree loss resulting from these diseases and others that are identified.
Program Highlights

• Staff of 9, six field specialists, one state coordinator, two analysts

• Websites = www.ufei.org and www.fire.ca.gov
  - SelecTree/CA Big Trees Register/Urbanwood/ForestTree

• CA ReLeaf Network = 100+ Community Groups

• CaUFC/Regional councils

• Grant Programs (GGRF)
  a. Green Trees For The Golden State
  b. Management Activities
  c. Green Innovations
  d. Woods in the Neighborhood
  e. Urban Wood and Biomass Utilization

• Tree City USA awards – 162 cities, 12 Tree Line Utilities,
  8 Tree Campus

• Applied Research & Demonstration
Regional Urban Foresters

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For more information visit:
http://www.fire.ca.gov/resource_mgt/resource_mgt_urbanforestry.php
James Scheid, Regional Urban Forester

Courtesy of Urban ReLeaf and the Golden State Warriors
Definition?
Urban Forestry Defined

PRC (UF Act Definition)

"Urban forestry" means the cultivation and management of native or introduced trees and related vegetation in urban areas for their present and potential contribution to the economic, physiological, sociological, and ecological well-being of urban society.

Note: Forests are more than just trees, and so are urban forests!
In its broadest sense, Urban Forestry embraces a multi-managerial system that includes, but is not limited to:

- Urban and environmental planning
- Landscape architecture
- Recycling/utilization of urban biomass
- Arboriculture
- Social science
- Economics
- Public health
- Fire ecology/fire management
- Outdoor recreation opportunities
- Fish and wildlife management
- Watershed management (water quality, hydrology, storm water management)
- Engineering
- Forest Management
Urban Forestry

- Ecosystems Management Approach (ex: Greenprint in Sacramento)
- Functional Design
- Sustainability (economic, social, environmental)
- Stewardship – the big buy-in!
- Benefits vs. Costs
- Common Sense – A Rare Win/Win.
Urban Forest Benefits

- GHG storage and avoided emissions
- Energy Conservation
- Air Quality
- Conserving Runoff
- Water quality improvement
- Economic (property value +)
- Public Health
- Much more.
The Urban Forest Industry 2009 (Clemson Study)

- $3.6 billion value added to State economy
- Approx. 60,000 Jobs
- Labor income: $2.041 Billion
- Total income: $2,876 Billion
- $246 Million in state and local taxes
Overview of AB 32 and SB 535

• **AB 32 – The Global Warming Solutions Act of 2006**
  - Air Resources Board is the lead agency. They have a “Scoping Plan”, and an “Investment Plan” to achieve the goals set under AB 32.
  - [http://www.arb.ca.gov/cc/ab32/ab32.htm](http://www.arb.ca.gov/cc/ab32/ab32.htm) - for more information.

• **SB 535 - 2012**
  - Set aside a portion of money collected from cap and trade revenue into a trust fund which will dedicate the money to programs and projects that reduce greenhouse gas emissions and mitigate the direct health effects of climate change for the most impacted and disadvantaged communities.
  - Cal EPA has a methodology for using CalEnviroScreen 2.0 to identify disadvantaged communities, and how to serve them.
  - [http://www.arb.ca.gov/cc/capandtrade/auctionproceeds/auctionproceeds.htm](http://www.arb.ca.gov/cc/capandtrade/auctionproceeds/auctionproceeds.htm) for more information.
CAL FIRE Greenhouse Gas Reduction Fund (GGRF) Grants

- California Forest Improvement Program (CFIP)
- Forest Legacy Program (FLP)
- Reforestation Grant Program
- Fuels Reduction Grant Program
- State Demonstration State Forest Grant Program
- Programmatic Timberland Environmental Impact Report Grant Program

- **Urban and Community Forestry Grants**
  - Green Trees For The Golden State
  - Green Innovations
  - Woods In The Neighborhood
  - Urban Forest Management Activities
  - Urban Wood and Biomass Utilization

Grant Eligibility

- Projects must reduce GHG emissions and help meet the goals of AB 32. Details are in the RFP documents and the Procedural Guide.
- Grant projects must be in an urban area or urban cluster as defined by the US Census Bureau. See this link: [http://www.census.gov/geo/www/ua/2010urbanruralclass.html](http://www.census.gov/geo/www/ua/2010urbanruralclass.html)
- Grant projects must be located in a disadvantaged community or be directly serving a disadvantaged community.
  - Disadvantaged community status will be determined using the CalEnviroScreen 2.0 tool.
- Cities, counties, districts and 501C(3) non-profit organizations are eligible to apply (unless otherwise stated in RFP).
- Individuals, companies and federal agencies are not eligible.
Grant Requirements

- We always require best management practices.
- We inspect all grants at least annually.
- We assist grantees throughout the grant application and implementation.
- We help grantees overcome obstacles to success. Including advocacy.
- We leverage grant funds to accomplish other goals with grantees.
Types of Urban Forestry Grant Projects

- **“Green Trees For The Golden State”**
  - Urban tree planting projects and associated costs

- **“Green Innovations”**
  - Green infrastructure projects (vegetated swales, green roofs, green walls, etc.)

- **“Woods In The Neighborhood”**
  - Purchase and improve unused neighborhood parcels
  - Similar to Green Innovations otherwise

- **“Urban Forest Management Activities”**
  - Management activities are: Urban forest management plans, tree or urban forest related policies and ordinances, urban tree inventories, and urban forest mapping and analysis.

- **“Urban Wood and Biomass Utilization”**
  - Development and implementation of an Urban Wood or Urban Biomass Utilization project or program. Better utilizing this resource will lead to improved management of urban vegetation. The focus of this program is to utilize the tree for its highest and best use(s) that leads to reductions in GHG emissions.
Bay Area Specific Information

• Urban Forest Map (CAL FIRE/FUF/Urban Ecos)
• USFS Bay Area canopy study (2010)
• USFS/CAL FIRE San Jose high resolution canopy study (2013)
• USFS Tree Guide for Northern Coastal Communities.
• Map of San Francisco’s urban forest
• Open Source
• Has city inventory info included
• Anybody can add their tree
• Has training and ID resources
• Shows ecosystem services of selected trees (individuals or groups)
• Map and wiki
• Mobile App for iPhone and Android has launched.
• Also in Sacramento Region, San Diego County, Los Angeles County, Philadelphia PA, Somewhere in MI.
Urbanization has led to a 10% increase in canopy cover over the last 20 years, but also to a 17% increase in impervious surfaces.

Excludes undeveloped open space.

Total annual benefits for the region were estimated at $5.1 billion per year.

A modest increase of just 3% in the urban canopy will increase annual benefits by $475 million or $69 for each person in the Bay area.

For those interested in the historic changes in the urban forests of the San Francisco Bay area and the benefits the trees provide, this document provides a wealth of information.
Overall canopy cover of 15.4%
- Ranges from 12%- over 20% by council district.
- Approximately 1.6 million trees
- Annual ecosystem services and property values of $239 million per year.
- 2 million additional potential planting sites – mostly on private property.
- Planting 100,000 of these sites would result in canopy increase to 16.3%, and a 7% increase in annual benefits ($16.4 Million. The increase takes 20-30 years.
- Total asset value of San Jose’s existing urban forest: $5.7 Billion ($3,634 per tree, calculated at 4.125% discount rate for 100 years).
- This increases to $6.1 Billion if the above mentioned 1% canopy increase would occur.
Northern California Coast Community Tree Guide: Benefits, Costs, and Strategic Planting

- Quantifies benefits of trees on a per-tree basis rather than on a canopy-cover basis (it should not be used to estimate benefits for trees growing in forest stands).
- Average annual net benefits (benefits minus costs) increase with mature tree size.
- Benefits differ based on location:
  - $29 (public owned) to $41 (private) for a small tree
  - $42 (public) to $60 (private) for a medium tree
  - $101 (public) to $122 (private) for a large tree
  - $142 (public) to $146 (private) for a large conifer.
- Illustrates how to use this information to estimate benefits and costs for local tree planting projects.
Urban Forestry Websites

- [www.fire.ca.gov/resource_mgt/resource_mgt_urbanforestry.php](http://www.fire.ca.gov/resource_mgt/resource_mgt_urbanforestry.php) - CAL FIRE Urban and Community Forestry
- [http://www.fs.fed.us/ucf/](http://www.fs.fed.us/ucf/) - USFS urban forestry website
- [www.ufei.org](http://www.ufei.org) - Cal Poly SLO Urban Forest Ecosystems Institute
- [www.californiareleaf.org](http://www.californiareleaf.org) – statewide umbrella non-profit (100+ local network organizations.
- [www.caufc.org](http://www.caufc.org) – statewide industry and municipal professional non-profit
- [www.wcisa.net](http://www.wcisa.net) – Western Chapter, International Society of Arboriculture (ISA)
- [www.arborday.org](http://www.arborday.org) – National Arbor Day Foundation
- [www.treesaregood.com](http://www.treesaregood.com) – ISA public education website
- [www.urbanforestmap.org](http://www.urbanforestmap.org) - one of four CA interactive open source urban tree maps (San Diego County, Los Angeles Region, Sacramento Region)
- [www.ufmptoolkit.com](http://www.ufmptoolkit.com) - online urban forest management plan development tool
- [http://lhhl.illinois.edu/index.htm](http://lhhl.illinois.edu/index.htm) - urban forestry related social science website
- [www.itreetools.org](http://www.itreetools.org) – free urban forestry geospatial analysis tools
My Best Reasons Why I Do What I Do
QUESTIONS AND ANSWERS
Thank You!

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Air District Overview
Advisory Council Special Meeting / Retreat

Jack P. Broadbent
Executive Officer/APCO
January 14, 2015
• My Air Online and Website Redesign

• Relocation of Air District Headquarters to 375 Beale Street
• Refinery Emissions Tracking, Community Monitoring Baseline and Rules
• Climate Strategy Implementation
• Emissions Reduction Rulemakings