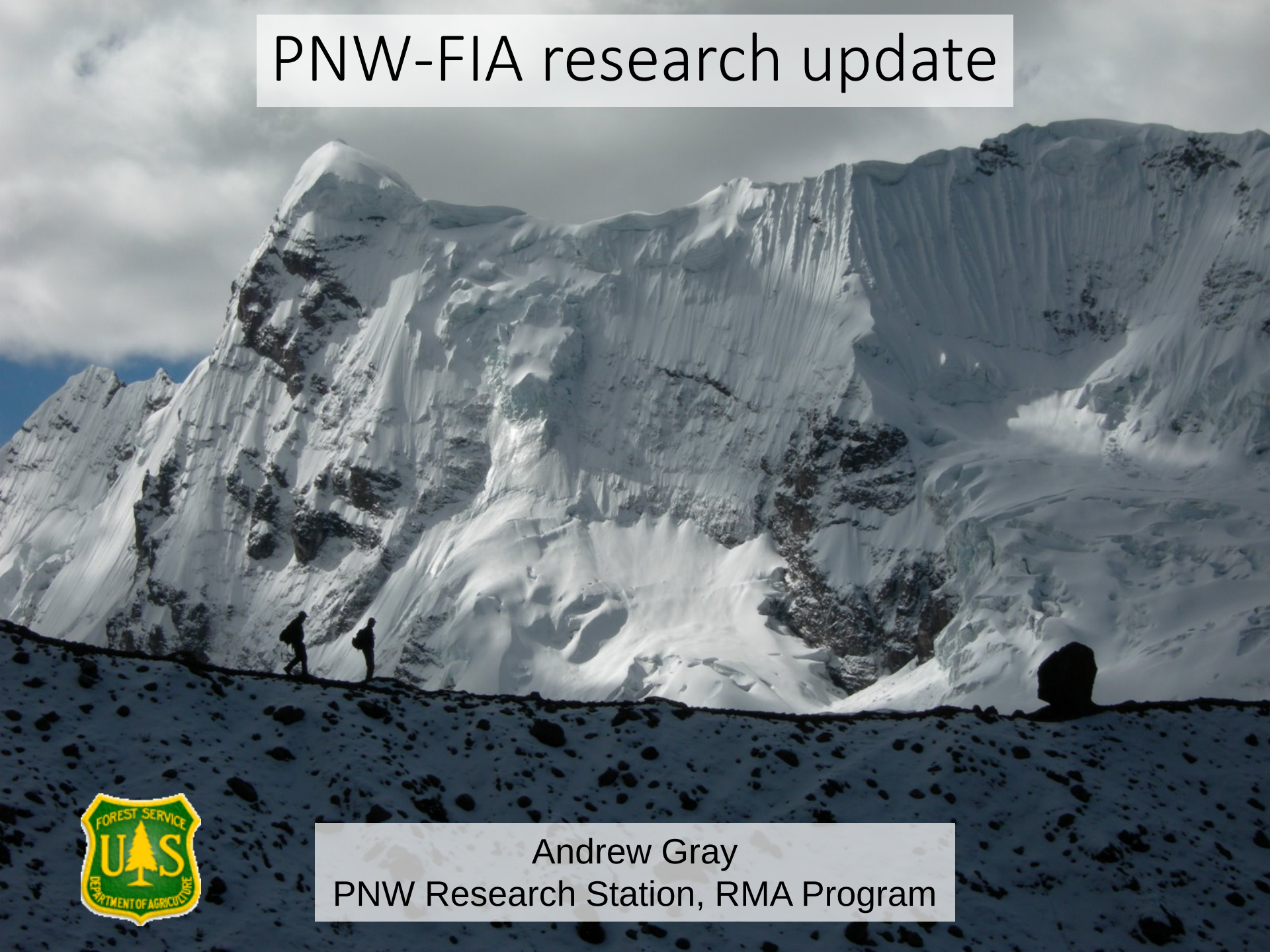
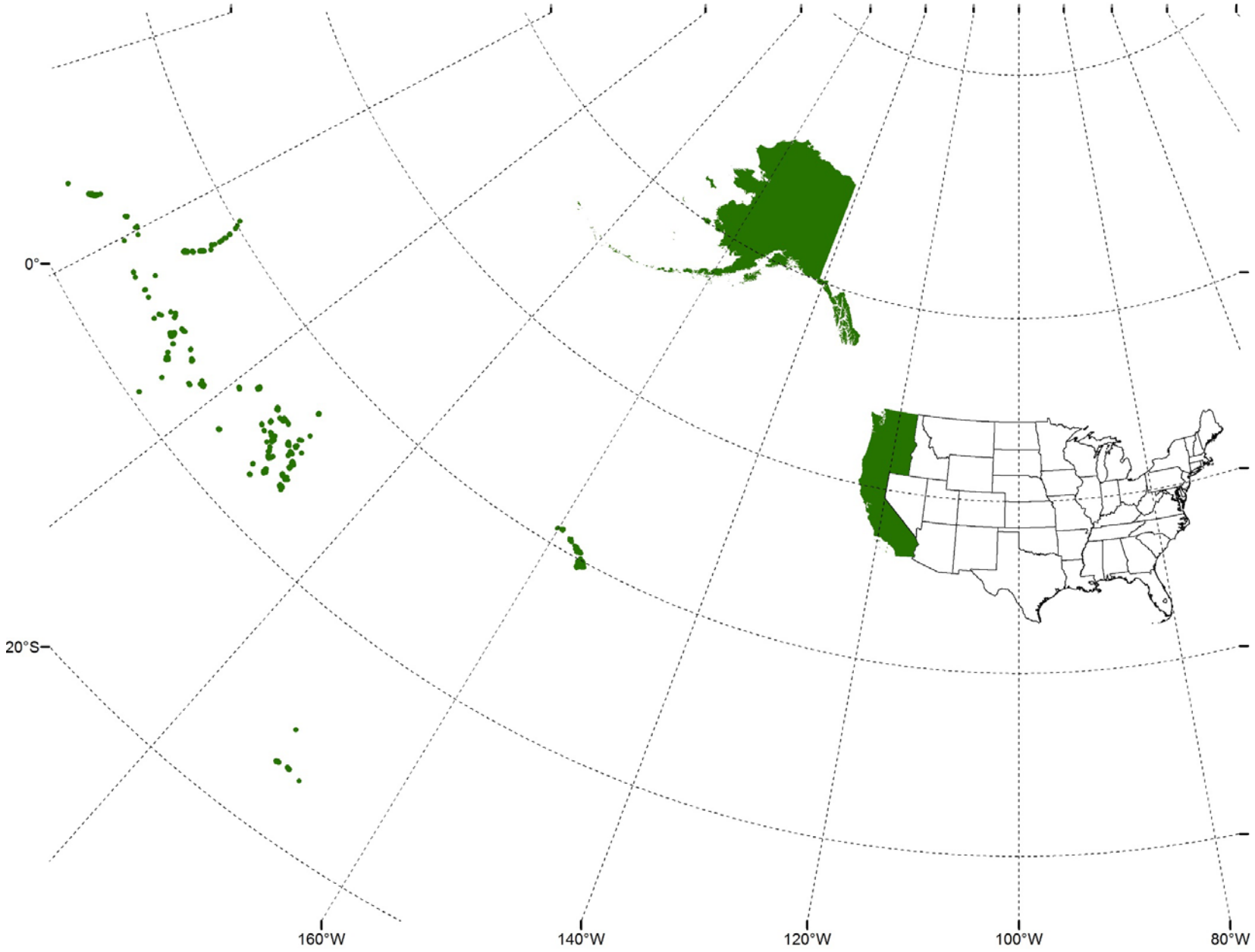
PNW-FIA research update



Andrew Gray
PNW Research Station, RMA Program

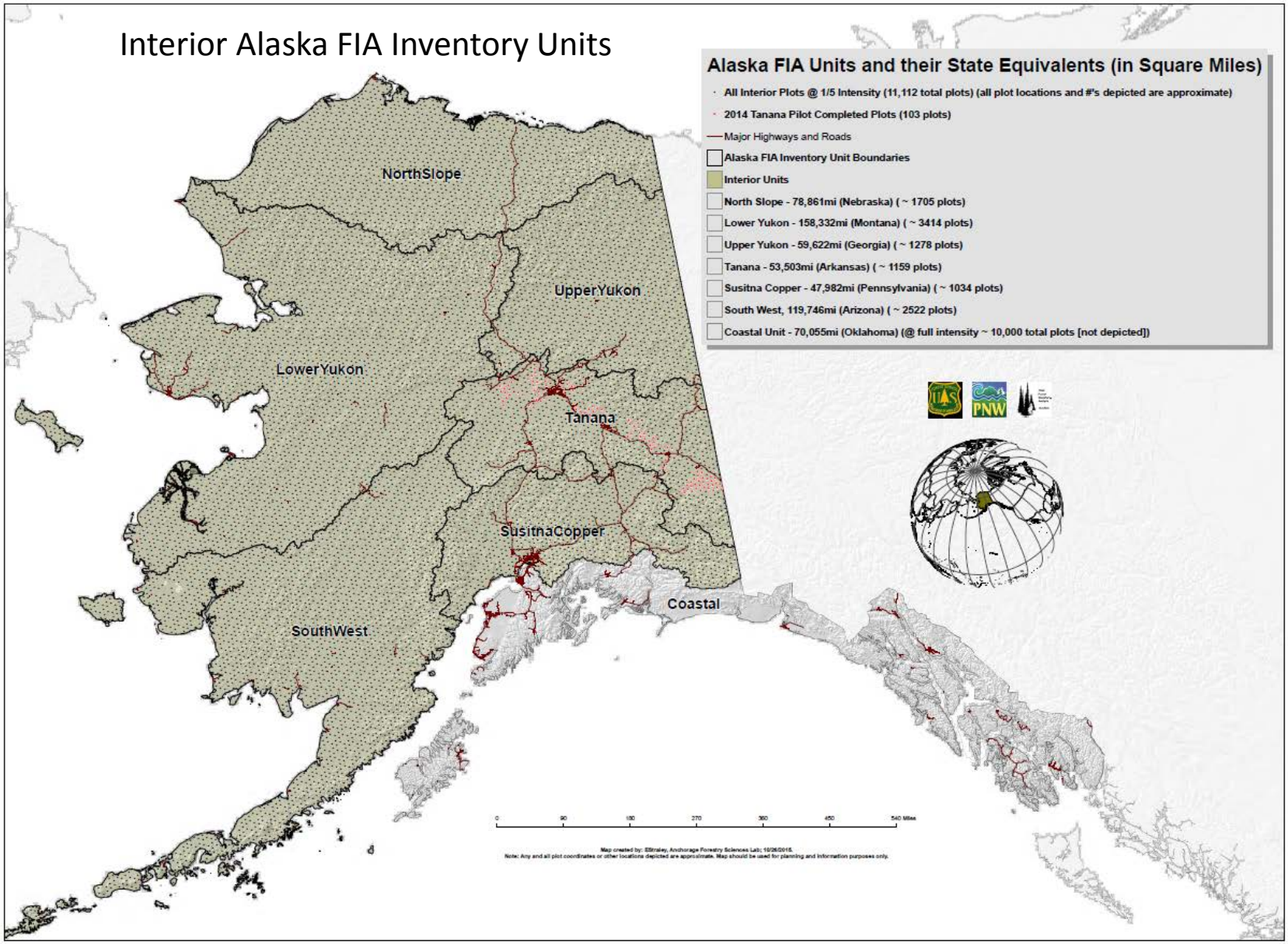
PNW-FIA responsibilities



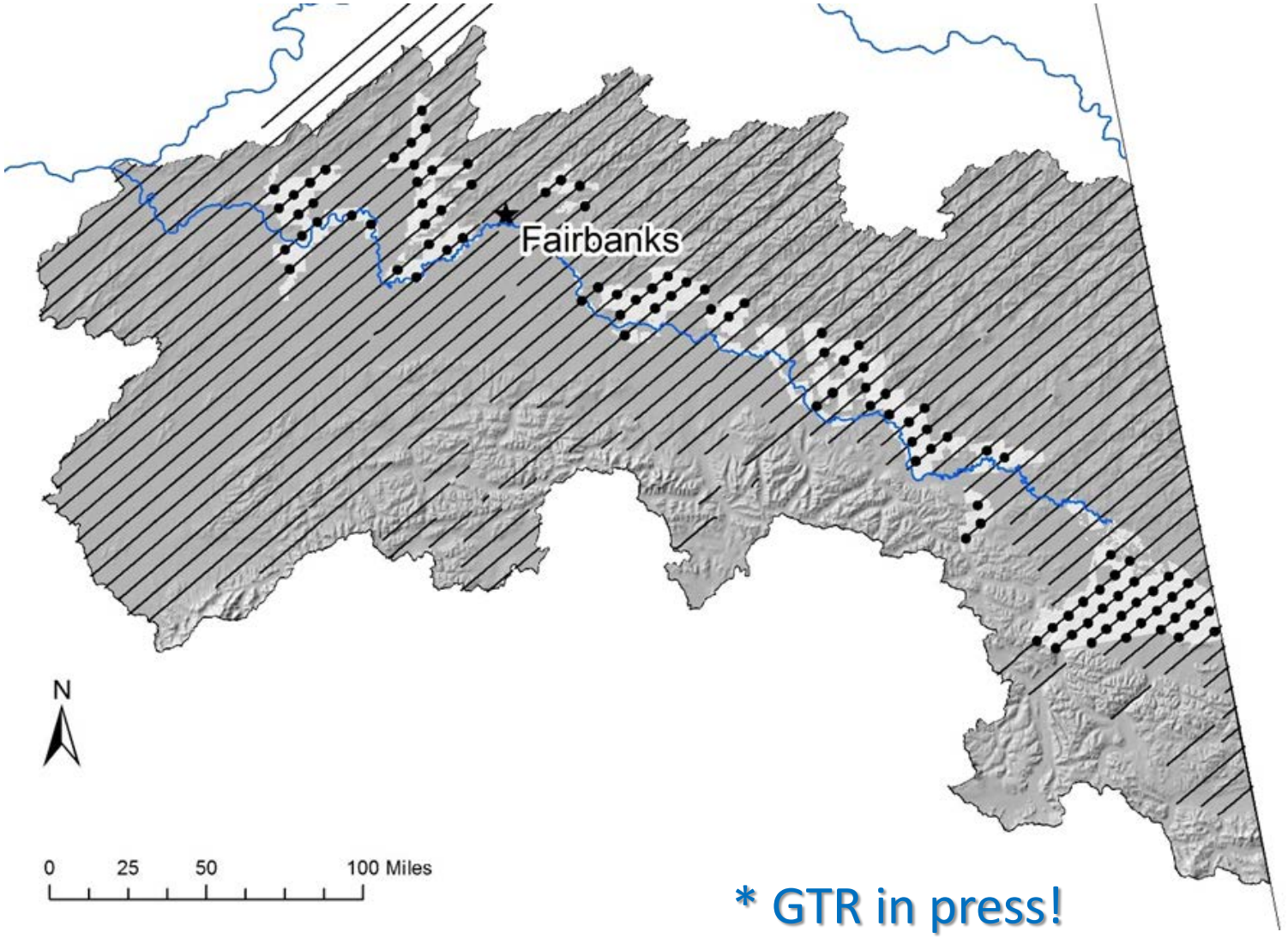
Research themes and priorities

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

Interior Alaska FIA Inventory Units



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

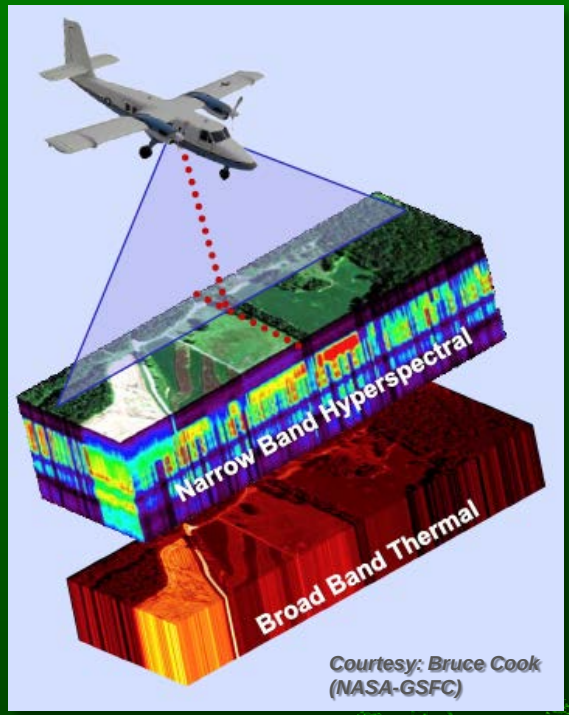


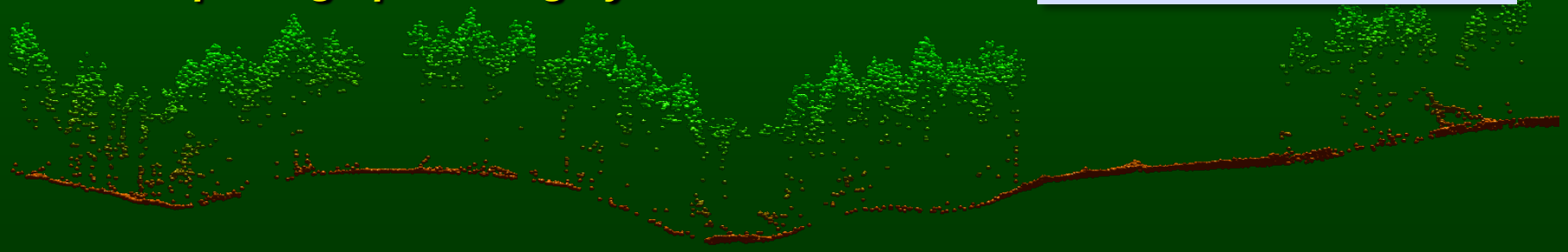
* GTR in press!

What is G-LiHT?

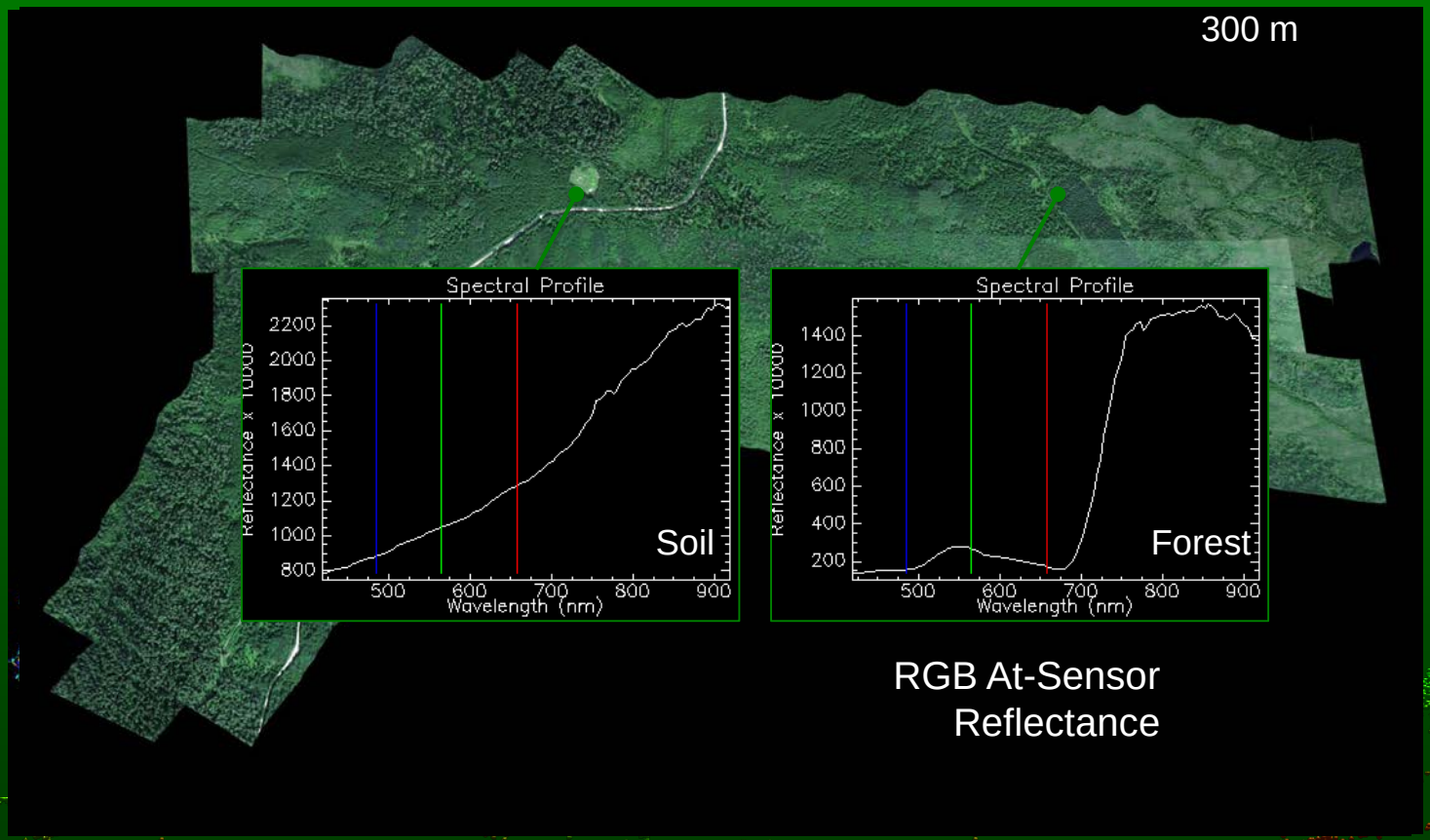
Goddard Lidar/Hyperspectral/Thermal (G-LiHT) is a portable, airborne imaging system that simultaneously maps the composition, structure, and condition of vegetation using:

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

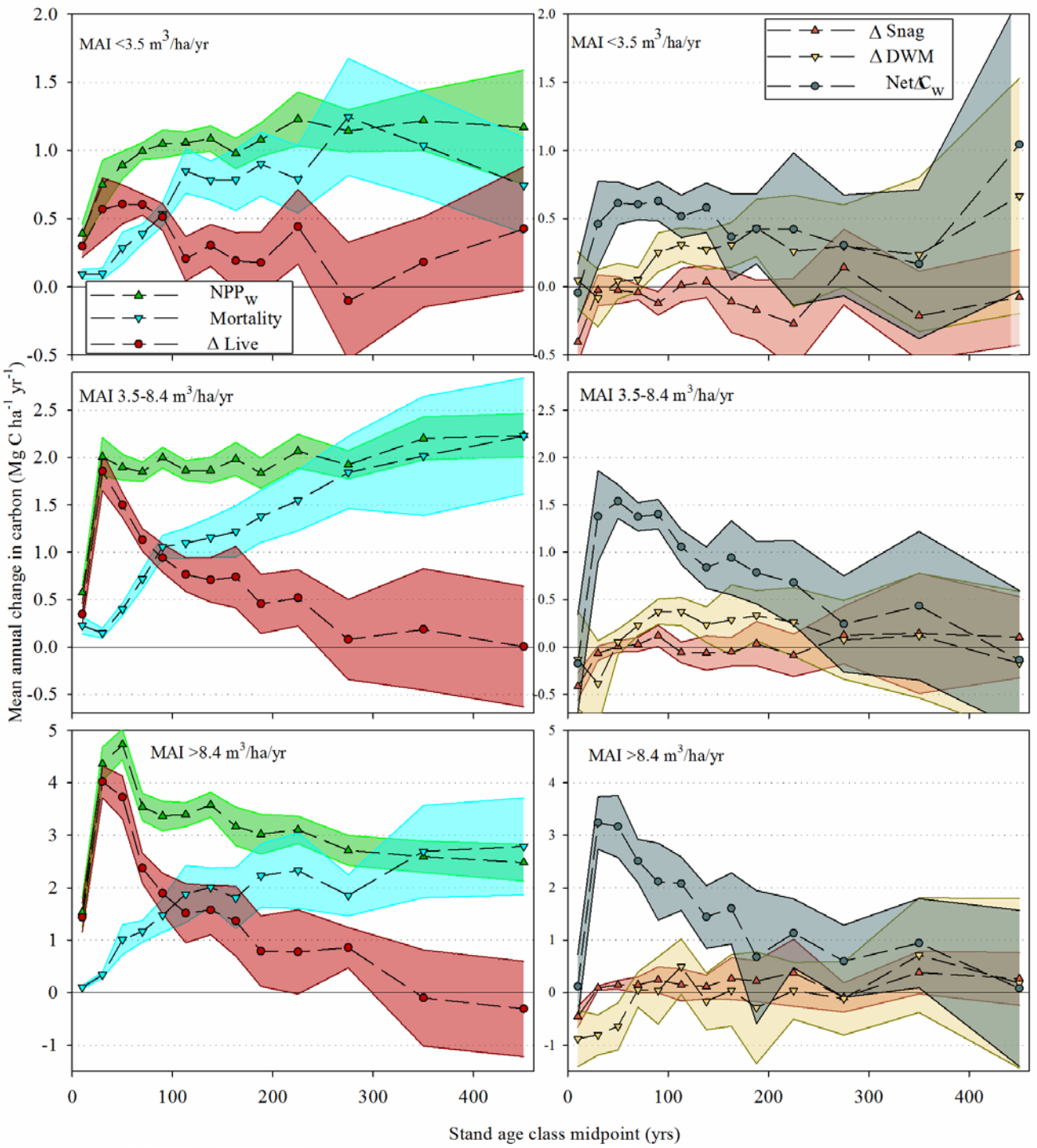


Carbon & biomass

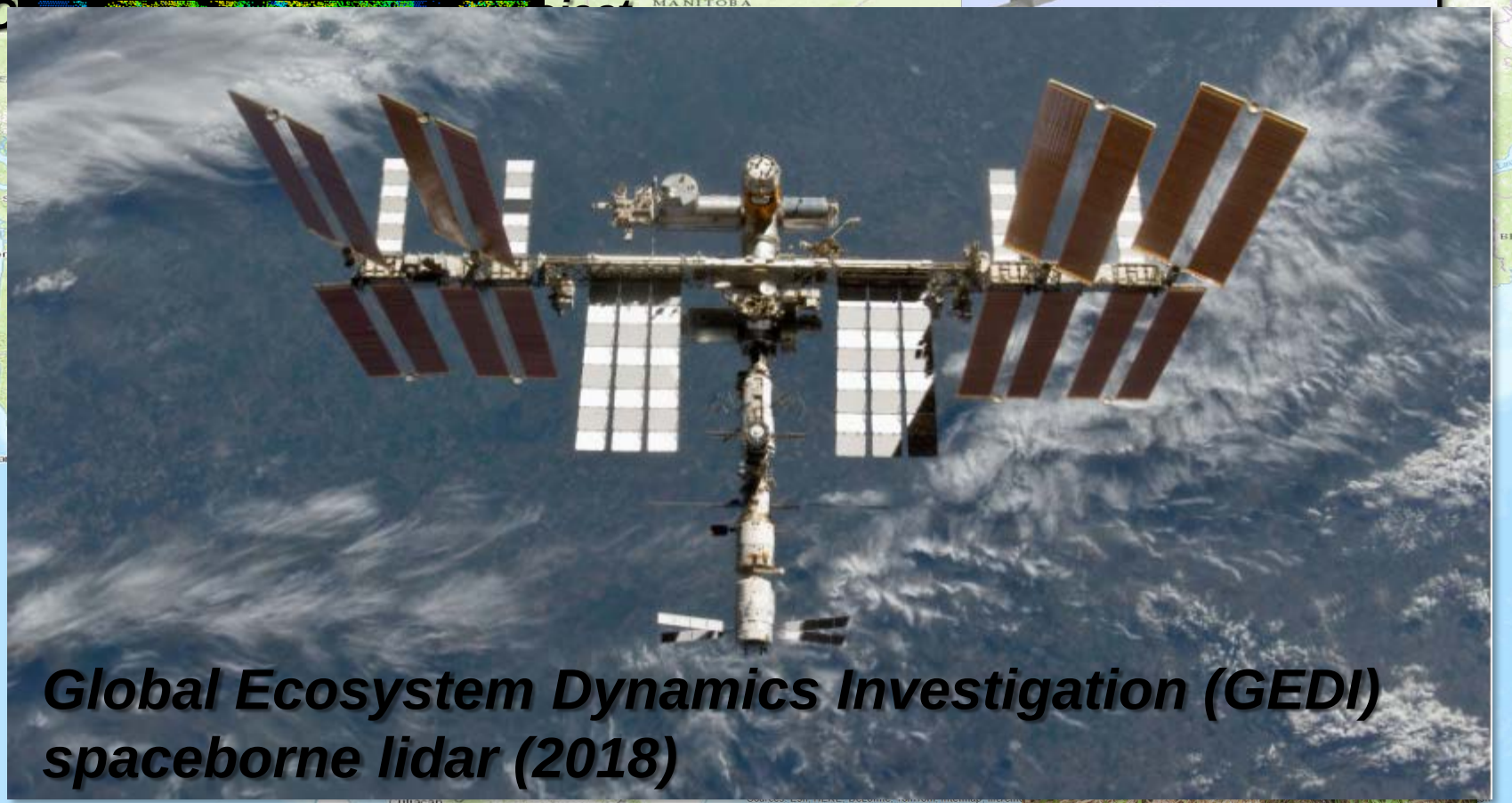
- Greenhouse Gas Inventories: CA, OR
- Drivers of C flux
- Developing representative tree volume and biomass equations
- Improving spatial and temporal models

C flux by MAI class and age

age	C flux (CI)
200-250	0.70±0.31
250-300	0.34±0.31
300-400	0.52±0.44
>400	0.15±0.64

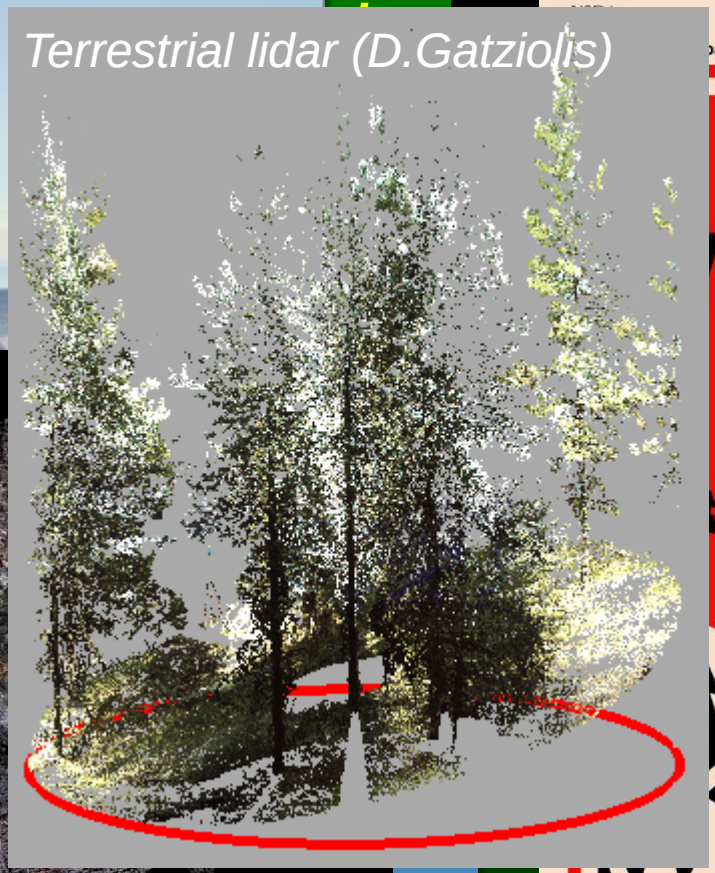


Development of carbon monitoring systems for remote regions using field and remote sensing data



Global Ecosystem Dynamics Investigation (GEDI) spaceborne lidar (2018)

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



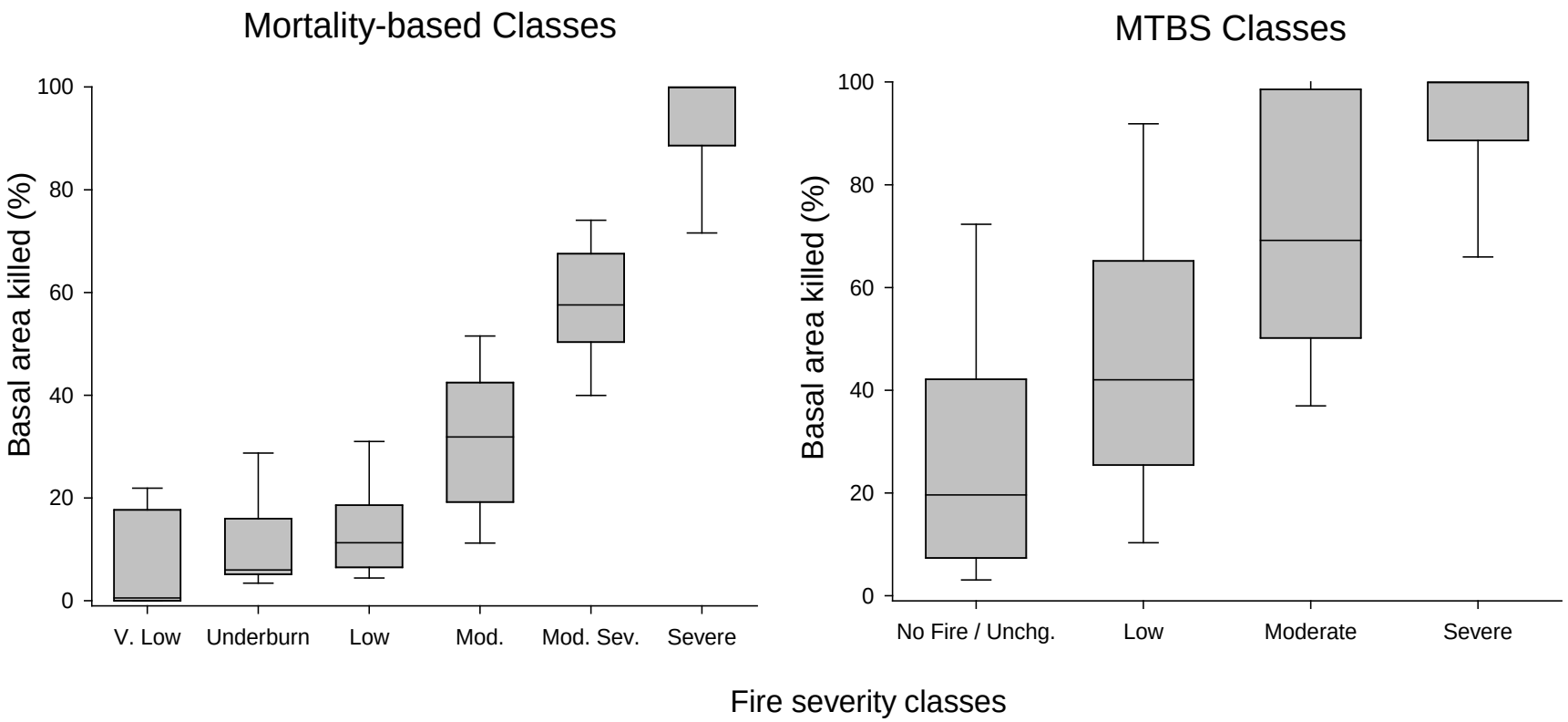
3-D models from video imagery (D.Gatziolis)

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

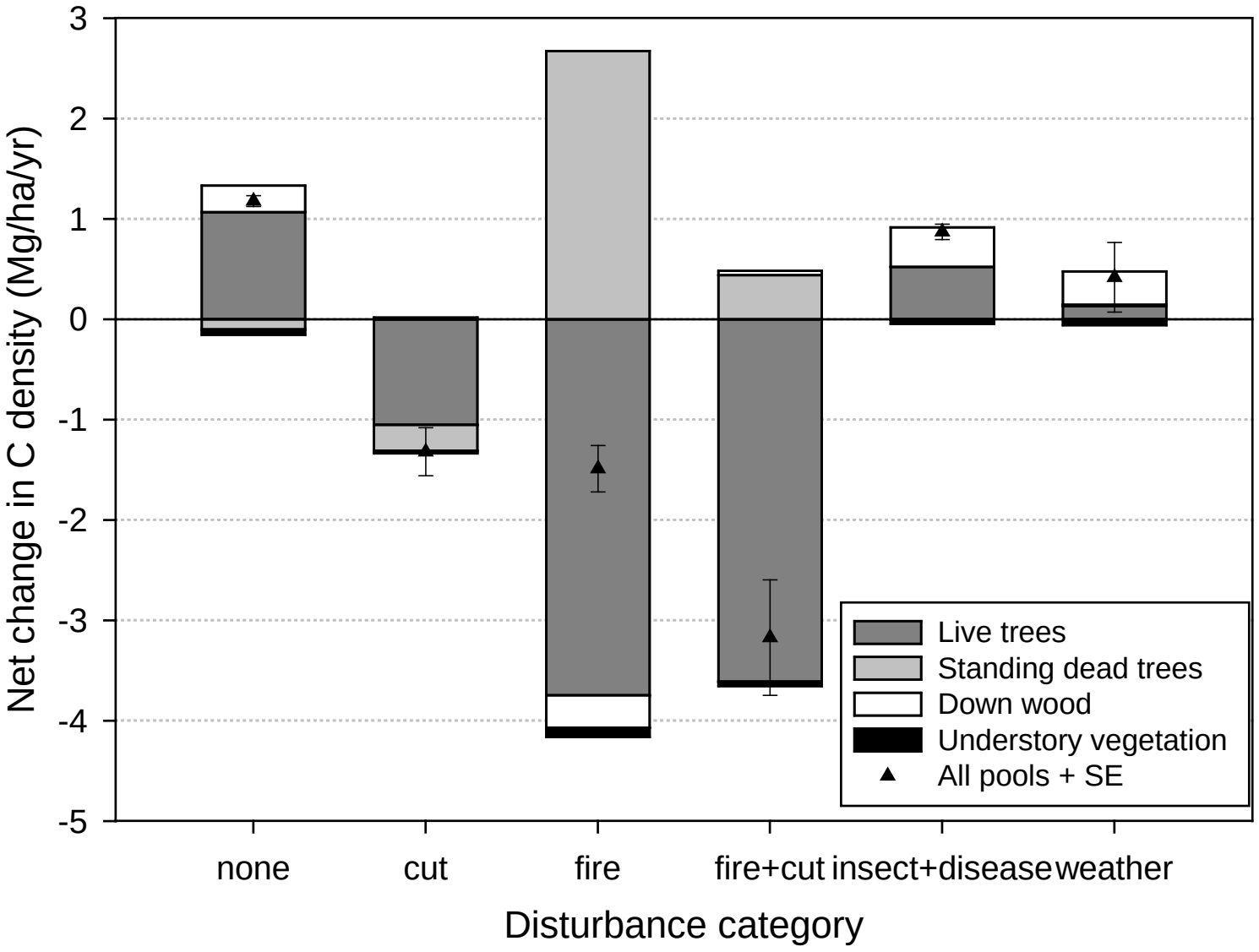
Monitoring burn severity

Plot classes based on mortality of trees of different sizes



For. Ecol. Manage. 359: 199

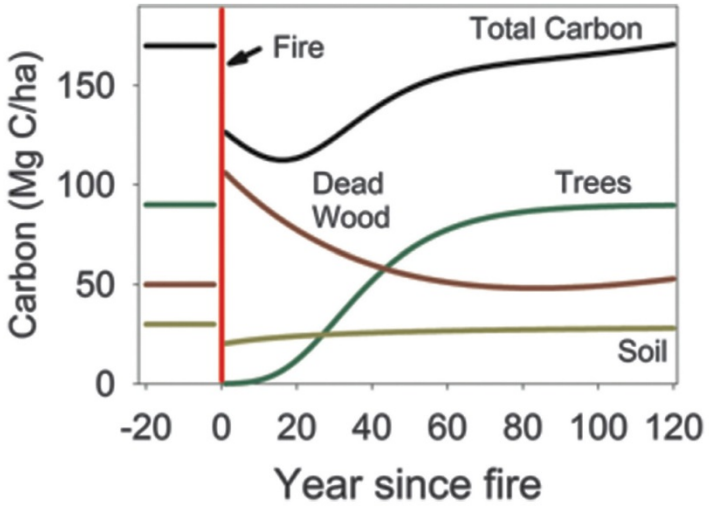
Disturbance effects on carbon



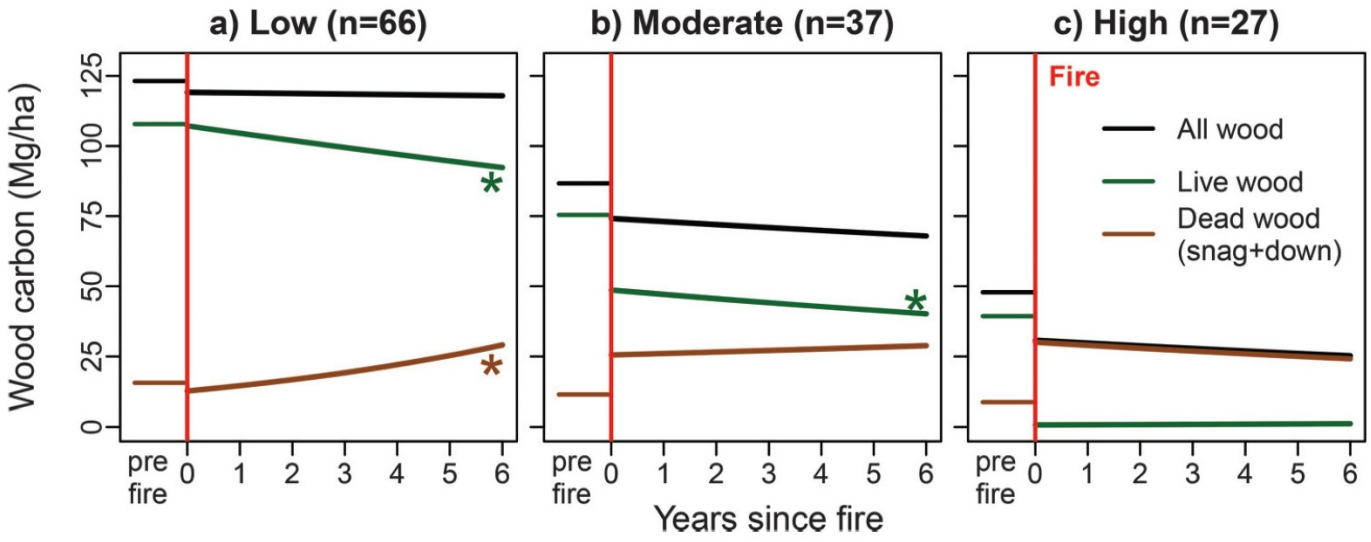
For. Ecol. Manage. 328: 167

Post-fire carbon trajectories from fire plots

The cartoon:



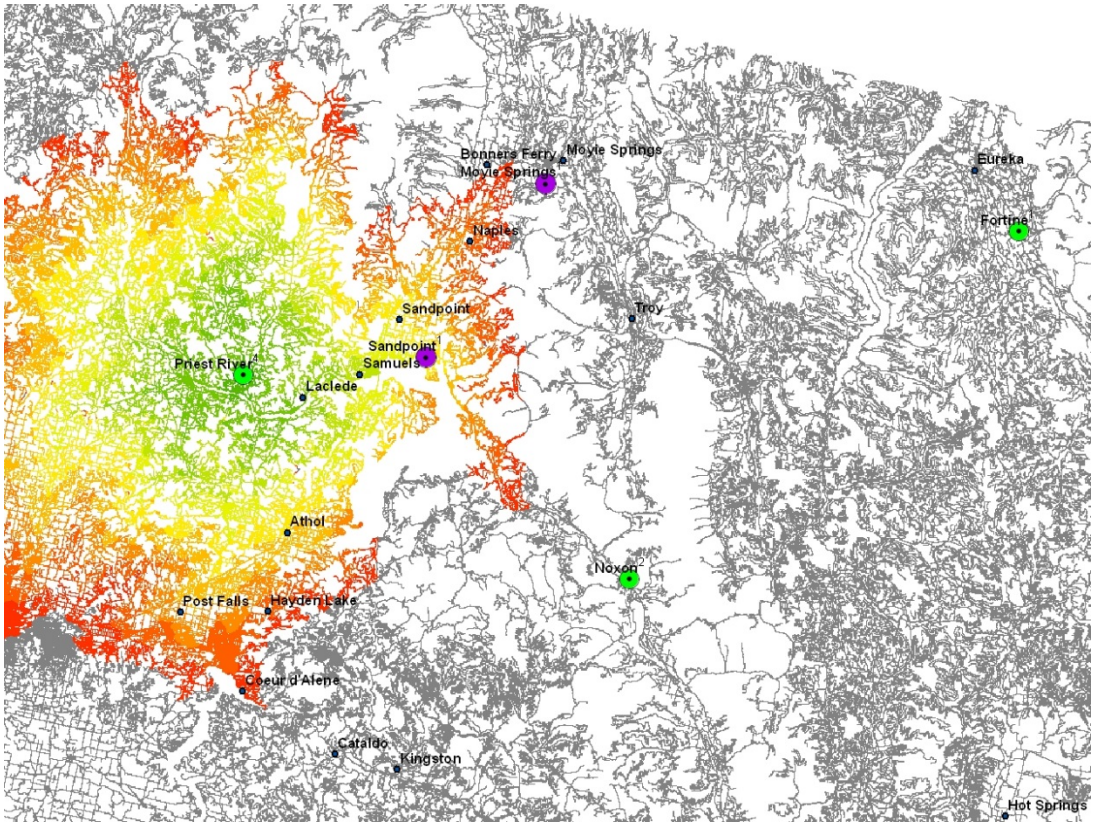
The reality:



Can. J. For. Res. 46: 610

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



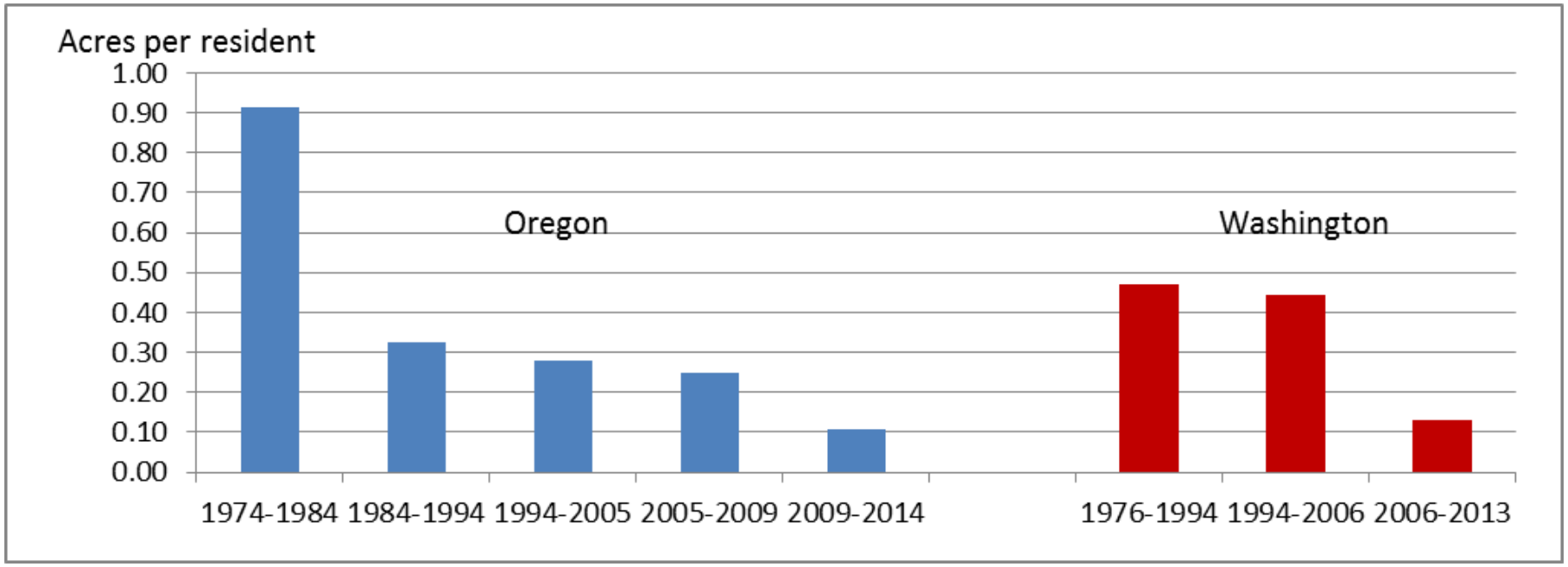
Example of road network and haul costs from FIA plots to potential mill site, BioSum model

Land use & land cover

- 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

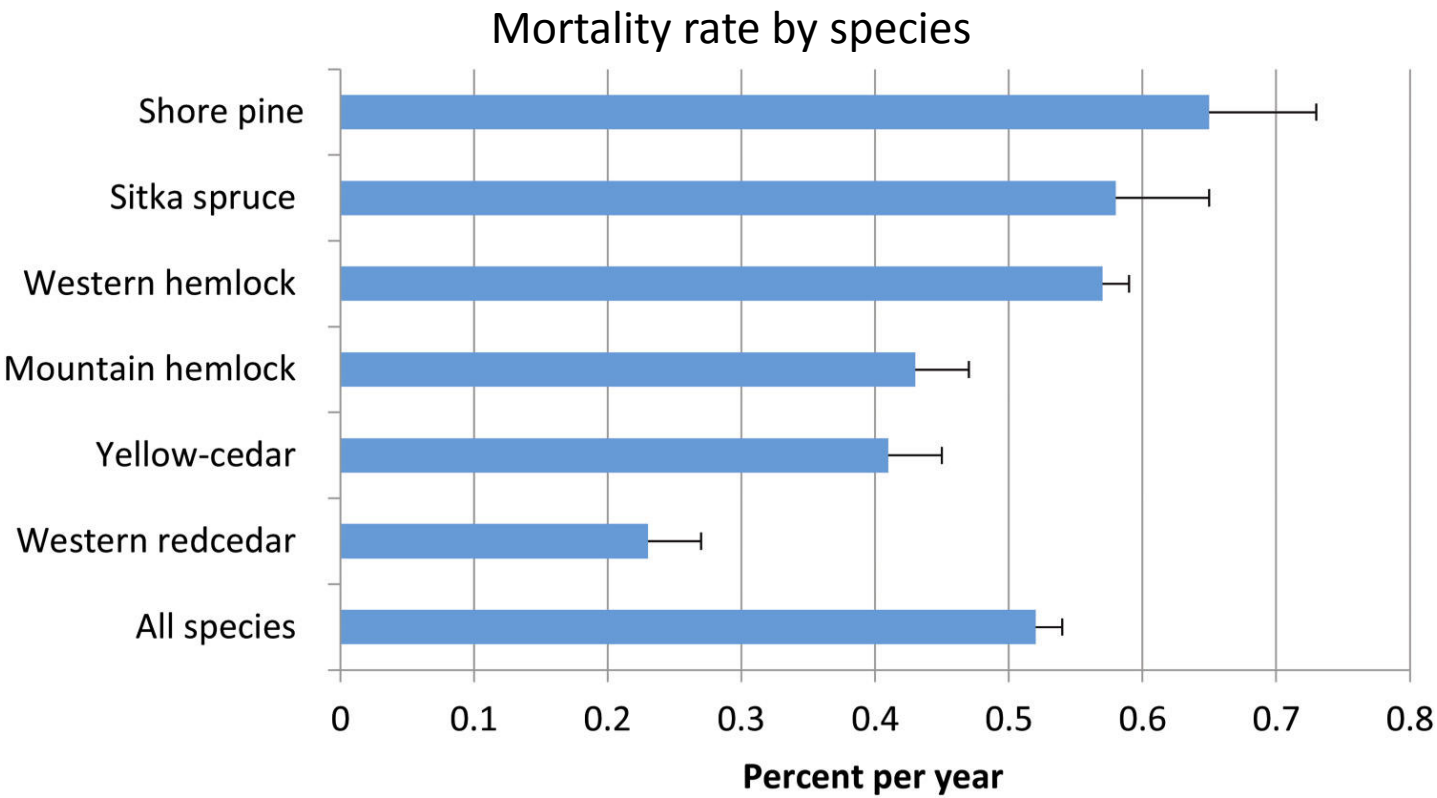
OR + WA development

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

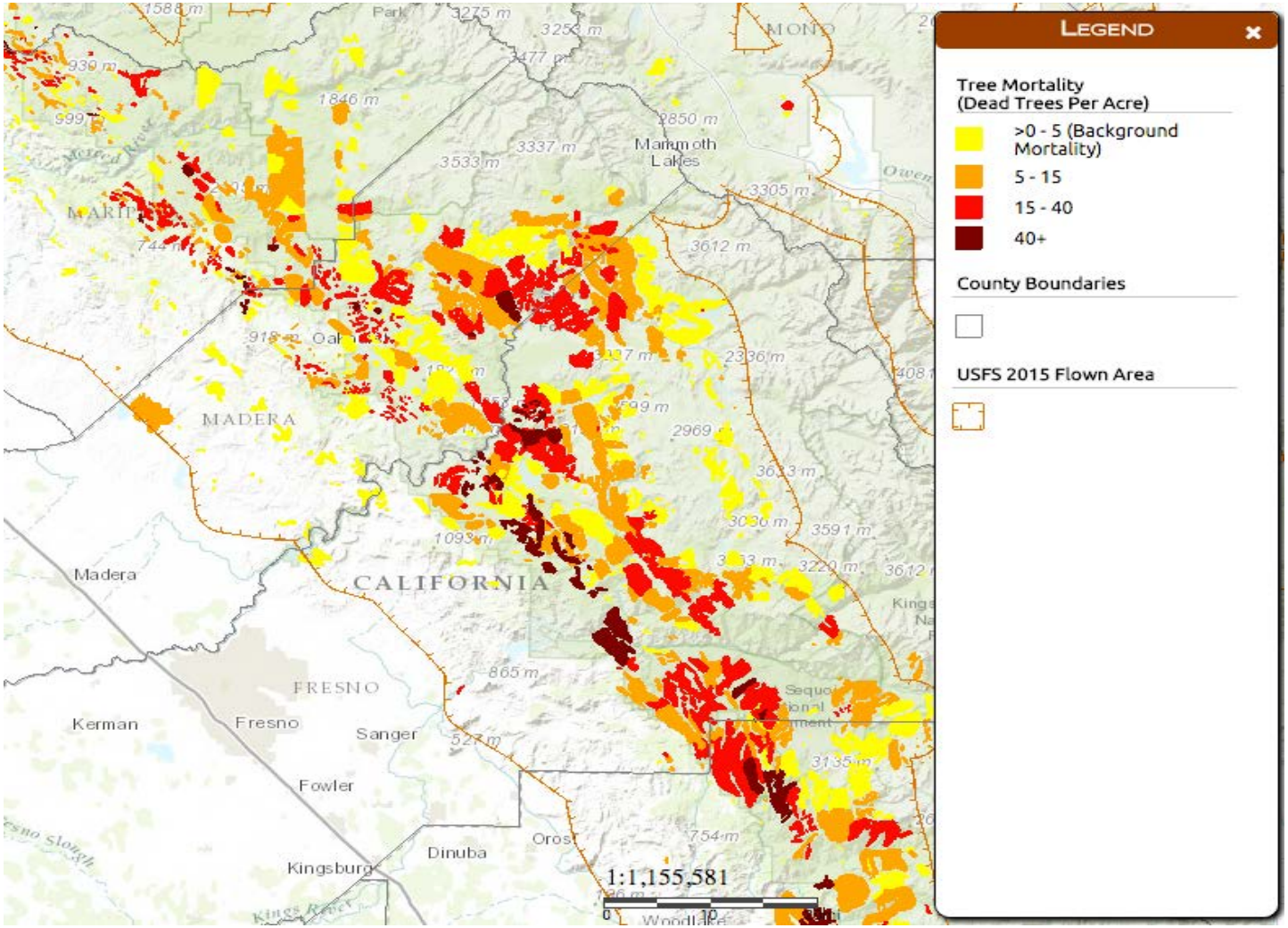
* Evidence of past mortality in places at low elevation, but growth exceeds mortality in recent decades, especially at high elevations



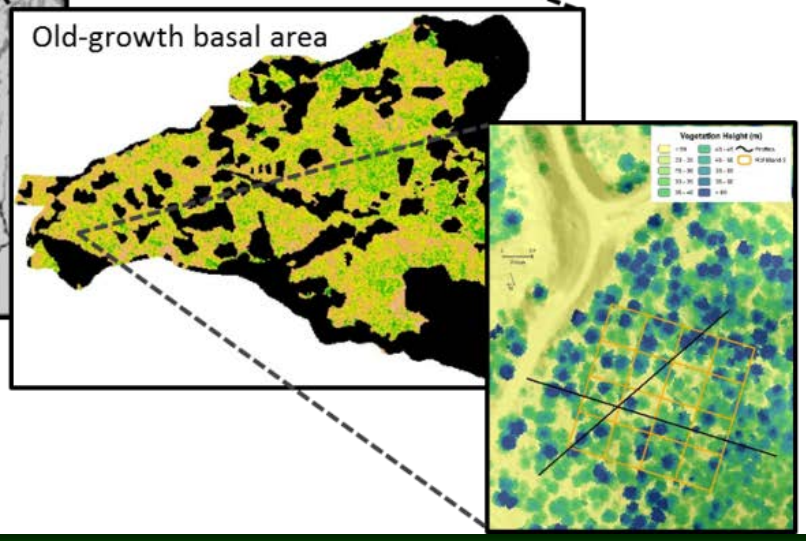
Barrett & Pattison, Can J For Res 47: 97

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

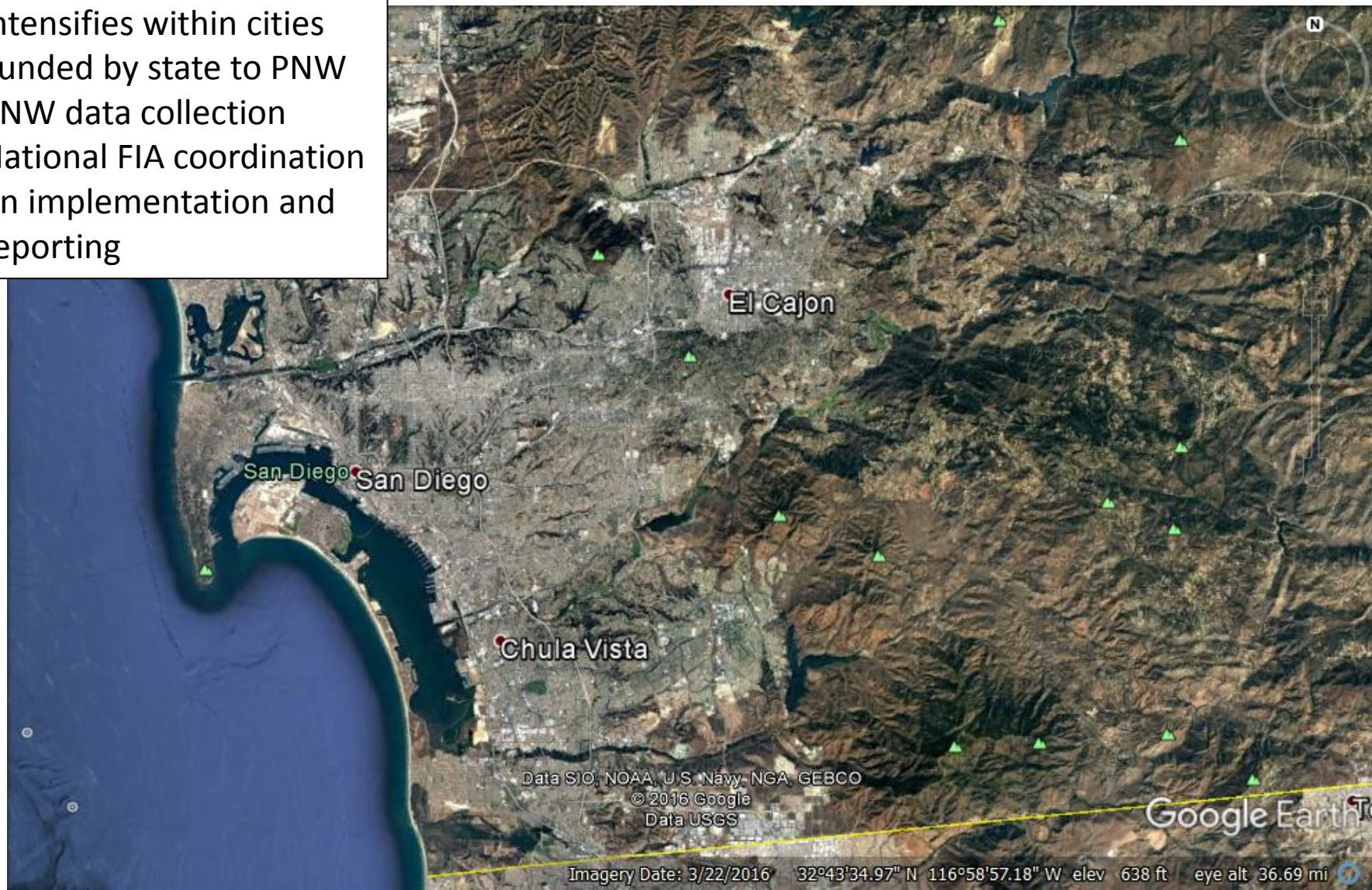
- Accuracy and precision
- Product comparisons
- Applicable scales

Forest Change and Vulnerability

- Forest decline
- Climate and disturbance effects
- Tree demography

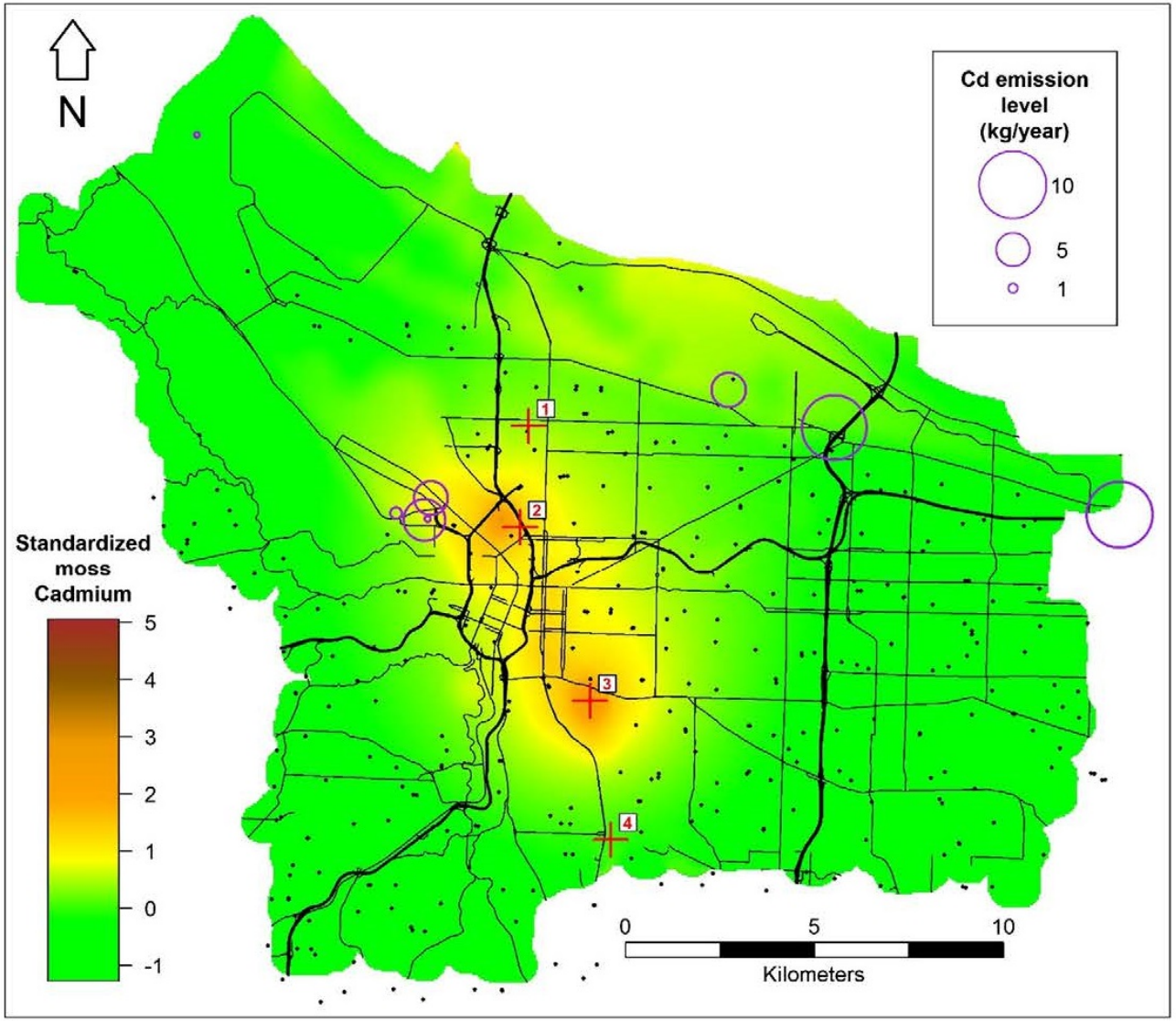
Urban FIA: San Diego 2017, Portland 2018

- 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



Donovan, Jovan & Monleon, Sci Tot Env 559: 84


Questions?