Forest Health Monitoring for Pests and Pathogens of Trees

Ryan Blaedow
Plant Pathologist, Asheville NC
USDA Forest Service – Forest Health Protection
Southern Region

February 22, 2021

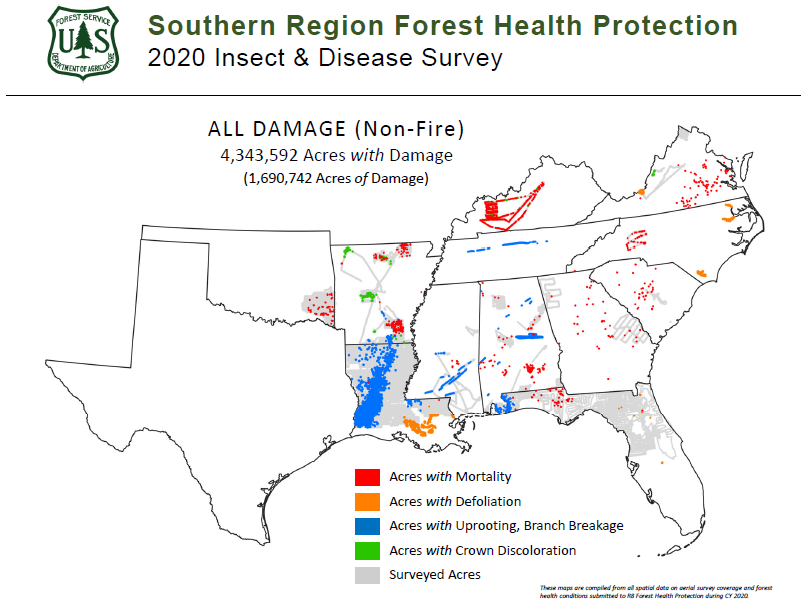
ryan.a.blaedow@usda.gov

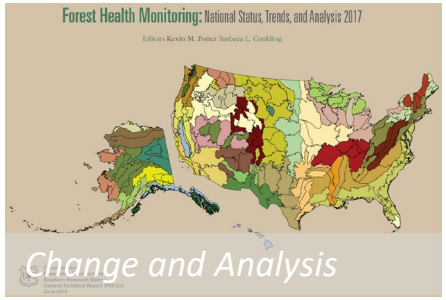
Monitoring for forest pests and pathogens:

- National Forest System
- Research
- State and Private Forestry
  - Forest Health Protection

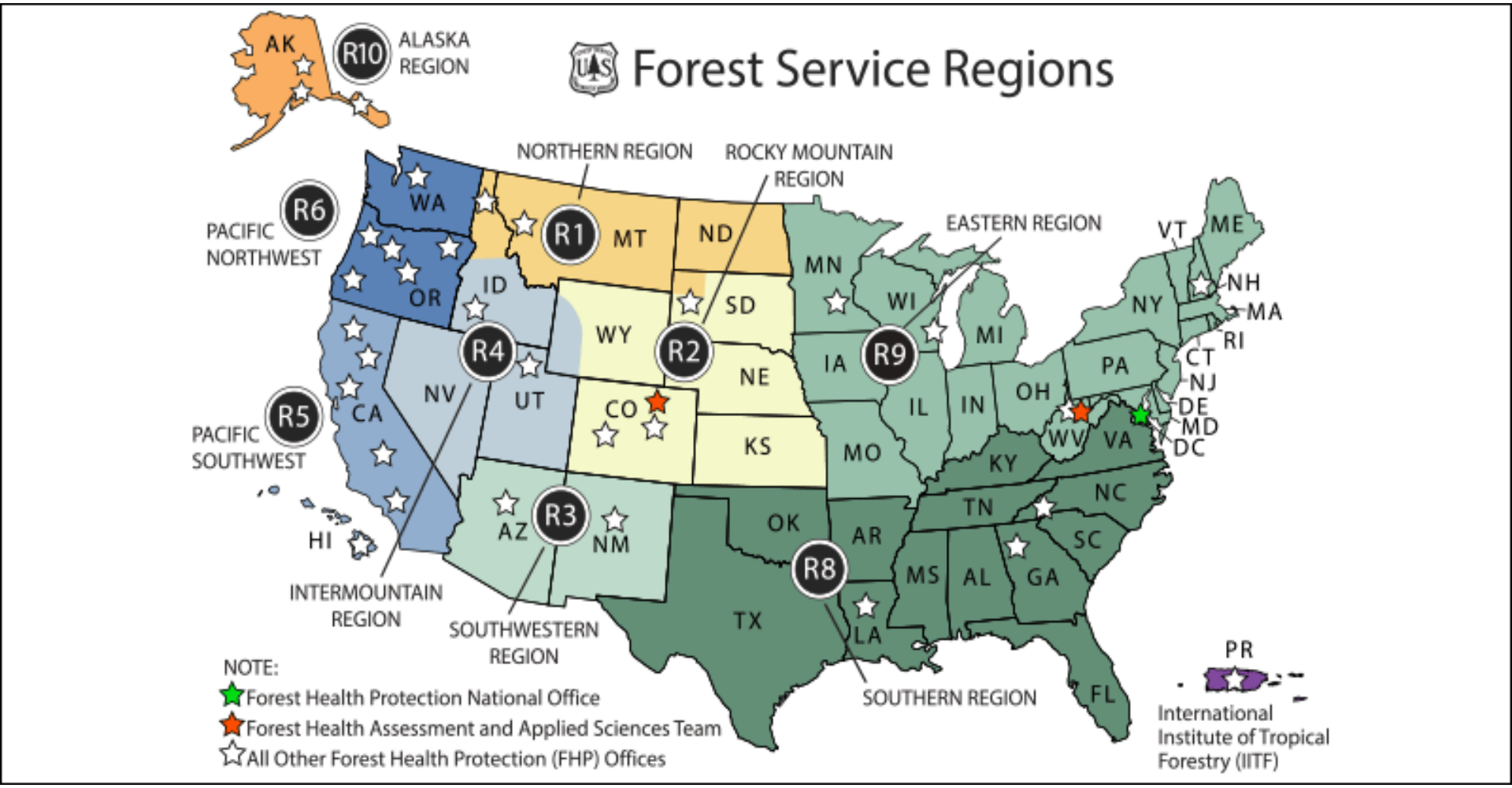
❖ Forest Health Monitoring (FHM)

Forest Health Protection





FHM: Detection Monitoring and Analysis


Forest Service Regions
AK
R10
ALASKA REGION
NORTHERN REGION
ROCKY MOUNTAIN REGION
EASTERN REGION
R6
PACIFIC NORTHWEST
R5
PACIFIC SOUTHWEST
R4
R1
R2
R9
R3
R8
WA
OR
CA
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SOUTHWESTERN REGION
SOUTHERN REGION
International Institute of Tropical Forestry (IITF)
NOTE:
Forest Health Protection National Office
Forest Health Assessment and Applied Sciences Team
All Other Forest Health Protection (FHP) Offices

Detection Monitoring

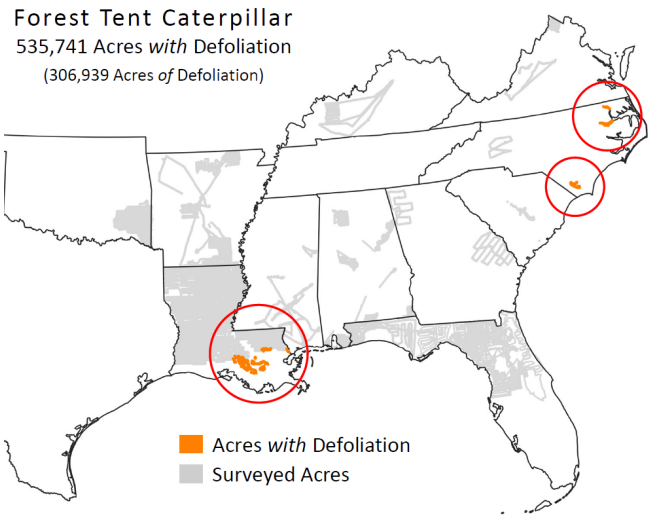
- <u>Aerial Surveys</u>
  - ✓ *Nationally standardized*
- <u>Ground surveys</u>
  - ✓ *By trained specialists*
- <u>Remote sensing tools</u>
  - ✓ *ForWarn II, HiForm & more…*

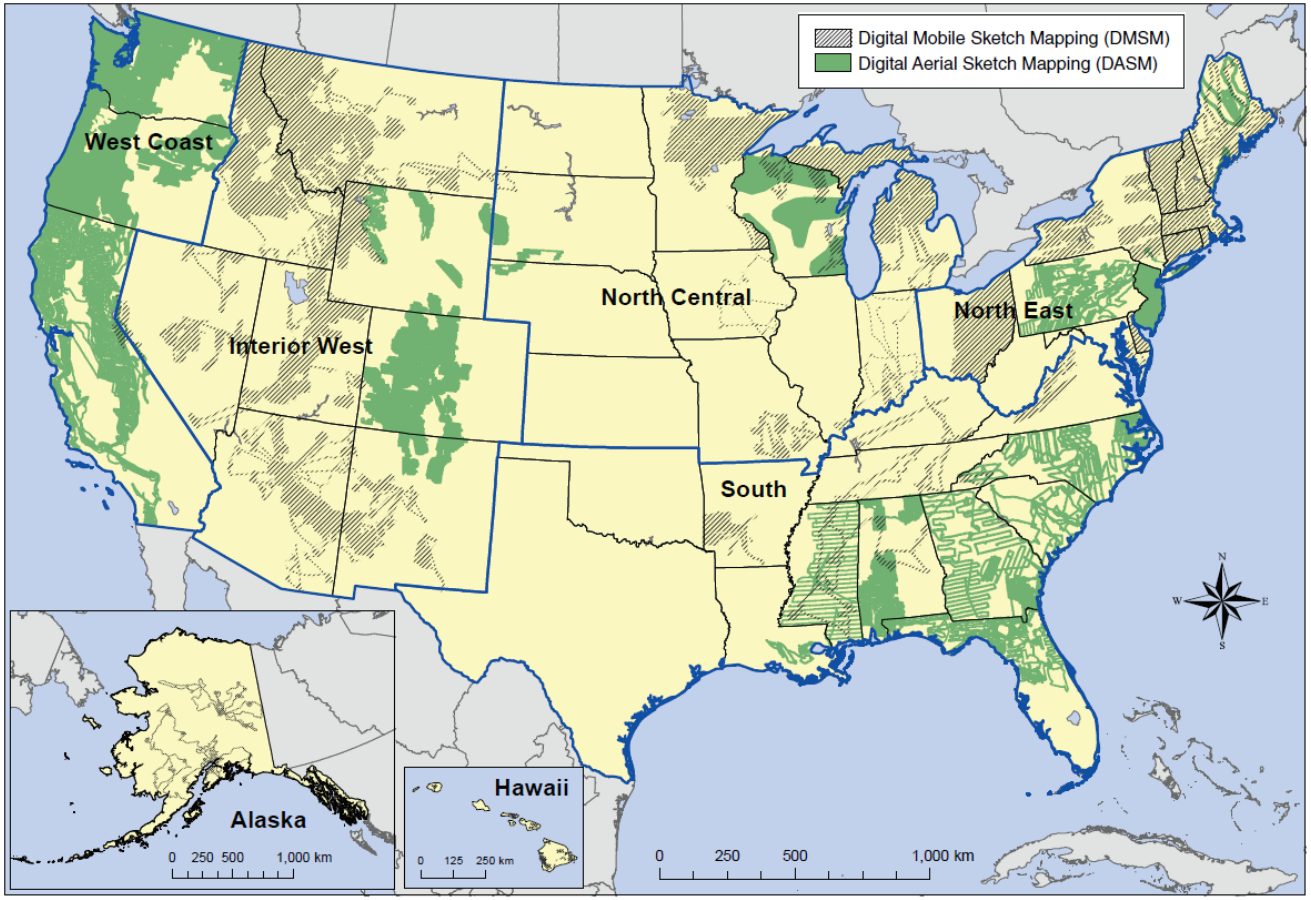
Cooperatively carried out by state forestry agencies and USFS personnel

Detection Monitoring

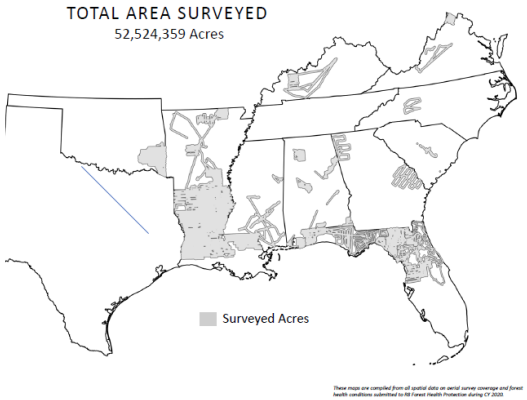
Aerial Survey

- Still the gold-standard approach for mapping large disturbance events
- Federal, state, and private lands
- Standardized nationally, but coverage varies widely





Southern Region Forest Health Protection
2020 Insect & Disease Survey

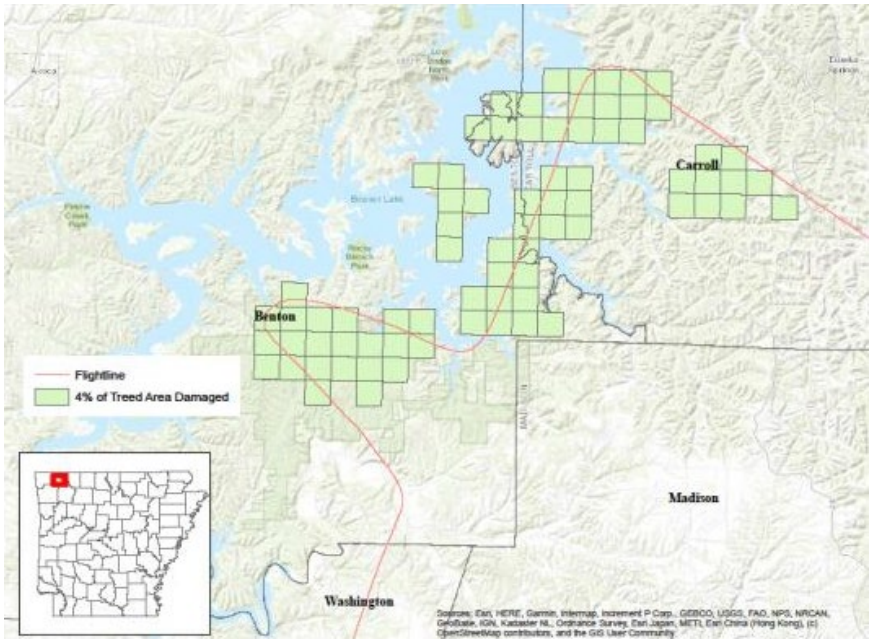


2016 National Aerial Survey Coverage

Forest Tent Caterpillar Defoliation

Photos: North Carolina Forest Service

Scattered Damage Agents

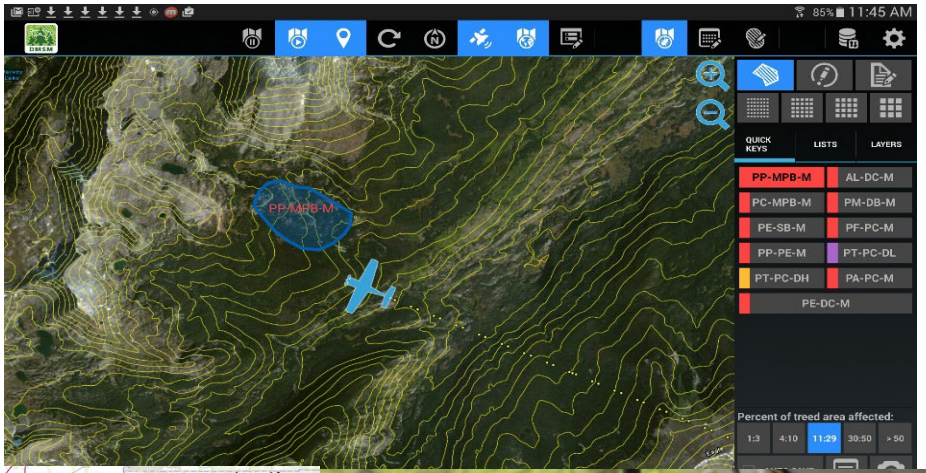


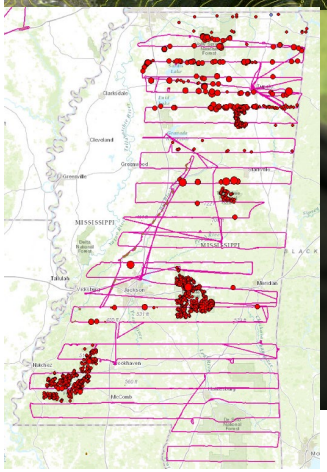
Jumping Oak Gall Wasp

Oak Decline & Drought

Digital Mobile Sketch Mapping - FHAAST

- Designed for aerial survey, forest health applications
- Also a separate application for use in ground survey
- Goal is to simplify and standardize forest health data collection methodology, improve data accessibility, and secure data storage





Detection Monitoring

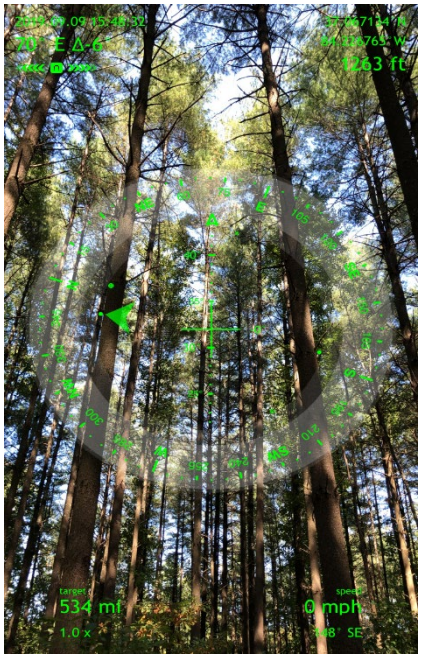
Ground Survey

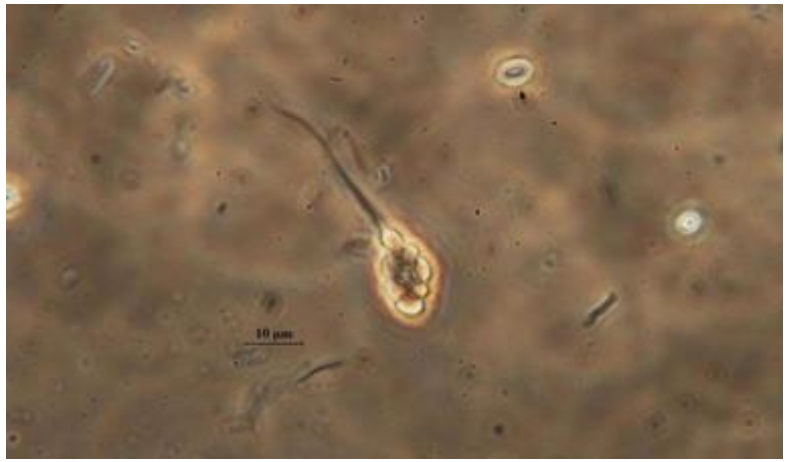
- Can occur before or after an aerial survey flight
- Ground-truth data is essential to supplement aerial survey and remote sensing tools

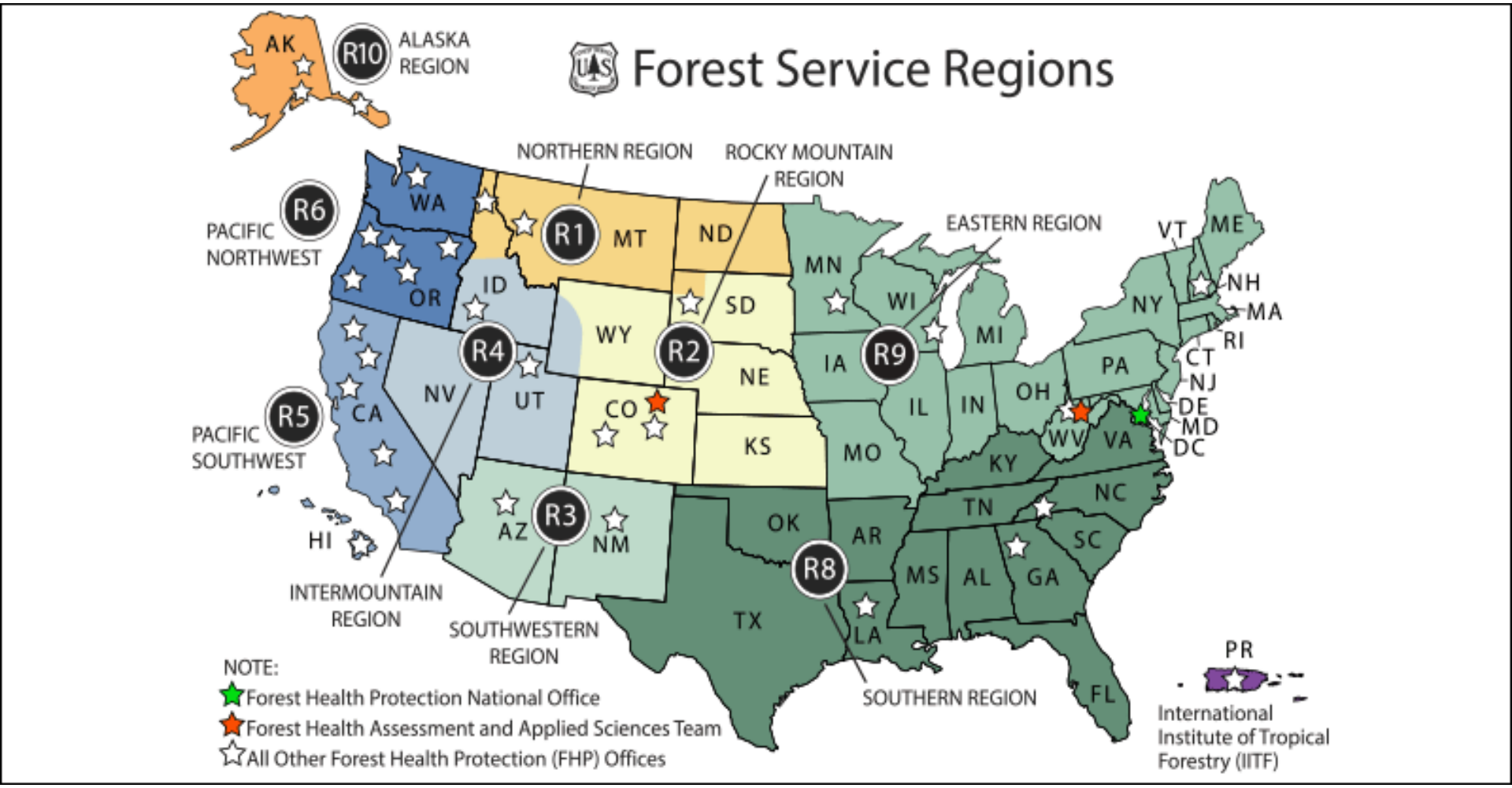
Detection Monitoring

Ground Survey

Insect and Disease Specialists
Inspections and Diagnostics



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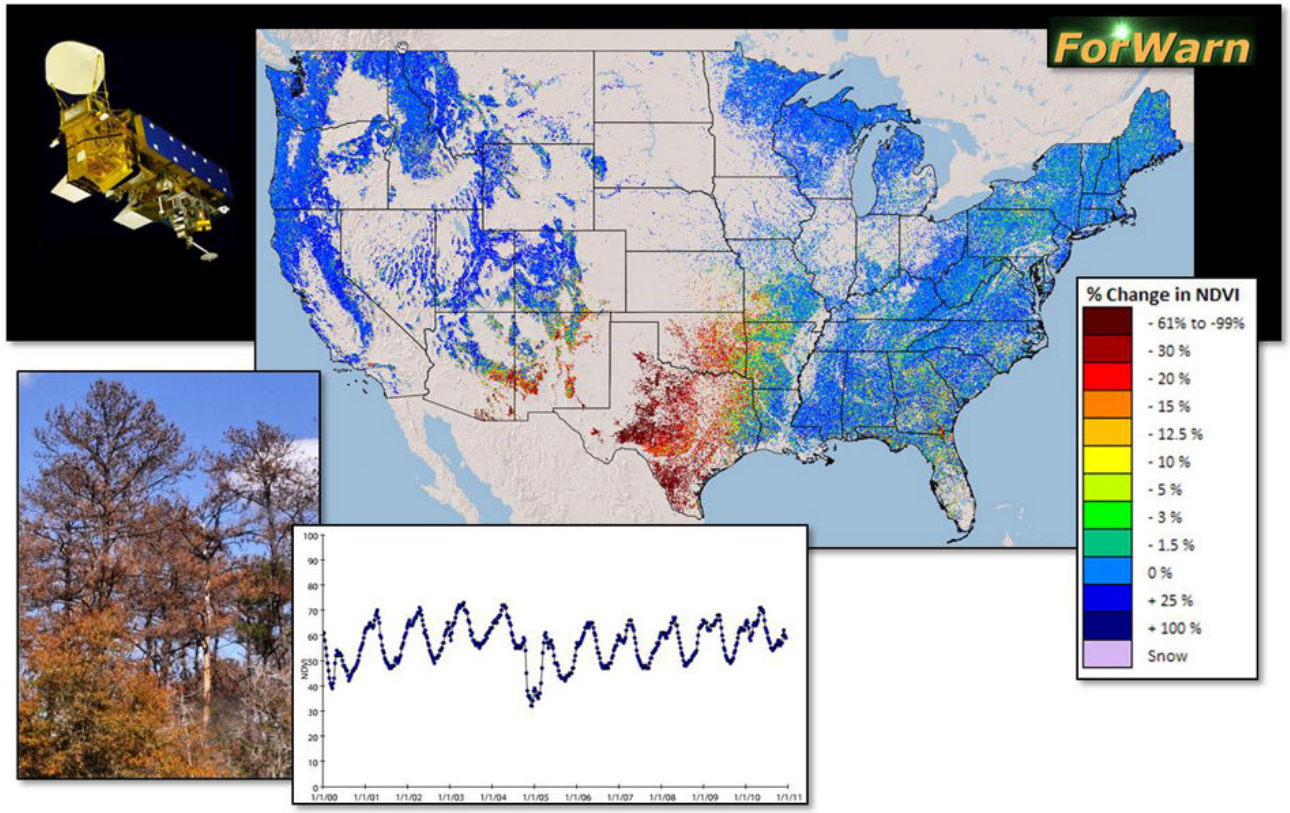
Detection Monitoring – Remote Sensing

- New tools like *ForWarn II* and *HiForm* are game-changers
- Not meant to replace aerial survey or ground truth activities, but to guide those activities more effectively
- These tools are powerful but must be use with care
- Standardized use and application are still significant challenges

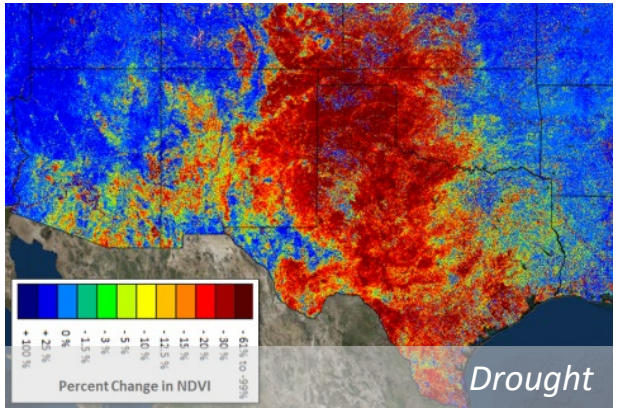
Detection Monitoring

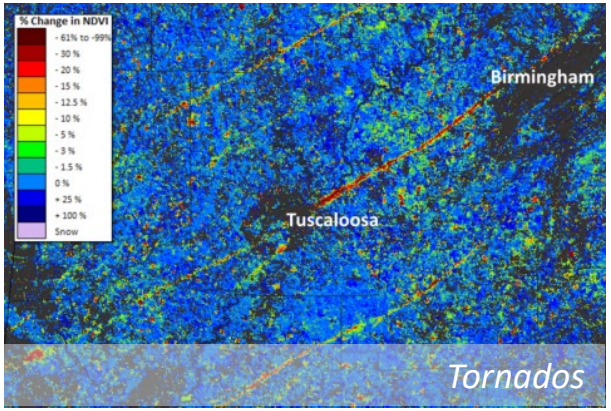
Remote Sensing

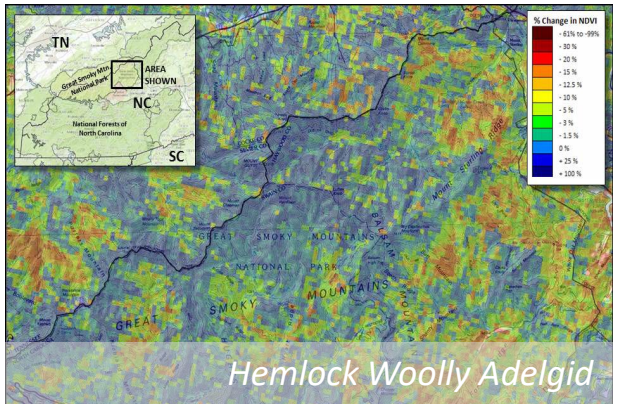


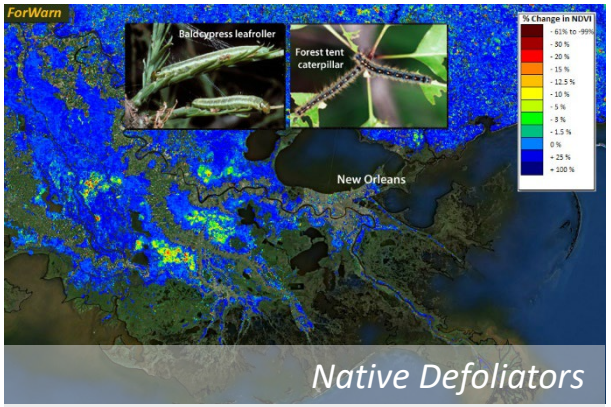
ForWarn II

Satellite-Based Change Recognition and Tracking









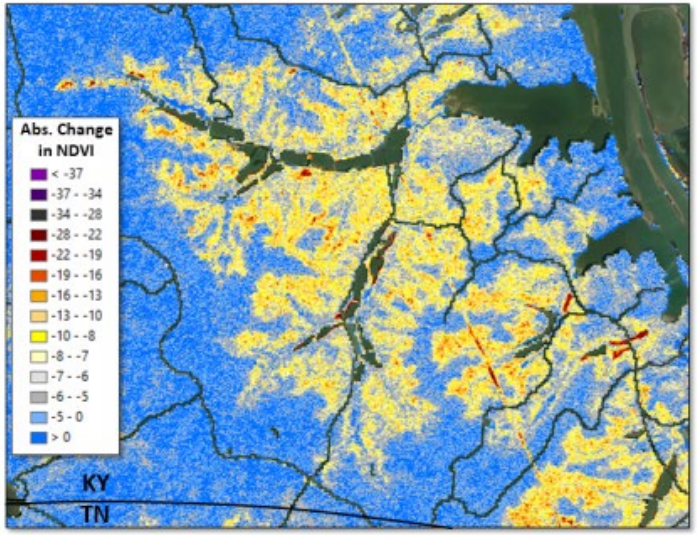
HiForm

High-Resolution Forest Mapping

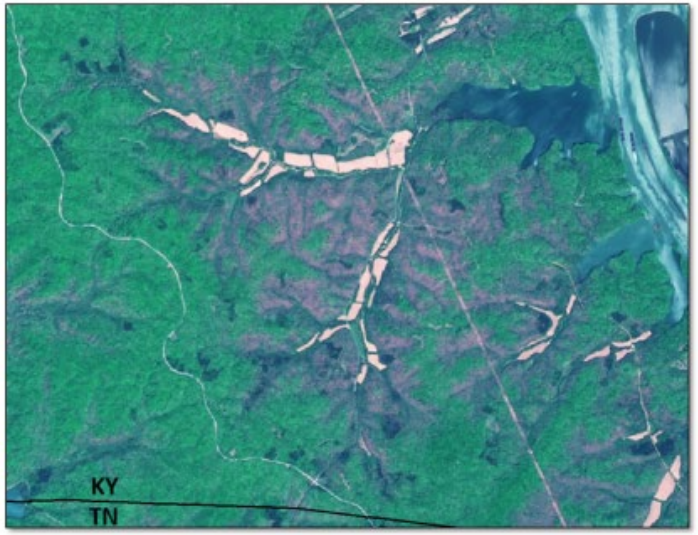
Land Between the Lakes

Absolute Change in NDVI and True Color Perspectives

20 Apr. 2020 vs. 21 Apr. 2019
Atmospherically-corrected NDVI change



20 Apr. 2020
Atmospherically-corrected true color



Analysis and Reporting

Synthesis of information from various data sources within and external to the Forest Service to produce issue-driven reports on status and change in forest health at national, regional, and state levels

USDA Forest Service:
https://www.fs.usda.gov/
Forest Health Protection:
https://www.fs.fed.us/foresthealth/
FHP Contacts and Field Offices
https://www.fs.fed.us/foresthealth/contact-us/regional-contacts.shtml
Forest Health Monitoring:
https://www.fhm.fs.fed.us/
Forest Health Publications and Reports:
https://www.fs.fed.us/foresthealth/publications/
Forest Health Assessment and Applied Sciences Team:
https://www.fs.fed.us/foresthealth/applied-sciences/
Forest Inventory and Analysis
https://www.fia.fs.fed.us/
Evaluation Monitoring
https://www.fs.fed.us/foresthealth/fhm/em/
ForWarn II
https://forwarn.forestthreats.org
HiForm
https://hiform.org

ryan.a.blaedow@usda.gov

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