

Simple methods for rapid mapping of tree mortality using readily available imagery: A case study from High Meadows in the Lake Tahoe Basin

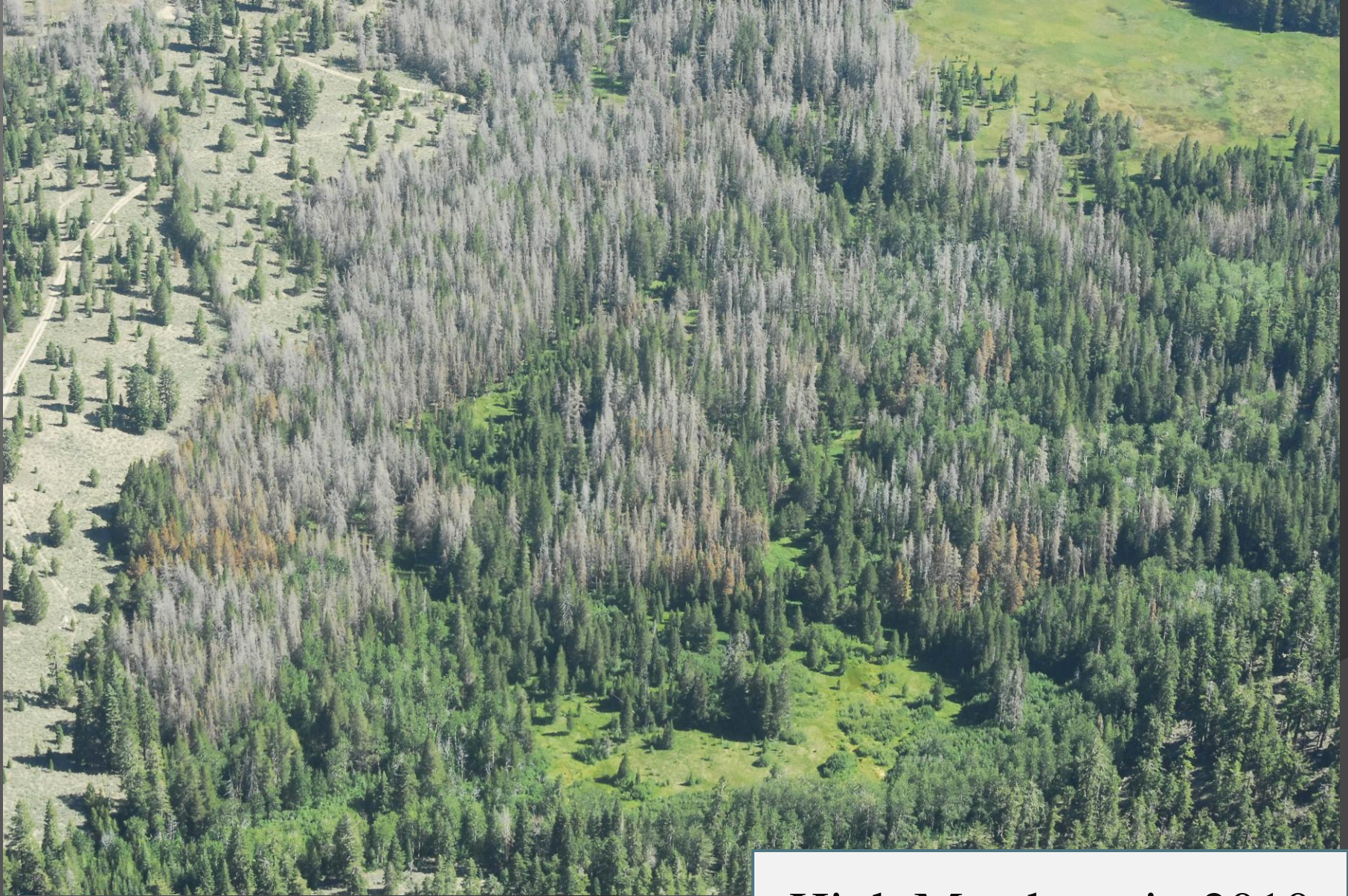
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Beverly Bulaon & Lisa Fischer

USDA Forest Service – Pacific Southwest Region
Forest Health Protection

Objective


*Provide estimates of tree mortality levels
at the local scale using
simple GIS tools*






High Meadows in 2010



NAIP Imagery



United States Department of Agriculture
Farm Service Agency

Aerial Photography
Field Office





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Imagery Programs

NAIP Imagery

NATIONAL AGRICULTURE IMAGERY PROGRAM (NAIP)


CA : 2005, 2009, 2010 & NV: 2006, 2010



United States Department of Agriculture
Natural Resources Conservation Service

GEOSPATIAL DATA GATEWAY






CAL-ATLAS

GEOSPATIAL CLEARINGHOUSE

University of
Nevada, Reno
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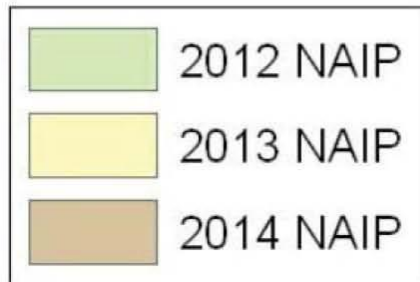
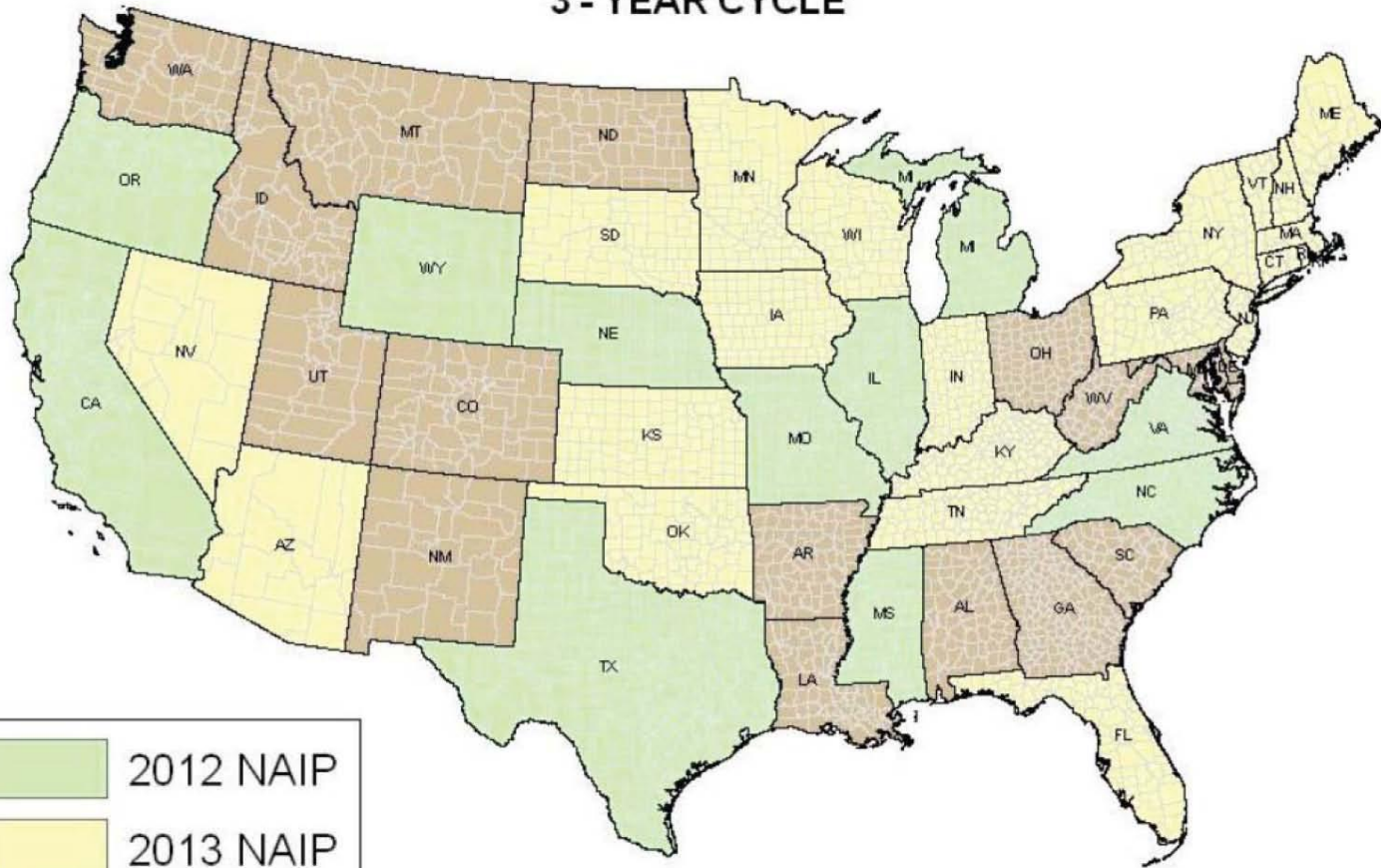
W.M. KECK

Earth Sciences & Mining Research
Information Center

Planned Acquisition of NAIP Imagery

2012 - 2014 NAIP ACQUISITION

3 - YEAR CYCLE



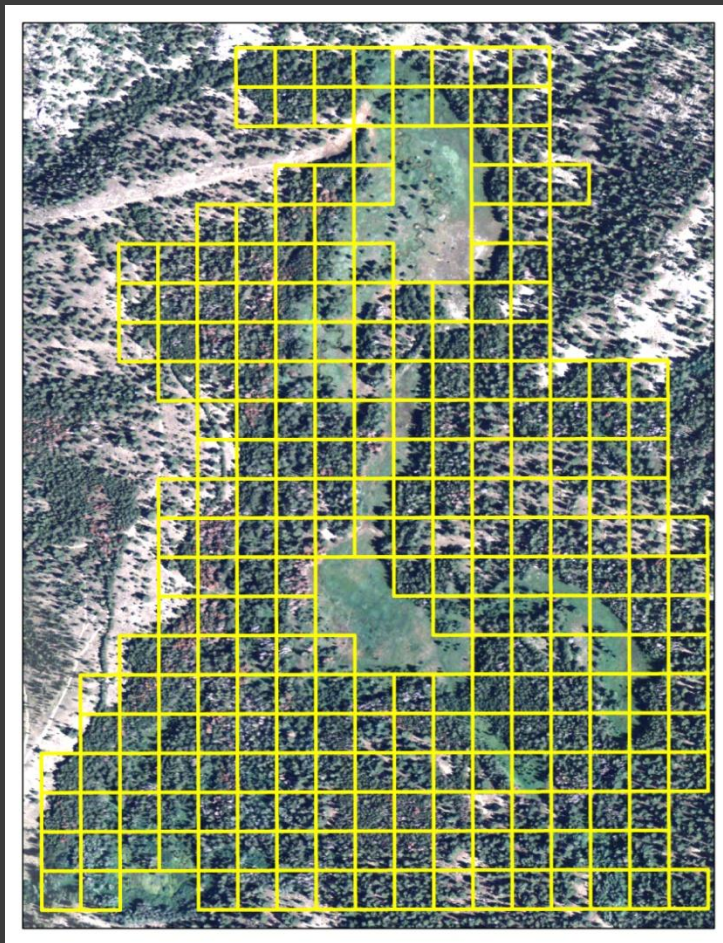
Mapping Methods

- I. Visually rate tree mortality levels across a grid
- II. Digitize tree mortality polygons using visual interpretation
- III. Use remote sensing software to classify and map tree mortality

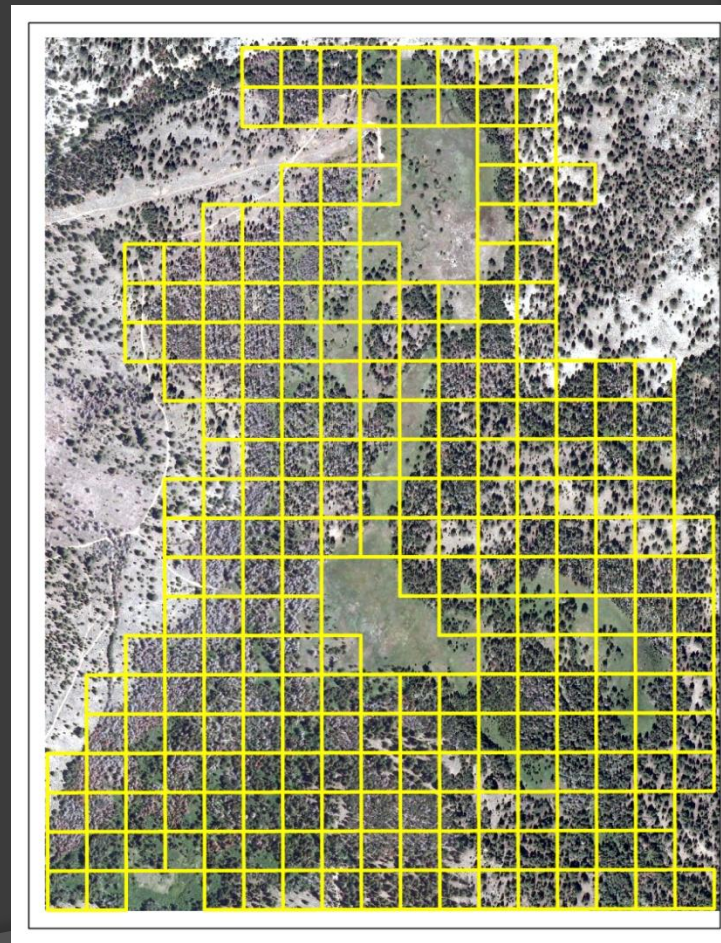
*1. Visually rate tree mortality levels
across a grid*

Grid for Visual Interpretation (1 acre cells)

2005 NAIP Image



2010 NAIP Image



Develop Severity Rating Scheme for Visual Interpretation of Grid Cells

Example: Percent Mortality Throughout the Canopy
(included older and recent mortality)

Very Low: None visible – trace or single crown

Low: 2 tree crowns – 25% of total canopy present appears dead

Moderate: 26% - 50% of total canopy appears dead

High: 51% - 75% of total canopy appears dead

Very High: 76% - 100% of total canopy appears dead

Map % Mortality Throughout the Canopy

Legend

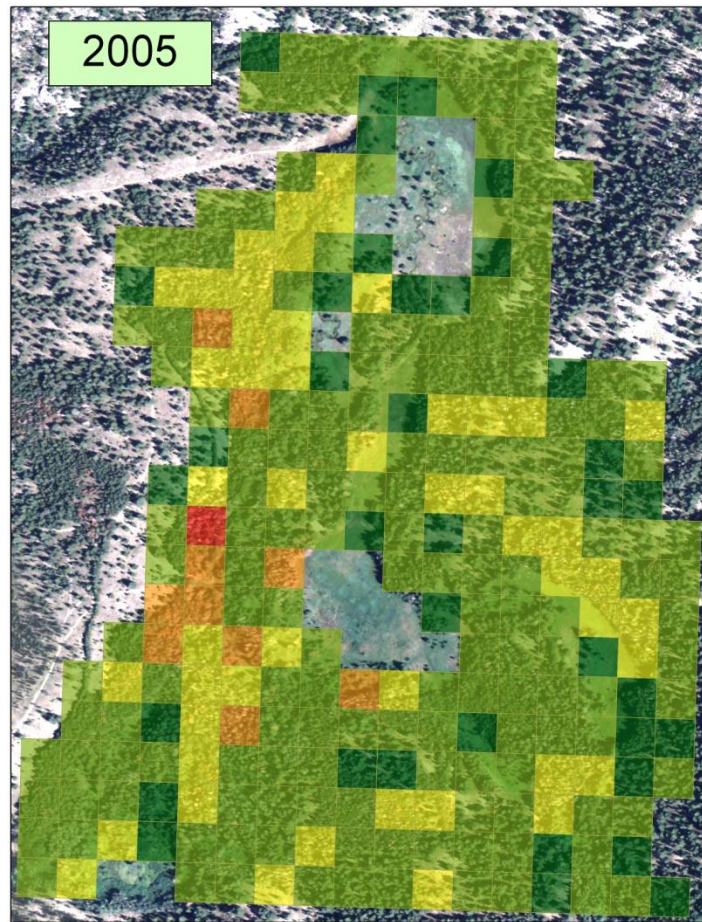
0 – 1 crown

**2 crowns –
25% of canopy**

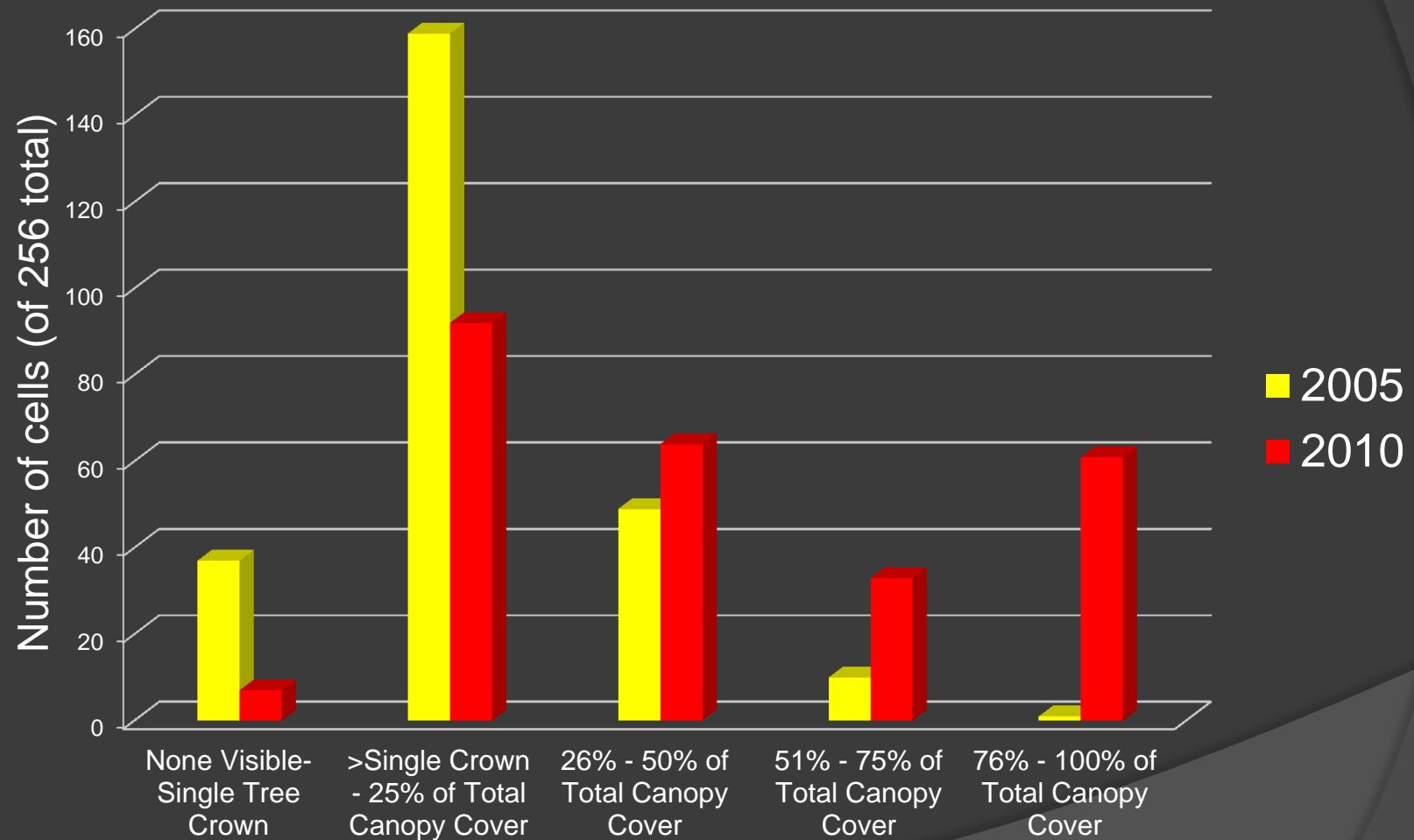
**26 – 50% of
canopy**

**51 – 75% of
canopy**

**76 – 100% of
canopy**

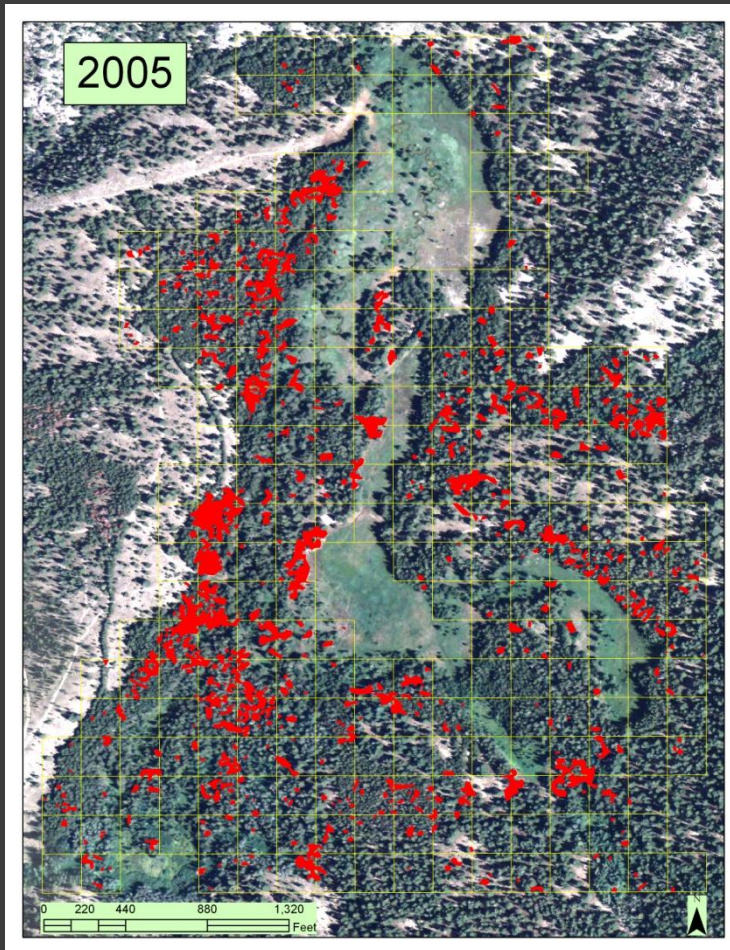


Comparing % Mortality Throughout the Canopy in 2005 to 2010

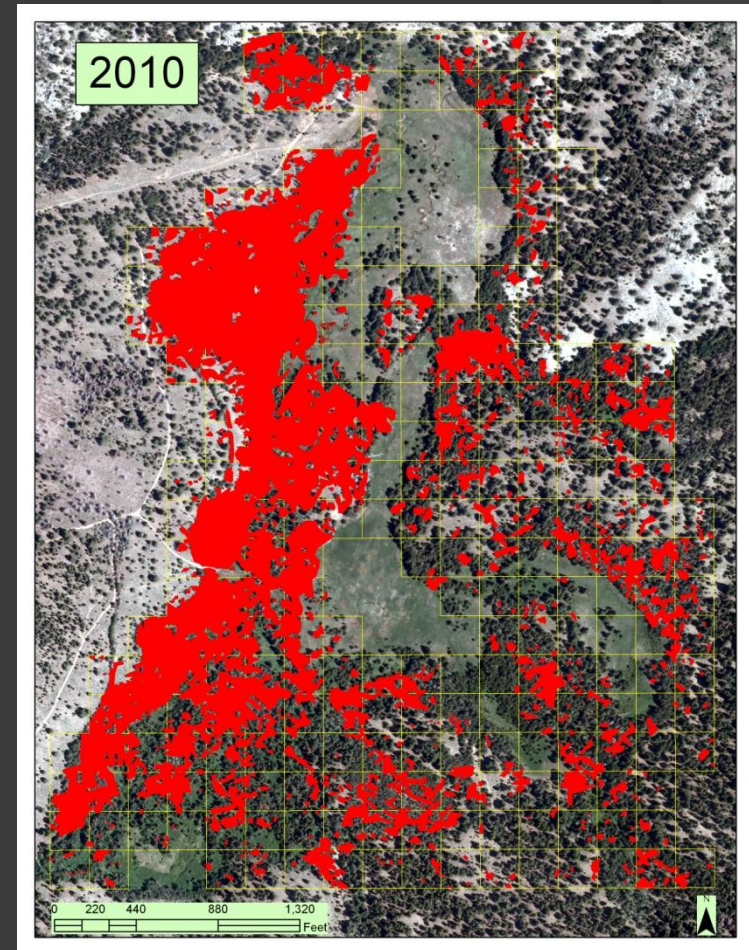


II. Digitize tree mortality polygons
using visual interpretation

Delineation of tree mortality after manually drawing polygons



20 acres with mortality of
256 acres in project area



79 acres with mortality of
256 acres in project area

III. Use remote sensing software to classify and map tree mortality

Image Classification with Remote Sensing Software

- Tools now within ArcGIS make classification available to more users
- Supervised classification example

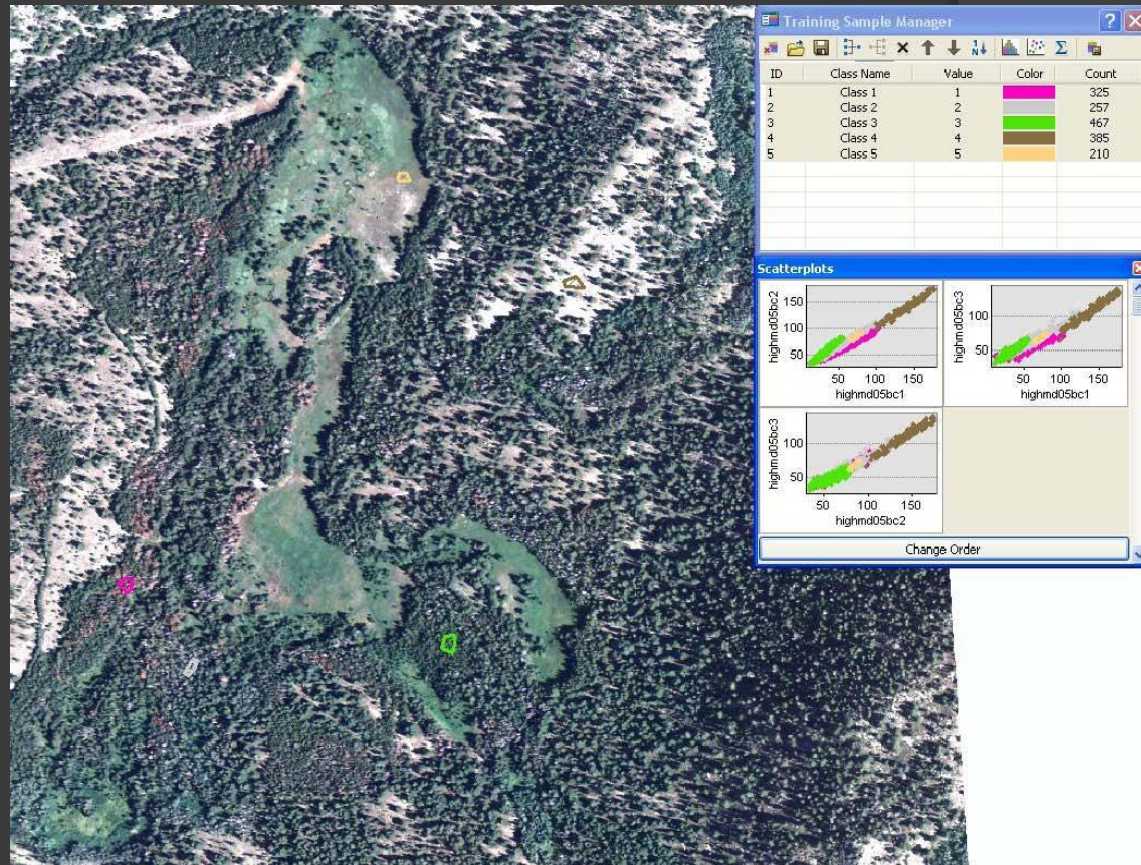
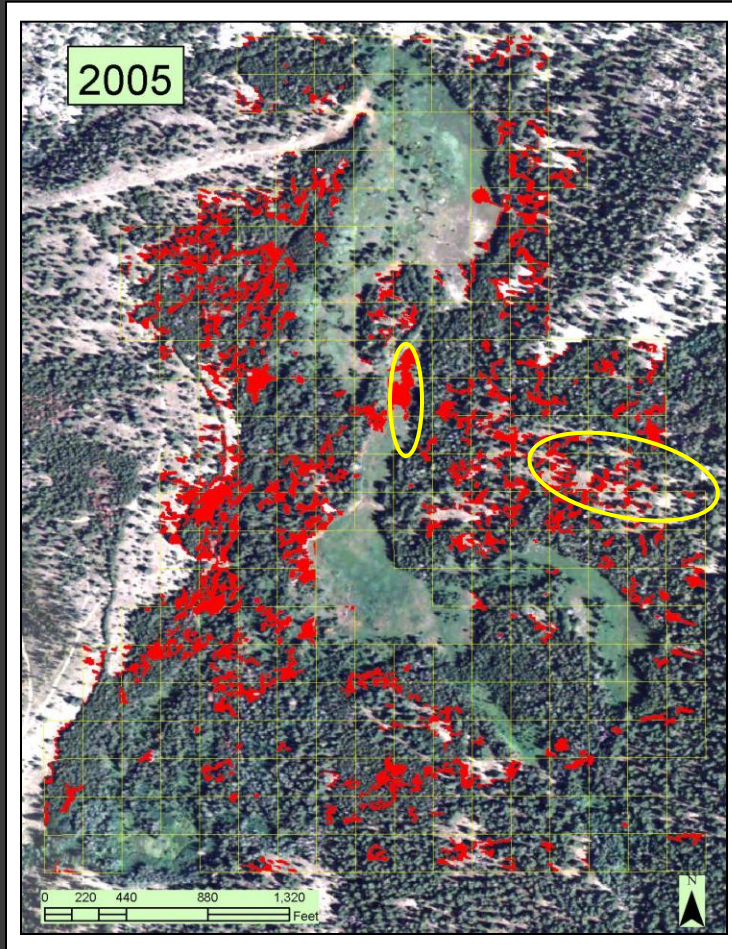
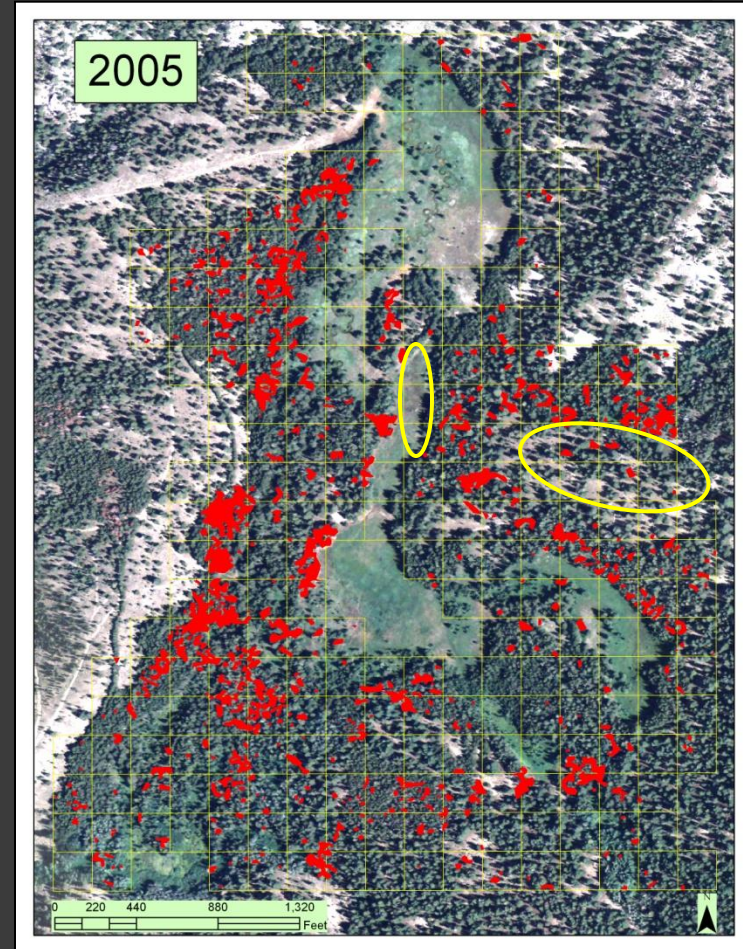


Image Classification Results



Mapped mortality after
image classification
(29 acres)

vs.



Mapped mortality after
digitizing
(20 acres)

Grid Approach	Digitizing Approach	Image Classification Approach
Simple	Very Simple	More Advanced
Less time required	More time required	Less time mapping but more time correcting errors
Less precise mapping	More precise mapping	Moderate precision-to-more precise mapping
Multiple options for data collection	Provides presence / absence of mortality data	Provides presence / absence of mortality data

<http://www.fs.usda.gov/main/r5/forest-grasslandhealth>

