LANDFIRE BRIEFING PAPER

February 2008

TOPIC: Renewing data products from the initial data sets. This update strategy of the LANDFIRE Operations and Maintenance Program is known as "Refresh" and includes a Rapid Refresh.

BACKGROUND: The LANDFIRE team has been developing an Operations and Maintenance (O&M) strategy that will update data products. This program of work provides review and update opportunities for the participation of multiple natural resource programs. As directed by the Project Charter, an O&M "Hand-off" plan (comprising a business case and technical plan) were completed. Once fully developed, the O&M program will detail all aspects of updating data products through the following incremental strategies:

- Refresh (An improvement approach)
- Biennial (Updates to prioritized areas of landscape changes/disturbances)
- Decadal (Comprehensive re-mapping of all lands)

The Refresh strategy was reviewed with input from Fire Program Analysis (FPA), Wildland Fire Decision Support System (WFDSS), National Interagency Fuels Coordination Group (NIFCG), National Wildfire Coordinating Group (NWCG) / Project Management Office (PMO), NWCG/NFAEB (National Fire and Aviation Executive Board), Fire Executive Council (FEC), and approved by the LANDFIRE Executive Oversight Committee (EOC). Additional information on the Refresh, Biennial, and Decadal LANDFIRE update strategies will be made available at (www.landfire.gov) and periodic conferences or workshops as requested.

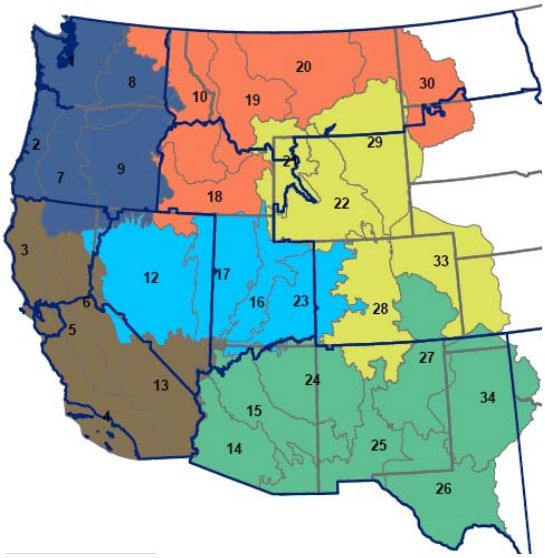
The focus of this paper is to summarize the LANDFIRE Refresh update strategy. A focus group including FPA, WFDSS, and NIFCG team members worked in collaboration with LANDFIRE on a "quick return" interim update prior to the full scope of the Refresh strategy, providing selected updates to data products in an expedited fashion for a short-term Rapid Refresh to meet data needs. Both the Rapid Refresh and Refresh updates are outlined in this paper.

A concurrent prototype for the long term O&M program will update data products for the southeast United States in 2008 as a proof of concept for the Biennial update strategy. The general area included in this southeast update is within two of Bailey's ecological provinces, the costal plains forest province and the southeastern mixed forest province. This prototype will focus on the ecological disturbance factors associated with, tropical storms/hurricanes, forest harvesting, wildland fires, and vegetation succession.

KEY POINTS: The initial LANDFIRE update strategy is comprised of two distinct cycles known collectively as the Rapid Refresh (RR) and Refresh. These cycles will capture major landscape changes from the time of the initial LANDFIRE imagery [National Land Cover Database (NLCD) circa 2001] utilizing a formalized process methodology. Oversight will be conducted by the LANDFIRE Business Leads. The primary objective of the RR is to provide updated data information for the Wildland Fire Decision Support System (WFDSS) and the Fire Program Analysis (FPA) project, to be used in support of wildland fire planning and natural resource management. RR is a one time improvement conducted by the National Interagency Fuels Technology Team (NIFTT) with data processing support through the Forest Service Remote Sensing Application Center (RSAC) and USGS Earth Resources Observation and Science (EROS) center. Refreshed products will be incorporated into a new updated base map for the nation. These products will be uploaded and served as separate layers along with the original layers on the National Map at EROS. The original LANDFIRE National data products will be maintained to provide for comparison applications. As data products are renewed through the Refresh and Biennial strategies, data on the National Map will be replaced with the most current versions.

RAPID REFRESH:

Rapid Refresh (RR) is the first segment of the Refresh strategy to update data by June 2008 based on fire disturbances that occurred between 1999 and 2007. Wildland fire perimeters will be collected from National and Western Regional sources of available spatial electronic data sets. The RR will leverage national Monitoring Trends in Burn Severity (MTBS) and Burned Area Reflectance Classification (BARC) data sets where available. Where MTBS or BARC burn severity data is not available RR uses Moderate Resolution Imaging Spectroradiometer (MODIS) data to update fire disturbance polygons within wildland fire perimeters of 1000-acres and larger. For smaller fires without MTBS or BARC a moderate severity will be assigned. RR is a national-scale effort, including a limited review by subject matter experts (SME) represented at the Geographic Area level. The scope of the SME review is limited to facilitate the "rapid" production goals of the RR effort. The refresh team will process these perimeters through RSAC to compile the burn severity and NIFTT will update the existing vegetation layers to 1 year post-burn. LANDFIRE scripts will be processed to produce the fuel model 40 and canopy layers. The Fuel model 13 layer will be produced as a cross-walk from the fuel model 40 layer. Some recommendations from the 2006 and 2007 LANDFIRE After Action Reviews (AAR) for adjustments of layers will be implemented. Data will be stored and served on the National Map at the USGS EROS center. The RR will update approximately 30+ map zones associated with the eleven western states and will be processed by map zone in Geographic Areas (Southwest, Great Basin, California, Northern Rockies, Northwest, & Rocky Mountain).



Rapid Refresh: Planned MZ Updates by Geographic Areas.

The RR updated layers include the following:

Existing Vegetation Type (EVT)	Existing Vegetation Height (EVH)
Existing Vegetation Cover (EVC)	forest Canopy Base Height (CBH)
13 Anderson (1982) Fire Behavior Fuel Models (FBFM)	forest Canopy Height (CH)
40 Scott/Burgan (2005) Fire Behavior Fuel Models (FBFM)	forest Canopy Cover (CC)
forest Canopy Bulk Density (CBD)	

A critical aspect is expediency for the "Rapid Refresh" being a "best effort" task. This requires limiting the scope of processes, data, and methodologies, to meet the "quick turnaround" intent by June 08'.

RAPID REFRESH SUMMARY:

- Conducted by LANDFIRE, NIFTT, RSAC, and EROS for delivery by June 2008.
- Focus is on wildland fire disturbances that occurred between 1999 and 2007 to update LANDFIRE Vegetation and Fire Behavior Fuel layers.
- Processed by map zone in Geographic Areas (SW, GB, CA, NR, NW, & RM).
- Update approximately 30+ map zones associated with the 11 western states.
- Same methods (scripts) as LANDFIRE with some adjustments based on AARs.
- National process with review by a limited group of SME at the geographic area level.

REFRESH:

The primary update approach in ***Refresh*** will involve a systematic approach that follows standardized procedures and application of spatial tools. This approach will involve a critique of existing LANDFIRE data products and an update process to be applied consistently by Fire Planning Unit (FPU), including interagency partners with participating FPU non-federal groups such as National Association of State Foresters (NASF). This methodology will be incorporated into new online courses being developed by NIFTT for instructing users on refresh and LANDFIRE data enhancement methodology. NIFTT, RSAC, and EROS will develop and publish a standardized methodology for collection, formatting, and quality control of disturbance perimeter and severity data with information provided to users beginning in the spring through the summer of 2008. Each FPU will be responsible for collection, formatting, and quality control of spatial perimeter data representing wildland fire, fuel and vegetation treatments, insect/disease mortality, wind throw, invasive plants, and other vegetation disturbances. As described in RR, Refresh will use national data sets where available for perimeters and thresholds of change, but FPUs will be responsible for data and thresholds not available nationally. MTBS and other national data sets are founded on consistency that supports the need for long term monitoring. Other consistent disturbance change threshold data will be generated by NIFTT, RSAC, and EROS as applicable and appropriate from local input and other sources. Standardized vegetation change rules will be developed by NIFTT through involvement of SMEs from FPUs. Changes since 1 year post-burn condition will be modeled. FPU teams working with NIFTT and RSAC will process data changes to renew LANDFIRE data products. The approach will rely on FPUs and Land Managers to determine if interagency updates are needed and coordinate this with the Refresh business management team for processing by NIFTT and RSAC. All updates will be compliant with interagency data standards (Federal Geographic Data Committee (FGDC), NWCG, Geospatial Task Group (GTG), etc.) Where a FPU determines that interagency updates are needed to make the LANDFIRE data products current, the FPU will use the Refresh update methodology. The Refresh approach will also be repeated for all National LANDFIRE map zones completed as of fiscal year 2008-09. The Refresh strategy will be implemented in a two-phased sequence.

Phase One:

In the spring of 2008 a technical briefing paper will be provided to the field, describing a standardized process for collection, formatting, and quality control of disturbance perimeters. This paper will address how data should be prepared (GIS projections, data format, and other required parameters) for eventual editing. Methodology will be consistent with ongoing efforts for data standardization by NWCG, Forest Service FACTS, and National Fire Plan NFPORS. The FPU teams will search for, critique, and format vegetation disturbance perimeter data from 1999 to end of FY2008. SMEs from each FPU will critique existing vegetation layers, and associated change rules for update of vegetation using disturbance severity data. They will also critique the assignments in LANDFIRE scripts for processing additional vegetation and fuel layers. These scripts will then be processed by NIFTT and RSAC. As part of this critique, Biophysical Setting (BPS) classes and descriptions will be simplified using a systematic procedure provided by NIFTT. SMEs from each FPU will critique and enhance the BPS succession data to provide time since disturbance data for growing the vegetation layers forward following a disturbance. The revision updates will be submitted incrementally in the Fall and Winter of 2008-2009 by Geographic Area for review/processing by NIFTT/RSAC. (Southern, Southwest, Great Basin, California, Northern Rockies, Northwest, Rocky Mountain, & Eastern). Further information on these submission time frames will be provided in connection with the methodology delivery. Data will also receive a Regional/National Level review and approval by a select group of experts during this time period along with Quality Control / Quality Assurance of the data products with the plan to deliver products on the National Map by spring/summer of 2009.

Phase Two:

Each FPU will follow the same general process outlined above in phase one to update data and incorporate disturbance changes up through the end of FY2009 with data submitted incrementally in the Fall-Winter of 2008 by Geographic Area for review/processing by NIFTT/RSAC. Data will be reviewed, processed, approved, quality checked, and delivered on the National Map by spring/summer of 2010. (Southern, Southwest, Great Basin, California, Northern Rockies, Northwest, Rocky Mountain, Eastern & Alaska).

The Refresh phases will produce updated layers for the following:

Vegetation (EVT/EVC/EVH) [updated and modified]	Canopy Fuel Characteristics [updated]
Biophysical Settings (BPS) condensed and simplified	S-class [updated and modified]
Fire Behavior Fuel Models (FBFM 13/40) [updated]	(potentially fire effects layers)

***REFRESH SUMMARY*:**

- Refresh needs will be determined by the FPU POC (Points of Contact) or Land Managers.
- Refresh updates will be processed through NIFTT, RSAC, and EROS for management applications.
- Incorporate landscape scale changes caused by management actions and/or disturbances, including wildland fire, weather/environmental effects, and succession.
- NIFTT, RSAC, and EROS will develop and publish a standardized methodology for collection, formatting, and quality control of disturbance perimeter and severity data in the spring of 2008.
- Each FPU in conjunction with NIFTT and RSAC will apply consistent methods for critique and update of areas of substantial change.
- The Refresh process will update existing vegetation layers, succession class, and fire behavior layers for landscape changes from 1999 to 2009.
- The updated data will be reviewed and certified at a regional- to national- level.
- Data will be processed, quality checked, and delivered on the USGS National Map in the spring/summer of 2009 (Phase One) and 2010 (Phase Two).

It is anticipated that as Refresh phases one and two generate updated products, further sensitivity analyses be conducted similar to the initial tests completed by the FPA project. The purpose of these analyses would be to refine and improve programmatic processes. This effort would broaden the scope of the sensitivity analysis to best determine the scope and scale of change(s) that make a difference in the modeled parameters across the FPU. This analysis would focus on the changes that contribute to the program requirements in efforts such as WFDSS/FPA and evaluate the most efficient and effective use of resources on mapping significant contributing changes.

In 2010, the LANDFIRE National O&M Biennial program is planned to be operational. The Biennial update will process data updates using a change detection vegetation transition for all map zones delivering updated data based on new imagery for fire, weather, and management induced changes to deliver products in 2011. LANDFIRE data enhancements developed by FPUs and Land Managers during the refresh process may be used to inform or be incorporated into the Biennial update through the application of the same tools and methods used during the Refresh strategy.

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