University of Idaho
College of Natural Resources

CARNEGIE R1 CLASSIFIED UNIVERSITY

UNIVERSITY OF IDAHO SITE REVIEW

RESEARCH AND ACADEMIC NETWORKS

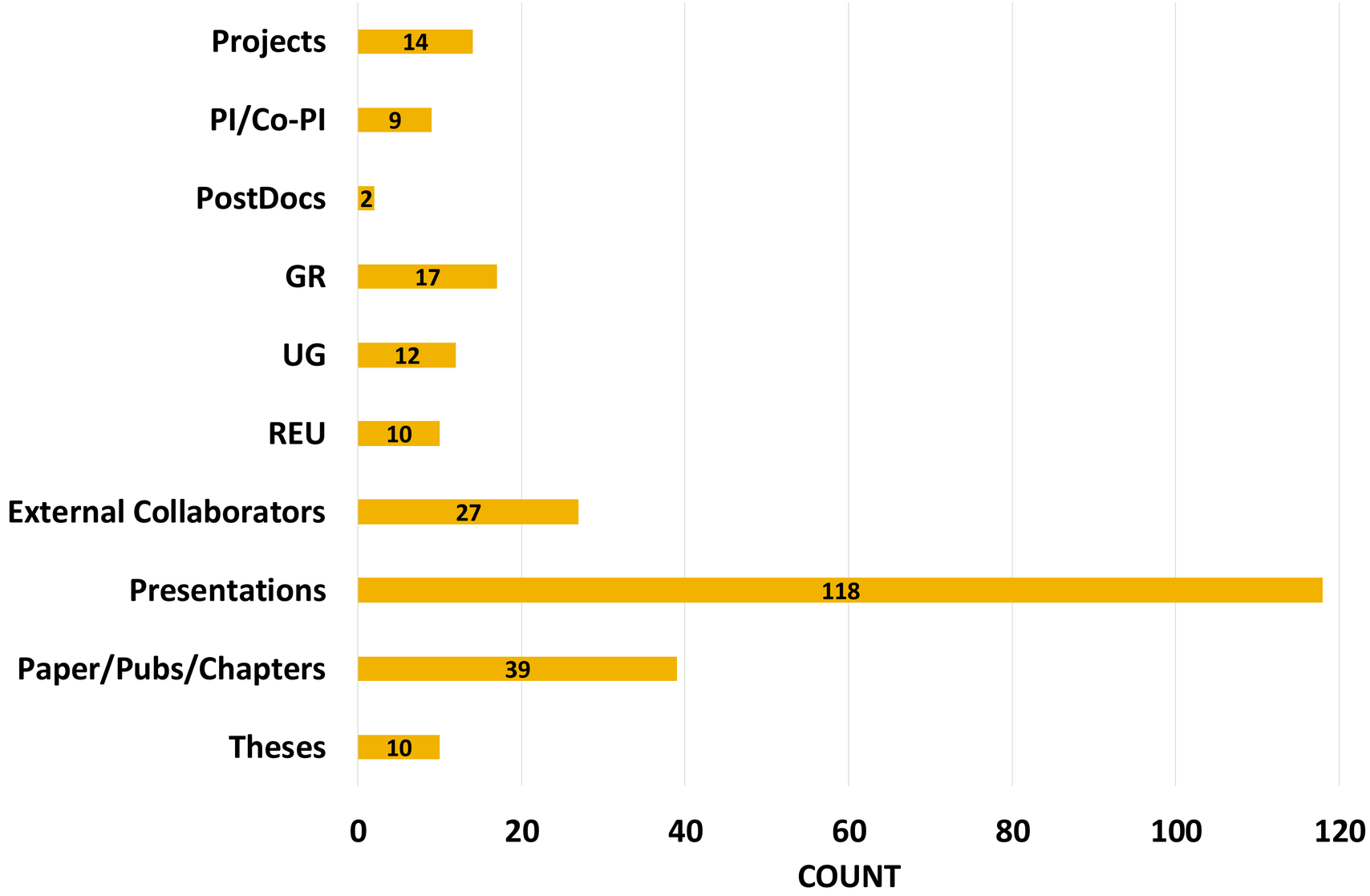
CAFS SUMMER 2025 IAB MEETING

JUNE 10-12

Intermountain Forestry Cooperative

CAFS: 2010 - 2025

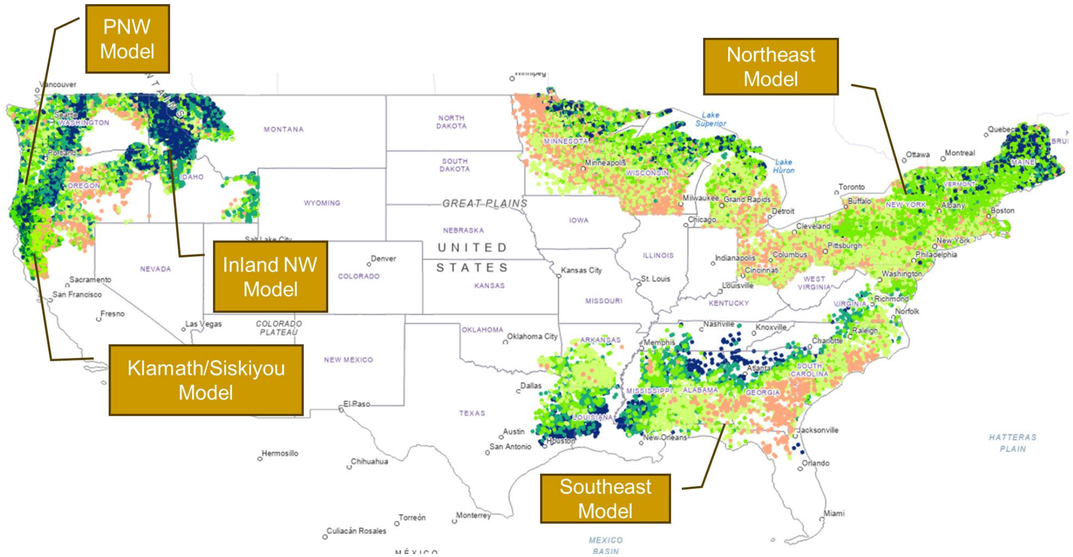
*BY THE NUMBERS**



* Missing 2017/2018

CAF: 2010 - 2025

MAJOR PROJECTS LED AT THE UOFI



- Fungal Endophytes in Conifer Systems
- Systemic Insecticides
- White pine & Douglas-fir Genomics
- White pine Blister Rust Resistance
- Larch and Cedar Nutrient Dynamics
- Western Larch Intensive Management
- Drivers of Forest Regeneration Success (INTERN)
- Seedling Response to Drought Conditioning
- UAS Photogrammetry for Enhanced Forest Inventory (INTERN)
- *Accuracy Assessment of RS Sensors/Platforms for Individual Tree Identification & Measurement (INTERN)*
- *Industrial Scale Reforestation Supply Chain BMPs (INTERN)*
- *Machine Learning and Mapping of Forest Carrying Capacity across the US*
- *Site-Stand Dynamics & Pine Beetle Mortality in Pine Ecosystems*
- *Robust SAE strategies for developing accurate stand-level diameter distributions*

Italics = Ongoing projects

IFC MEMBER SUPPORT FOR CAFS

UNIVERSITY OF IDAHO PUBLIC-PRIVATE PARTNERSHIP

INDUSTRY

PotlatchDeltic

Manulife

MOLPUS WOODLANDS GROUP

STIMSON LUMBER COMPANY

NewForests

Bennett Lumber Products, Inc.

IDAHO FOREST GROUP

COUNTY

HOOD RIVER COUNTY – FRUIT RECREATION INDUSTRY

STATE

IDAHO DEPARTMENT OF LANDS

WASHINGTON DEPARTMENT OF NATURAL RESOURCES

FEDERAL

FOREST SERVICE – US – DEPARTMENT OF AGRICULTURE

NATIONAL SYSTEM OF PUBLIC LANDS – U.S. DEPARTMENT OF THE INTERIOR – BUREAU OF LAND MANAGEMENT

Center for Advanced Forestry Systems

COLLABORATION

ADVANCING FOREST SCIENCE

NCASI
IMPACT. SCIENCE. SOLUTIONS.

Roseburg
A Forest Products Company

MIT Lincoln Laboratory

National Science Foundation

The Nature Conservancy

CampbellGlobal
a J.P.Morgan company

UBC Forestry
University of British Columbia

MONSEN ENGINEERING

NIFA

Rocky Mountain Research Station

FBRI
Forest Biometrics Research Institute

ETH zürich

Forestry Corporation

USDA NRCS
U.S. Department of Agriculture
Natural Resources Conservation Service

USGS
science for a changing world

IDAHO GEOLOGICAL SURVEY

NIBIO
NORSK INSTITUTT FOR BIOØKONOMI

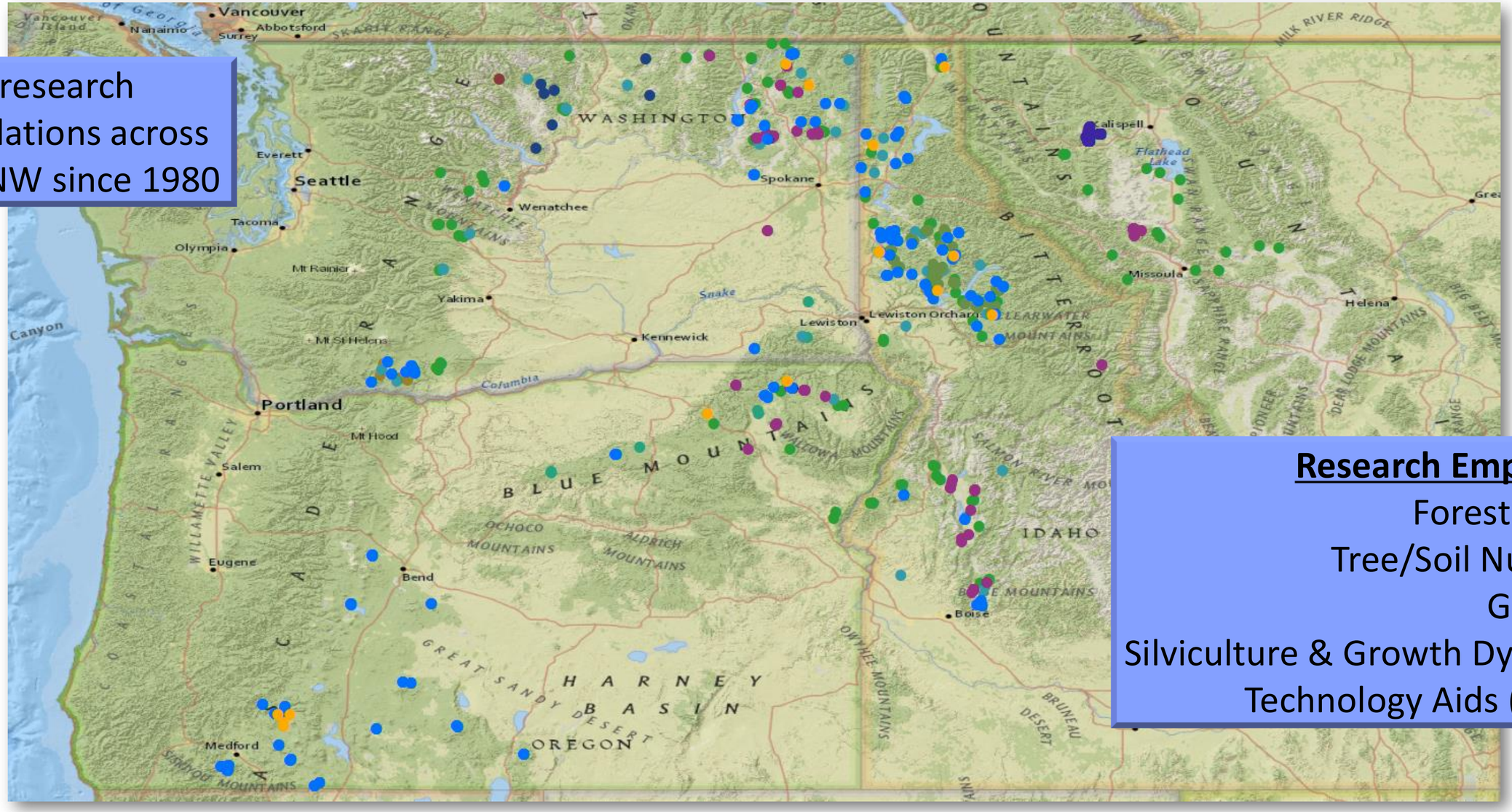
UNIVERSITY of TASMANIA

NSW GOVERNMENT Department of Primary Industries

INSTALLATION NETWORK

REGIONAL OPERATIONAL RESEARCH FOR LOCAL STAND MANAGEMENT

500+ research installations across the INW since 1980



<u>Research Emphases:</u>

Forest Health

Tree/Soil Nutrition

Genetics

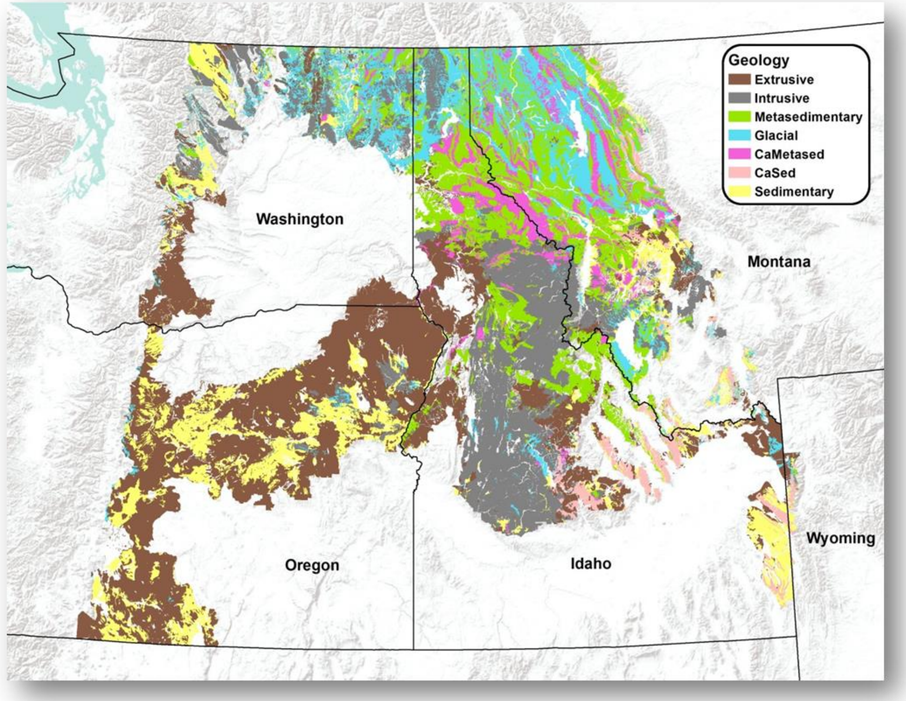
Silviculture & Growth Dynamics

Technology Aids (LiDAR)

NUTRITION GUIDELINES – HISTORIC ROOTS

SEED ORCHARD & SILVICULTURE SUPPORT

- Full spectrum physiochemical analysis for creating and maintaining healthy seed orchards
  - Contract with Region 1 and 6 Seed Orchard Managers to provide foliar and soil nutrition analysis
  - Fertilizer recommendations to overcome nutrient deficiencies and maintain nutrient balances for productivity and enhancing cone crop production
- Silviculture-Nutrition Management Guidelines as a function of soil parent material



Element	Function	Source
Nitrogen (N)	Photosynthesis Biomass Production	Atmosphere
Phosphorus (P)	Metabolism	Rock
Potassium (K)	Defensive Chemicals Stomatal Control	Rock
Sulfur (S)	Photosynthesis Pest Resistance ?	Rock Atmosphere
Copper (Cu)	Photosynthesis N processing	Rock
Boron (B)	Cell wall structure Translocation of Sugars	Rock

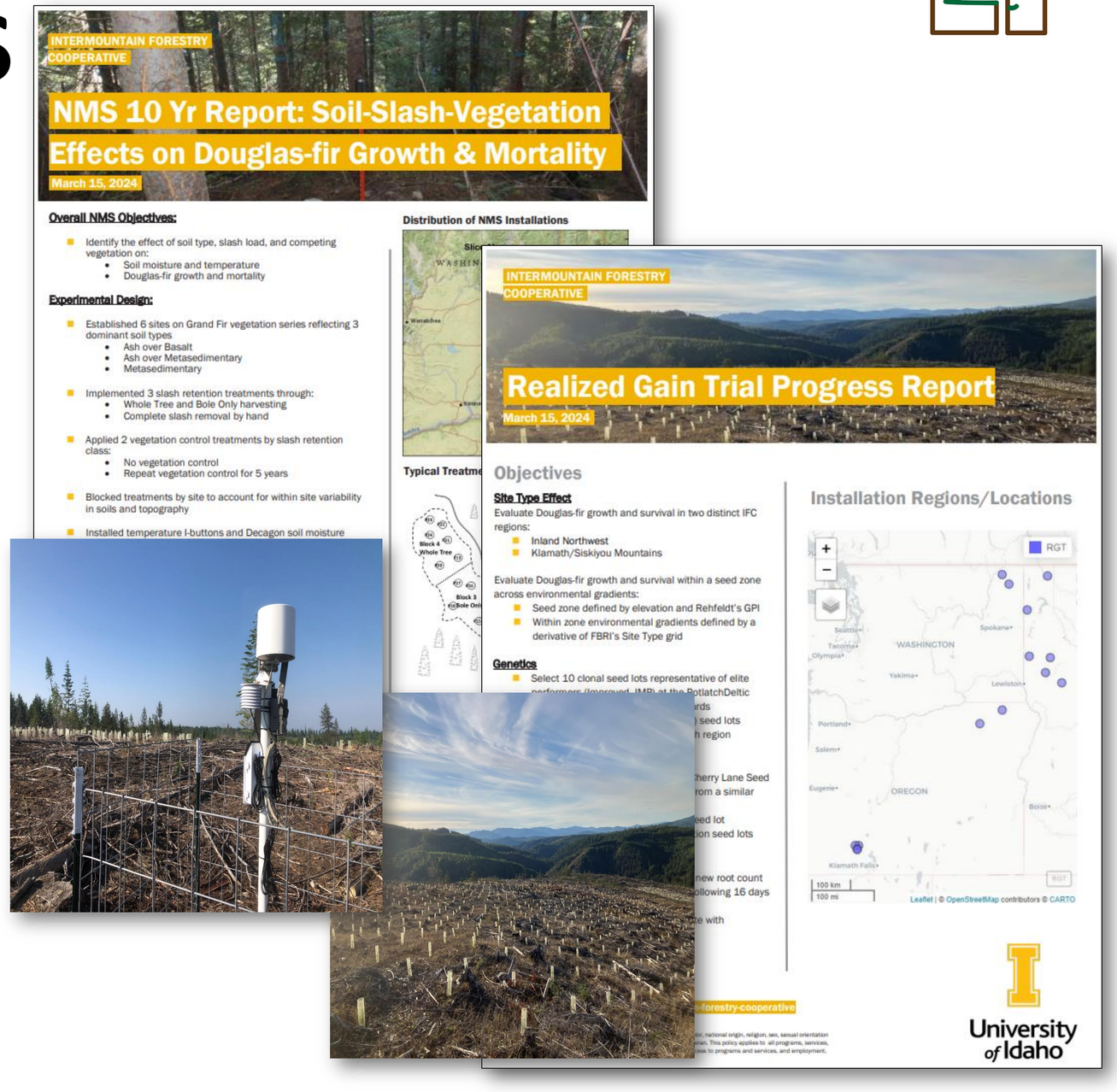
Soil Parent Material	Soil Texture	Soil Nutrition
Basalt (BA)	Fine	High
Volcanic Ash (VA)	Fine	Medium
Schist (SH)	Medium	Medium
Granite (GR)	Coarse	Medium
Gneiss (GN)	Coarse	Medium
Metasedimentary (MS)	Variable	Low
Glacial Till (GT)	Variable	Variable

Species	Demand
Grand fir	Very High
Douglas-fir	high
White Pine	Moderate to high
Ponderosa pine	Moderate
Lodgepole pine	Low
Western larch	Low

RESEARCH INITIATIVES

PROJECT UPDATES + DELIVERABLES

- REFORESTATION
  - Nutrient Management Study
    - Installed 2008-2012
    - 10 yrs results available in summary 2-pager, manuscript in development
  - Realized Genetic Gain Trials
    - Installed 2022-2025
    - 2 yr update available in summary 2-pager,
    - IFC graduate student thesis on early study findings late 2025
    - Climate Station Network available to members for INW and K-S regions
      - Precipitation, air temperature, relative humidity, vapor pressure deficit, soil moisture, soil temperature

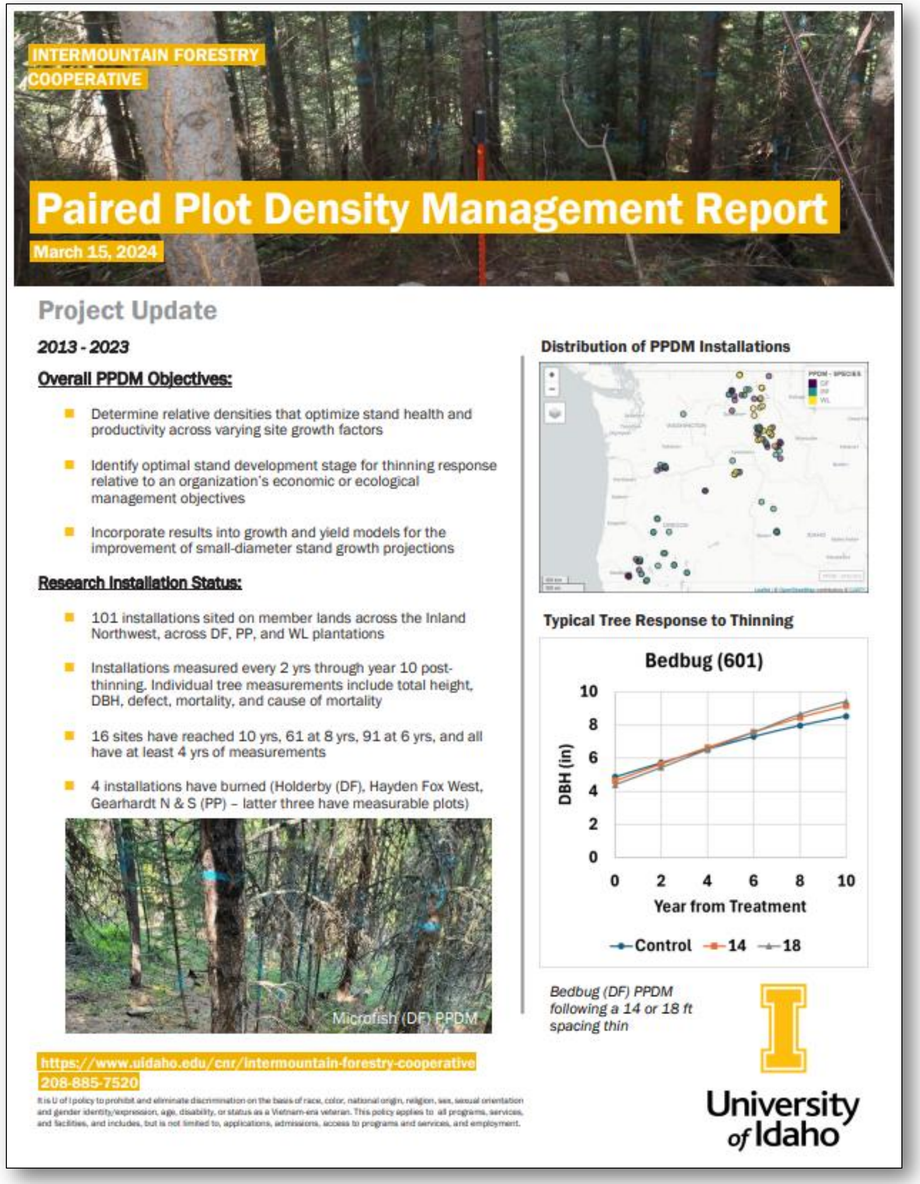


RESEARCH INITIATIVES

PROJECT UPDATES + DELIVERABLES

DENSITY MANAGEMENT

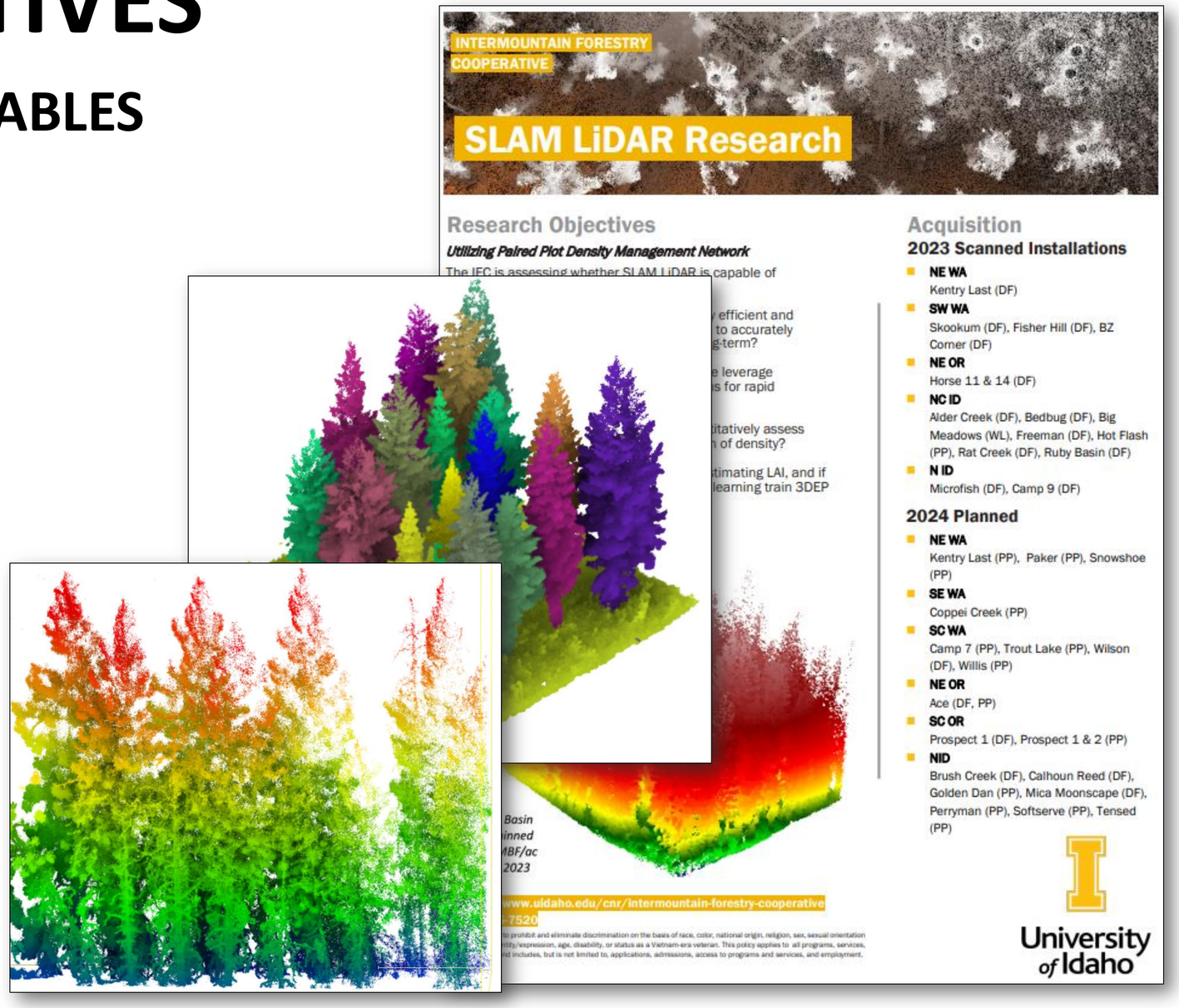
- <u>Paired Plot Network</u>
  - Initiated 2013, ongoing
  - Evaluates tree and stand response to thinning intensity as a function of site and species composition
  - Treatment response used to calibrate:
    - G&Y models
    - Validate SDImax models
    - Evaluate thinning effects on taper
  - Thinning Response Calculator
    - Developing a species-site type calculator to estimate growth/mortality as a function of density manipulation across the Intermountain West
  - Training plots for lidar research (SLAM, ALS, Geiger)



RESEARCH INITIATIVES

PROJECT UPDATES + DELIVERABLES

- LiDAR + 3D NAIP
  - Paired Plot Network
    - Evaluate the utility of using SLAM LiDAR for periodic remeasurement
    - Measure species tree taper as a function of thinning intensity, species composition, and site type
    - Leverage historic and future 3D NAIP and/or LiDAR acquisitions for building machine learning models relative to forest metrics (site index, carbon, biomass, etc.)
    - Build LiDAR-LAI models



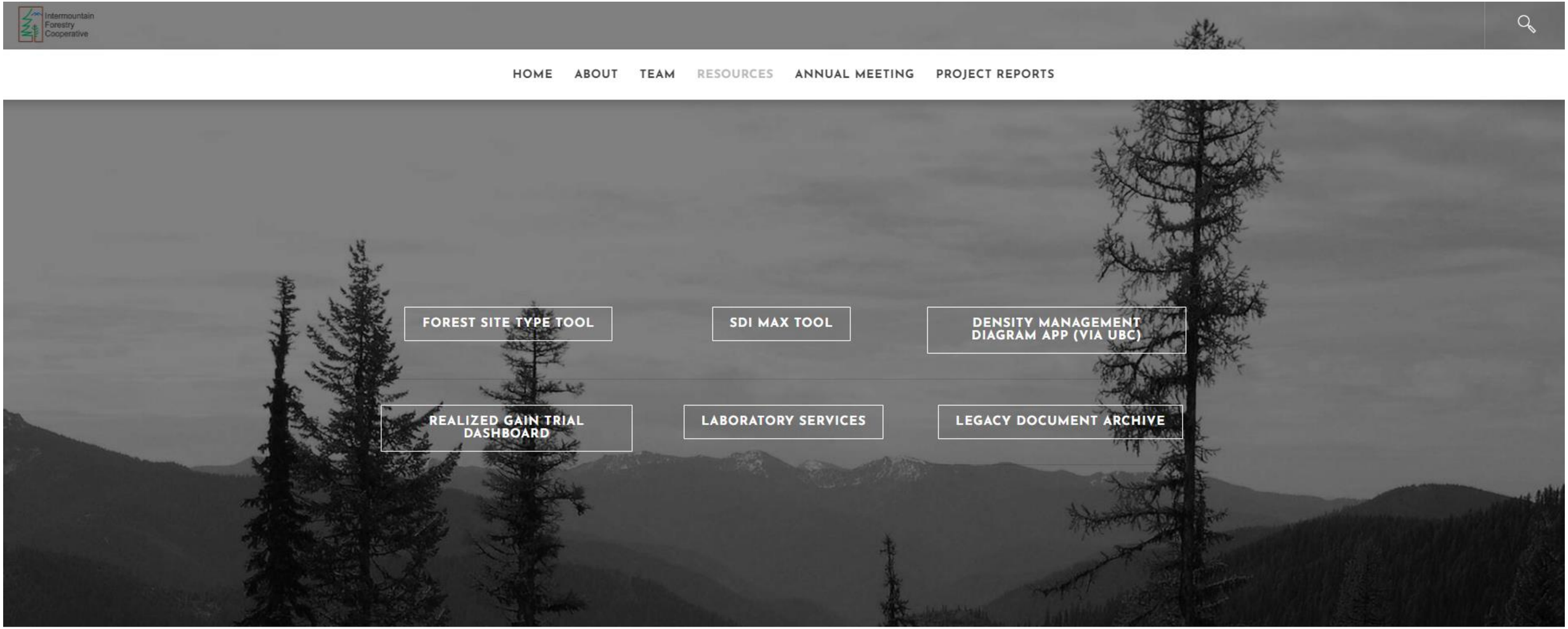
TOOLSETS FOR MANAGERS

FOCUS: FOREST SITE TYPE TOOL

Resources - IFC (intermtnforestcoop.com)

Username: IFC_SDImax

Password: Density5454!



FOREST SITE TYPE CALCULATOR

DEFINING RELATIVE SITE QUALITY: ƒ(CLIMATE, TOPOGRAPHY, SOIL)

Intermountain Forestry Cooperative

HOME IFC HOMEPAGE

FOREST SITE TYPE CALCULATOR

This tool generates classifications of forest site type based on precipitation, heat load and soil quality. Click on the steps below to generate a site type map of a region of interest.

STEP 1: DEFINE AOI FOR SITE TYPE CLASSIFICATION

Draw polygons on the map or upload a shapefile to define a region of interest. A button will appear - click it to request statistics over your region.

Map area: NorthWest USA

○ Upload Shapefile (Directions) ◉ Draw areas on a map

STEP 2: REFINE THE FOREST SITE TYPE

Polygon Map

Map files are large and may take a few minutes to load. Further, map files will be deleted 15 minutes after they are rendered.

Inputs: User Defined Area of Interest (>50K acres)

Outputs:

1) Mean Annual Precipitation
2) Heat Load (Radiation x DD10-40)
3) Available Soil Water
4) Depth to Restrictive Layer
5) **Forest Site Type**

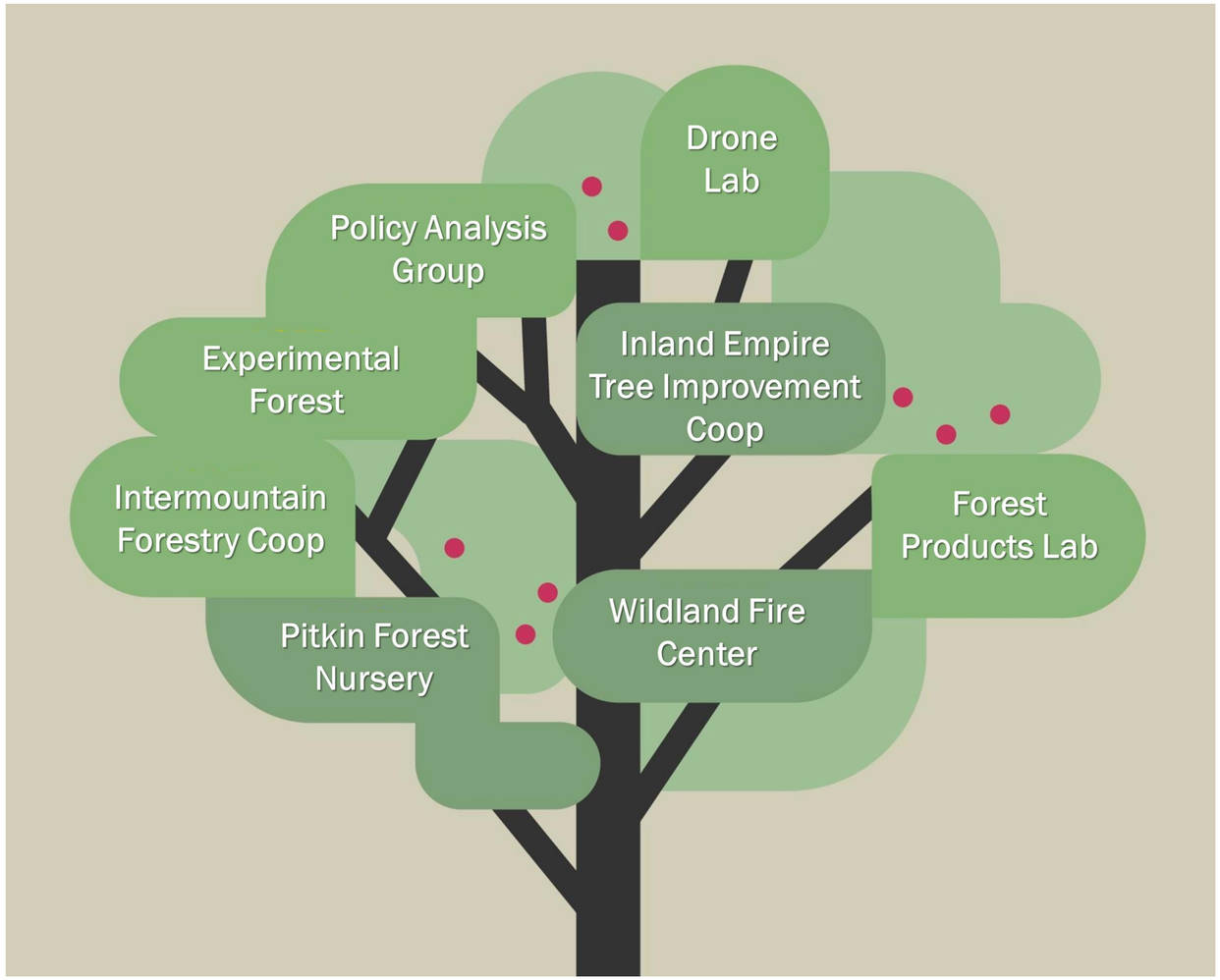
FUTURE DIRECTIONS @ UI

FOREST INNOVATIONS INSTITUTE

SYNERGIES & COLLABORATIONS FOSTERED THROUGH CAFS

FOREST INNOVATIONS INSTITUTE

LEVERAGING RESOURCES, CUTTING BARRIERS



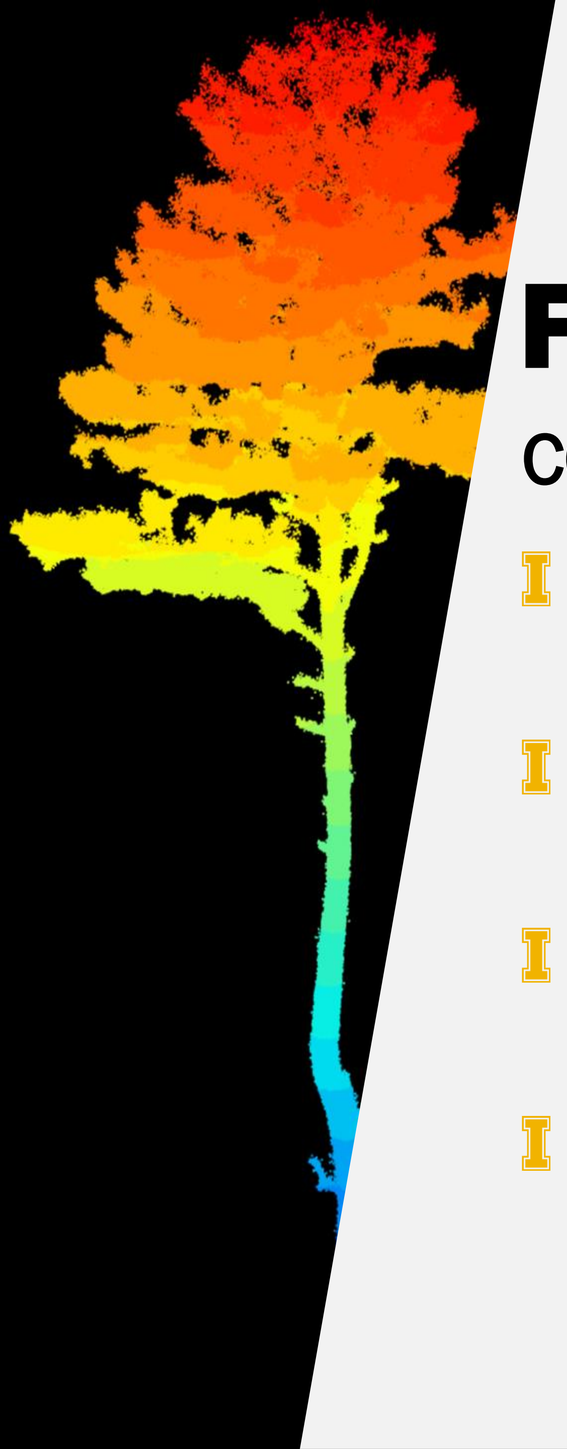
Fixed-rate contracting

Coordinated and individual projects

Shared and proprietary R&D

Discounted membership for existing coops

Not intended for commercial services



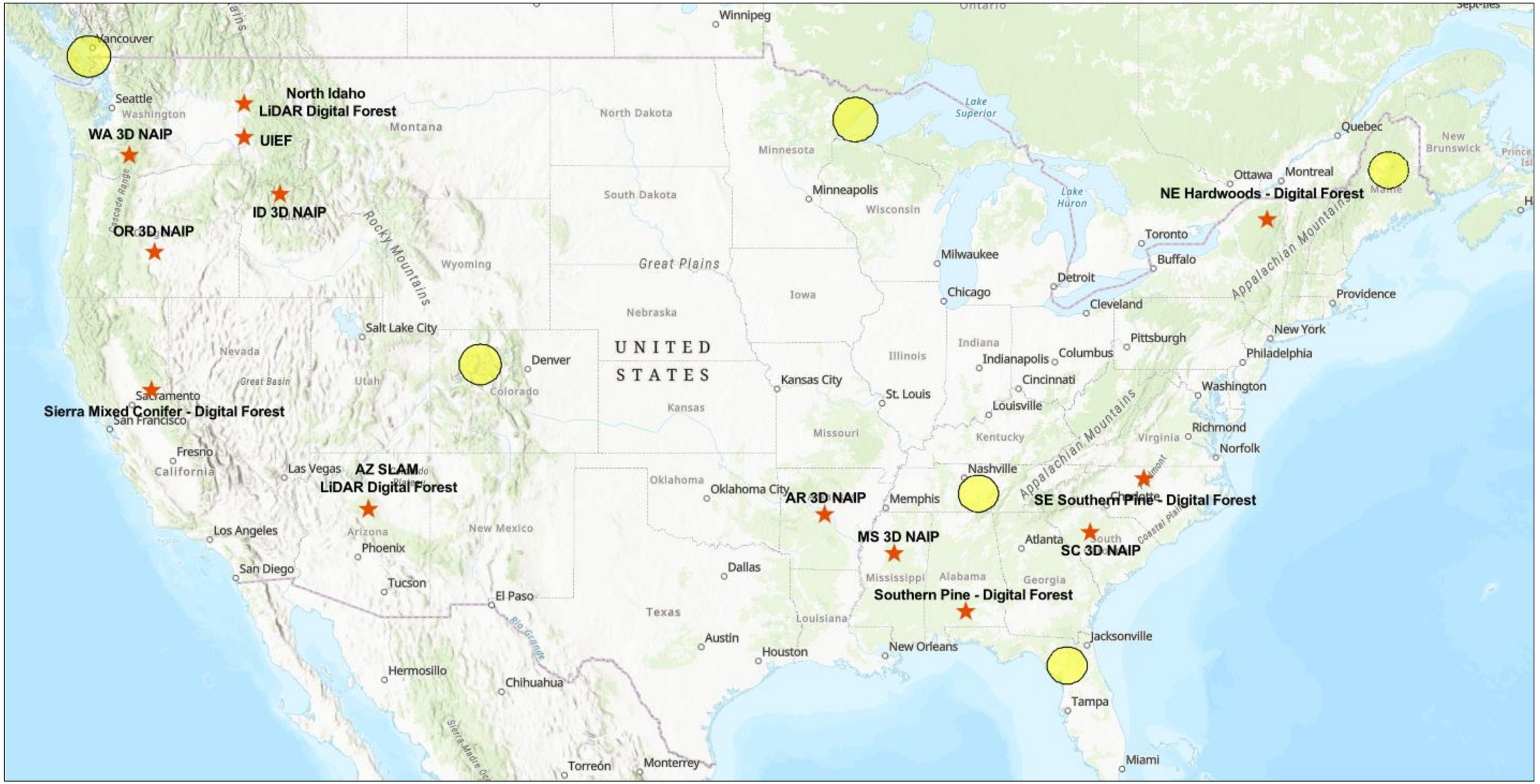
FOREST INNOVATIONS INSTITUTE

CORE MISSION

- Advance contemporary and emerging technologies and information systems
- Crosscutting research: digital transformation, networking, robotics, automation, remote sensing, AI
- Partner with University faculty and students for interdisciplinary training and research – workforce development
- Engage industry specialists, businesses, Native American Tribes, nonprofits, universities, and public land management agencies

FOREST INNOVATIONS INSTITUTE

REGIONAL & NATIONAL IN SCOPE & COLLABORATION

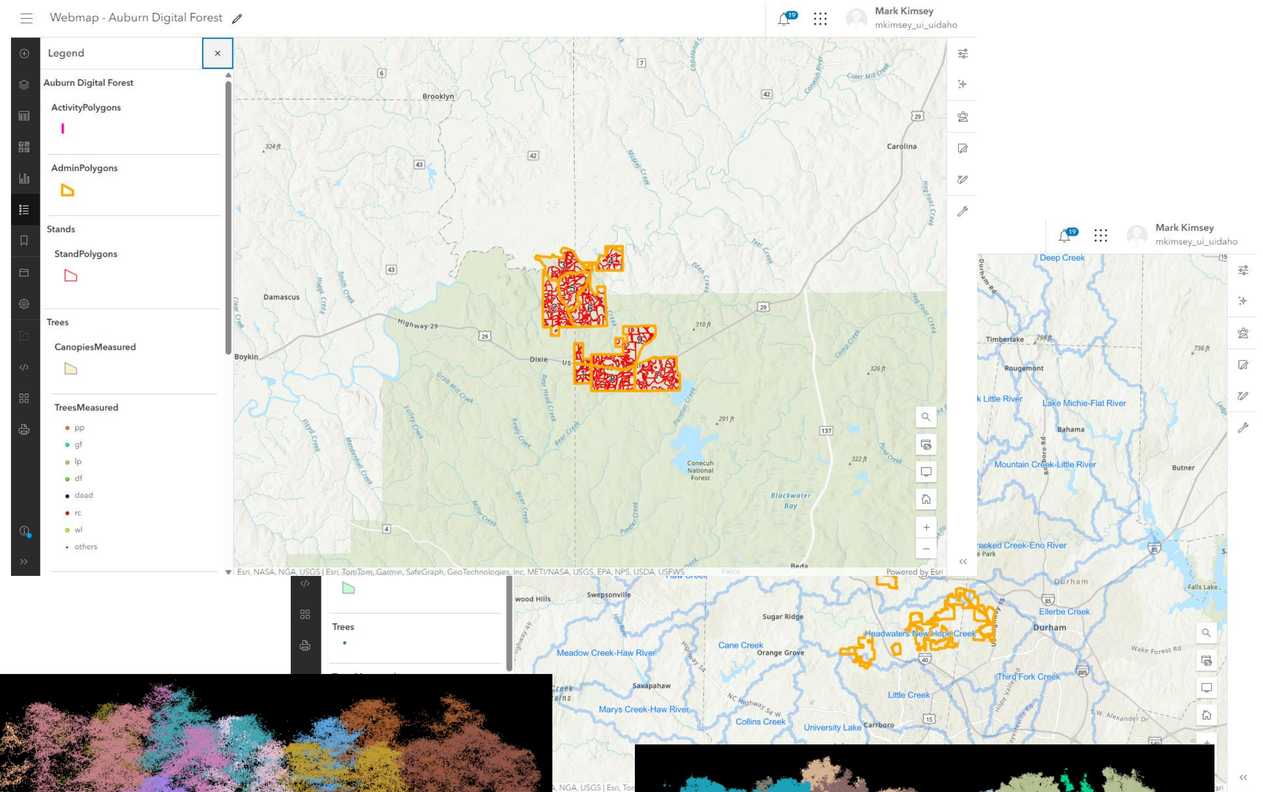


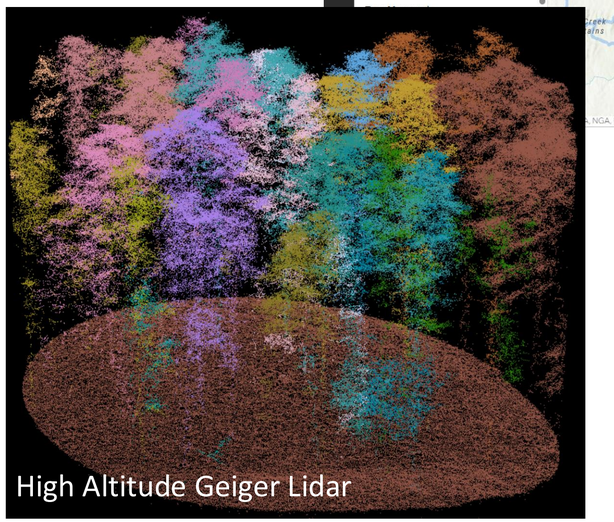
NATIONAL INITIATIVE

DEVELOP A COORDINATED INNOVATION NETWORK TO LINK RESEARCH FORESTS NATIONWIDE

PAUL SMITHS COLLEGE, AUBURN, DUKE, UC BERKELEY, OREGON STATE
…OTHERS

- Drive digital forest innovation
- Broad geographic networking
- Diverse forested communities for testing
- Deploy a common data model to all partners and develop common analytics
- Develop Next Generation Research and Management Personnel
- Leverage Research and Resources for Competitive Grant Funding
- Build International Relationships





NIBIO

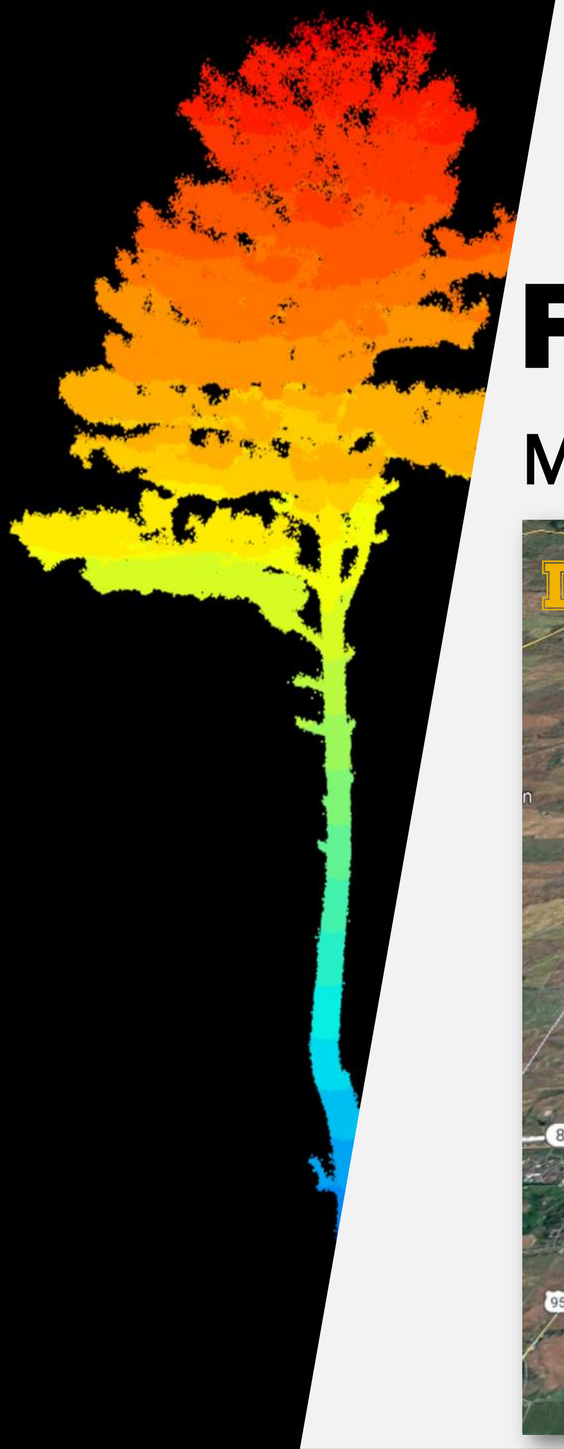
UNIVERSITY of TASMANIA

INTERPINE INNOVATION

Forestry Corporation

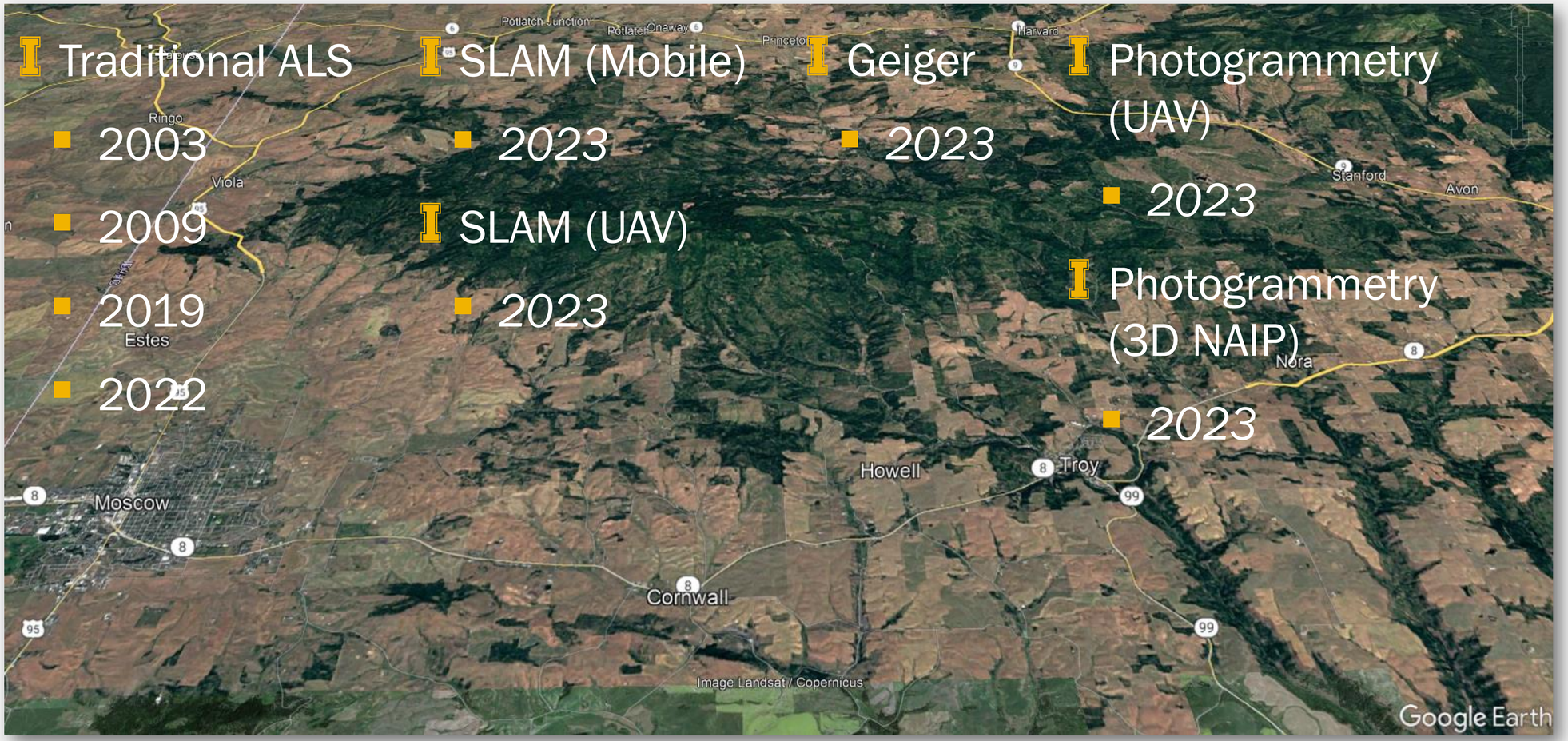
MIT LINCOLN LABORATORY

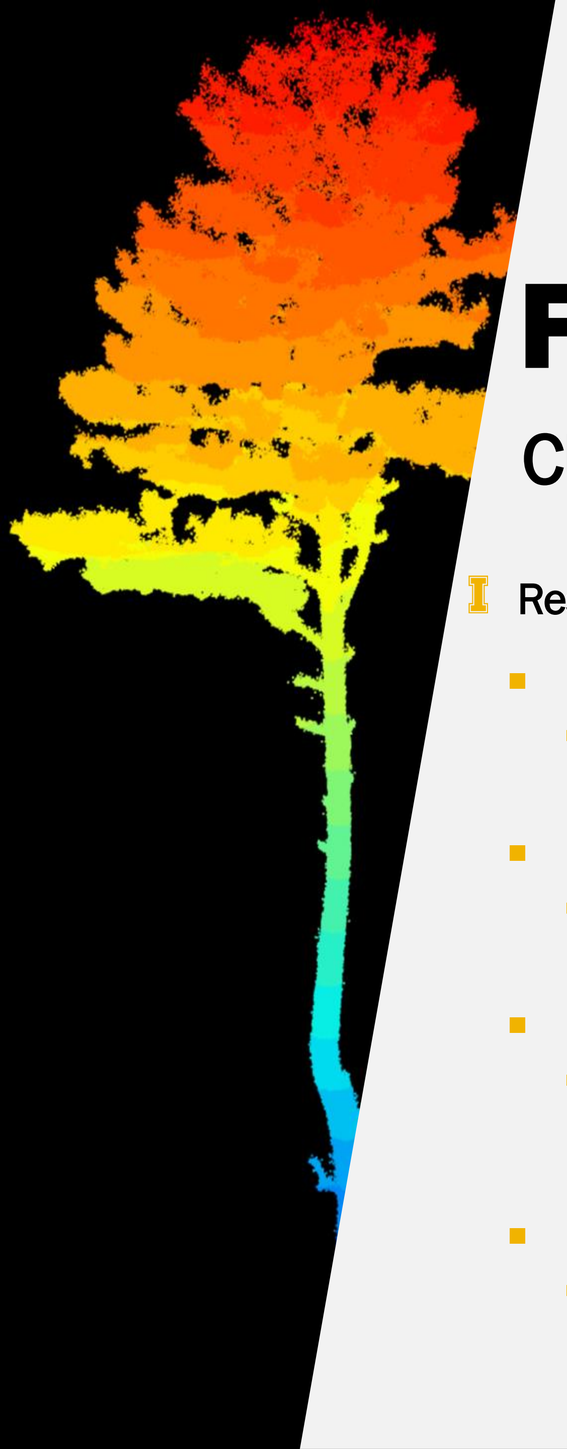
3DEO



FOREST INNOVATIONS INSTITUTE

MOSCOW MOUNTAIN DIGITAL FORESTRY LABORATORY





FOREST INNOVATIONS INSTITUTE

CURRENT STAFFING & WORKFORCE DEVELOPMENT

Research Scientists

- Dr. Edward Flathers
  - Remote sensing, data org, process automation
- Dr. Heather Greaves
  - Remote sensing, veg and surface mapping
- Dr. Jaslam Poolakkal
  - Advanced statistics modeling, scalable and interactive applications
- Dr. Aaron Sparks
  - Remote sensing, inventory & disturbance characterization

Graduate Students

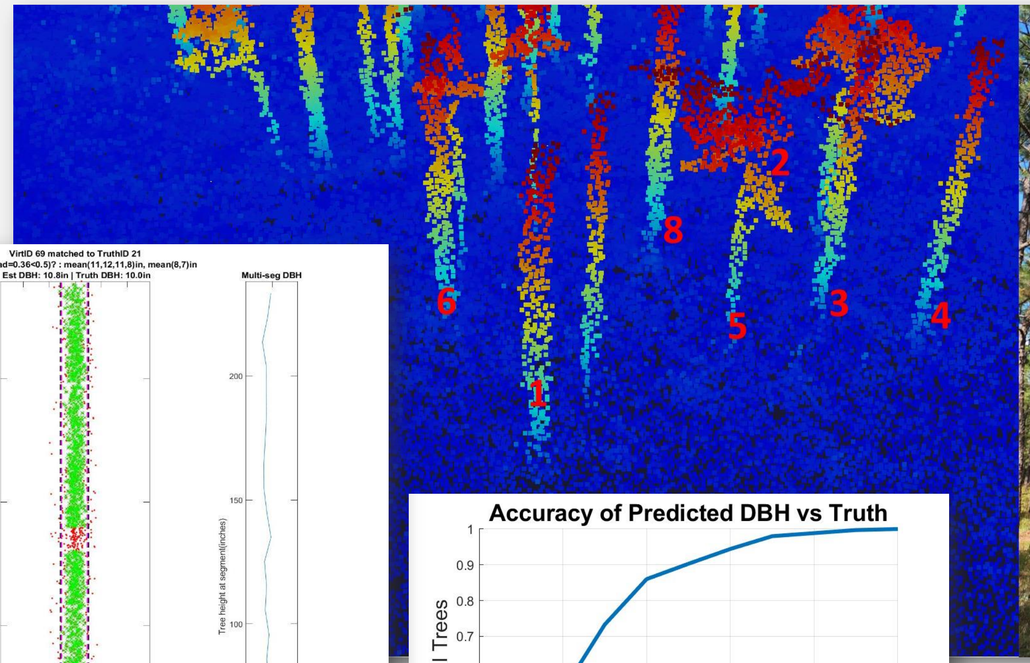
- Noel Daugherty (MS)
  - Remote sensing & biometrics
- Steevensen Alcius (Fulbright PhD)
  - Remote sensing & biometrics
- Haley Anderson (PhD)
  - Forest health modeling

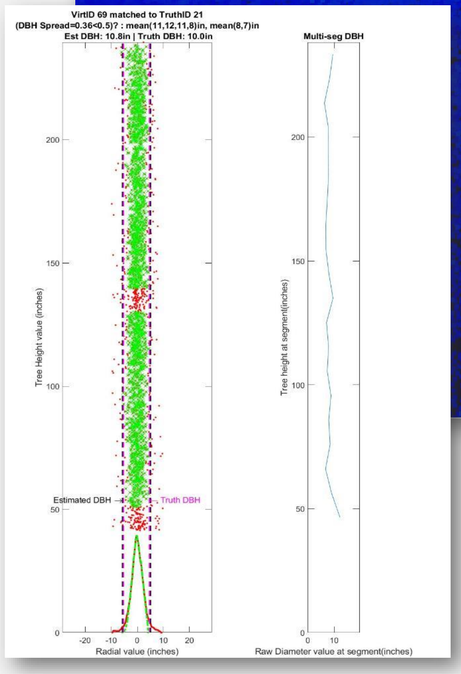
Undergraduate Students

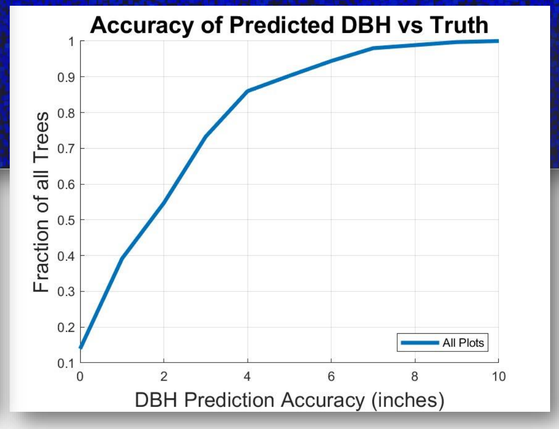
- Christian Marzan (BS Forestry)
- James Shook (BS Forestry)
- Spencer Lake (BS Forestry)
- Miah Dannahower (BS Forestry)
- Riley Robenstein (BS Wildlife)
- Mia Wanstrom (BS Wildlife)
- Bidhi Paudel (BS Comp. Sci.)
- Robbie Reinhardt (BS Comp. Sci.)

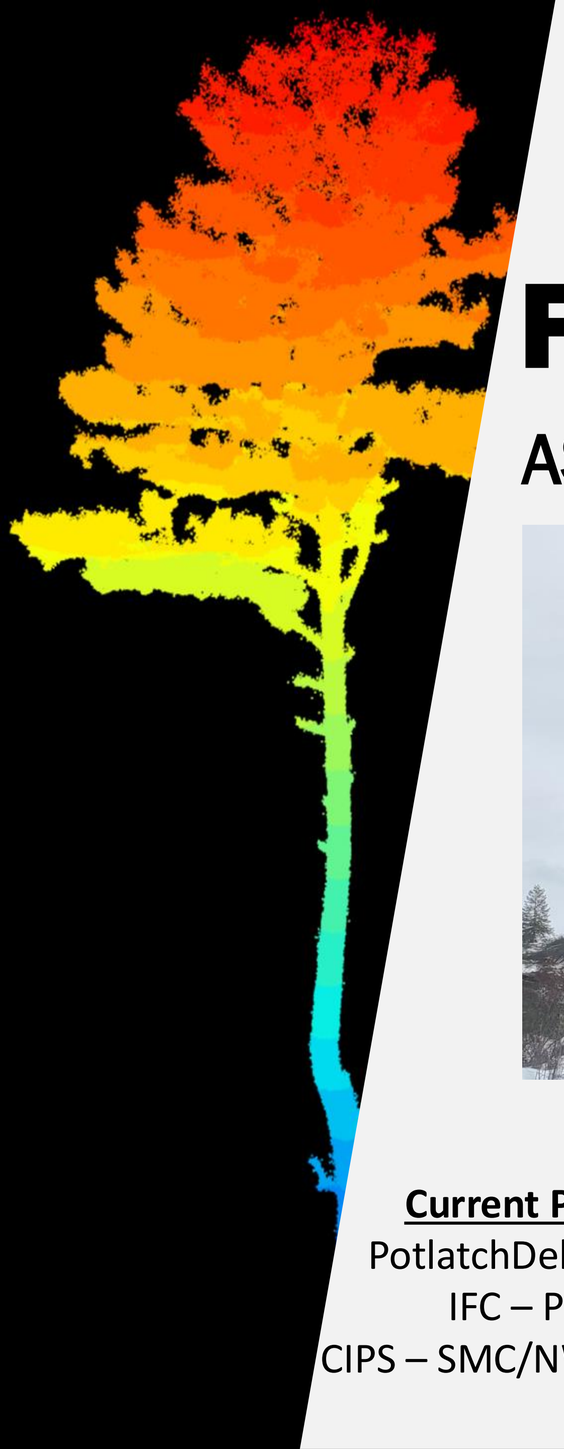
FOREST INNOVATIONS INSTITUTE

MEASURING STEM DIAMETER W/GEIGER LIDAR - MS



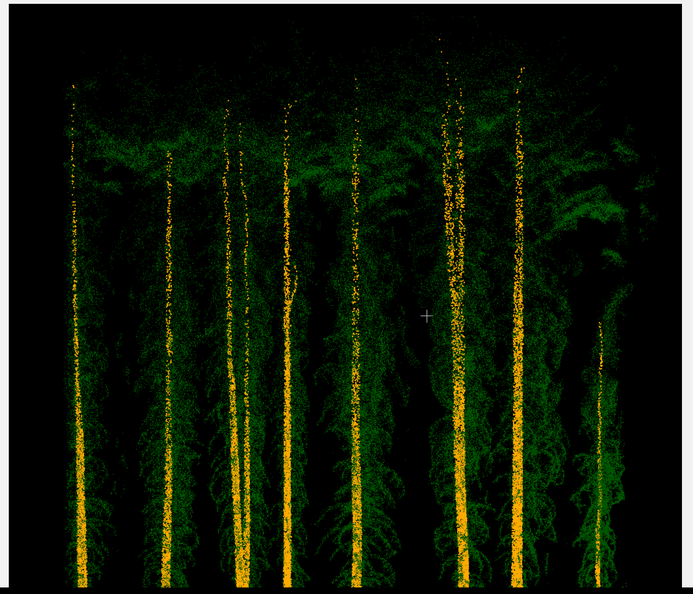


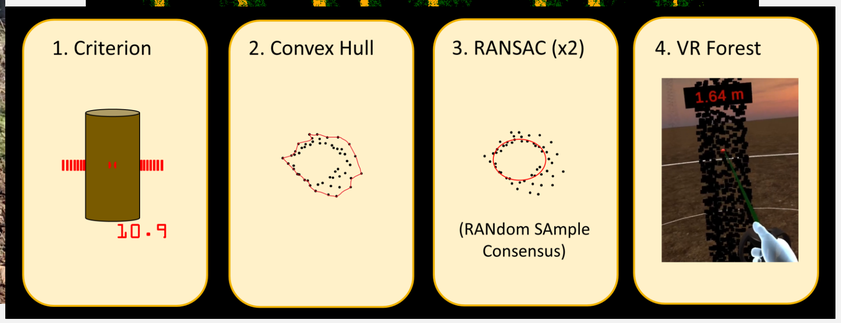




FOREST INNOVATIONS INSTITUTE

ASSESSING SILVICULTURE EFFECTS ON TAPER W/SLAM





Current Projects

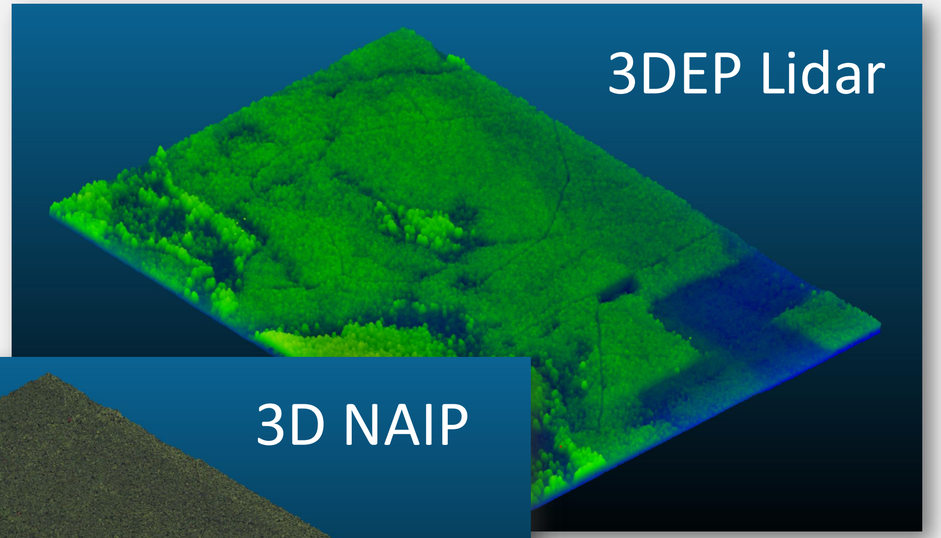
PotlatchDeltic - MOE

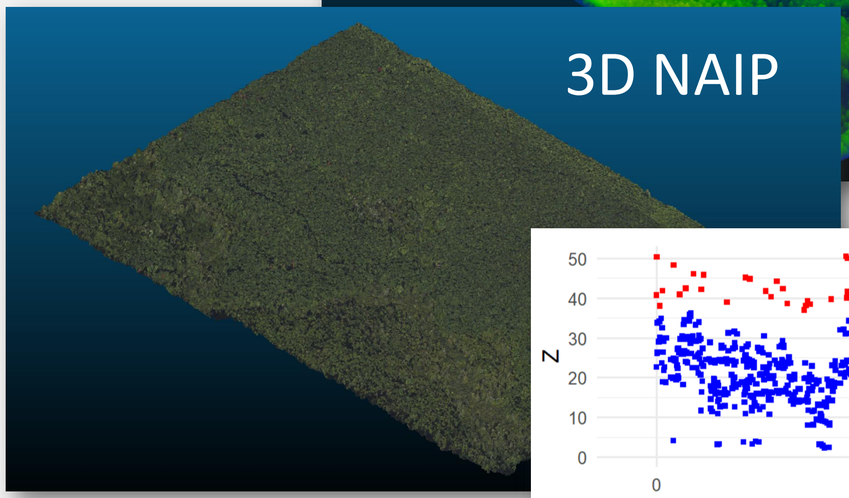
IFC – PPDM

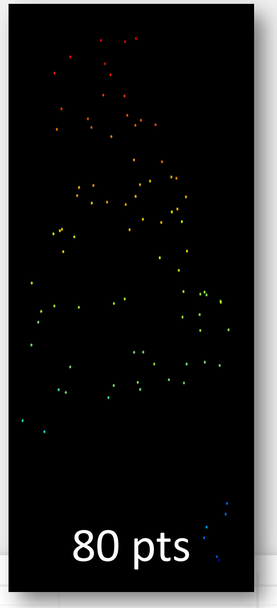
CIPS – SMC/NWTIC/VMRC

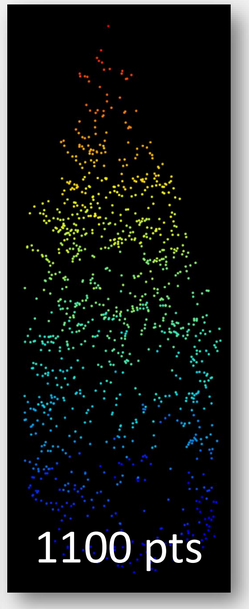
FOREST INNOVATIONS INSTITUTE

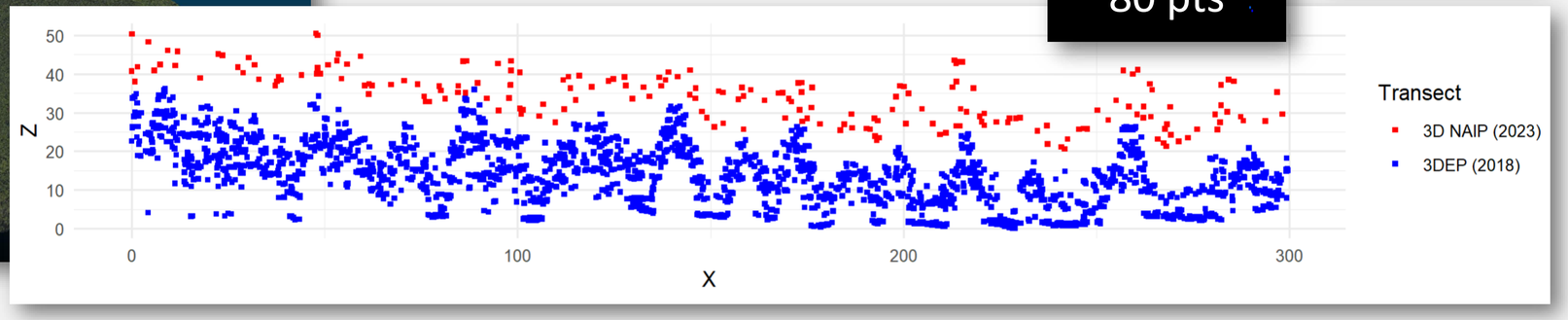
MAPPING SITE PRODUCTIVITY W/3D NAIP + 3DEP LIDAR





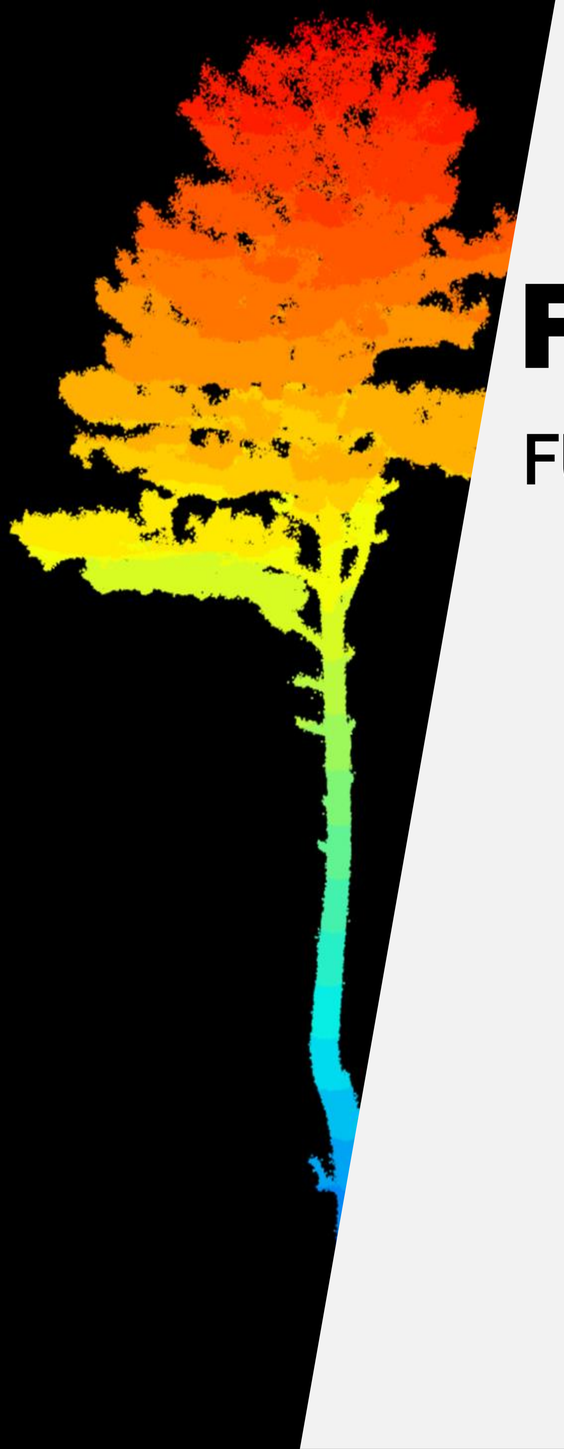






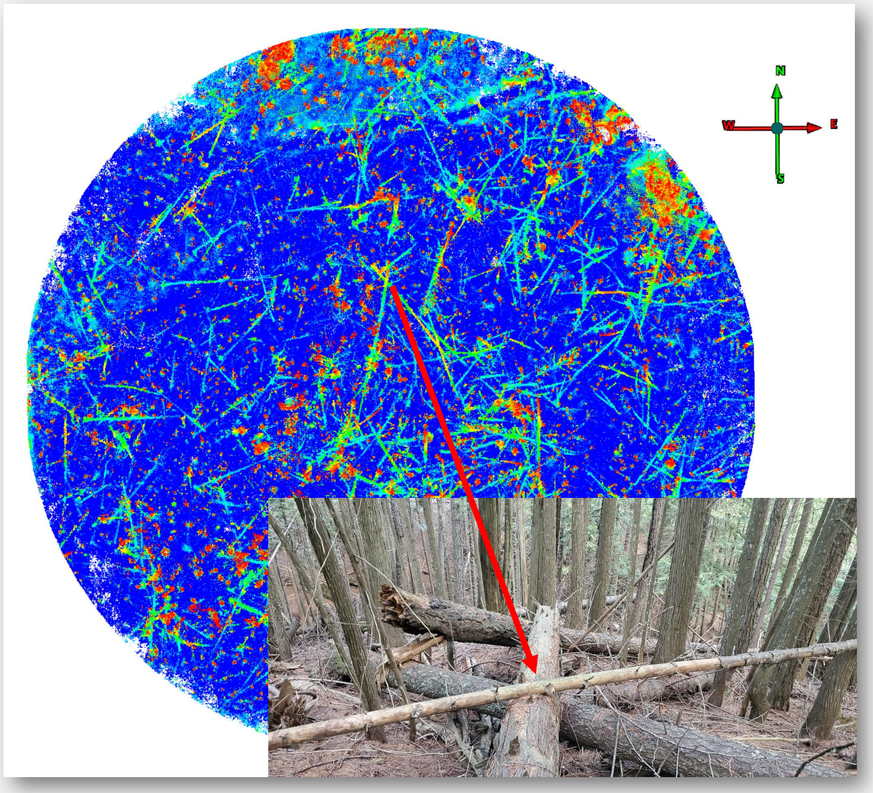
FBRI Forest Biometrics Research Institute

NRCS Natural Resources Conservation Service



FOREST INNOVATIONS INSTITUTE

FUEL/BIOMASS MODELING W/GIEGER LIDAR - FUTURE



MIT LINCOLN LABORATORY

3D EO

FlamMap

Rocky Mountain Research Station

NETWORKING FOR THE NEXT GENERATION OF RS INFORMED G&Y MODELS

Leveraging CAFS, IDF, FII, Mensurationist Societies, GMUG, OLI

SPECIES IDENTIFICATION & MAPPING

Leverage Free & Evolving Technology

NAIP, Geiger

APP DEVELOPMENT & DEPLOYMENT

Turn Research into Application

Web Apps, AGOL, GitHub

FIRE & FUELS MODELING & MAPPING

Geiger LiDAR for Estimating Landscape Fuel Loading