And how to Access It

ONE SET OF AVAILABLE SPATIAL DATA

Spatial Data

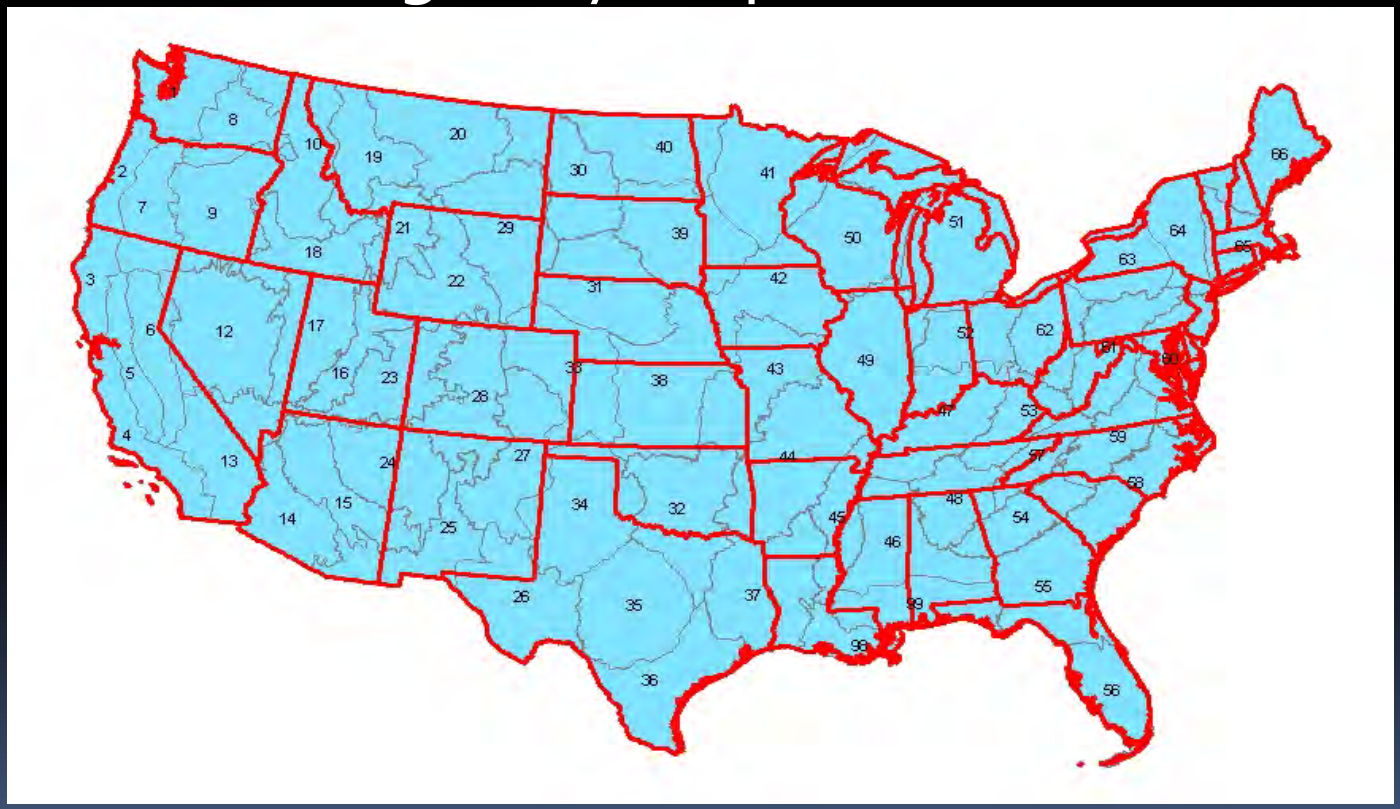
- Many varied sets of data exist in a multitude of scales, themes, and resolution.
- One set that is national in scale and uses fuels for fire behavior analysis as one of its themes is LANDFIRE.
- Access is: https://landfire.gov web site serves as data distribution site (DDS),and has description of products, and findings from data use.

History

- Several versions of this data have been produced since its inception in 2002 to support National Level Fire and Fuels programs such as FPA & WFDSS
- Rapid Assessment (LF 0.5.0) 2006:
  - Proof of Concept
  - Set approach for first National LANDFIRE effort

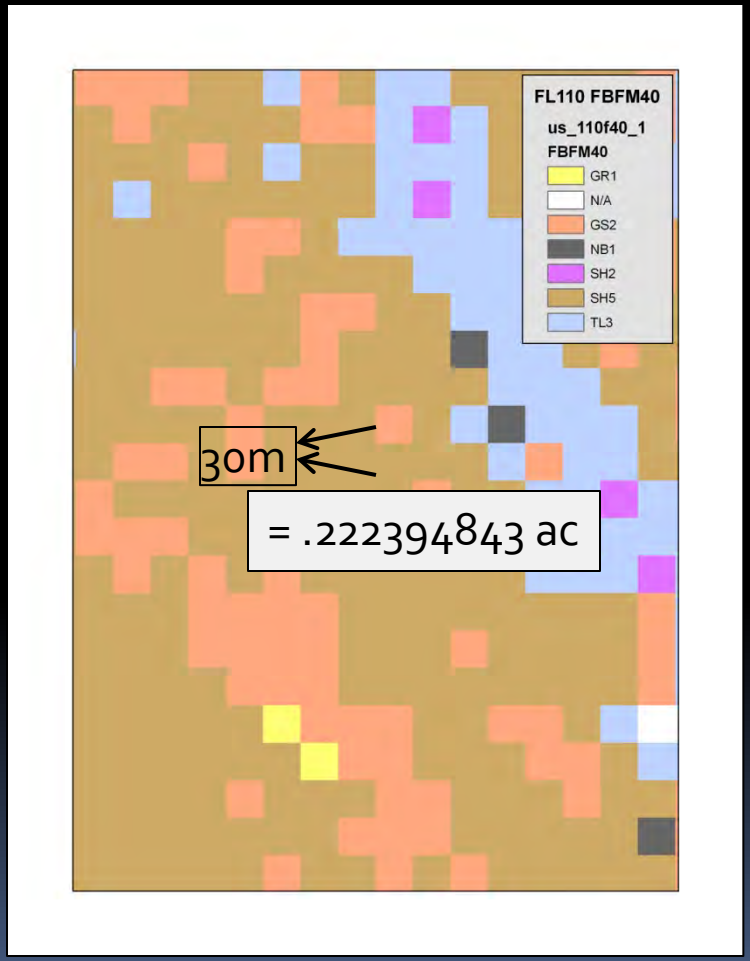
Arrangement

- Data arranged by map zone and Geo Area



Data Arrangement

- Age of imagery is 1999 through 2001
- Resolution of Data is 30m x 30m
- Plot data strongest in forested vegetation types



Data Arrangement

- Due to the plot data being used to re-enforce accuracy; fuels and fire layers are based on Vegetation primarily EVT- EVC and EVH
- The coding in the grids for EVC and EVH is used to delineate the lifeform. 10% or greater of the pixel in trees it's a treed pixel—less than 10% of trees but greater than 10% shrub it's a shrub pixel. Less than 10% shrub it's a herbaceous pixel.

National LANDFIRE

- LF 1.0.1 Was produced and used in fire seasons of 2006 and 2007 with AAR's after each
  - Issues: Barriers, cbh to high, cbd to low, Urb/Ag
- As a result several incentives began
  - EO CBH layer (Joe Scott)
  - Calibration workshops started with LANDFIRE personnel for input on surface fuel models.
    - FBFM based on average fire season conditions
    - Decisions were made with respect to high cbh low cbd

Rapid Refresh

- LF 1.0.1 created in response to AAR's
- Artificially lowered cbh and increased cbd by a fudge factor; based on Farsite runs of known fire perimeters and conditions.
- Input fire footprints from 1999 – 2007 on the landscape

Improvements

- LF 1.0.2-- The issues raised in the fire seasons of 06, 07, 08, provided incentive for significant changes to the base data.
  - Rock- water- roads- Barren- riparian were all reassessed with new methods
  - Urb/Ag masks were broken into burnable –non-burnable EVT's-
    - developed areas with wildland fuel models
    - NLCD and NASS primary layers in re-classification

Refresh c01

- LF 1.0.5 resets data to age of imagery
  - New cover and height methods employed (EVC and EVH)
    - Pixel shift within calibrated fuel rules
  - New cbh and cbd approach based on plot data (mainly FIA)
  - Improvements layer incorporated

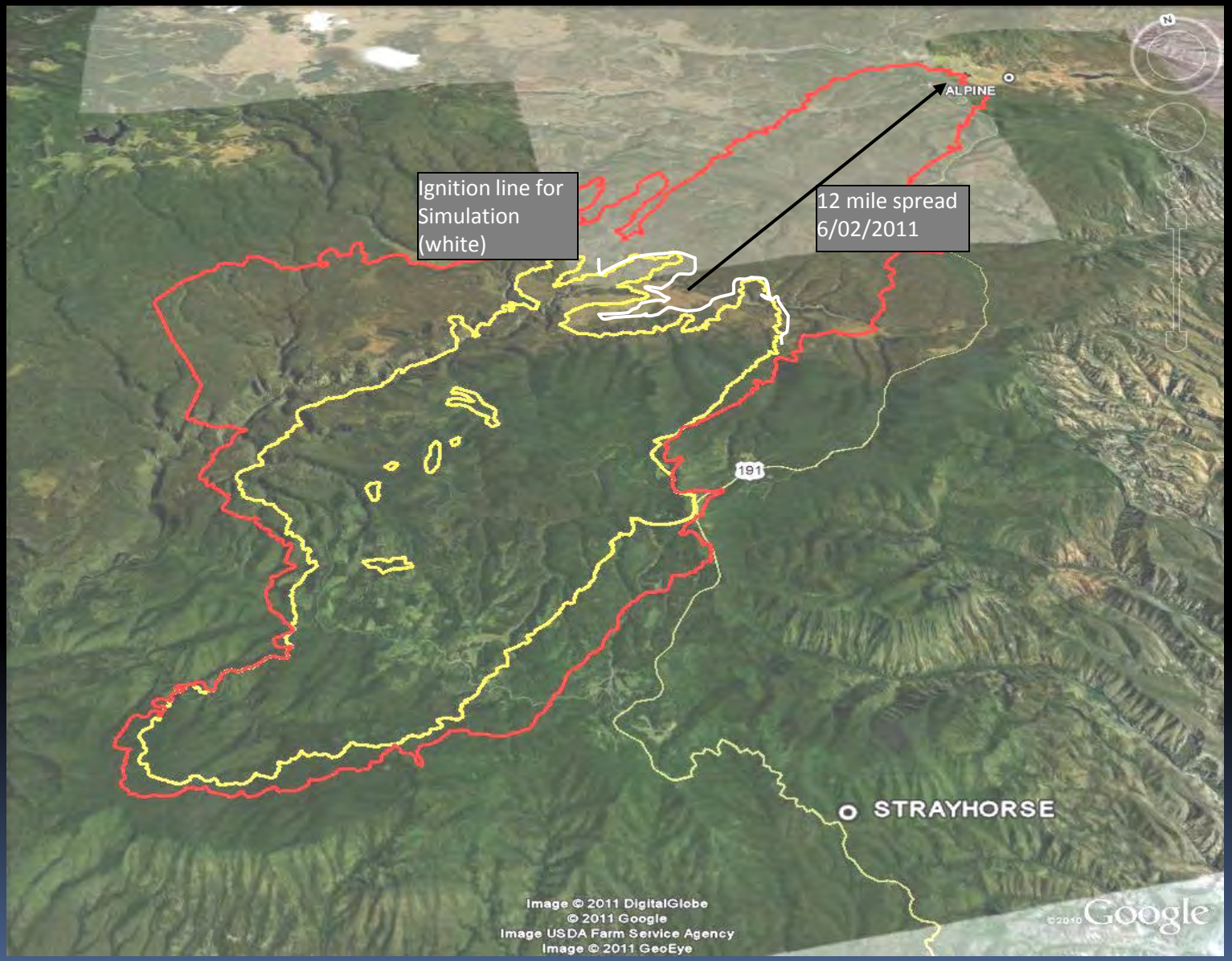
Refresh c08

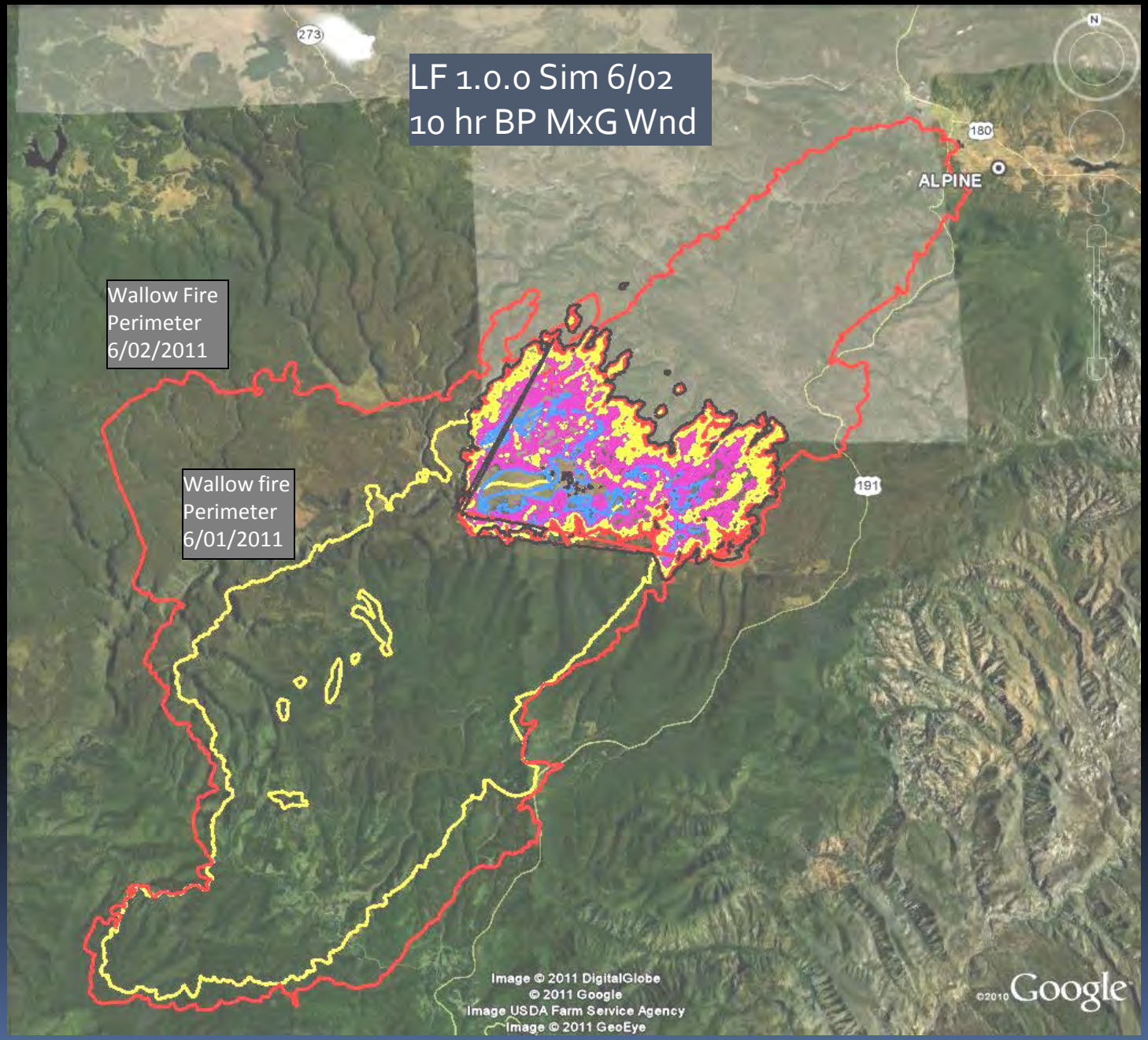
- LF 1.1.0 adds disturbance from age of imagery to 2008 to the LF 1.0.5
  - Disturbance based on type – Fire- mechanical arrangement- mechanical removal- wind- insect and disease
  - Based on severity low- moderate- high;
  - Based on 2 times since disturbance for surface fuel models 3 TSD for canopy

Refresh c08

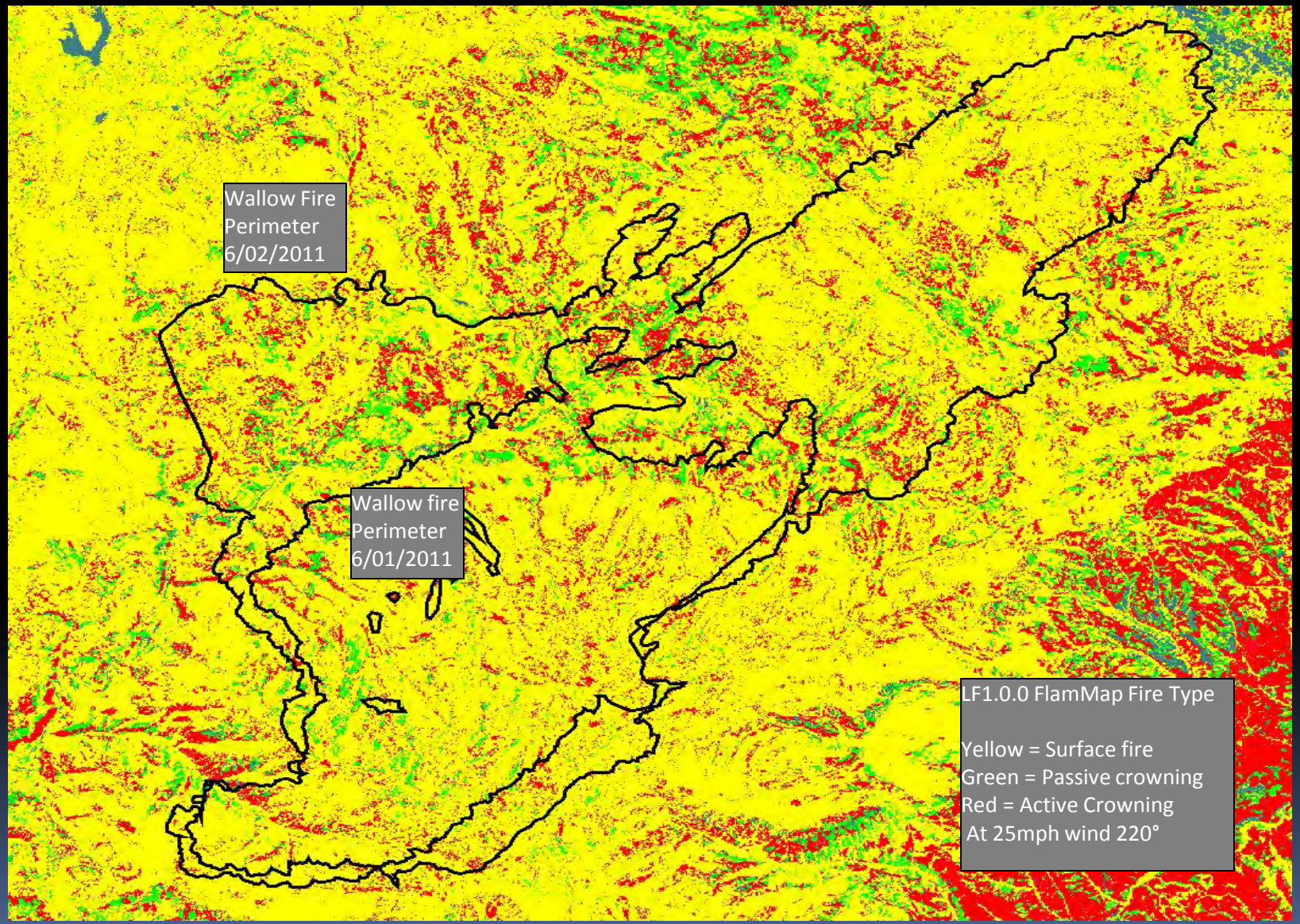
- Canopy (cc, ch, cbh and cbd) values are from FVS scenarios based on coefficient of change in canopy characteristic immediately after, midway between 0-5 yrs, and midway between 5-10 years.
- Surface fuel models based on expert opinion from each geo region; uses second growing season after disturbance and 8 years after disturbance as baseline. Generally the approach reduces fire behavior characteristic in the first TSD for moderate and high severity in fire and treatment areas.

Evaluation

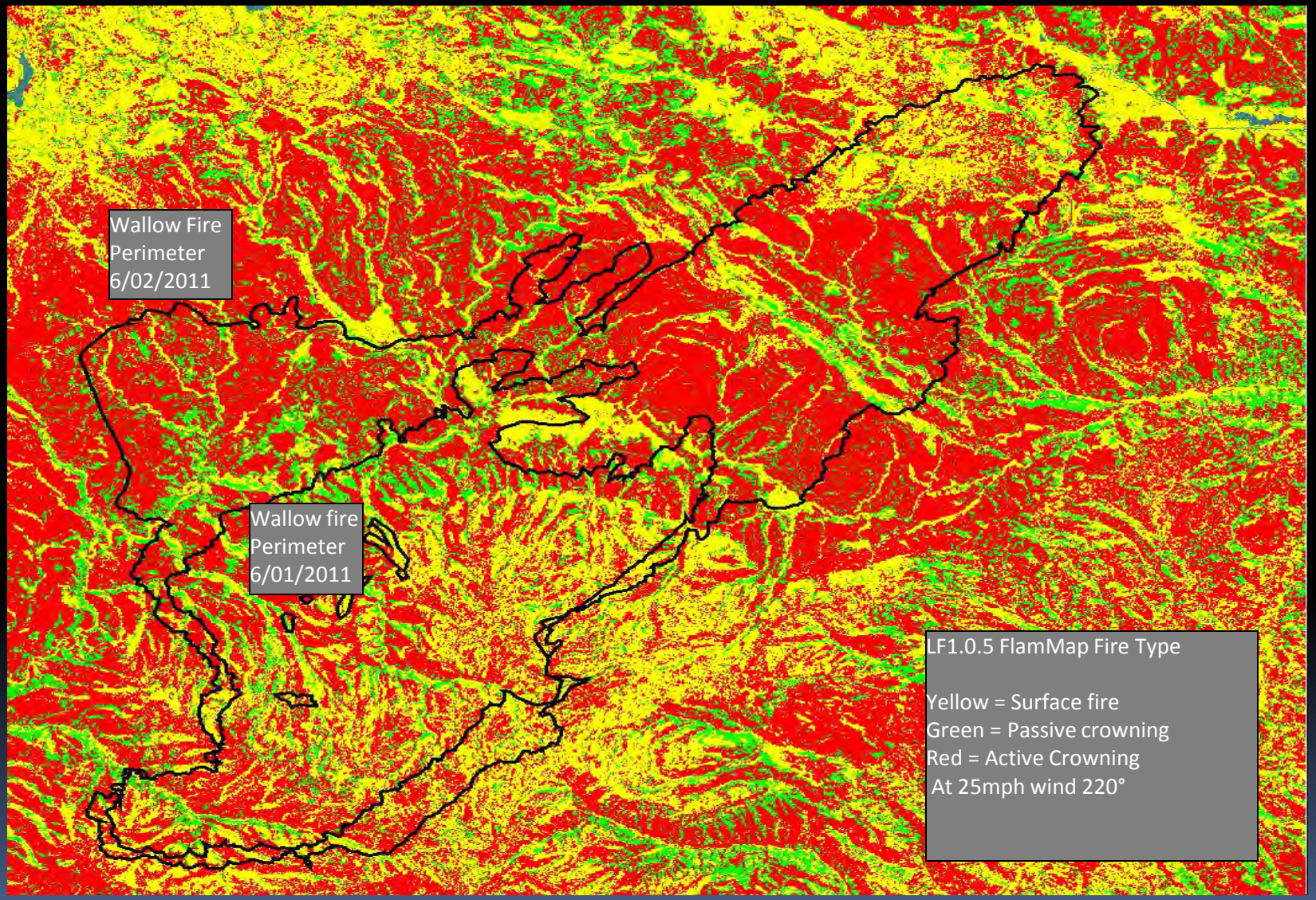

Ignition line for Simulation (white)
12 mile spread 6/02/2011
ALPINE
191
STRAYHORSE
Image © 2011 DigitalGlobe
© 2011 Google
Image USDA Farm Service Agency
Image © 2011 GeoEye
Google

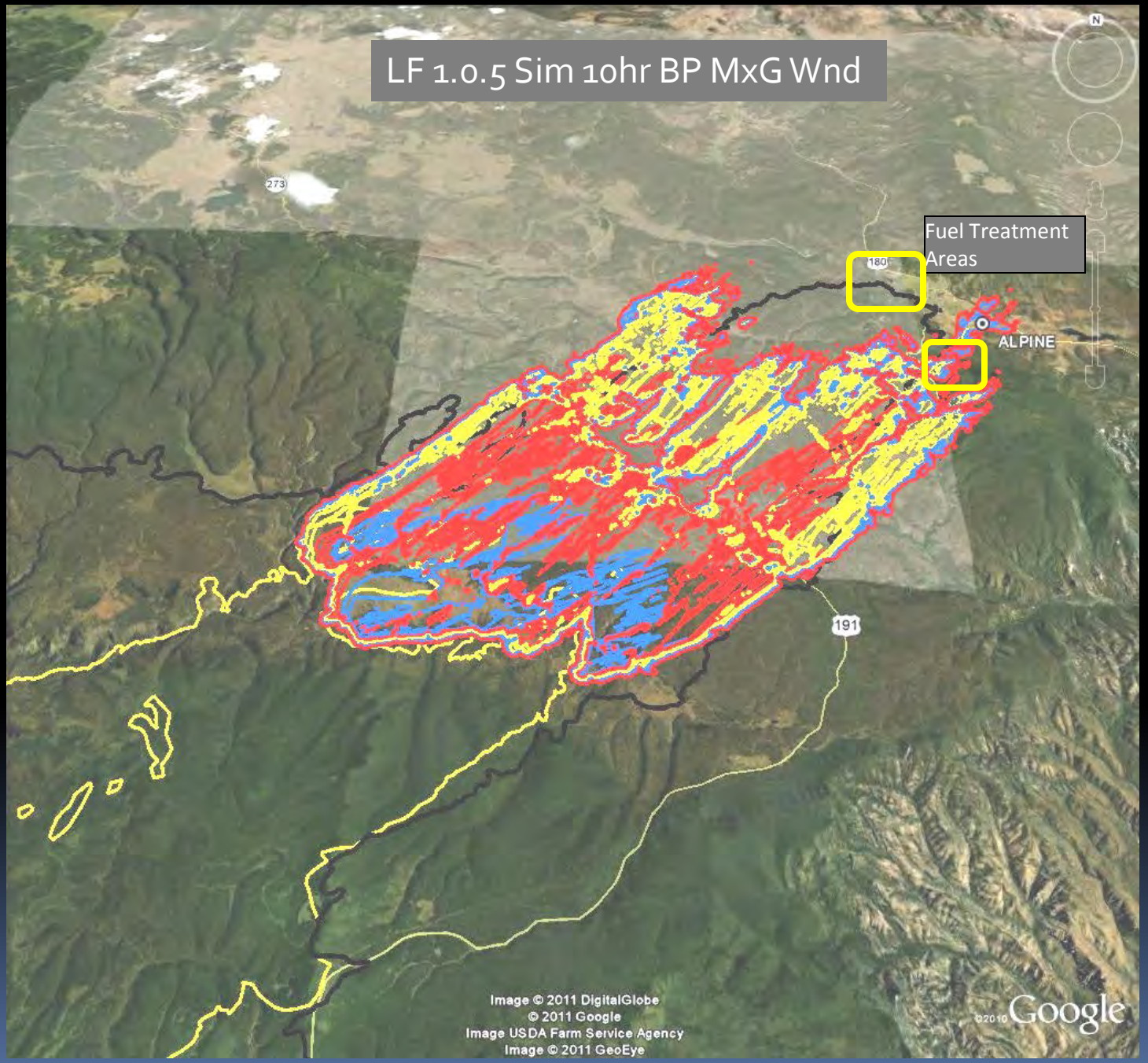

LF 1.0.0 Sim 6/02
10 hr BP MxG Wnd
Wallow Fire Perimeter 6/02/2011
Wallow fire Perimeter 6/01/2011
ALPINE
273
180
191
N
Image © 2011 DigitalGlobe
© 2011 Google
Image USDA Farm Service Agency
Image © 2011 GeoEye
©2010 Google

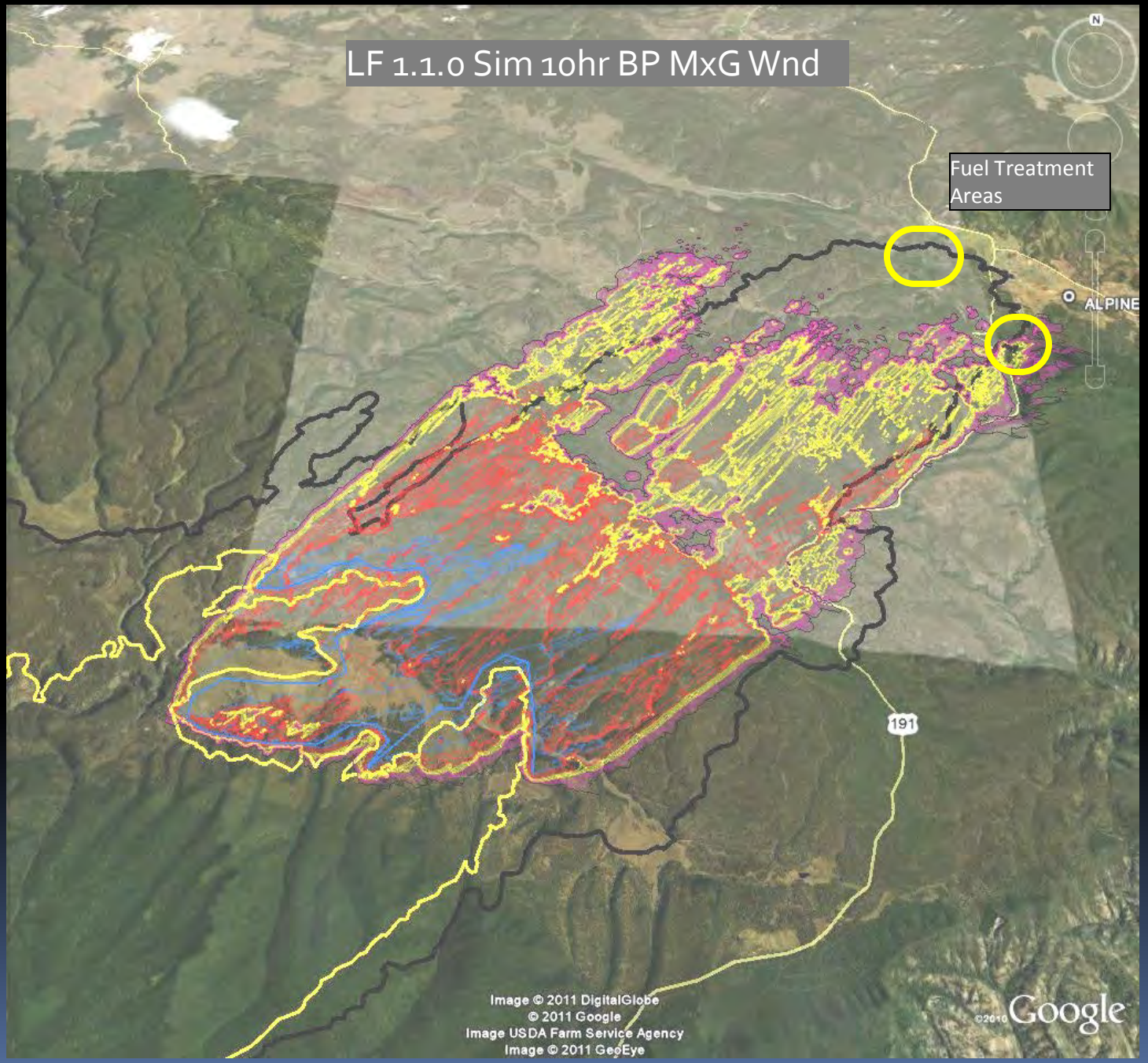
LF 1.0.0 Fire Type

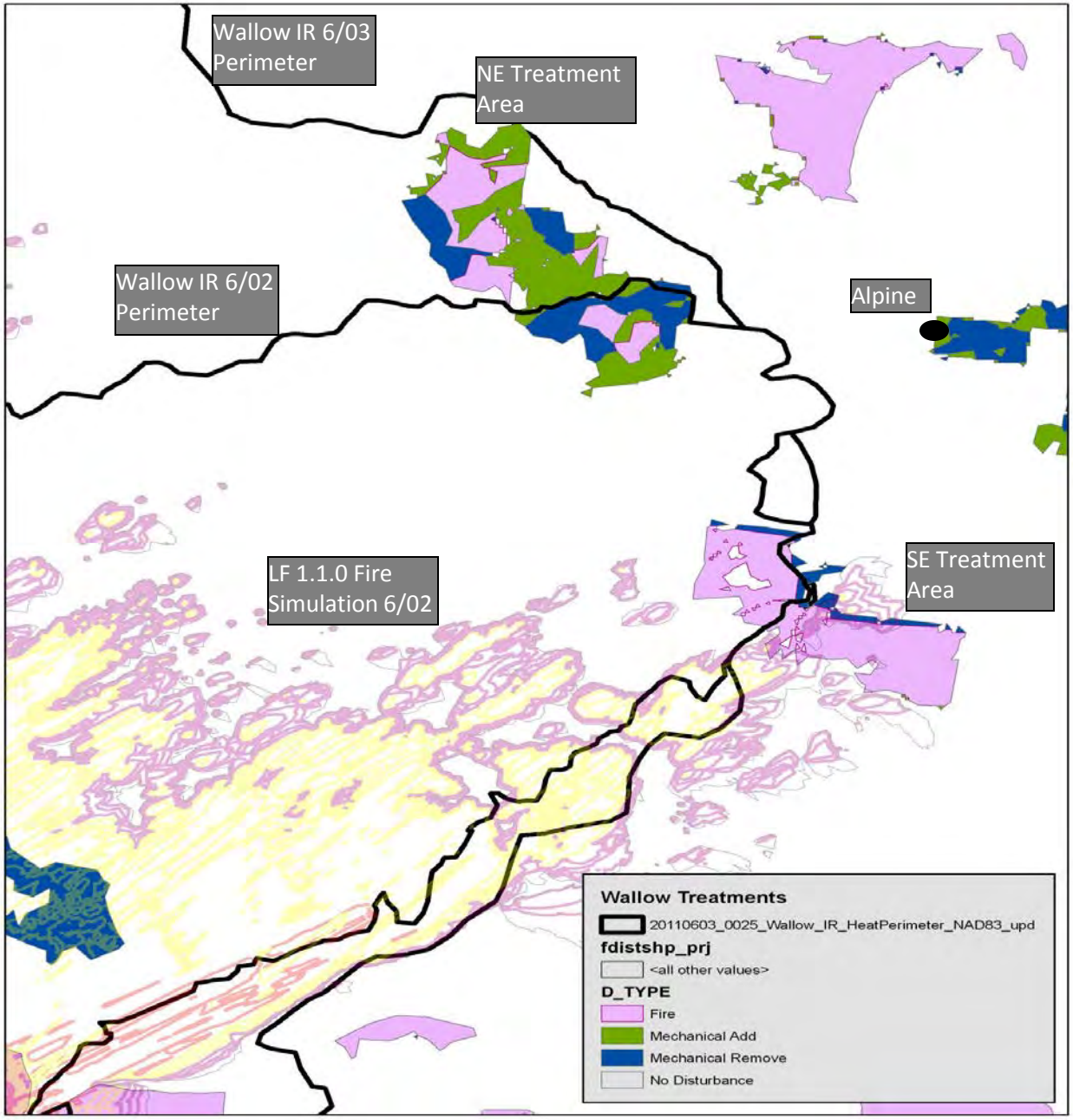


LF 1.0.5 Fire Type




LF 1.0.5 Sim 10hr BP MxG Wnd
Fuel Treatment Areas
ALPINE
273
180
191
Image © 2011 DigitalGlobe
© 2011 Google
Image USDA Farm Service Agency
Image © 2011 GeoEye
Google


LF 1.1.0 Sim 10hr BP MxG Wnd
Fuel Treatment Areas
ALPINE
191
Image © 2011 DigitalGlobe
© 2011 Google
Image USDA Farm Service Agency
Image © 2011 GeoEye
Google


Wallow IR 6/03 Perimeter
NE Treatment Area
Wallow IR 6/02 Perimeter
Alpine
LF 1.1.0 Fire Simulation 6/02
SE Treatment Area
Wallow Treatments
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fdistshp_prj
<all other values>
D_TYPE
Fire
Mechanical Add
Mechanical Remove
No Disturbance

Considerations

- Wide variation in the amount of development in some of the Urb/Ag EVT's may cause them to over or under predict fire behavior. They were assigned fairly low burning fuel models consistently across the country because the amount of ground disturbance in the vegetation is unknown.

Considerations

- Some surface fuel models developed with LF 1.0.0 cbh and cbd may create more torching and crowning than desired with the cbh and cbd in LF 1.0.1. – Live and foliar fuel moistures will be an important input to help curtail this artifact.

Considerations

- Surface fuel models are not developed for extreme conditions when many acres are burned. For most areas and most EVT's fuel moistures and windspeed should suffice to model these conditions, but some special conditions are being considered by LF fuels team.
  - SE geo area a wet season condition was used at the calibration workshops to reflect their average fire season fuel model layer. Many low TL fuel models were used as a result of this approach and they may not model accurately the below normal rainfall years when fire activity is high.
  - Great Basin/SW areas some years have wet late summer and early spring conditions that lead to heavier than normal annual grass fuel load. The average fire season fuel models assigned during the calibration workshops do not provide for this fuel load and the potential fire spread that could result from it.

LANDFIRE Data Access Tool

- You may have only familiarity with LF data in the WFDSS or FPA systems
- LF Data Distribution Site (DDS) resides at http://landfire.gov
- Or through an ArcMap project with LFDAT
  - The downloaded data may then be given a closer assessment, editing, or attributes.
  - The data then can be used for fire analysis, fire planning, treatment prioritization etc

LFDAT Demo

Data Layers - Vegetation

- Existing vegetation type (EVT) – represents currently present vegetation on a site, map units and ecologic naming convention are from NatureServe's Ecological Systems classification.
- Biophysical Settings (BpS)- represents an approximation of the vegetation that was dominate on the landscape prior to Euro-American settlement- Reference Conditions. Takes into account historical fire regimes and current plant communities on site. Developed through modeling sessions throughout the country. = PNV with disturbance

Succession Class

- Succession Class (SClass)- describes vegetation species composition, cover, height ranges of successional states that occur within each BpS. Can also include uncharacteristic species not represented in the composition or structure of the successional states within a BpS.

Disturbance

- Disturbance (FDIST) – polygons of known disturbances from 1999 (age of imagery) thru 2008 that have modeled transitions in fuels and vegetation type. Disturbance perimeters are derived from MTBS, change detection methods from Landsat imagery, and local agency provided input.

FBFM 40

- Fuel Model 40 (FBFM40) – Scott and Burgan (2005) Standard Fire behavior fuel models layer gives a distinct distribution of surface fuel strata. Based on expert opinion (calibration workshops) and arranged in the data by rulesets derived from EVT, EVC, and EVH. Depicts surface fuel characteristics for the first 6 feet of the fuel bed strata. These data were transitioned in disturbed areas from LF1.0.5 to LF 1.10. This layer is used in construction of a landscape file (LCP).

Canopy Cover

- Canopy Cover (CC) – depict percent cover of stand by pixel. Derived from existing vegetation cover (EVC) and classified to use in fire behavior models. Re calculated in LF 1.0.5 (EVC) based on stem mapping process in FIA plots which reduced some of the over prediction of observed or imagery produced canopy closure. This is critical to modeling fire behavior due to the effects of wind reduction values. These data were transitioned in disturbed areas from LF1.0.5 to LF 1.10 with FVS. This layer is used in construction of a landscape file (LCP).

Canopy Height

- Canopy Height (CH) - derived from existing vegetation height (EVH) and classified to use in fire behavior models. Depicts average height of stand in each pixel. Minor recalculations were done to improve EVH in LF 1.0.5. These data were transitioned in disturbed areas from LF1.0.5 to LF 1.10 with FVS. This layer is used in construction of a landscape file (LCP).

Canopy Base Height

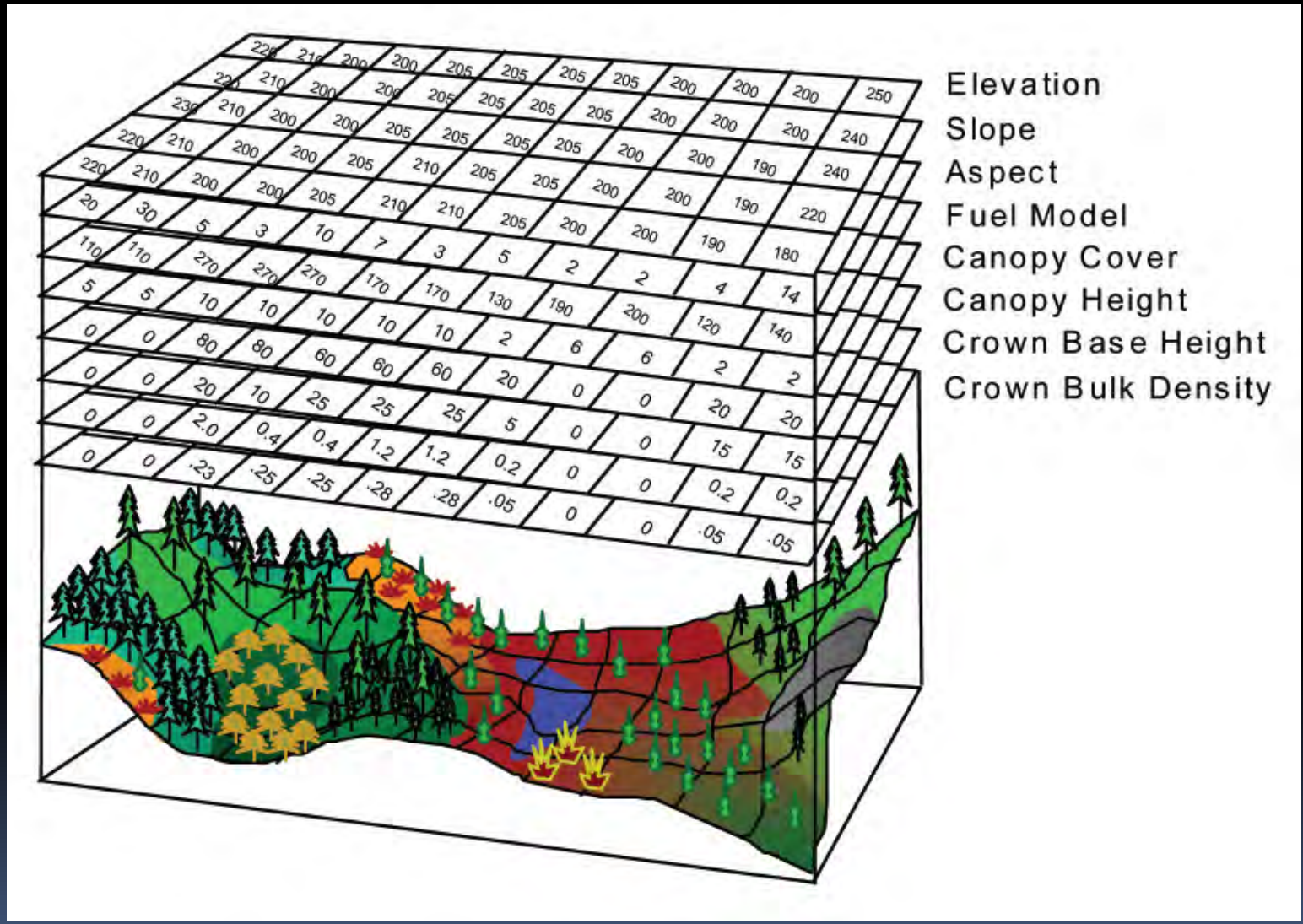
- (CBH)– calculated in the data from primarily FIA plot data, grouped EVT's, EVC, and EVH.Depicts the average height of treed vegetation types, from ground to canopy bottom. For use in fire behavior modeling it is the plane above the ground where sufficient canopy fuel exists to carry fire vertically into the canopy. The units of measure of CBH in the LANDFIRE data is m * 10. These data were transitioned in disturbed areas from LF1.0.5 to LF 1.10 with FVS. This layer is used in construction of a landscape file (LCP).

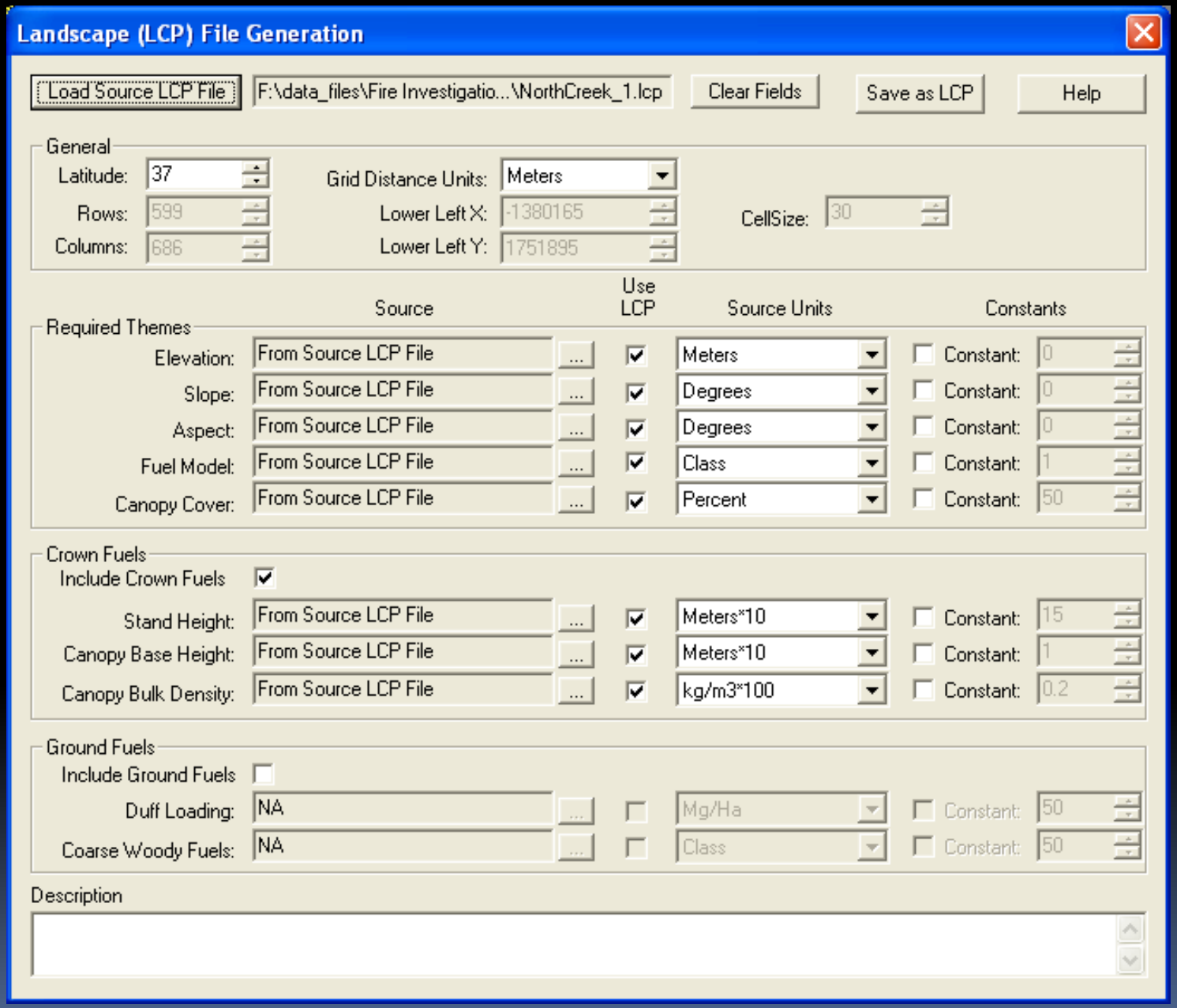
Canopy Bulk Density

- (CBD) – calculated in the data from primarily EVT, EVC, and EVH through a General Linear Model (Thompson 2007). Depicts volume of available aerial fuel in treed pixels. The units of measure of CBH in the LANDFIRE data is m * 100. These data were transitioned in disturbed areas from LF1.0.5 to LF 1.1.0 with FVS. This layer is used in construction of a landscape file (LCP).

Other Layers

- Physical Features Grids – elevation, aspect, and slope. All these physical characteristics effect fuel and fire attributes and are required for construction of a landscape file (LCP).
- Landscape File 40 (LCP) – An eight grid sandwich which depicts the physical and fuel related aspects of the fire ground for fire modeling purposes.


Elevation
Slope
Aspect
Fuel Model
Canopy Cover
Canopy Height
Crown Base Height
Crown Bulk Density


Landscape (LCP) File Generation
Load Source LCP File
F:\data_files\Fire Investigatio...\NorthCreek_1.lcp
Clear Fields
Save as LCP
Help
General
Latitude: 37
Grid Distance Units: Meters
Rows: 599
Lower Left X: -1380165
CellSize: 30
Columns: 686
Lower Left Y: 1751895
Source
Use LCP
Source Units
Constants
Required Themes
Elevation: From Source LCP File ... Meters Constant: 0
Slope: From Source LCP File ... Degrees Constant: 0
Aspect: From Source LCP File ... Degrees Constant: 0
Fuel Model: From Source LCP File ... Class Constant: 1
Canopy Cover: From Source LCP File ... Percent Constant: 50
Crown Fuels
Include Crown Fuels
Stand Height: From Source LCP File ... Meters*10 Constant: 15
Canopy Base Height: From Source LCP File ... Meters*10 Constant: 1
Canopy Bulk Density: From Source LCP File ... kg/m3*100 Constant: 0.2
Ground Fuels
Include Ground Fuels
Duff Loading: NA ... Mg/Ha Constant: 50
Coarse Woody Fuels: NA ... Class Constant: 50
Description

Existing and Future Conditions

- To this point all the layers downloaded from LANDFIRE will be used to describe Existing Conditions of the North Creek Project Area of the Escalante Headwater.
- Changes in the spatial landscape will need to occur to demonstrate a treatment regime that moves the site toward a more desired condition.

Treatment Types to Move Toward Desired Conditions

- Prescribed fire or managed wildfire
  - Effects surface fuel loading, depth, continuity
  - Effects soil seed bank
  - Can effect CBH
  - Can effect CBD
- Conditions Addressed
  - Balanced vegetation structure
  - Meadow restoration / expansion
  - Protection of property and ecologic values
  - Encroachment of invasive species

Mechanical Treatments

- Mastication
  - Target fuel bed depth and/or vertical arrangement
  - Can also effect CBH
- Under-thinning with activity fuel treatment
  - Raises CBH by lowering surface strata and raising canopy strata
  - Addresses crown fire initiation and problematic fire behavior
- Overstory thinning
  - Targets CBD to limit active crown fire spread

Mechanical Treatment Effects

- The expected effects of these types of treatments can be edited into the existing condition fuels layers from LANFIRE to address movement toward desired conditions of balanced vegetation structure, meadow restoration and expansion, private property and values protection, encroachment of invasive species, protection and restoration of desired old growth communities, as well as other desired conditions

Assignment Part 1

- Download LANDFIRE Refresh 2008 layers for existing conditions with LFDAT (Refresh 2008 is toward bottom of drop down list)
  - Existing Vegetation Type (EVT), Biophysical Setting (BpS), Succession Class (SClass)
  - FBFM 40 (Scott Burgan), CBH, CBD, Canopy Cover Canopy Height, LCP-FBFM 40
- From National (toward top of the list)
  - National US: Aspect, Elevation, and Slope

Assignment part2

- Unzip downloaded layers if you are working in ArcMap 9.x
- Build Landscape file of existing conditions with LFDAT (FlamMap- File>create Landscape or Farsite – Inputs> project inputs landscape →) make sure source units are correct.
- Save LCP as North_Cr in your files for later use