

Prospects for using Forest Inventory and Analysis and related data for monitoring forest carbon offsets

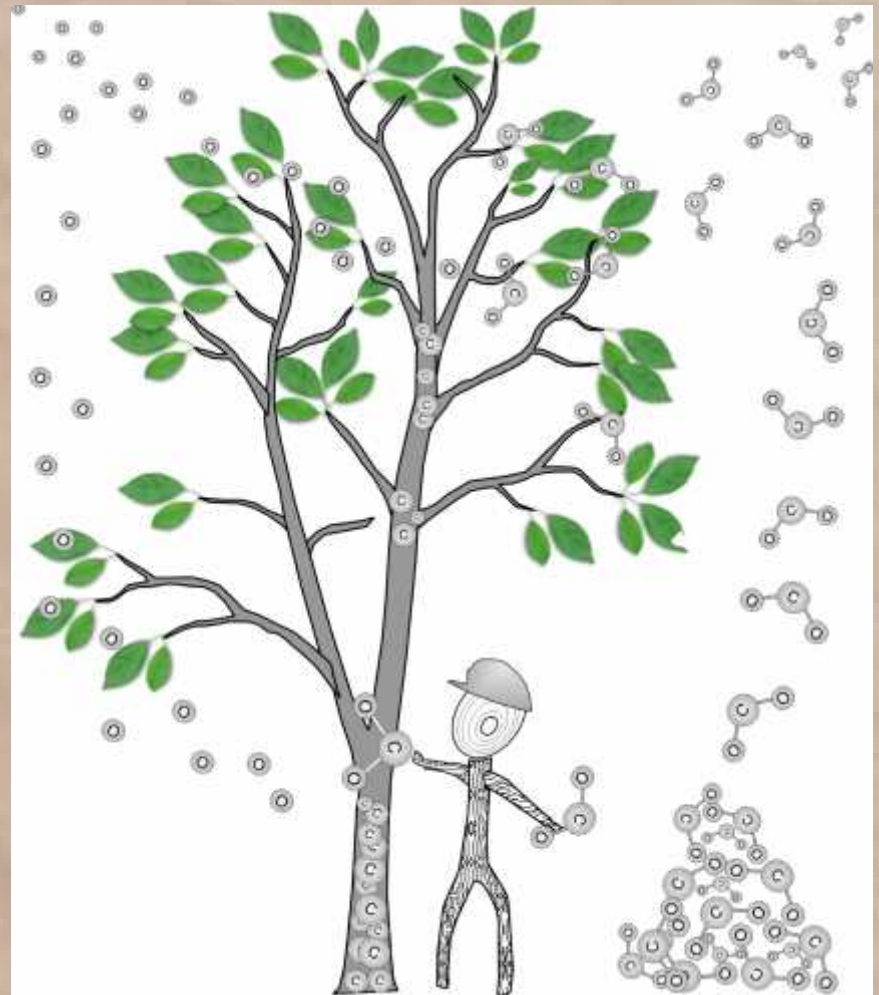
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Forest and Agriculture GHG Forum, Shepardstown, WV,
April 6-9, 2009

Acknowledgments:

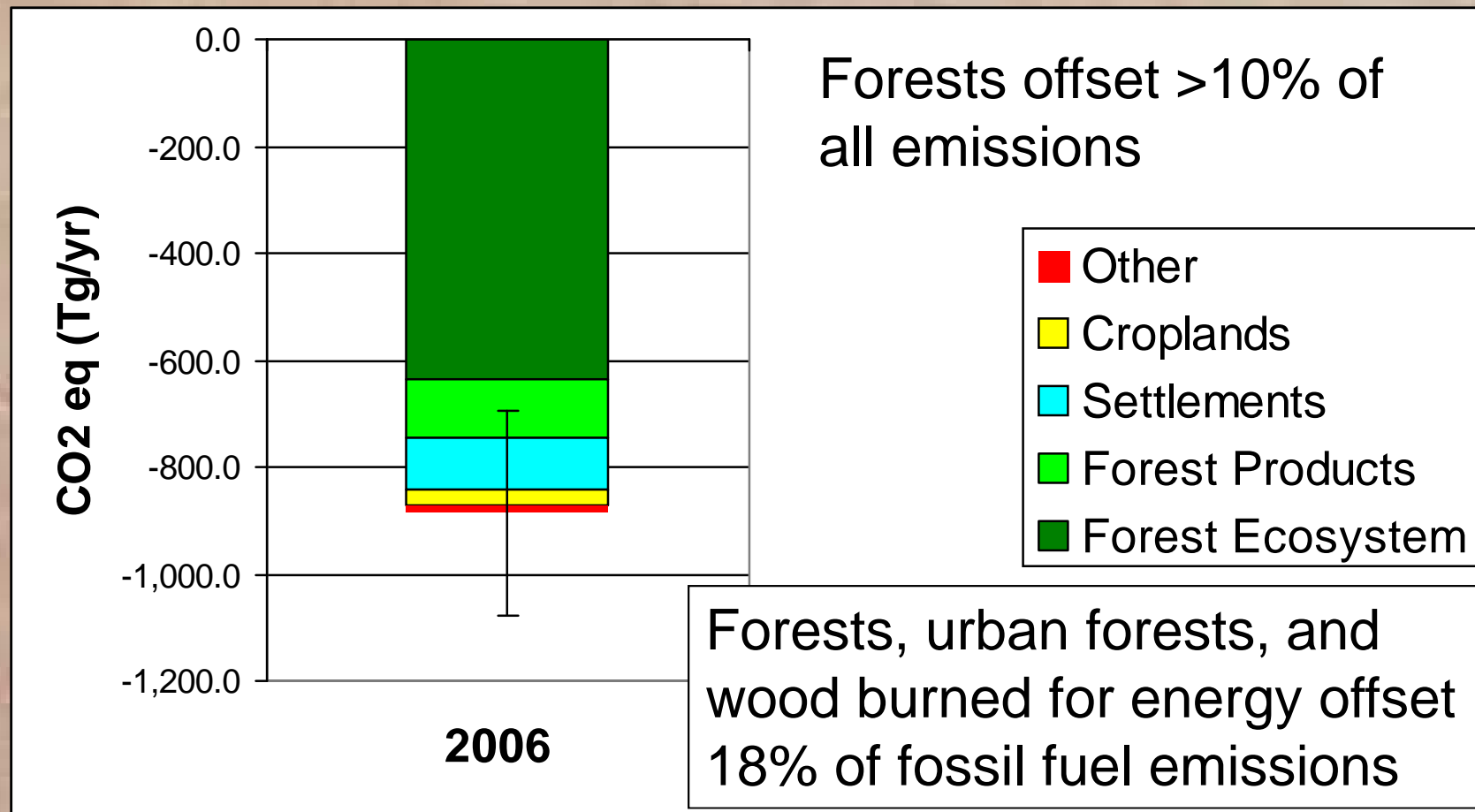
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Chip Scott
Brad Smith
Jim Smith
Chris Swanston
Ty Wilson
Chris Woodall



Outline

- ✓ Carbon stocks
- ✓ What are FIA data?
 - focus on annualized survey
 - not only carbon per area but also area
 - what about after the forest?
 - basis for text, tabular, graphs...maps?
- ✓ Prospects for the near future
 - foundation for the ultimate carbon observation system!?

Net C sequestration, Land Use Change and Forestry for the United States



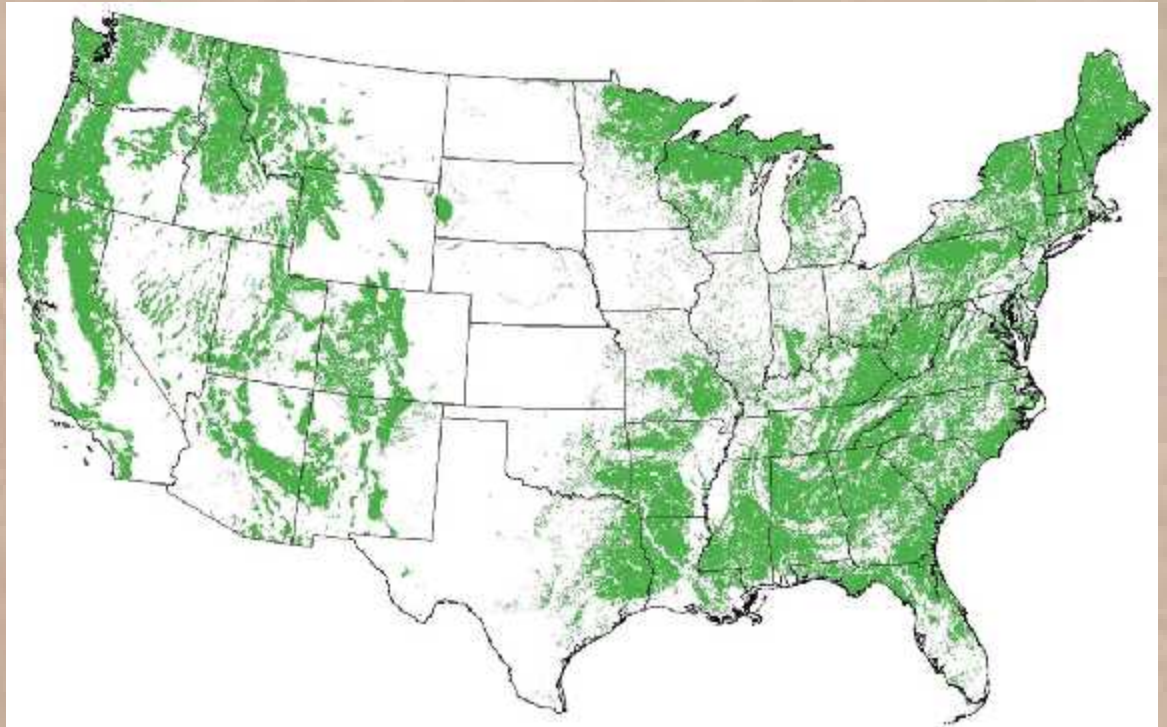
Fire emissions?

Source: EPA (2008), Inventory of US GHG emissions and sinks
(all are net sinks, no non-CO₂)

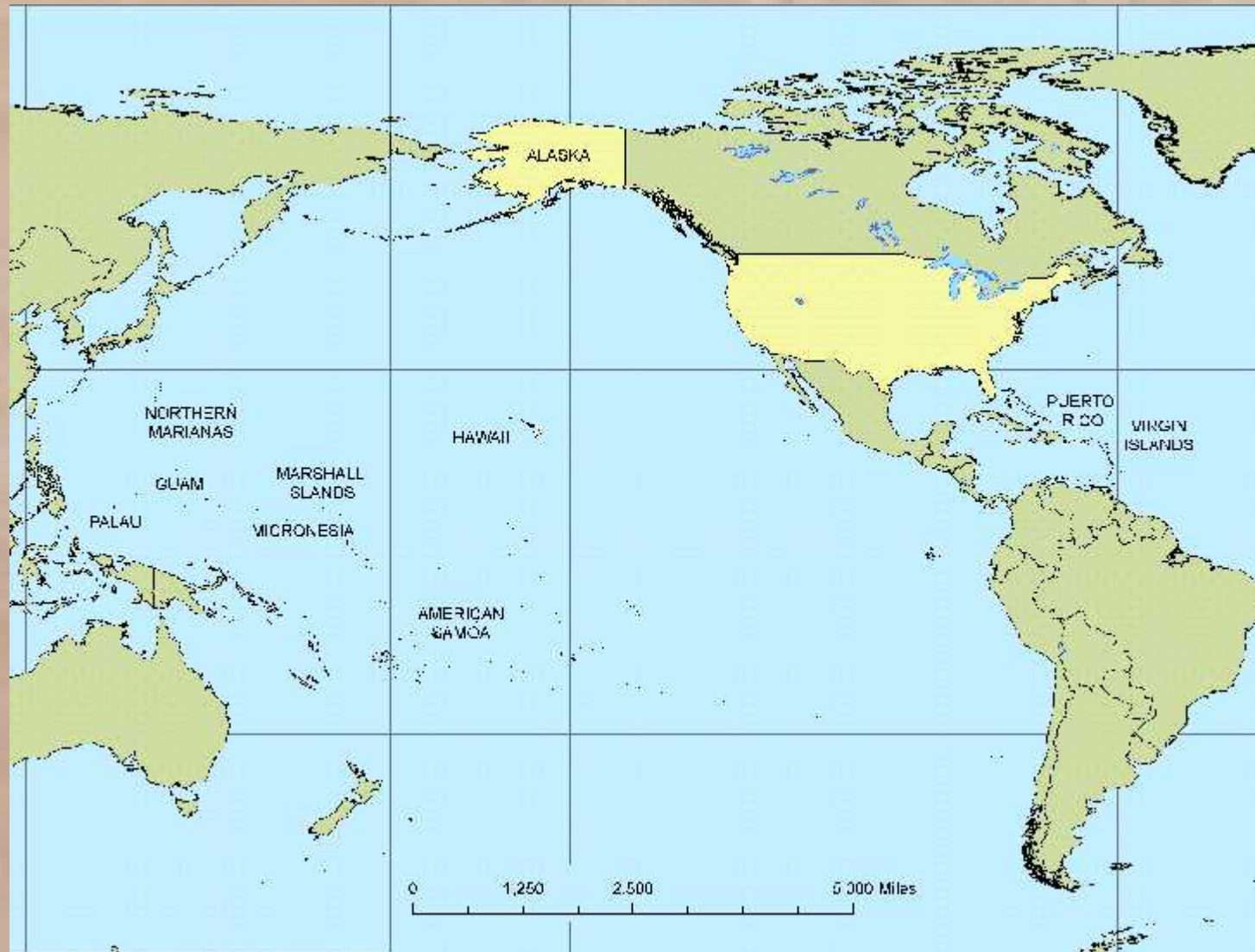
National program goals for FIA

To conduct strategic forest inventories of the United States to estimate:

- extent of forest land
- volume, growth, and removal of forest resources; and
- health and condition of the forest.



Over 300 million hectares of forest – 4th most forested nation in the world



Geographic span of FIA

From the Arctic Circle to the Tropic of Capricorn.

From the Virgin Islands to Palau, west of Sidney

Ground data becoming available from most of island territories—starting again in Hawaii—southeast AK

Fast Fact: FIA operates in 12 different time zones

What kind of FIA data can inform the carbon debate?

Phase 2 - forest mensuration

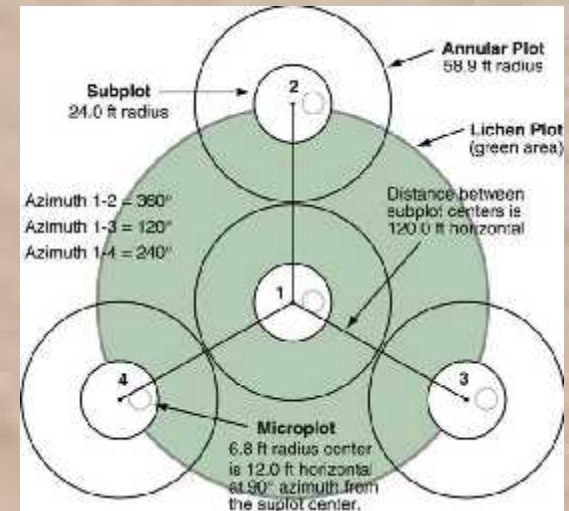
- 1 plot per 6000 acres
- visit plot every 5 years

Phase 3 – forest health

- each 16th P2 plot
- soils, forest floor, down woody nationally
- 1 plot per 96,000 acres
- soils sampled every 2nd visit

Phase 1 – remote sensing

- reduce variance through stratification



What kind of FIA data (continued)?



Harvested wood & products

- Utilization Studies

- Timber Products Output

Ownership survey

National Inventory & Monitoring Applications
Center

Summary table of FIA plot data

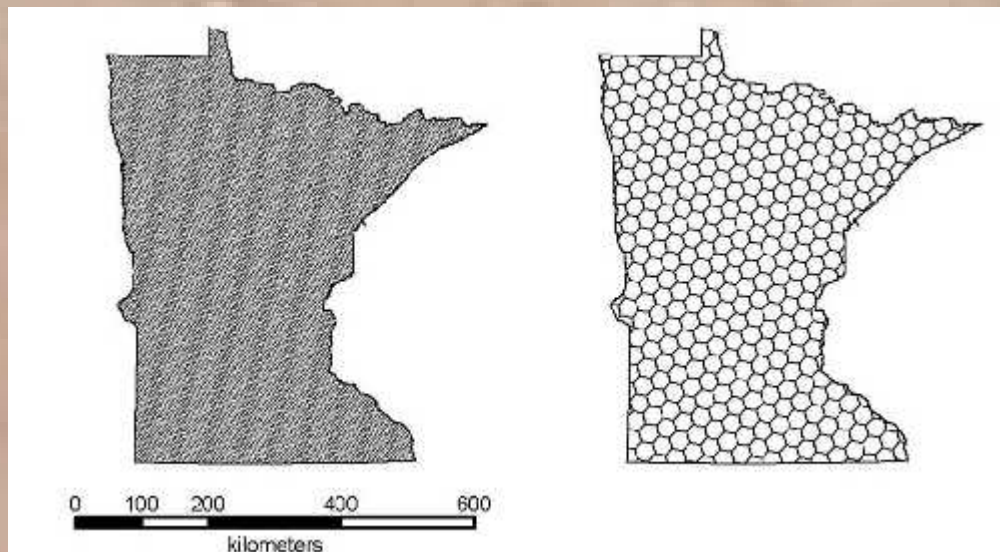
Live trees	Data available, used in carbon estimates
Standing dead trees	Data available, used in carbon estimates
Understory vegetation	Data exists- not analyzed
Down dead wood	Some regions every P2 plot, not in database
Forest floor	Population totals not worked out
Soil carbon	Population totals not worked out

Sampling frame –where locate plots?

Adopted hexagonal sampling frame

Shape allows plots to be equidistant

Shape allows for further tessellation



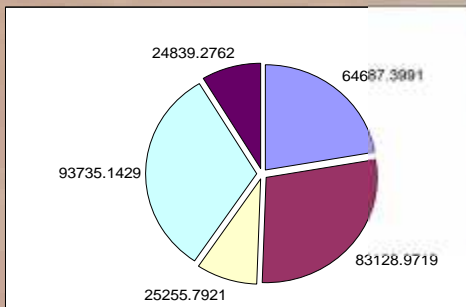
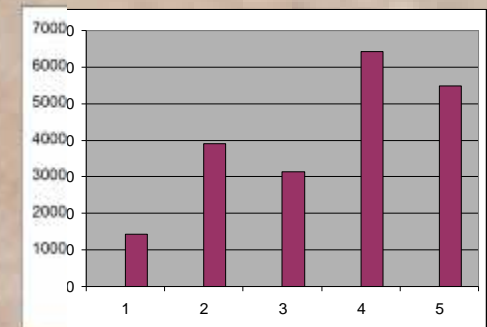
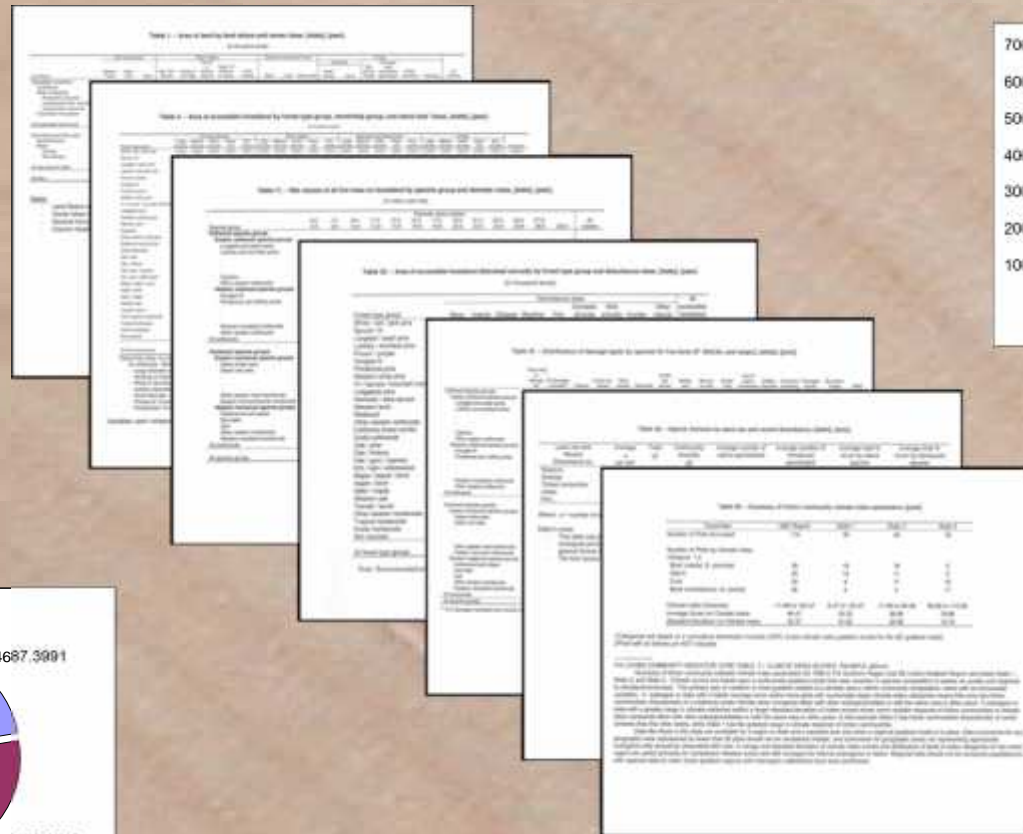
For US:

-- 125,000 forested P2 plots

-- 7,800 P3 plots

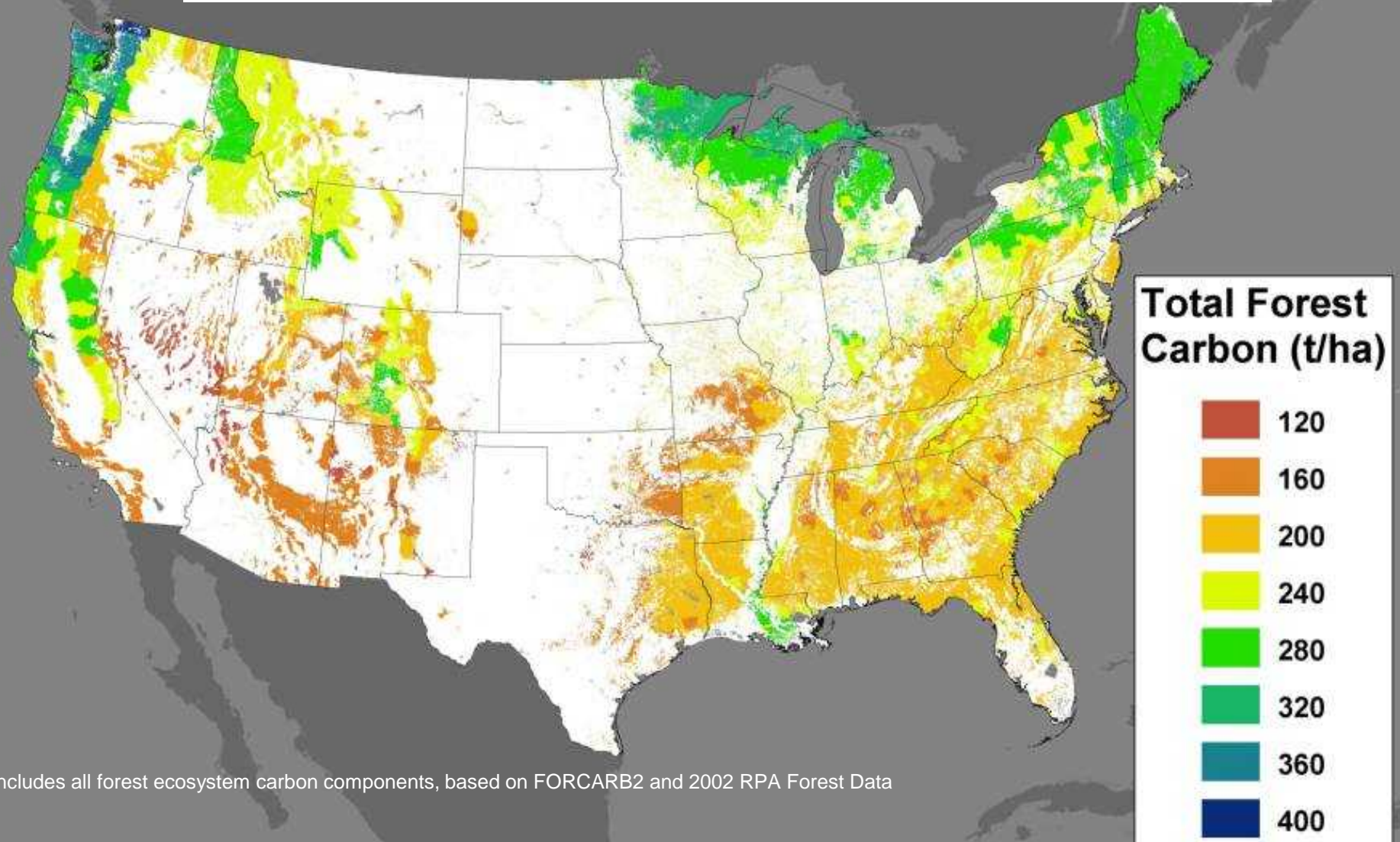
State of Minnesota, P2/P3 grid

FIA typically produces reports that include textual, tabular, and graphical descriptions of the forest resource...



But what about maps?

Carbon stocks per hectare by county



Includes all forest ecosystem carbon components, based on FORCARB2 and 2002 RPA Forest Data

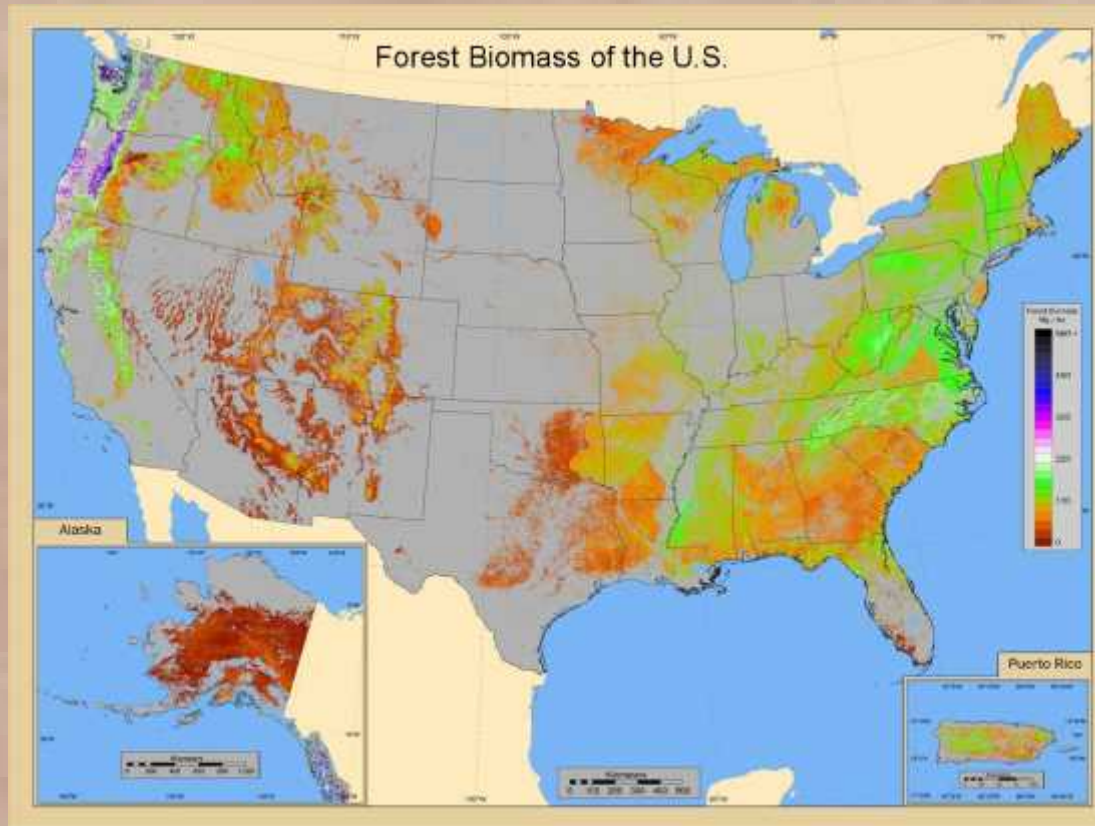
Maps from FIA data, other data, and models

Soon will be many maps....

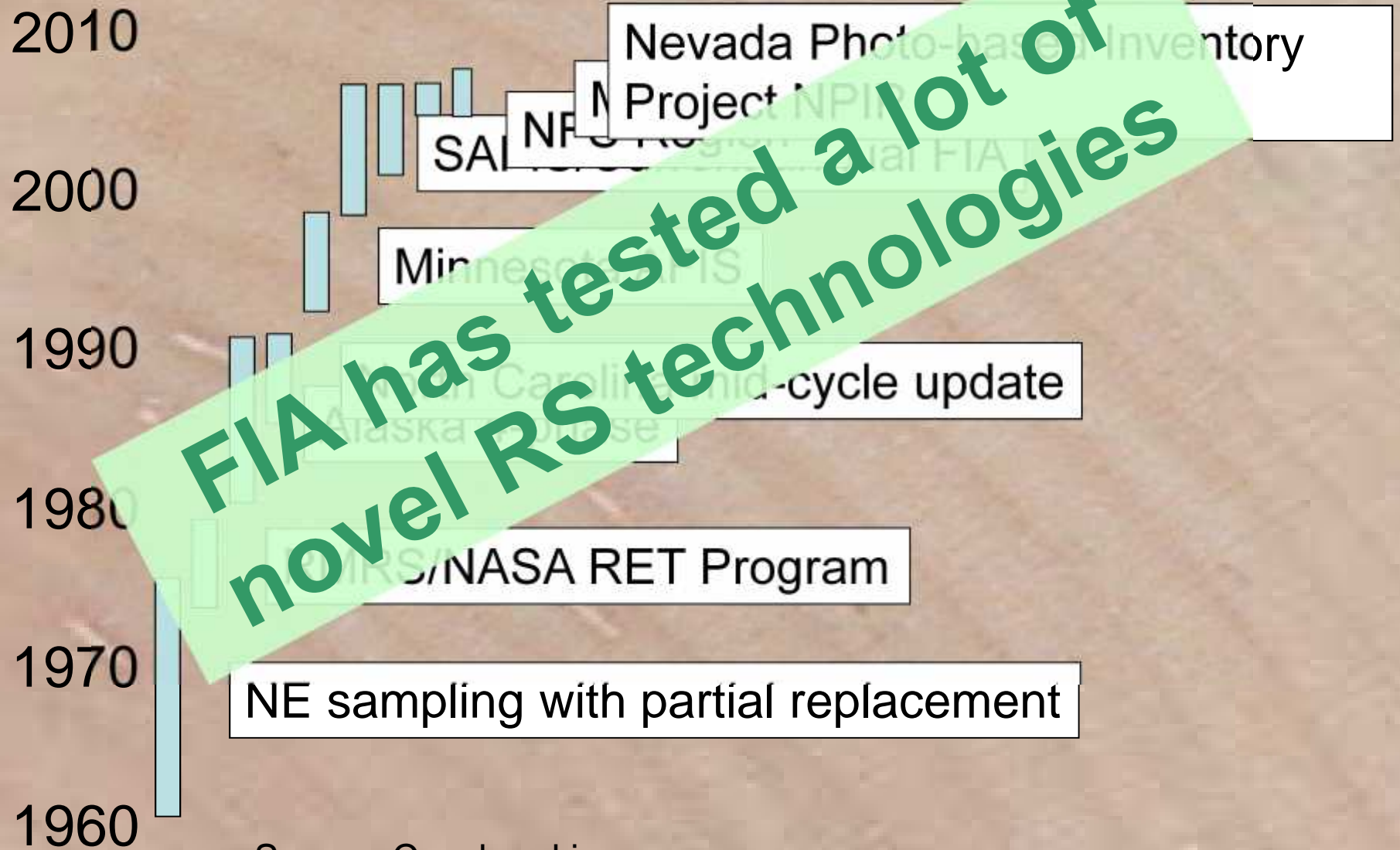
Cubist&NLCD
(Blackard et al
2008)

Some others:
Landsat
(Cohen et al)

MODIS
(Wilson et al)



2. Pilot studies

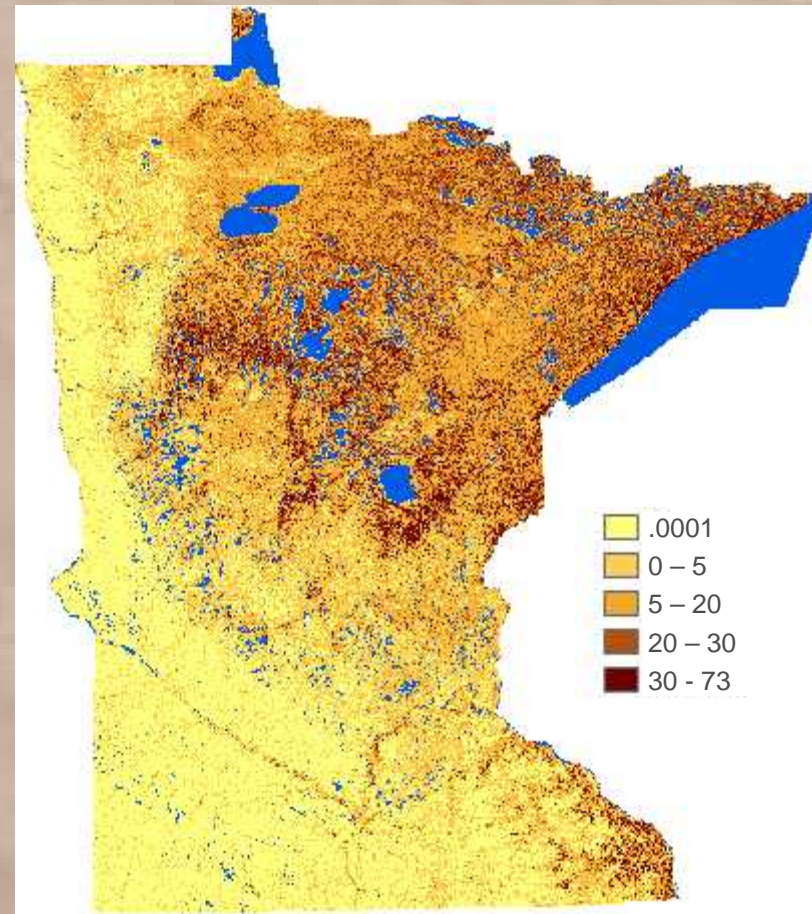
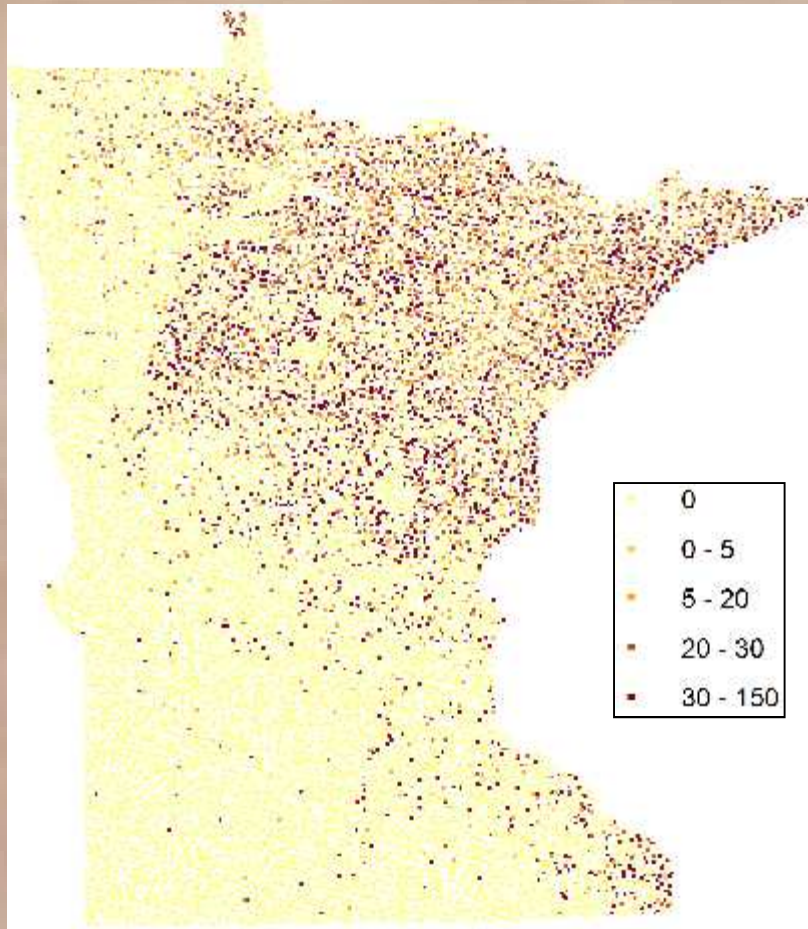


Source: Czaplewski

Mapping– Scaling: Plot vs pixel-level maps

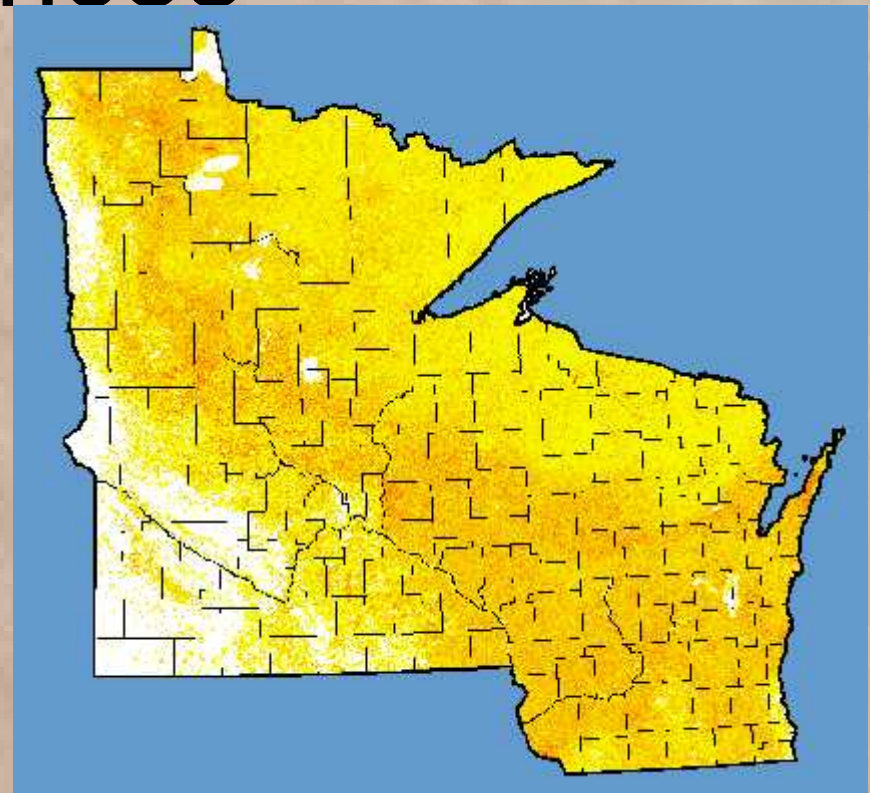
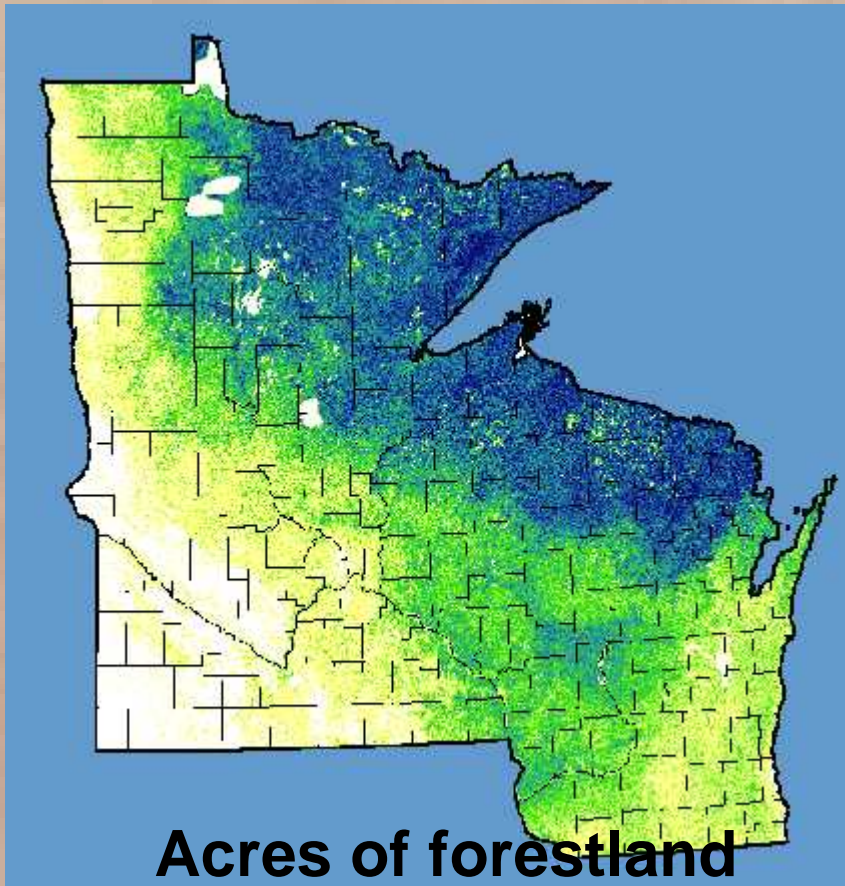
Plot-based map

Greatest Nearest Neighbor



Source: Rachel Riemann

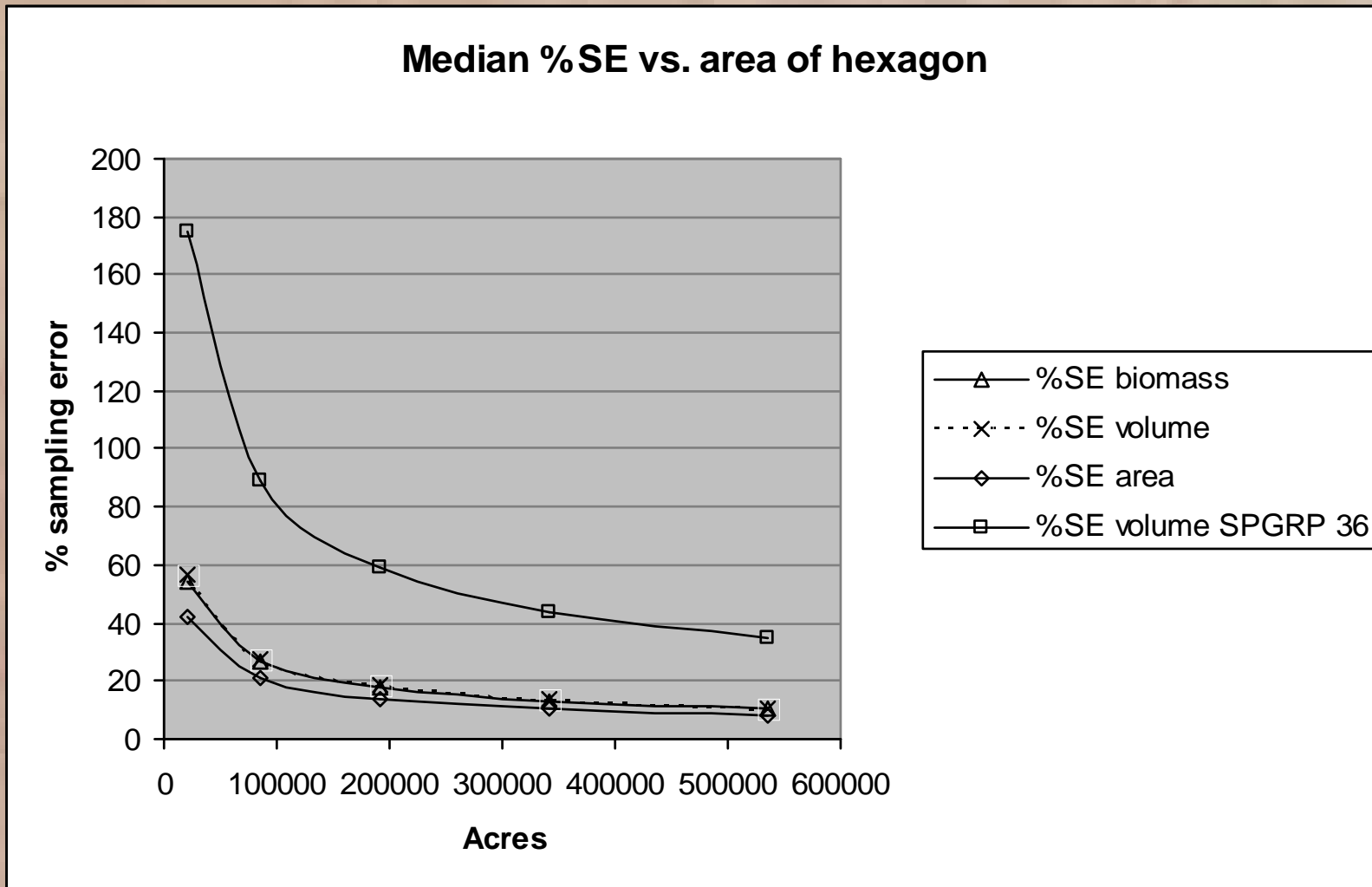
Mapping estimates and variances



Ty Wilson, in preparation

Data Delivery System -- FIDO

Precision of estimates vs. area



Ty Wilson, in preparation

National Inventory & Monitoring Applications Center (NIMAC) -- in FIA

Mission: To develop forest ecosystem inventory and monitoring methods and tools to help FIA and other organizations monitor forests, producing comparable results across the landscape.

Examples:

Eastern National Forests: using planning tool

Natl Forest in Missouri: 2X P2 sample and 7X P3

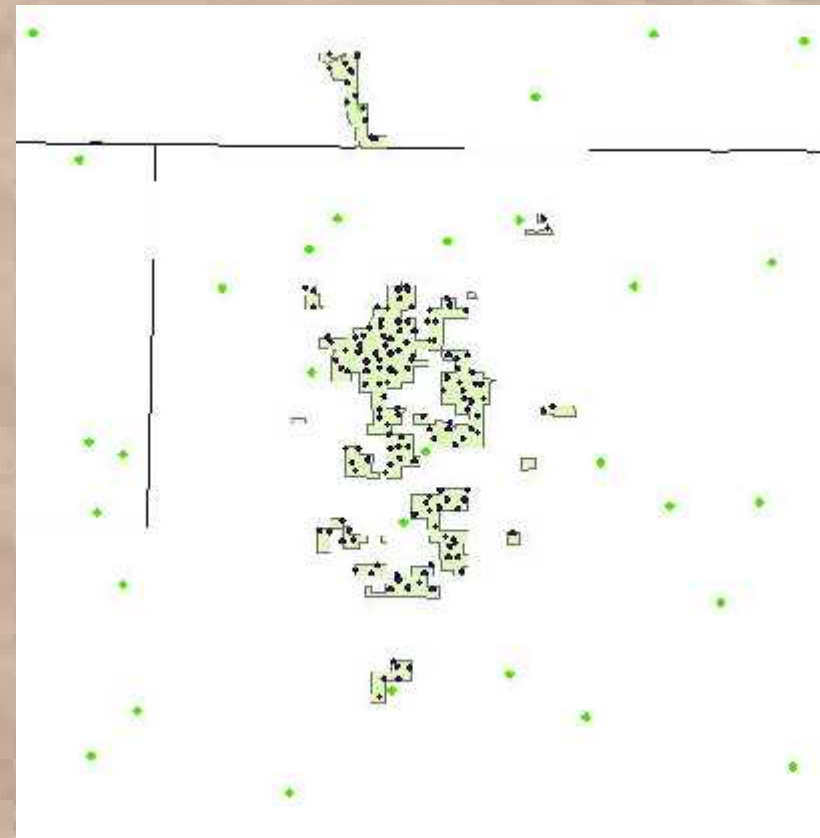
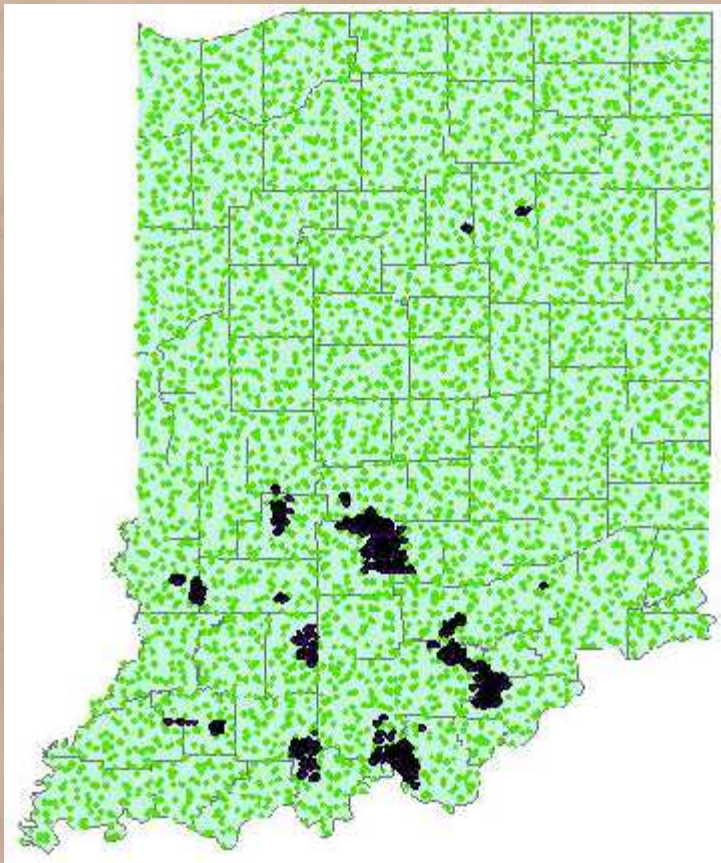
Wisconsin DNR: monitoring 500,000 ac State
Forests

Indiana DNR: monitoring 150,000 ac State Forests

State of Indiana lands - Increased FIA plot intensity

Green dots=FIA P2 plots
Black dots=1 subplot only

Zoom into State forest



Summary...for now

FIA Data:

- ✓ Poised to be a foundation
 - carbon stocks, stock change, carbon fate beyond forests, land use change
- ✓ Data are being collected annually
- ✓ Documentation, analysis, data delivery system needs time to catch up
- ✓ Data integration/fusion with RS techniques and modeling produce even more useful results