Combining FIA and Remote Sensing to Improve Spatial Resolution of Forest Resource Monitoring

Sean Healey, Interior West FIA
Context

• The FIA plot grid allows estimation with adequate precision starting at about the county scale.

• Many groups can (and do) create high-resolution maps using inventory data for pixel-level calibration and validation.

• What is on the horizon that might be of sustained use by FIA and its clients?
Nearest Neighbor Imputation Maps

Useful for:
- Applications that require a surface (fire, water, habitat)
- Applications that require a tree list (FVS)
- Small area estimation techniques as ancillary data

Currently available: 250-m resolution

Coming: 30-m resolution
Image-based Change Estimation (ICE)

- Pilot production has been completed in several states
- Targets: Land Use, Land Cover, and Change
Image-based Change Estimation (ICE) - continued

• Measured on FIA plots using each new acquisition of NAIP imagery (every 3 years)

• Will be linked with standard FIA variables to improve temporal precision of change estimates

• Observation grid can be intensified by clients
Landscape Change Monitoring System (LCMS)

US government (Forest Service/USGS/NASA) project that works with leading Landsat change detection scientists to compare and integrate their innovations

1. Compare algorithms
2. Explore combination of algorithms
It turns out that automated algorithms disagree a lot at both the pixel level and population level.
Change Estimation

- We found that patterns in what each type of map gets right/wrong can be used in a meta-model that gives us better accuracy than any individual map.

- Working closely with Google and developers of each original algorithm, LCMS will produce a national product (back to 1985) in 2017.
How is this relevant to FIA?
1. May complement more expensive photo interpretation work (ICE)
2. Output of meta-model can be “tuned” to match sample-based estimates at broader scales
Work with NASA

GEDI Mission
(Global Ecosystem Dynamics Experiment)
LiDAR on the International Space Station
Like FIA, GEDI will generate a sample of forest conditions around the world.
Using model-based estimation, GEDI will generate gridded biomass estimation & will support estimation over any area.

*Waveform models are calibrated at locations where both ground and LiDAR data are available*
Summary of operational spatial data associated with FIA

- Tree list maps
- Maps of historical and ongoing forest change
- Global LiDAR sample