

**Role of North America Forest Disturbance and
Regrowth In The NACP: Integrated Analyses Of
Landsat and US Forest Service FIA Data**
– aka: North American Forest Dynamics (NAFD)

Principals

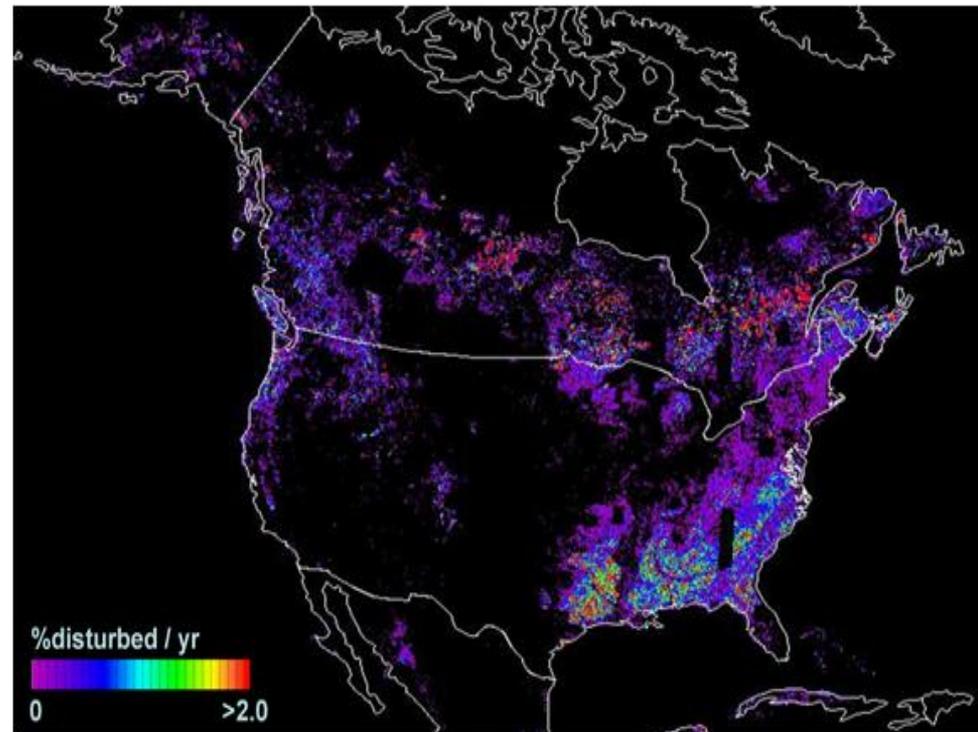
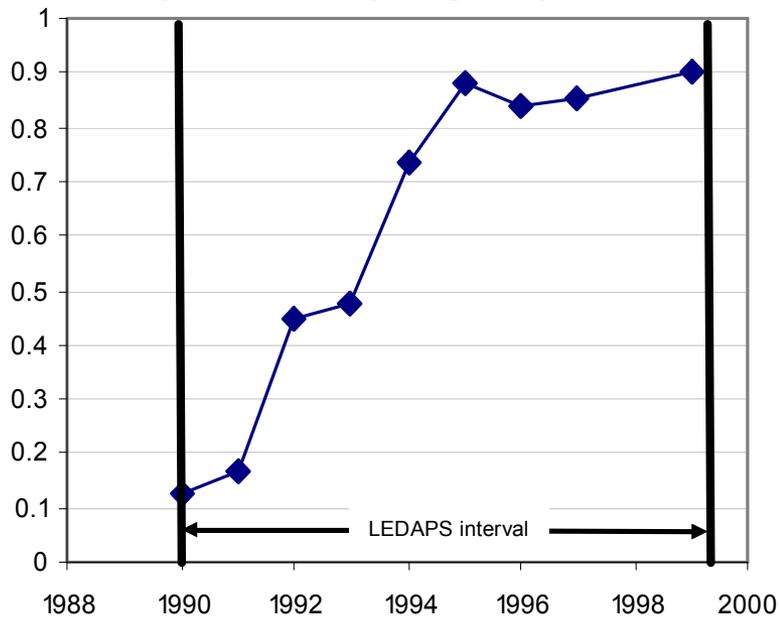
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Jeffrey G. Masek, Gretchen G. Moisen,
Sean P. Healey, Chengquan Huang,
Robert E. Kennedy, Scott L. Powell**

NAFD Project

- ~ 2002: Cohen, Goward, Masek begin collaboration; initiate discussion with FIA Remote Sensing Band & Management Team
- ~ 2003: LEDAPS begins

LEDAPS initial disturbance product: 1990-2000

Fraction of major disturbance detected by LEDAPS (e.g., Virginia, p15 r34)



NAFD Project, cont.

- ~ 2003: Prototype studies begin
 - Begin constructing dense time-series data cubes
 - Establish MOU with FIA
- 2005: NAFD Phase I begins
 - Objective: describe nationwide disturbance and regrowth patterns using cubes
 - Requires sampling.....Sample design...
 - Forestness Index analyses
 - National estimation of disturbance and regrowth metrics...
 - Validation...
 - Exploration of biomass modeling through time & trajectory-based change detection...
 - FIA applications

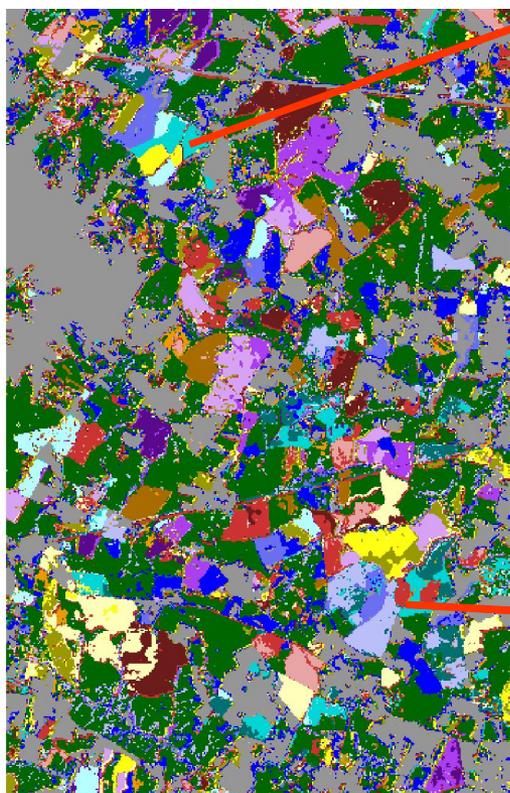
Initial sample-level metrics derived from Forestness Index:

$$FI = \sqrt{\frac{1}{NB} \sum_{i=1}^{NB} \left(\frac{b_i - \bar{b}_i}{SD_i} \right)^2}$$

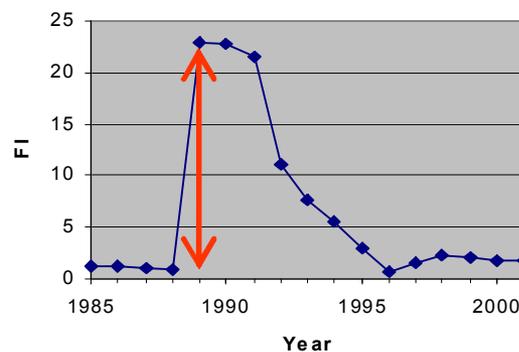
Year Disturbed



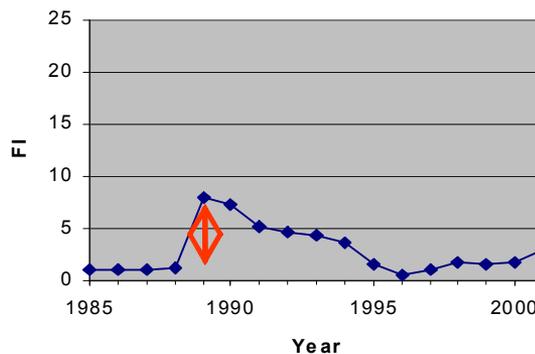
Lake Anna, VA, 60 km NW of Richmond



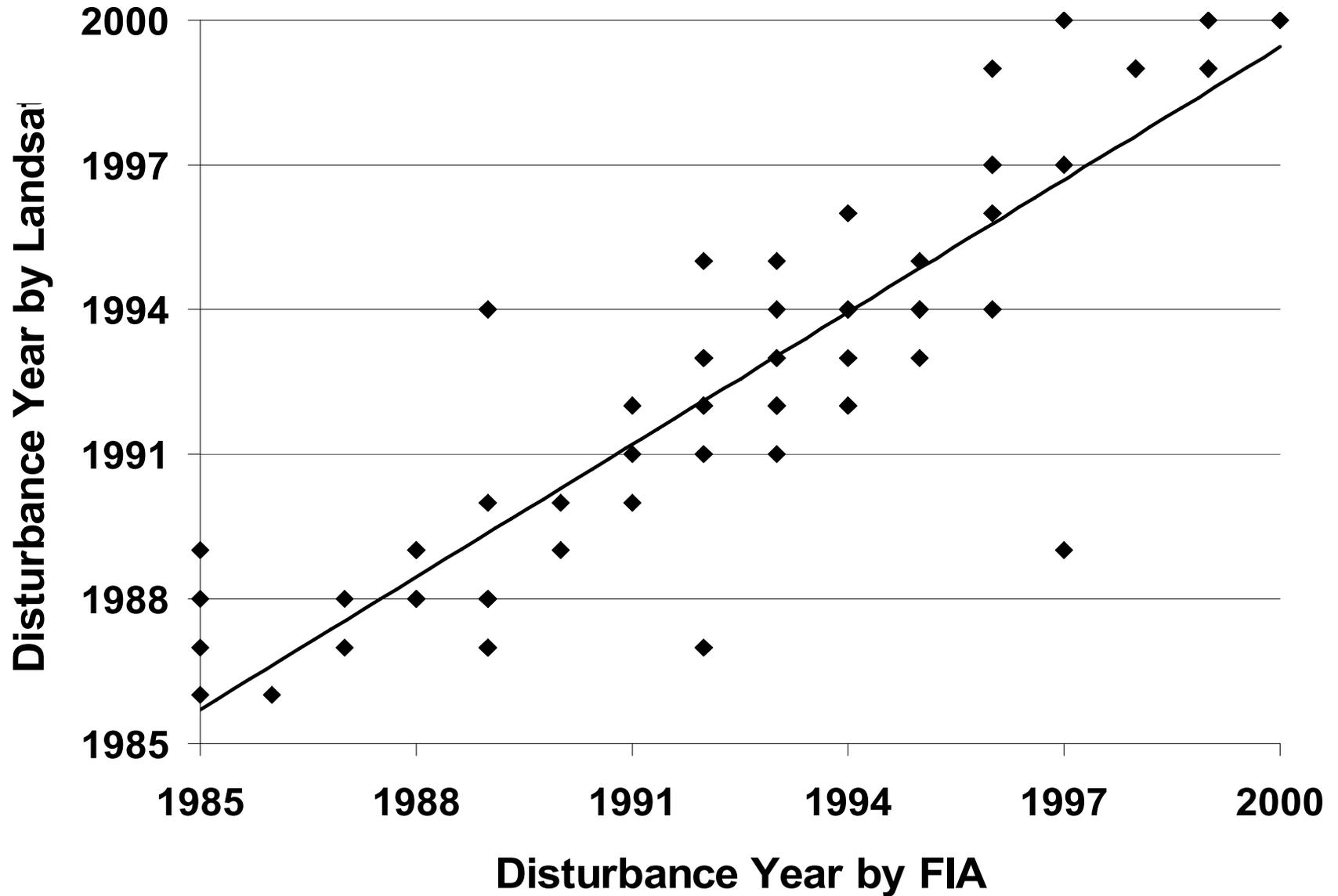
Major disturbance



Minor disturbance



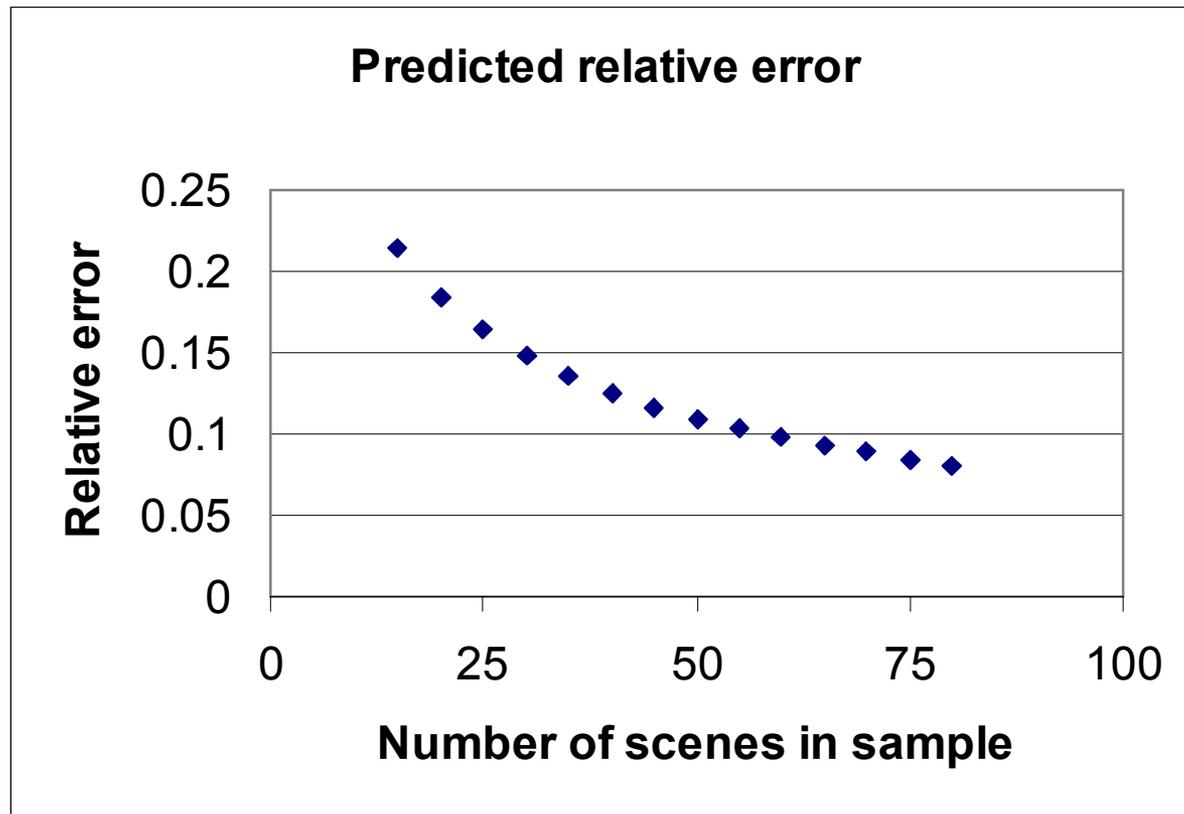
Example of Validation (more soon)



Proposed Future Directions

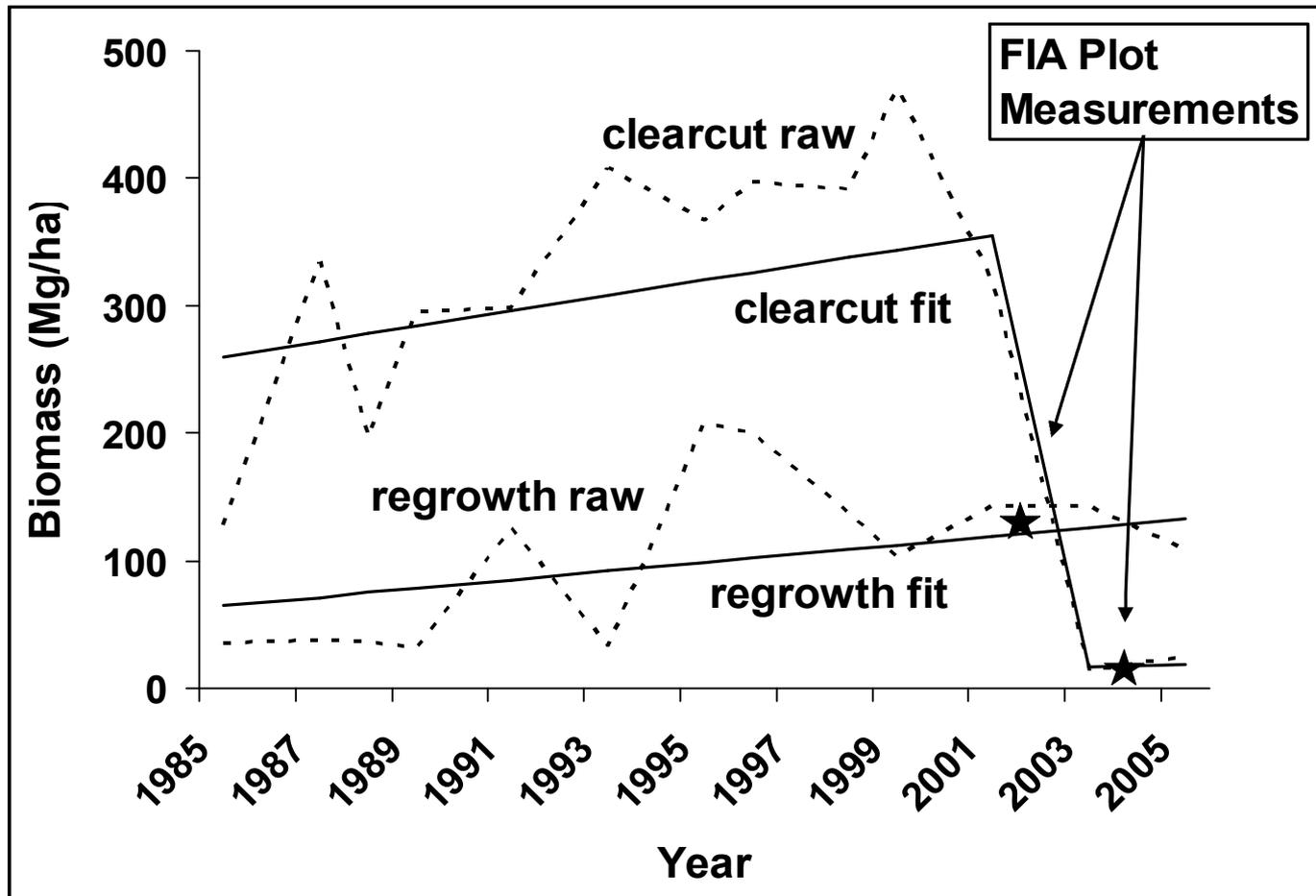
NAFD Phase II (objective)

- *Reduce error in nationwide estimates of forest dynamics by increasing sample size*

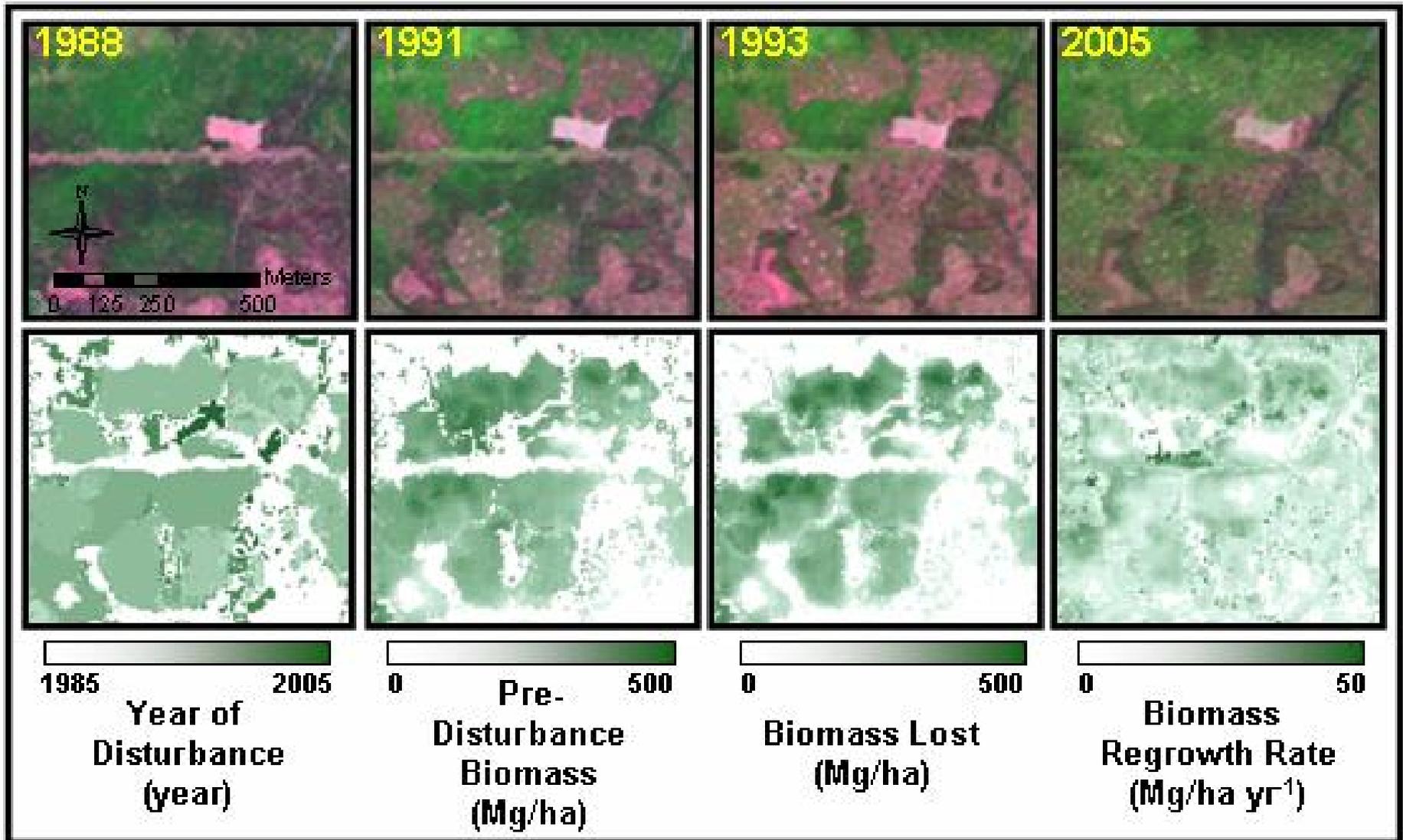


NAFD Phase II (objective)

- *Convert data cube reflectance to data cube biomass with regression trees and trajectory curve fitting*



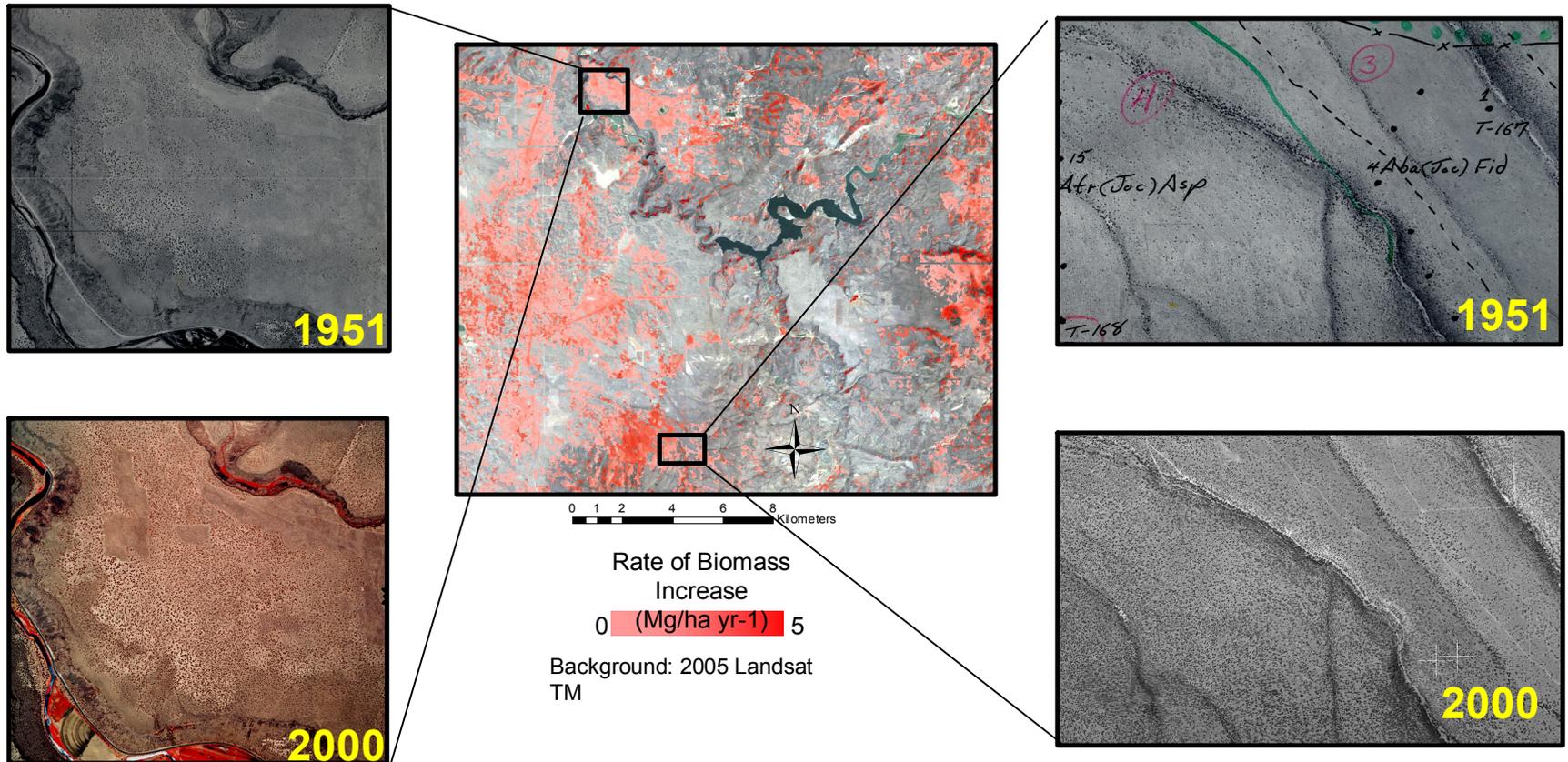
Anticipated Products—sample level



NAFD Phase II (objective)

- *Quantify forest component of woody encroachment, focusing on forest margins and lower rates of biomass accrual*

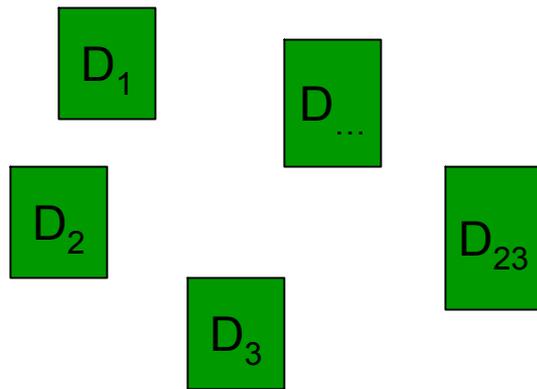
Example: 1985-2005, Central Oregon: p45 r29



NAFD Phase II (objective)

- *Develop nationwide maps of forest biomass dynamics using model-assisted estimation techniques*

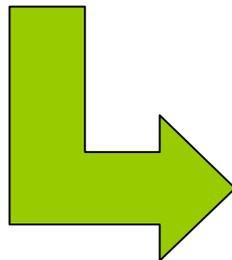
Disturbance Metrics at
23 Landsat Samples



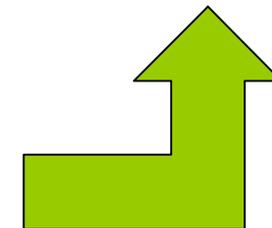
Horvitz-Thompson
Estimators

$$\hat{t}_{\pi} = \sum_{i=1}^v \frac{y_i}{\pi_i}$$

National Estimates
Of
Disturbance Metrics
D



f



NAFD Phase II (additional objectives)

- *Partner with Canada and Mexico*
- *Develop formal collaborative relationships with other NACP-funded scientist*