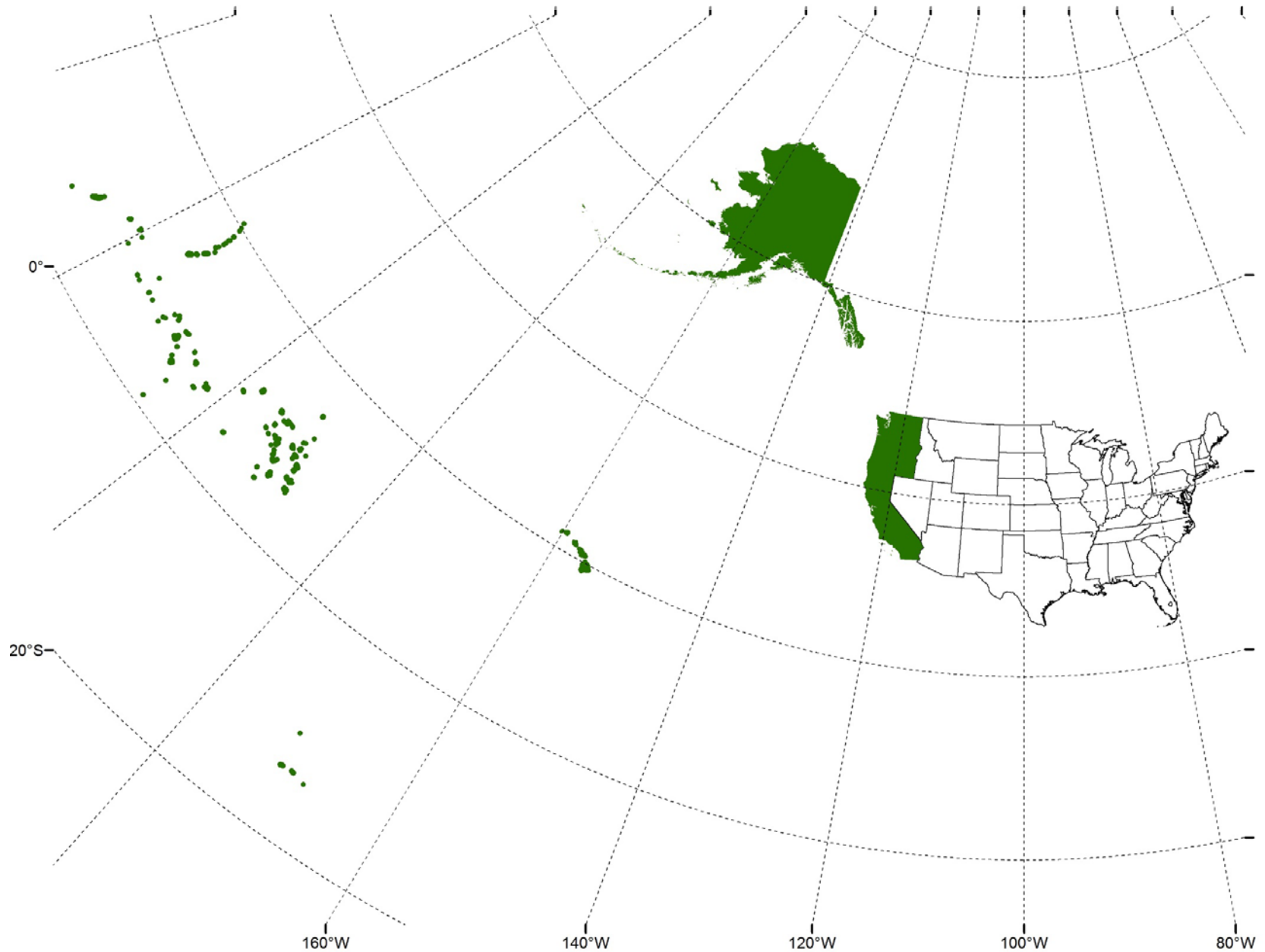


# PNW-FIA research update



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PNW Research Station, RMA Program

# PNW-FIA responsibilities



# Research themes and priorities

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- ❑ Interior Alaska inventory
- ❑ Carbon & biomass
- ❑ Wildfire effects & management
- ❑ Land cover / land use
- ❑ Urban FIA



# Interior Alaska FIA Inventory Units

## Alaska FIA Units and their State Equivalents (in Square Miles)

• All Interior Plots @ 1/5 Intensity (11,112 total plots) (all plot locations and #'s depicted are approximate)

• 2014 Tanana Pilot Completed Plots (103 plots)

— Major Highways and Roads

□ Alaska FIA Inventory Unit Boundaries

■ Interior Units

□ North Slope - 78,861mi (Nebraska) (~ 1705 plots)

□ Lower Yukon - 158,332mi (Montana) (~ 3414 plots)

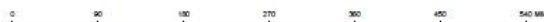
□ Upper Yukon - 59,622mi (Georgia) (~ 1278 plots)

□ Tanana - 53,503mi (Arkansas) (~ 1159 plots)

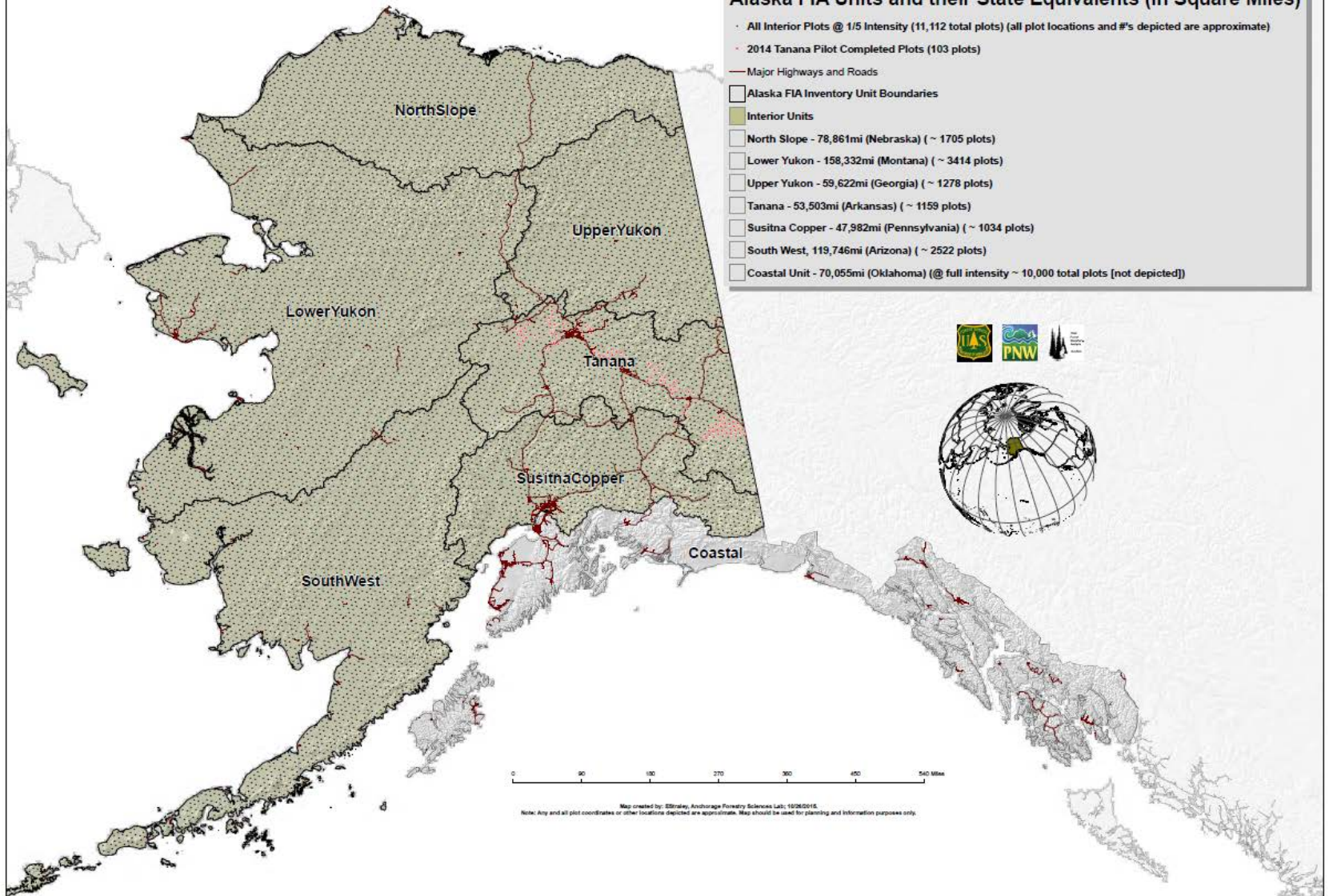
□ Susitna Copper - 47,982mi (Pennsylvania) (~ 1034 plots)

□ South West, 119,746mi (Arizona) (~ 2522 plots)

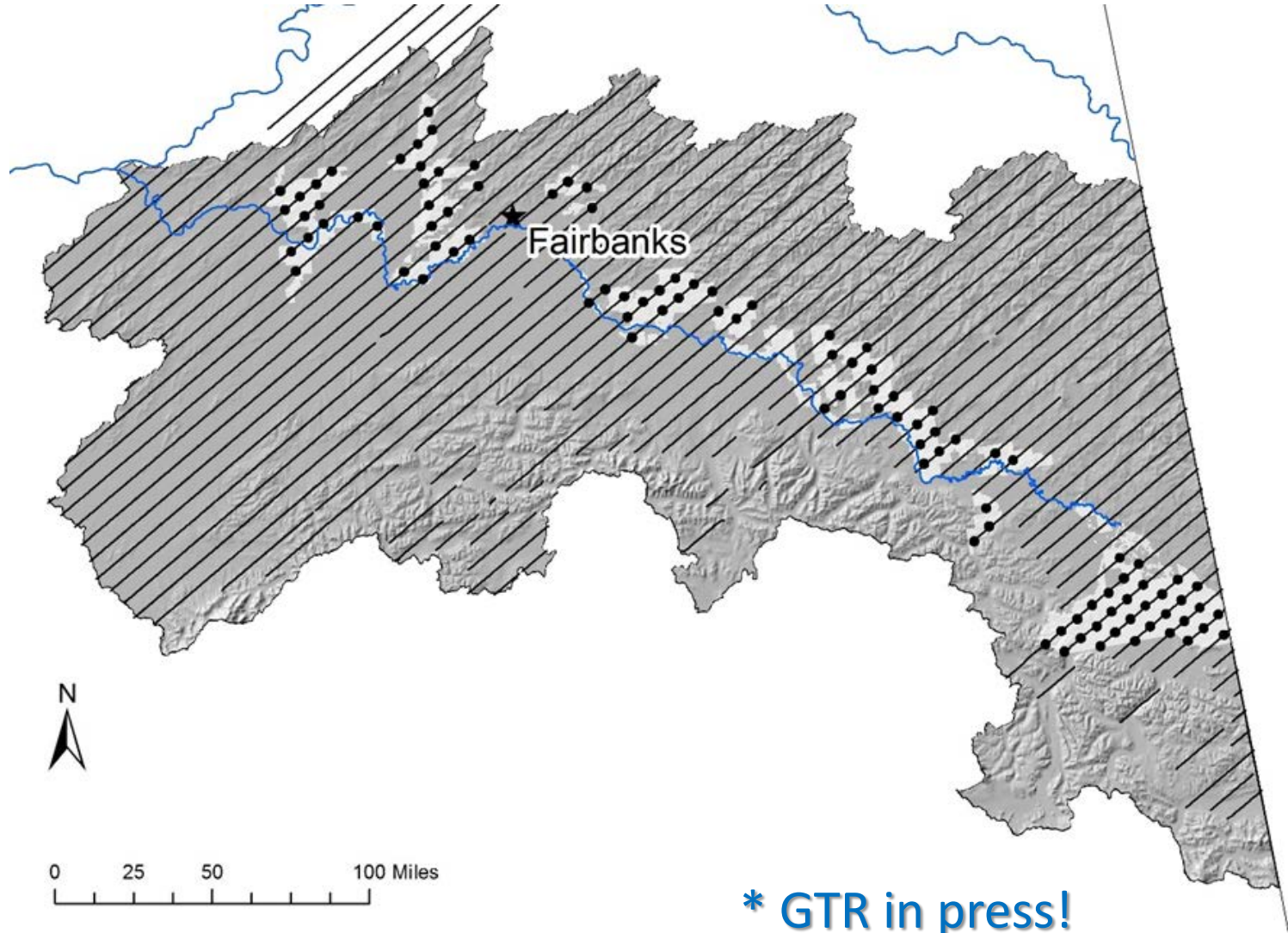
□ Coastal Unit - 70,055mi (Oklahoma) (@ full intensity ~ 10,000 total plots [not depicted])



Map created by: ESR/ale, Anchorage Forestry Sciences Lab; 10/26/2016.  
Note: Any and all plot coordinates or other locations depicted are approximate. Map should be used for planning and information purposes only.



# Tanana basin: plots, lidar strips, and pilot study area

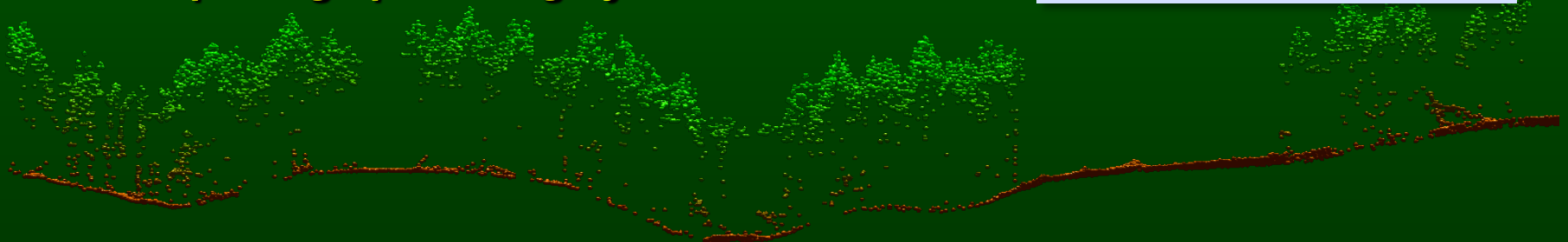
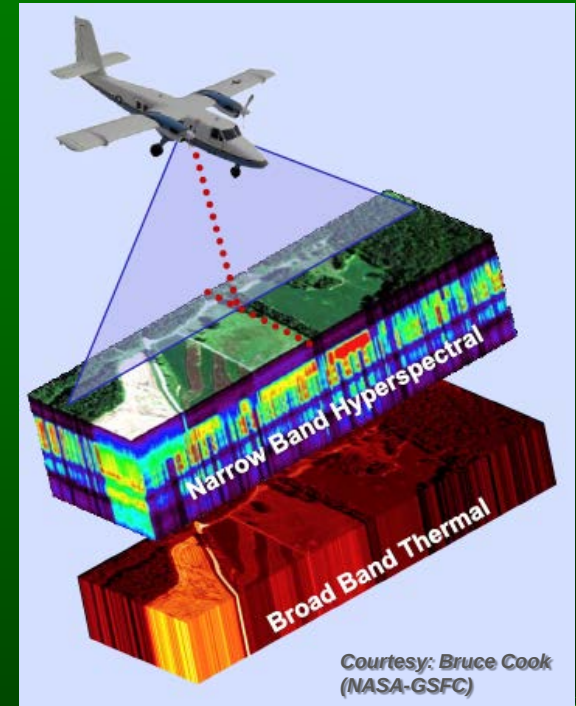




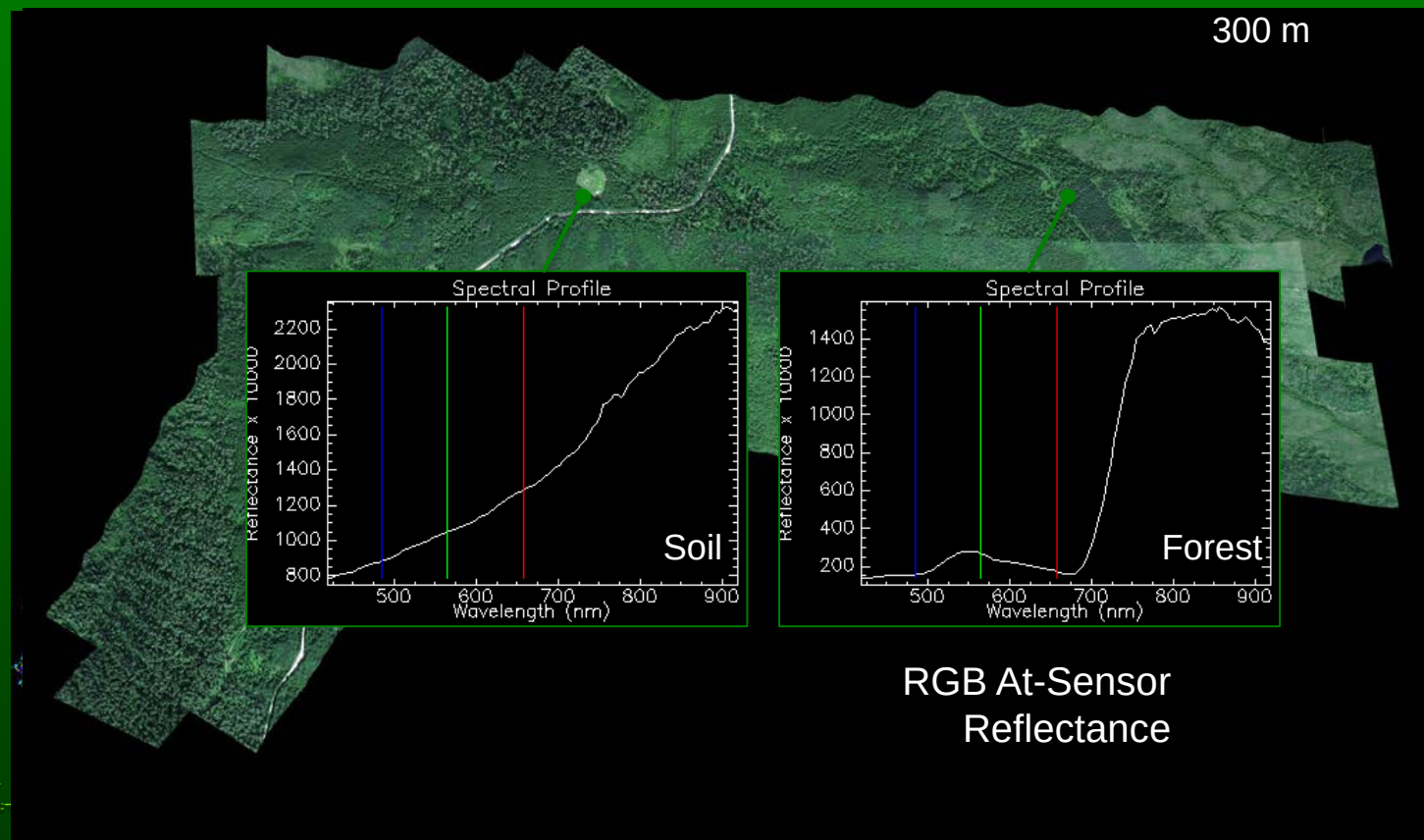
# ***What is G-LiHT?***

***Goddard Lidar/Hyperspectral/Thermal (G-LiHT) is a portable, airborne imaging system that simultaneously maps the composition, structure, and condition of vegetation using:***

- 1. Laser scanning – 3D structure of vegetation***
- 2. Imaging spectroscopy – Species composition and variations in biophysical variables***
- 3. Thermal measurements – Surface temperature, heat and moisture stress***
- 4. DSLR photographic imagery***



# Example G-LiHT Products: Bonanza Creek



# Carbon & biomass

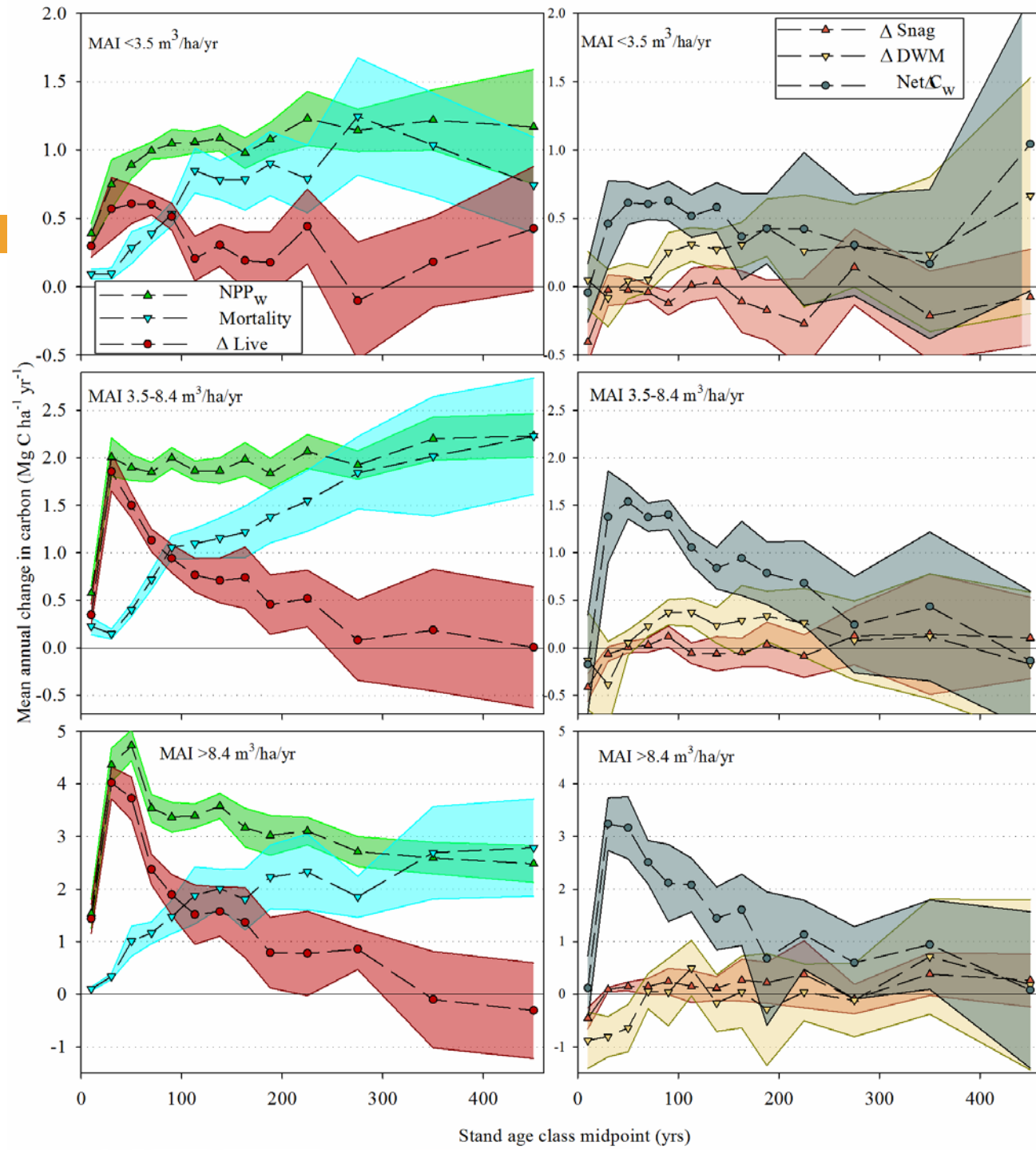


- Greenhouse Gas Inventories: CA, OR
- Drivers of C flux
- Developing representative tree volume and biomass equations
- Improving spatial and temporal models



# C flux by MAI class and age

| age     | C flux (CI)     |
|---------|-----------------|
| 200-250 | $0.70 \pm 0.31$ |
| 250-300 | $0.34 \pm 0.31$ |
| 300-400 | $0.52 \pm 0.44$ |
| >400    | $0.15 \pm 0.64$ |



## ***Development of carbon monitoring systems for remote regions using field and remote sensing data***





## Goal 3. Utilizing advanced technologies to support vegetation assessment on FIA plots & beyond



Terrestrial lidar (D.Gatziolis)



3-D models from video imagery (D.Gatziolis)

Department of Agriculture

# YOU FLY, WE CAN'T



### DRONES NEAR WILDFIRES ARE NOT SAFE

FLYING DRONES OR UAS (UNMANNED AIRCRAFT SYSTEMS) WITHIN OR NEAR WILDFIRES WITHOUT PERMISSION COULD CAUSE INJURY OR DEATH TO FIREFIGHTERS AND HAMPER THEIR ABILITY TO PROTECT LIVES, PROPERTY, AND NATURAL CULTURAL RESOURCES

FIRE MANAGERS MAY SUSPEND AERIAL FIREFIGHTING UNTIL UNAUTHORIZED UAS LEAVE THE AREA, ALLOWING WILDFIRE TO GROW LARGER.

CONTACT YOUR NEAREST LAND MANAGEMENT AGENCY OFFICE TO LEARN MORE ABOUT UAS AND PUBLIC LANDS



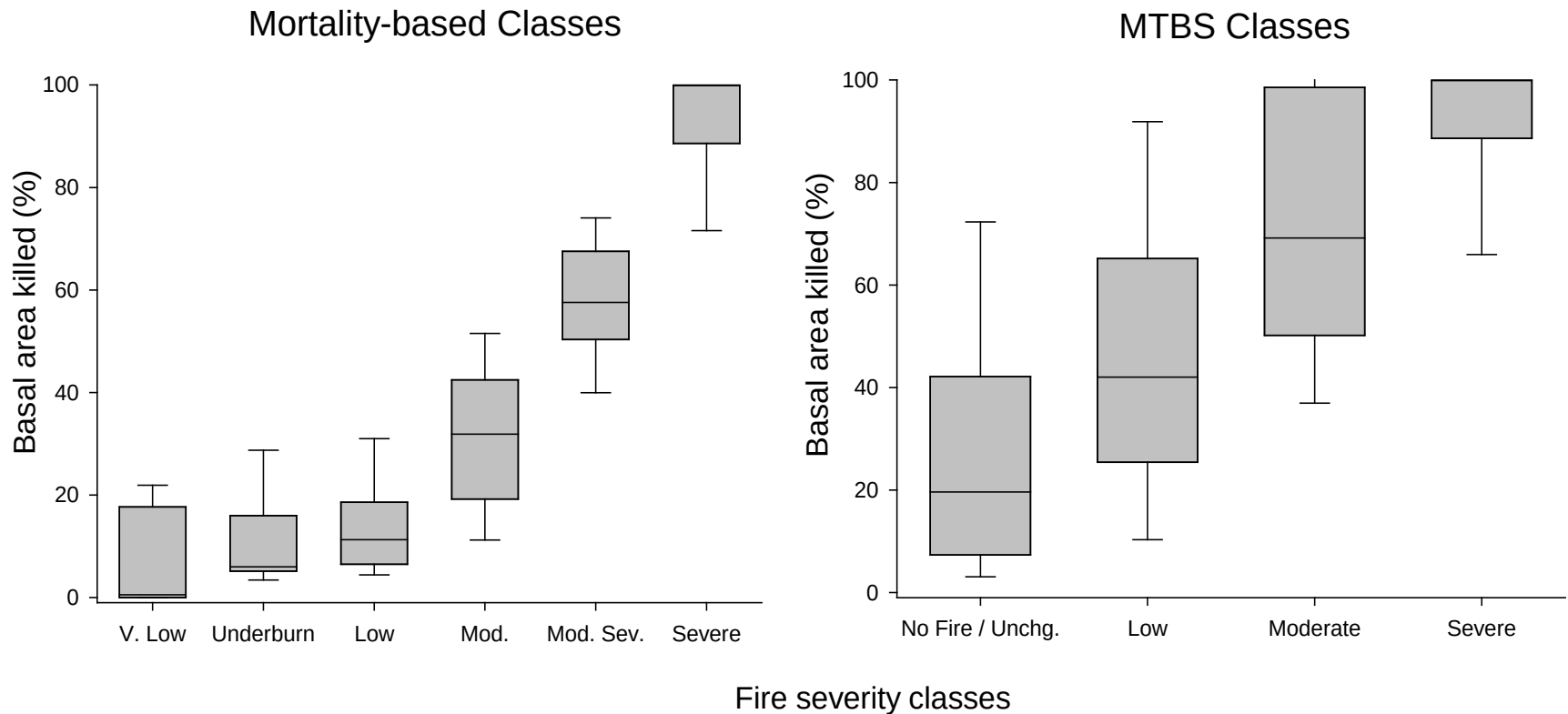
# Wildfire effects & management



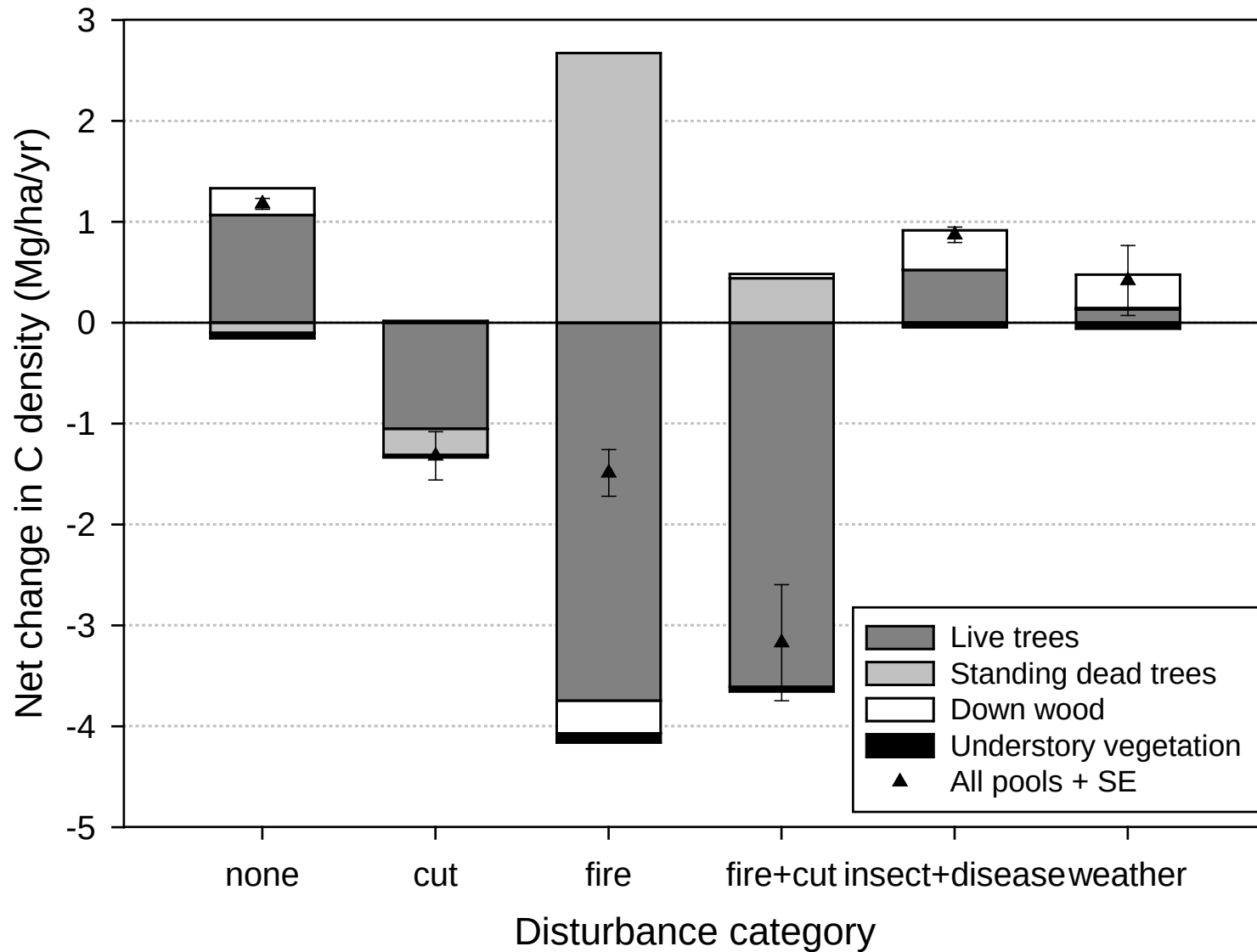
- Describing variation in fire severity and causes
- Assessing disturbance effects on carbon flux
- Evaluating effectiveness and cost of treatments to reduce fire severity

# Monitoring burn severity

Plot classes based on mortality of trees of different sizes



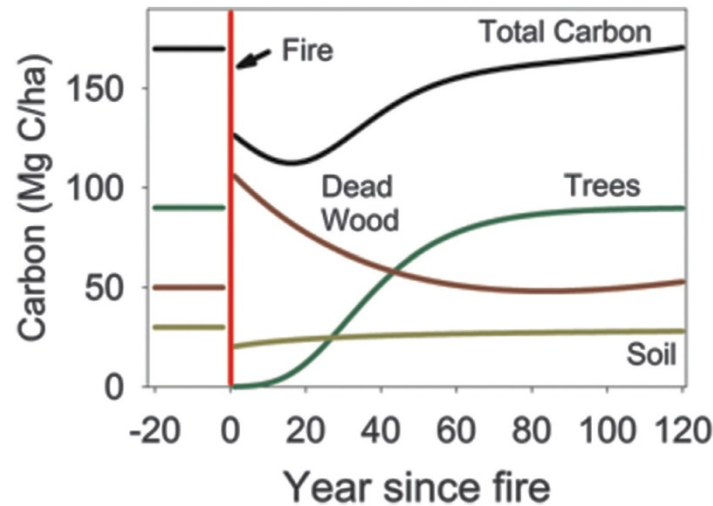
# Disturbance effects on carbon



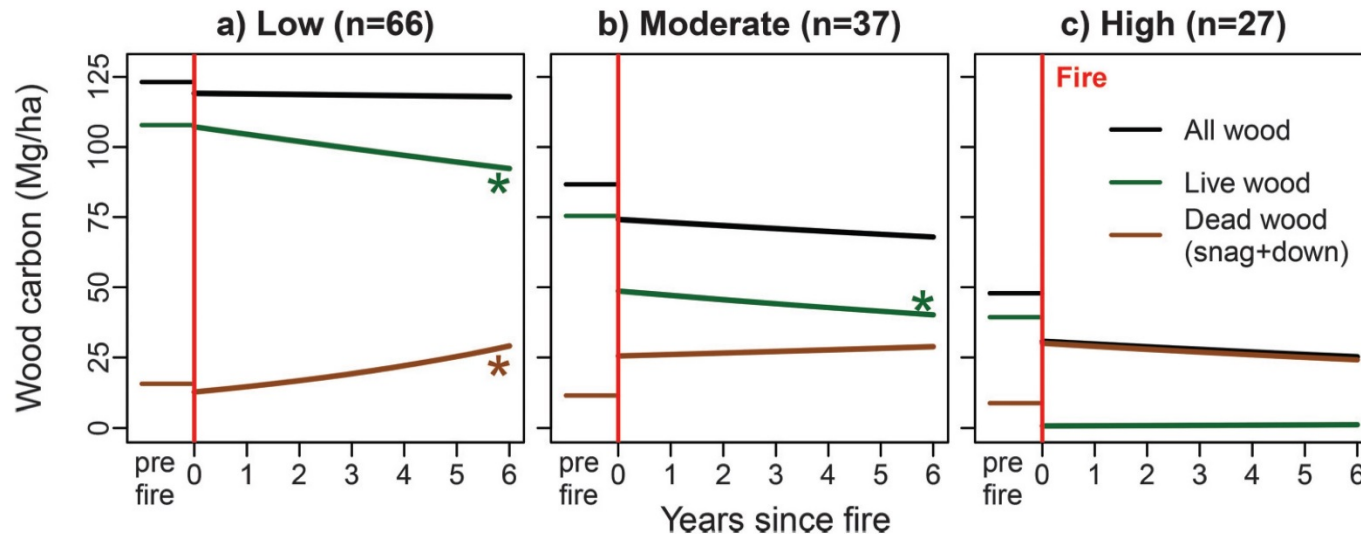


# Post-fire carbon trajectories from fire plots

The cartoon:

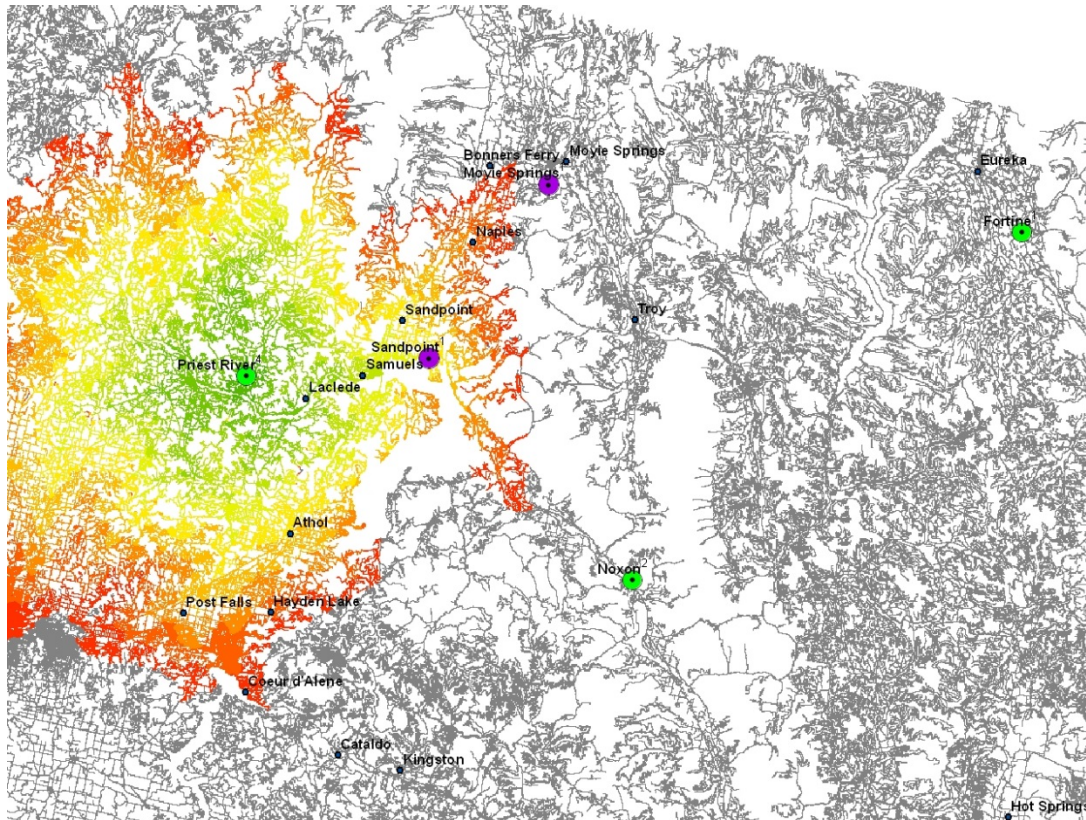


The reality:



# Biomass use, thinning, and fire risk

- Nugget: thinning dense stands and using small trees for woody biomass can reduce fire risk, but costs and benefits vary dramatically among treatments and forest types
- Using real-world data to prioritize management options for mixed conifer across the west: Jain, Fried et al. RMRS-GTR-292



Example of road network and haul costs from FIA plots to potential mill site, BioSum model



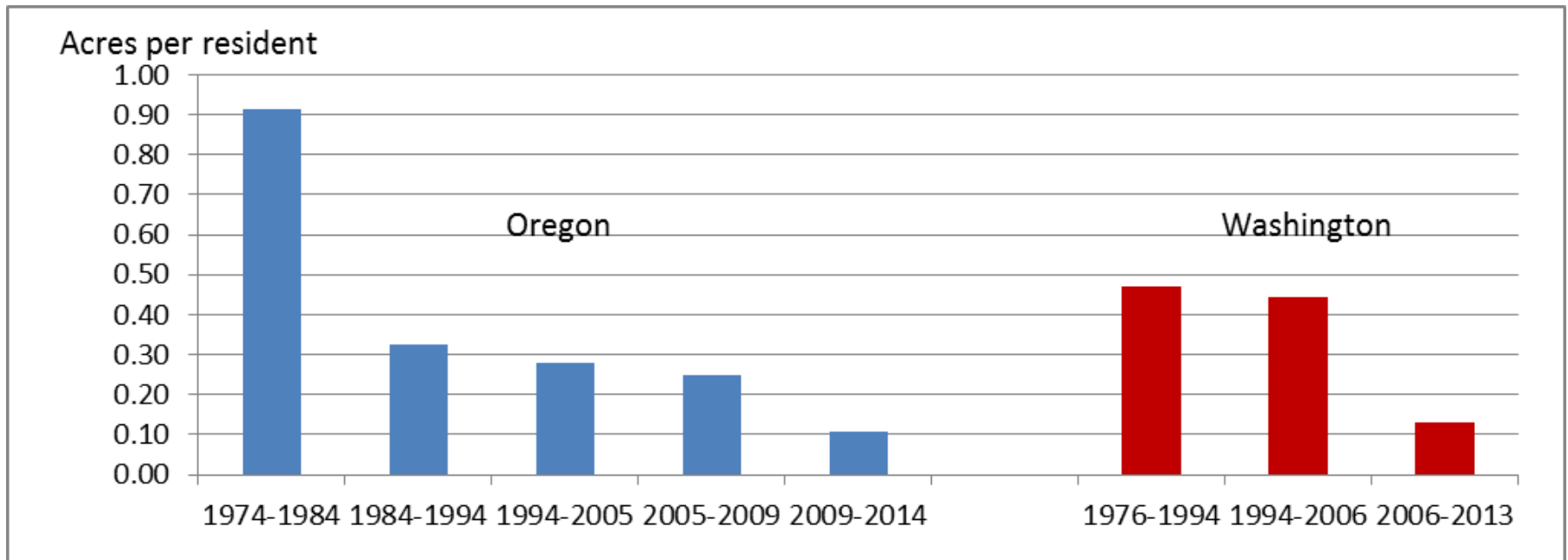
# Land use & land cover

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- Land use and land cover change from plots
- Development zone study in OR+WA, ICE in CA
- Understanding mortality events
- GNN vegetation mapping in CA, OR, +WA
- Stand structure from lidar

# OR + WA development

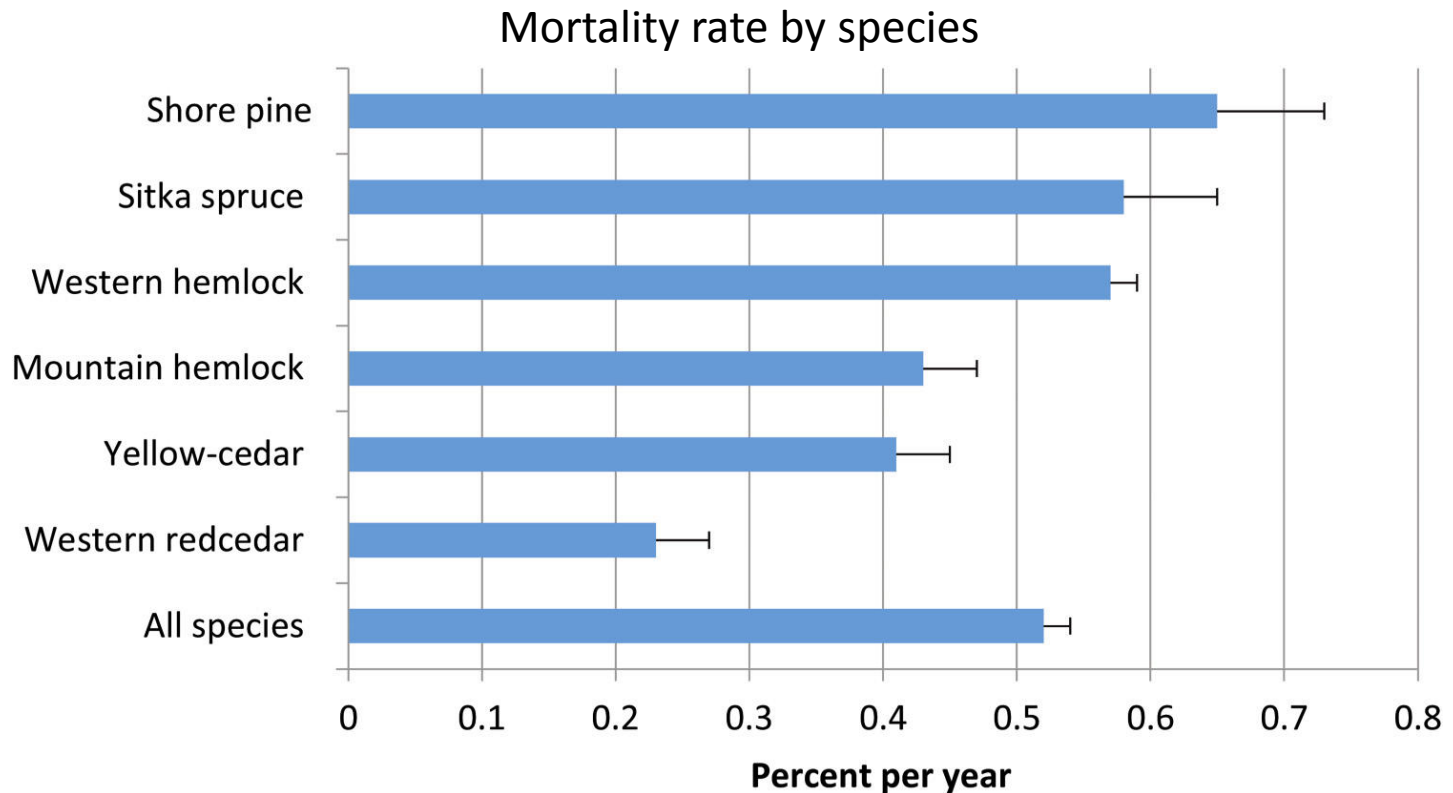
Area per new resident of non-federal land changing from forest, farm, or range uses to low-density residential or urban uses





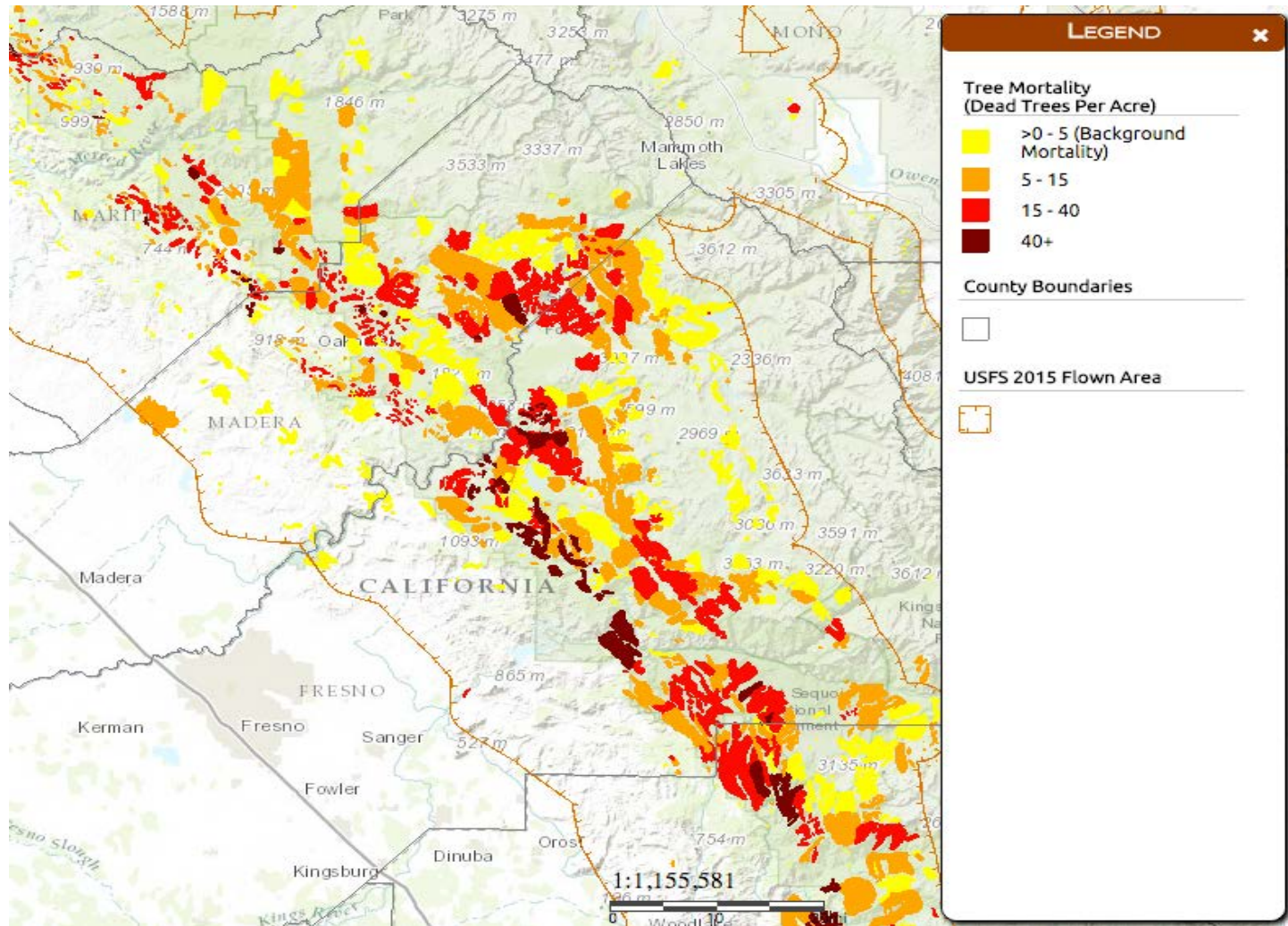
# Alaska yellow cedar is not currently declining

\* Evidence of past mortality in places at low elevation, but growth exceeds mortality in recent decades, especially at high elevations

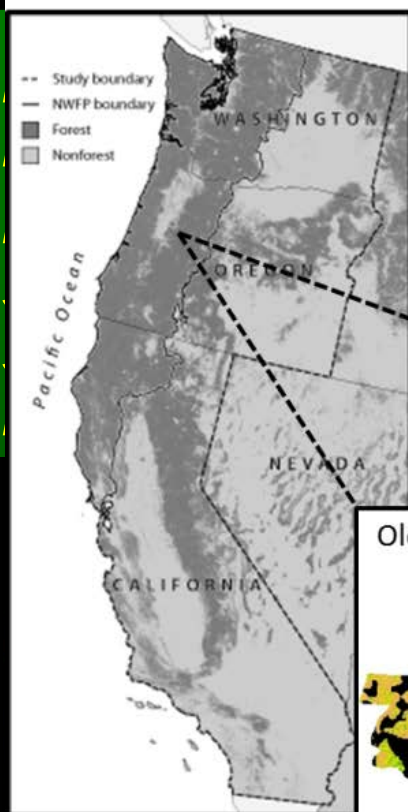


# California mortality events

WO-funded project to assess changes in tree mortality in California from FIA plots since 2000. Collaboration led by Fried with PSW and UC-Berkeley. LOTS of interest!



# Characterizing changes in forest vegetation over space and time by integrating forest plot measurements with remotely-sensed data

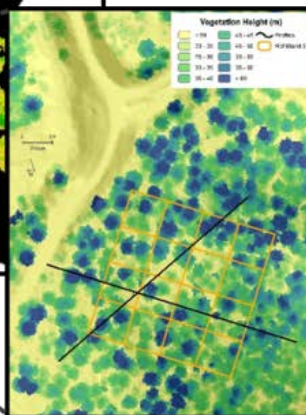
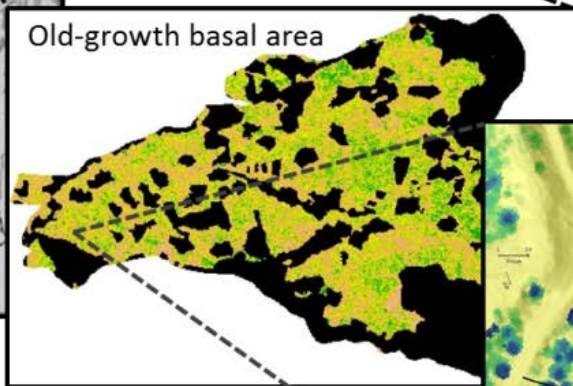


## Improved Vegetation Mapping

- Cutting-edge remote sensing
- Hierarchical modeling
- Mapping forest function

## Limitations of Vegetation Mapping

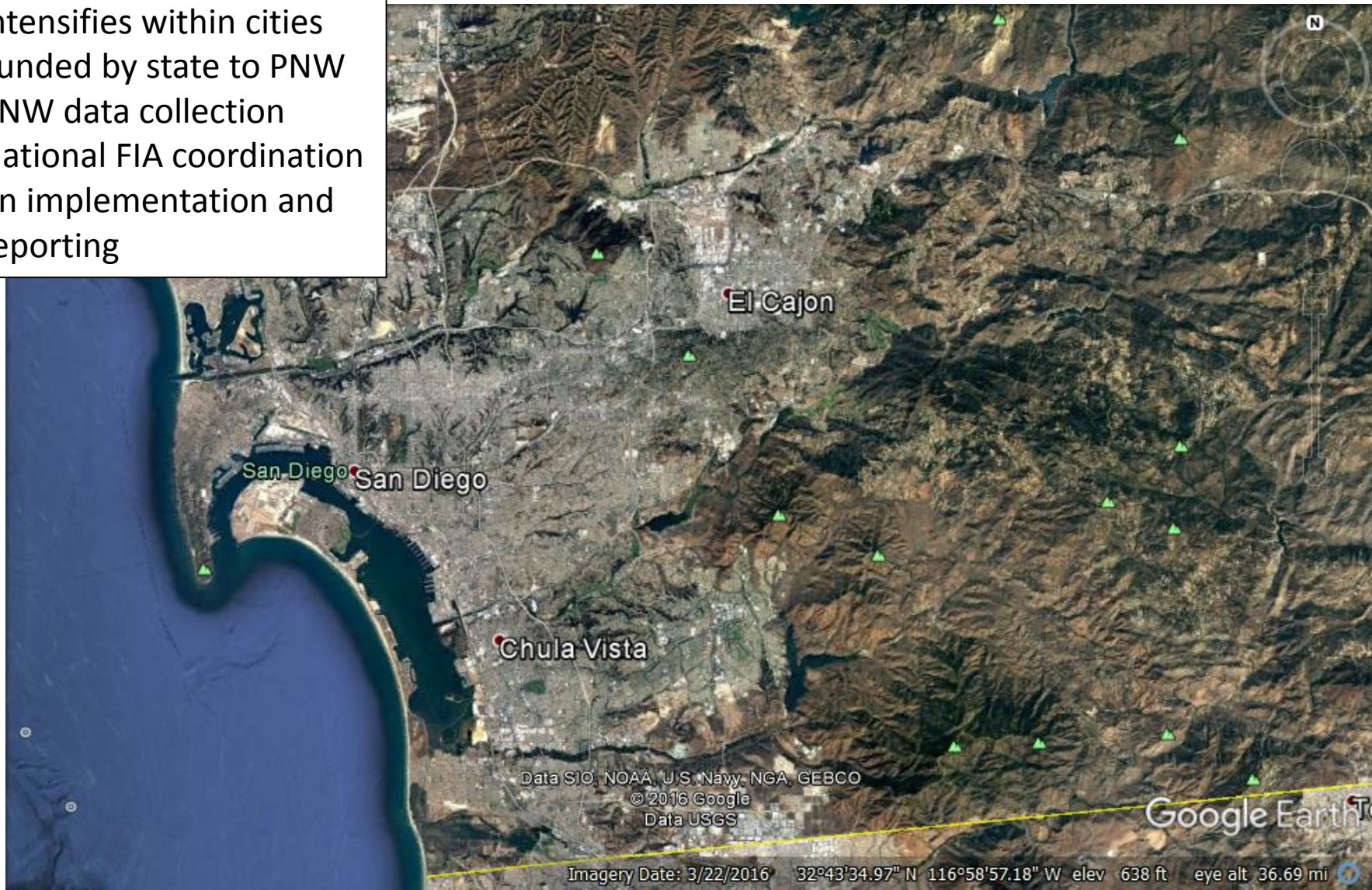
- Accuracy and precision
- Product comparisons
- Applicable scales





# Urban FIA: San Diego 2017, Portland 2018

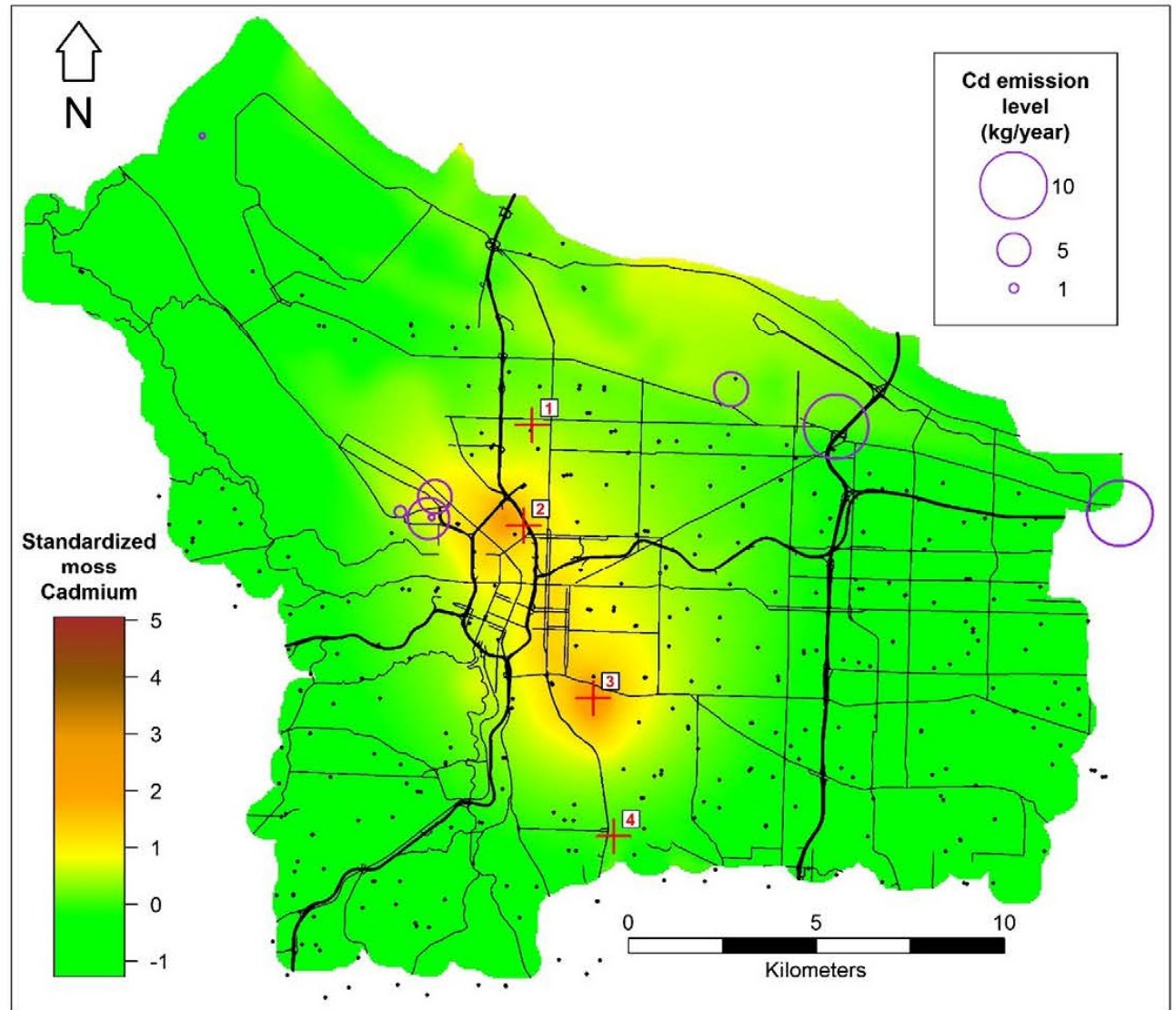
- Newer national design intensifies within cities
- Funded by state to PNW
- PNW data collection
- National FIA coordination on implementation and reporting





# Urban air pollution

- Cadmium hot-spots detected and concentrations modeled around art glass manufacturers
- Ongoing work to develop moss as urban air pollution indicators





Questions?

