MAIN TOPICS

- LANDFIRE User Guide Process
- Landscape Change
  - Disturbance Mapping
  - Vegetation Transition Databases (VTDB)
  - Land Change Mapping
  - Updates to Fire Modeling products
  - Examples: Lassen logging, Zaca fire
- LANDFIRE Reference Guide Process
LANDFIRE User Guide Process

- Foundational Data
  - Reference Data
  - Remote Sensing Data
  - Bio-physical Data

- Vegetation Data
  - Classification
  - Mapping
  - Landscape Change

- Fire Modeling Data
  - Fire Behavior
  - Fire Effects
  - Fire Regime
LANDFIRE User Guide Process

- LANDFIRE Methods and Processes
- Compare-contrast methods
- Compare-contrast results
- Regionally specific reporting
LANDFIRE User Guide Process

- Foundational Data
  - Reference Data
  - Remote Sensing Data
  - Bio-physical Data
- Vegetation Data
  - Classification
  - Mapping
  - Landscape Change
- Fire Modeling Data
  - Fire Behavior
  - Fire Effects
  - Fire Regime
LF 2008 Transition Process

Vegetation Improvements #2
- LF National EVT
- Refresh EVT
- BuAg BuUr Rip/Wet Rock Water

Circa 2001
- Fire Behavior Mapping
- Fire Effects Mapping
- Fire Regime Mapping

Vegetation Transition Modeling

Circa 2008
- Fire Behavior Mapping
- Fire Effects Mapping
- Fire Regime Mapping

Vegetation Improvements #3
- MRLC Landsat TM
- EDNA

Refresh EVT

Circa 2001 EVT
- EVC
- EVH

Vegetation Transition Database

Circa 2008 EVT
- EVC
- EVH

LF VDDT
- Non-forest VTDB
- Forest VTDB
- FVS/FFE

Disturbance Grid
- EVENTS
- RSLC
- MTBS

Disturbance Mapping
Landscape Change

- Disturbance Mapping
  - Detecting Change
  - Change Causality
  - Change Severity

- Vegetation Transition Databases (VTDB)
  - Disturbance Integration
  - Non-forest Transition Databases
  - Forest Transition Databases

- Land Change Mapping
  - Updating EVT/EVC/EVH
  - Updating Disturbance
  - Tracking Disturbance
Detecting Change

- Landsat TM Imagery – Stacks consisting of 10 for 438 path rows
- Landsat ETM – When necessary
- Image Preprocessing – LEDAPS Surface Reflectance
- Cloud/Shadow Masking
- Snow/Ice Masking
Change Causality

- LANDFIRE Events
- Burn Severity from Wildfire mapping programs (MTBS, BAER, RAVG)
- SMARTFIRE
- Protected Area Database (PAD)
Change Severity

- LF 2008 – Vegetation Change Tracker (Huang et al. 2010)
Disturbance Product

- Identifies Changed Pixels Only - 1 Product / year
- Legend
  - 160 Codes
    - 19 Causes / Events
    - 2 Type Confidences
    - 3 Severity Levels
    - 3 Severity Confidences
“A convergence of evidence”

Data Source

- MIICA + Refresh Events + dNBR Severity = High
- MIICA + PAD + SMART FIRE = N/A
- MIICA + PAD + dNBR Severity = N/A
- Refresh Events + dNBR Severity = Medium
- Refresh Events + dNBR Severity = Medium
- MTBS BAER RAVG = High

Confidence

- High
- High
- Medium
- Medium
- N/A
- Medium
DISTURBANCE INTEGRATION - TSD

- **1 YEAR** Time Since Disturbance (TSD)
- **2-5 YEARS** Time Since Disturbance (TSD)
- **6-10 YEARS** Time Since Disturbance (TSD)
DISTURBANCE INTEGRATION - TYPE

<table>
<thead>
<tr>
<th>Event Code</th>
<th>Event Description</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Development</td>
</tr>
<tr>
<td>2</td>
<td>Clearcut</td>
</tr>
<tr>
<td>3</td>
<td>Harvest</td>
</tr>
<tr>
<td>4</td>
<td>Thinning</td>
</tr>
<tr>
<td>5</td>
<td>Mastication</td>
</tr>
<tr>
<td>6</td>
<td>Other Mechanical</td>
</tr>
<tr>
<td>7</td>
<td>Wildfire</td>
</tr>
<tr>
<td>8</td>
<td>Wildland Fire Use</td>
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<td>9</td>
<td>Prescribed Fire</td>
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<td>10</td>
<td>Wildland Fire</td>
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<td>11</td>
<td>Weather</td>
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<tr>
<td>12</td>
<td>Insecticide</td>
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<tr>
<td>13</td>
<td>Chemical</td>
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<td>14</td>
<td>Insects</td>
</tr>
<tr>
<td>15</td>
<td>Disease</td>
</tr>
<tr>
<td>16</td>
<td>Insects/Disease</td>
</tr>
<tr>
<td>17</td>
<td>Herbicide</td>
</tr>
<tr>
<td>18</td>
<td>Biological</td>
</tr>
</tbody>
</table>

- Disturbance Type
  - Fire
  - Mechanical Remove
  - Mechanical Add
  - Windthrow
  - Insects and Disease
  - Chemicals
  - Herbicide
FINAL “VDIST”

Code 131: Fire/High Severity/1 year TSD
Code 313: MechAdd/Low Severity/6-10yrs TSD
Non-Forest Transition Databases

- Non-forest VTDB
  - Non forest EVT succession to forest
  - High severity fire, mechanical remove to non-forest EVT
  - Non-forest EVT after fire
  - Non-forest EVT after mechanical add & remove
  - Non-forest EVT after chemical/herbicide
  - VDDT SClass A EVC/EVH
  - Mapzone summaries drive rules
Non-Forest Transition Databases

- Non forest EVT succession to forest
  - Forest site potential; EVT based on ESP
- High severity fire, mechanical remove
  - Forest to shrub or grass common to MZ
- Non-forest EVT
  - After fire; shrub to grass (exotics in WD sage); grass to grass
  - After mechanical remove: shrub to grass common to MZ
  - After chemical/herbicide: exotic to natural
Forest Transition Databases

- **Forest VTDB**
  - Run all plots through FVS-FFE
  - Acquire new cover and height
  - Bin into EVC and EVH classes
  - Group output at 2 levels of EVT
  - Assign majority outcome
  - Create forest lookup tables
FVS/FFE Simulation Parameters

- **Mechanical Remove**
  - High: Clearcut and burn
  - Moderate: Remove 35% stand density; pile and burn
  - Thin from below in 0-6”; pile and burn

- **Mechanical Add**
  - Cut 90%, 75%, and 55% of 0-8” then masticate

- **Fire**
  - Target 95%, 75%, and 45% mortality

- **Insects and Disease**
  - 85%, 55%, and 10% fixed mortality

- **Windthrow**
  - Thin 85%, 55%, and 10% of stand and leave on the ground
FVS/FFE Simulation Parameters

Succession

- 10 year run w/ No Disturbance
- All disturbance simulations followed by succession
- Assuming no succession on non-forest vegetation
Updating EVT/EVC/EVH

- Overlay VDIST w/2001 Veg
- Import overlay data
- Import non-forest tables
- Import forest tables
- Format & test update queries
- Run update queries
- Export vegtrans dbf
- Create updated veg grids
Updating Disturbance

- Overlay VDIST w/2001 Veg
- Apply logic rulesets
- Create Fuel Disturbance grid
Tracking Change

- Assign disturbance type
- Assign transition “classes”
- Create Transition Magnitude grid
Fire Behavior Transition Databases

- **Surface Fuel: FBFM 13 and 40**
  - Based on updated EVT, EVC, EVH (and BpS)
  - Conditional on disturbance type, severity, TSD (FDIST)
  - Mapped in the LANDFIRE Total Fuel Change Tool (LTFCT)

- **Canopy Fuel: CH, CC, CBH,CBD**
  - Based on updated EVT, EVC, EVH
  - Same GLM and regression tree equations as undisturbed
  - Mapped in the LANDFIRE Total Fuel Change Tool (LTFCT)
Fire Effects Transition Databases

- **FCCS**
  - Disturbed areas mapped into 600 series
  - Pull in post-disturbance FBFM40
  - Use surface loadings from FBFM40 models
  - Mapped in the LANDFIRE Total Fuel Change Tool (LTFCT)

- **FLM**
  - Based on updated EVT, EVC, EVH (and BpS)
  - Same rulesets for disturbed and undisturbed
Succession Class
- Based on updated EVT, EVC, EVH (and BpS)
- Same rulesets for disturbed and undisturbed

Departure (VDEP, VCC)
- Changing Sclass distribution may change VDEP, VCC

Historical Fire frequency (MFRI, FRG)
- No Change

Historical Fire severity (PRF, PMS, PLS)
- No Change
Example 1: Lassen Forest
Lassen NAIP - 2006
Lassen EVC – LF2001
Lassen Disturbance – 2001-2010
Lassen EVC – LF2012
Lassen NAIP 2012
Lassen FBFM40 – LF2012
Lassen FCCS – LF2008
Example 2: Zaca Fire
Zaca NAIP 2006
Zaca NAIP 2009
Zaca MTBS
Zaca SClass 2012

- NODATA
- A
- B
- C
- D
- E
- UN
- UE
- Water
- Snow / Ice
- Non-burnable Urban
- Burnable Urban
- Barren
- Sparsely Vegetated
- Non-burnable Agriculture
- Burnable Agriculture

USGS
Fire Modeling Institute
The Nature Conservancy
LANDFIRE
LANDFIRE Reference Guide Process

- Area Overview
  - Geography, Landforms
  - Site potential

- Non-vegetated and Cultural Vegetation
  - Lithomorphic, hydromorphic
  - Urban
  - Agricultural

- Natural and Semi-natural
  - Herbaceous
  - Shrub
  - Treed
LANDFIRE Reference Guide Process

- Vegetation Transition logic and rulesets
  - Non-forest
  - Forest
- Fire Modeling product logic and rulesets
  - Fire behavior
  - Fire effects
  - Fire regime
- Regionally specific vegetation
Questions?