LANDFIRE
2017 Program Report

Executive Summary

The Landscape Fire and Resource Management Planning Tools (LANDFIRE) 2017 Program Report summarizes the accomplishments, successes, and organization of the LANDFIRE program in FY 2017, as well as its anticipated activities in FY 2018.

In 2017, LANDFIRE prepared numerous presentations and publications helping inform and educate users. The program experienced great benefits from the partnerships that have been developed over the years. The partnership with the United States (U.S.) Geological Survey (USGS) National Gap Analysis Program (GAP) and agreements with Natural Resources Conservation Service (NRCS) and Bureau of Land Management (BLM) have resulted in solid LF Remap planning outcomes. These partnerships could also prove beneficial in the development of future update improvements.

The major program accomplishment in 2017 was the completion and delivery of the LANDFIRE 2014 Update. The Update, delivered by the LANDFIRE team at the Department of the Interior (DOI)'s USGS Earth Resources Observation and Science (EROS) Center, provided the most recent version in a series of update projects with delivery on reference, disturbance, vegetation, and fuels data. Another noteworthy item included the development and release of the seasonally adjusted fuels data sets under the Modeling Dynamic-Fuels with an Index System (MoD-FIS) effort for the Great Basin and Southwest U.S. This effort systematically transitions surface fuel models based on seasonal conditions. The Great Basin and Southwest U.S. is the second area (following the Southeast U.S.) to leverage Landsat composite imagery from key portions of the growing season to update LANDFIRE Existing Vegetation Cover (EVC) and the 40 Scott and Burgan Fire Behavior Fuel Model (FBFM40) products. Future efforts in the MoD-FIS arena are anticipated in upcoming years. The program also kicked off the LF Remap project, a comprehensive vegetation and fuels mapping effort designed to produce new base data of the LANDFIRE product suite.

The LANDFIRE technical team held numerous workshops and webinars, as well as setting the technical direction for data products by completing the LF Remap prototypes and transitioning to production. The continued integration of Forest Inventory and Analysis (FIA) data and new geospatial datasets greatly supported mapping vegetation changes in LANDFIRE, such as production of the LF Reference database, Landsat image composites for vegetation, and disturbance mapping.

The Nature Conservancy (TNC) LANDFIRE Team completed the external review of all LANDFIRE Biophysical Setting (BpS) state-and-transition models and their associated narrative descriptions. A website, developed specifically to facilitate the review process, enabled more than 9,000 downloads of BpS description documents. Several hundred reviews were returned from experts outside the LANDFIRE organization. As a result, LANDFIRE's BpS model / description bundle will be improved scientifically and will offer easier to acquire information to support the LANDFIRE user community more effectively.

TNC continued to be an important partner in assisting in project administration, planning, and communication.

The LANDFIRE Program

LANDFIRE is a joint program between the U.S. Department of Agriculture (USDA) Forest Service (USFS) and the DOI, with TNC. LANDFIRE applies consistent methodologies and processes to develop comprehensive maps and data describing vegetation, disturbances, fire regimes, and wildland fuels across the U.S. and insular areas.

LANDFIRE Vision

LANDFIRE is a cornerstone of a fully integrated national data information framework developing and improving vegetation and fuels data products based on the best available authoritative data and science in an all-lands landscape conservation approach founded on inter-agency/inter-organizational collaboration and cooperation. LANDFIRE is acknowledged for management excellence and effective mission delivery.

LANDFIRE Mission

LANDFIRE's mission is to provide agency leaders and managers with a common "all-lands" data set of vegetation and wildland fire/fuels information for strategic fire and resource management planning and analysis.

LANDFIRE's objectives are to:

- Provide national-level comprehensive and consistent strategic geospatial data products and databases to support wildland fire and natural resource management, planning, research, analysis, and assessment;
- Produce repeatable, identifiable, mappable, and scalable data products;
- Supplement and assist modelling of fire behavior and effects; and
- Improve collaboration between programs, data, and agencies for holistic wildland fire and natural resource management.

LANDFIRE Organization

The LANDFIRE Program is comprised of four organizational components in a blended-matrix structure involving Business Leadership from the DOI and the USDA Forest Service; Agency Technical Center Operations, and Operational Partners.

- Governance: Common oversight of program activities, management of component functions, coordination with sponsors and stakeholders, program budgeting, and program business case.
- Operations: Program functions that do not include direct data production. These functions include website support, hardware and software systems, technical support, communications and outreach, user support via the LANDFIRE Help Desk, and user feedback management.
- Production: Direct production of data products including version updating of existing products and new editions applying comprehensive product-wide mapping.
- Improvement and Innovation: Enhancement to current data production methods and advancement of new scientific methods and information sources.

LANDFIRE Fiscal Year (FY) 2017 Results

Accomplishments

USDA Forest Service

- **The USDA FS FIA Liaison** position was vacant; however, detailers performed the work by providing spatial data processing in support of the LF Remap project prototyping; providing FIA data; and coordinating data sharing agreements with external partners developing automated software to assign national vegetation classifications to plots.

- **Fire Modeling Institute** (FMI) Technical Lead for LANDFIRE Program participated in workshops to advance EVT and National Vegetation Classification (NVCS) mapping in Alaska, drafted the Technical Plan for the Remap project, assisted with documentation of NVCS and Ecological Systems crosswalks and auto keys, assisted with development of EVT Remap legend, documented LANDFIRE transitions methodology and processes in support of IFTDSS, progressed on LANDFIRE/ST-Sim Update project and drafted documentation, and developed methods and documentation of Vegetation Mapping related to Ag/Urban/Ruderal veg.

Earth Resources Observation and Science Center

- **LANDFIRE 2014 Update**. Completion of the latest release in a series of update projects designed to deliver a suite of updated LANDFIRE products for the conterminous U.S. (CONUS), Alaska, and Hawaii. LF 2014 delivered, on time and on budget, a variety of core products within the Reference, Disturbance, Vegetation, and Fuels categories. Focusing on the years 2013 and 2014, this update built off previous updates to account for landscape changes, growth, and disturbance information to support wildland fire and natural resource management, planning, research, analysis, and assessments. LF 2014 was a collaborative effort between several partners.

- **Seasonally Adjusted Fuel Products for the Great Basin and Southwestern U.S.** Completion of the Spring and Summer delivery of the MoD-FIS project for the Great Basin and Southwest U.S. MoD-FIS data provided a new approach to enhance the accuracy of U.S. fuel products by systematically transitioning surface fuel models based on seasonal conditions in these regions to understand changes to fire behavior fuel models based on the current fire season herbaceous production. Using the depth of the Landsat archive, LANDFIRE calculated Normalized Difference Vegetation Index (NDVI) for scenes during key times throughout the growing season. Image composites containing the maximum NDVI are developed. The maximum NDVI from these composites were then used to inform herbaceous cover, resulting in updated EVC, Existing Vegetation Height (EVH), and Fire Behavior Fuel Model (FBFM) layers that better reflect fuel availability for the current fire season.

- **LF Remap Production Kickoff.** Although a formal kickoff for the LF Remap project was held earlier, a technical kickoff of the LANDFIRE Remap production took place

in March 2017. The current LANDFIRE products are largely based on Landsat data with a time stamp of 2001. While update projects have captured many landscape changes using disturbance/change detection techniques, the foundational data are still over 15 years old and as much as 10-20% of the landscape has not been adequately addressed by those techniques. Furthermore, improved remotely sensed data are now available from Landsat 8 along with numerous data plots from the NRCS, NRI, FIA, and other partners. The LF Remap project will combine consistent methodologies and processes with state of the art software and hardware technologies to fully leverage the satellite imagery data and contemporary data sources creating a completely updated foundational base data.

- **LF Help Desk Improved Services.** The LANDFIRE Help Desk became operational at the USGS EROS Center in 2015. Since then, the Help Desk has worked with LF Operations to provide better internal transparency, reporting to the program, as well as improved customer experience with faster and better documented responses.

- **Workflow Management System for LF Operations.** LF Operations develops and maintains the LF website and access to all digital data, as well as manages all internal and external communication activity including document management and technical customer support. A collaborative work flow management system was successfully implemented in 2017 to improve communication and productivity among dispersed members. Efforts to address LANDFIRE user feedback is being developed to ensure timely response to inquiries.

- **Website 508 Compliance.** With the January 18, 2018, implementation deadline of the federally regulated Americans with Disabilities Act, the LANDFIRE web team fulfilled the requirement that websites and electronic content of federal agencies, or websites that receive federal funding, conform to Web Content Accessibility Guidelines (WCAG) 2.0 AA. Each web page needed to be reviewed and updated to ensure the website met compliance.

The Nature Conservancy

- **External review of LANDFIRE BpS state-and-transition models.** Completed the external review of all LANDFIRE BpS state-and-transition models and their associated narrative descriptions. A website that was designed and developed specifically to facilitate the review process enabled more than 9,000 downloads of BpS description documents. Several hundred reviews were returned from experts from outside the LANDFIRE organization. As a result, LANDFIRE's BpS model/description bundle will be improved scientifically, and will offer more easily acquired information that will support the LANDFIRE user community more effectively.

- **LANDFIRE Communications.** Managed the LANDFIRE Twitter site (more than 1,300 followers) and the YouTube Channel (videos viewed more than 1,500 times). Published monthly and special event postcards, in collaboration with EROS Communication staff, that highlighted LANDFIRE Updates and new products, interviews with LANDFIRE users, and informational questions and answers with LANDFIRE Subject Matter Experts.

Lessons Learned

- The LF 2014 Update implemented more formal project management tools including a scope document, scheduling software, project plan, and project kick off. These tools and techniques allow for the knowledge and input from the staff to be included into planning. This allowed for better allocation of staff between production of LF 2014 Update and planning for LF Remap.
- LANDFIRE continues to recognize the impact and value of partnerships. The range of efforts in LANDFIRE NRCS NRI data and USGS GAP integration work on vegetation legend, and LF Remap planning has allowed us to foster and prepare for broader data improvements. Shared benefits come from working together and learning from each other. Coordination and collaboration takes time, effort, and patience, but partnerships are a key element to a successful path forward to expand capability and data functionality.

Awards and Recognition

- 2017 DOI Environmental Achievement Award – Environmental Dream Team.
  - The EAA includes individual, team, and partner awards. The "Environmental Dream Team" award highlights work that improves collaboration and efficiency across organizational boundaries. To earn the distinction, the LANDFIRE team demonstrated that the program was unique in its approach and produced clear results that are repeatable at a national scale. This award acknowledges the LANDFIRE team for being environmental champions and agents of change who work to enhance environmental stewardship, create efficiencies, improve communication, avoid and address conflict at the lowest levels, and reduce environmental review times.

Presentations and Workshops

The Nature Conservancy

- Hosted SW-OR BpS review meeting in Medford, OR.
- Presented at Asheville Macro Modeling Workshop, Asheville, NC.
- Attended TNC Burn Boss Meeting in Bend, OR.
- Invited guest lecture, Northern Michigan University. Presenter Randy Swaty.
- Invited presentation: Disturbance Ecology of the Great Lakes, Fresh Coast Film Festival, Marquette, MI. Presenter Randy Swaty.
- Presented at Departmental Seminal, Loyola University, Chicago, IL. Presenter Randy Swaty.
- Presented LANDFIRE 101 to Southwestern Biological Station (USGS), Flagstaff, AZ. Presenter Randy Swaty.
- Presented using LANDFIRE for conservation planning to SW Colorado stakeholders, Cortez, CO. Presenter Randy Swaty.

- Led the presentation From Microbes to Management to Society for Conservation GIS, Monterey Bay, CA. Presenter Randy Swaty.

Webinars

The Nature Conservancy

- Potomac Headwaters LANDFIRE Webinar.
- LANDFIRE Introductory Data Product Review for Alaska. Presenter Wendel Hann. General information about LF's Data Product Review.
- Do-It-Yourself Data Tinkering: Adapting Spatial Data for Local Use - Co-hosted with Conservation Biology Institute and SCGIS. Presenter Kori Blankenship.
- BpS Review for the BLM Core Science Forum. Presenter Kori Blankenship.
- Do-It-Yourself Tinkering - LANDFIRE Data Modification for the Northern Rockies. Presenter Kori Blankenship.
- LANDFIRE in California: What It Is and Why It Matters. Presenter Jim Smith.
- Making National Spatial Data Work on Your NW Landscape. Presenter Kori Blankenship. (For more information on this topic see: Modifying LANDFIRE Geospatial Data for Local Applications by Don Helmbrecht and Kori Blankenship.)
- Tools and Data for Large Landscape Management. Co-hosted with Network for Landscape Conservation for the NPS "Scaling Up" series. Presenter Randy Swaty.
- All Lands Data from Vegetation to Fuels: Planning, Engagement, and Feedback. Co-hosted with Utah State University Forestry Extension. Presenter Henry Bastian.
- Exploring LANDFIRE reference condition data and models. Presented to NRCS by Randy Swaty.

Publications and Reports

Earth Resources Observation and Science Center

- Picotte J, Long J, Peterson B, Nelson K, 2017. LANDFIRE 2015 Remap – Utilization of Remotely Sensed Data to Classify Existing Vegetation Type (EVT) and Structure to Support Strategic Planning and Tactical Response. Published online:

The Nature Conservancy

- Updating the LANDFIRE Fuel Data Jumpstarts Local Planning Efforts. Wildfire. 26.3: 24-27. Blankenship, K., A. Beauchaine, D. Helmbrecht, and J. Patton. 2017.
- Updating LANDFIRE Fuels Data for Recent Wildfires; tutorial by Tony Beauchaine, Kori Blankenship, and Don Helmbrecht.
- Mapping the potential mycorrhizal associations of the conterminous United States of America. Fungal Ecology, 24, pp.139-147. Swaty, R., Michael, H.M., Deckert, R. and Gehring, C.A., 2016.
- Collaborative scenario modeling reveals potential advantages of blending strategies to achieve conservation goals in a working forest landscape. Landscape ecology,

31(5), pp.1093-1115. Price, J.M., Silbernagel, J., Nixon, K., Swearingen, A., Swaty, R. and Miller, N., 2016.

- The Best Way to Spend an Hour: Reviewing LANDFIRE Ecosystem Descriptions and Models. The Bulletin of the Ecological Society of America, 97(2), pp.180-182. Swaty, R., 2016.
- Mycorrhizas, drought, and host-plant mortality. In Mycorrhizal Mediation of Soil (pp. 279-298). Gehring, C.A., Swaty, R.L., and Deckert, R.J., 2017.

Partnerships

LANDFIRE enjoys and promotes many partner relationships with numerous benefits to and from each other. We recognize our partners within three categories:

- **Principal Partner:** A LANDFIRE Principal Partner is an organization and/or individual with a strong, vested interest in LANDFIRE and shares many common goals. Principal Partners serve as sponsors and provide financial support and programmatic direction. There are two principal partners: The DOI and the USDA Forest Service.
- **Major Partner:** A LANDFIRE Major Partner is an organization and/or individual with unique expertise and interest in LANDFIRE and demonstrates a willingness to apply their expertise to LANDFIRE initiatives and efforts. Our major partners are The Nature Conservancy (TNC), USGS Earth Resources Observation and Science (EROS) Center, USDA FS Rocky Mountain Research Station FMI, USGS GAP, USDA FS FIA, and USDA NRCS.
- **Supporting Partner**: A LANDFIRE Supporting Partner is an organization and/or individual targeted to receive LANDFIRE products and services. Supporting Partners often provide data or services to LANDFIRE as well, but usually as part of their general operation without specific, value-added processing. A complete list of supporting partners can be found at https://www.landfire.gov.

Partnership highlights in 2017 include:

- Building from the GAP/LANDFIRE Memorandum of Understanding (MOU) signed in 2014, LANDFIRE has worked to integrate GAP staff as part of the LANDFIRE team, strengthening the relationship and ability of both programs to collectively work on issues of common concern and begin a joint effort on the LF Remap project.
- Due to the MOU with the NRCS (signed in 2015), LANDFIRE has been able to use the National Resource Inventory (NRI) data set in the development of LF Remap.
- The data agreement with the BLM to provide Assessment Inventory & Monitoring (AIM) data has continued to leverage BLM data and NRCS/NRI protocol across BLM managed lands.

These partnerships have great potential to improve the suite of LANDFIRE data products not only in LF Remap, but in future updates as well.

LANDFIRE FY 2018 Plans

USDA Forest Service

- FMI Technical Lead for LANDFIRE Program (now vacant)
  - Fund and fill the position.
- FIA Liaison for LANDFIRE Program (vacant all year – filled with detailers)
  - Fund and fill the position.

Earth Resources Observation and Science Center

- LF Remap Production. With prototyping and planning completed, LF Remap production began in FY 2017. Like previous LANDFIRE deliveries, products will be released, starting in FY 2019, by LANDFIRE Geographic Areas (GeoAreas): six for CONUS and one each for Alaska, Hawaii, and the insular areas. Using the latest inputs and processing techniques, LF Remap will introduce several new layers.
- Development of LF Remap products.
  - Production of LF Remap for production for the western portions of the conterminous U.S.(CONUS).
  - Scoping for a possible update while working on LF Remap.
- LANDFIRE MoD-FIS. The LANDFIRE Program addressed the seasonal variations of fine fuels (herbaceous and shrubs) in the Great Basin and Southwest U.S. with the LF Fine Fuel Dynamic (LF-FFD) product. Efforts to produce and release these products will continue in FY 2018, with the potential of adding other areas of the U.S. to the development plan.
  - Reference, Disturbance, Existing Vegetation, and Fuels production. Produce and release fall 2017 and spring and summer 2018 seasonal MoD-FIS products for the Great Basin and Southwestern U.S.
  - Investigate development of products for additional areas in the U.S.
- Continue to more fully highlight and promote use of data from partnerships.
- Technical leadership in:
  - Leveraging BpS review by increasing BpS-focused outreach,
  - Working with NatureServe to update CONUS, Hawaii, and the Caribbean Ecological System Sequence tables for Auto-Keys,
  - Developing sequence tables for NVCS Group and Ruderal systems. CONUS, Hawaii, and the Caribbean are complete, and
  - Planning and implementing a continuous improvement process for BpS models and descriptions.
- User Support and Program Communication.
  - Participate in the design and management of LANDFIRE's website (https://landfire.gov).
  - Assist TNC with design and flow of TNC LANDFIRE website (https://www.conservationgateway.org/ConservationPractices/FireLandscapes/LANDFIRE/Pages/landfire.aspx) and the TNC LANDFIRE Web-Hosted Application Map (WHAM!) (http://maps.tnc.org/landfire/).
  - Coordinate LANDFIRE direct communications in collaboration with relevant TNC LANDFIRE staff (Bulletins, Postcards, etc.).

- o Support LANDFIRE Remap production through communications, announcements, and intelligence gathering.
- o Coordinate activities with the NE LANDFIRE Liaison
- o Provide direct support to existing users or potential users of LANDFIRE Program products.
- o Facilitate (and lead on specific tasks where appropriate and designated) the LANDFIRE Website Group and LANDFIRE Communications Strategy Group.

The Nature Conservancy

- User Support and Program Communication.
  - o Participate in the design and management of TNC LANDFIRE's website presences, www.conservationgateway.org, the LANDFIRE Program website, www.landfire.gov, www.landfireview.org and the LANDFIRE Web-Hosted Application Map (WHAM!).
  - o Actively manage LANDFIRE social media activities.
  - o Coordinate LANDFIRE direct communications in collaboration with relevant USGS EROS staff (Bulletins, Postcards, etc.).
  - o Support LANDFIRE Remap production through communications, announcements, and intelligence gathering.
  - o Assist (or lead if designated) the LANDFIRE Program in partnership or collaboration opportunities, such as TNC, Joint Fire Science Program (JFSP), BLM AIM, Open Standards), National Land Cover Database (NLCD), Landscape Conservation Collaborative, NRCS/ Ecological Site Description, Collaborative Forest Landscape Restoration Program, Cohesive Strategy, and GAP.
  - o Coordinate activities with the NE LANDFIRE Liaison.
  - o Provide direct support to landscapes utilizing or considering utilizing LANDFIRE Program products.
  - o Participate (and lead on specific tasks where appropriate and designated) in the LANDFIRE Website Group and LANDFIRE Communications Strategy Group.
  - o Leverage BpS review by increasing BpS-focused outreach and conducting BpS workshop at major ecological conference.
- Tool and Process Development.
  - o Complete a plan for incorporating ST-Sim into the LANDFIRE production process and a framework for using ST-Sim as a data localization and feedback tool.
  - o Coordinate the development of an online server-based process for ST-Sim with ApexRMS and LANDFIRE partners (if funded by collaborative group).
- LANDFIRE Production Support.
  - o Assist (or lead if designated) in the development, review, and improvement of LANDFIRE spatial products as requested by the Business Leadership Group (BLG),
    - Fire Regime,
    - S-Class (Succession Classes),
    - Vegetation Departure Index (VDEP)/Vegetation Condition Class (VCC), and

- ▪ BpS spatial data improvement.
  - o Manage the NatureServe Remap support contract to ensure timely and useful product delivery.
  - o Complete the current LANDFIRE Auto-Key Improvement Project and assist with analyses and communications as requested/designated.
  - o Plan and implement a continuous improvement process for BpS models and descriptions.
  - o Plan and initiate Phase 2 improvement of BpS descriptions (format and content) and begin implementing changes to the official documents.
  - o Lead and manage the new BpS information delivery system.
- Data Analysis.
  - o Lead the 2014 LANDFIRE agreement assessment process based upon data delivery by LANDFIRE FIA liaison:
    - ▪ First Priority: EVT,
    - ▪ Second Priority: EVC,
    - ▪ Third Priority: EVH, and
    - ▪ Fourth Priority: Disturbance
- Project Administration, Planning, and Communication.
  - o Participate in LANDFIRE Remap and other planning conference calls/meetings and activities.
  - o Participate in regular Business Lead Team (BLT) and BLG calls.
  - o Participate in other relevant BLG, BLT and Technical Leadership Group (TLG) calls as appropriate and requested.
  - o Lead TNC LANDFIRE budget control and team management.
  - o Administer relevant contracts and agreements as specified by the BLT.
  - o Participate in "special issue" calls or webinars requested by the BLT.
  - o Provide Quarterly Activity Reports.
    - ▪ Provide a 12-month progress Report each funding year.

Acronyms

AIM	Assessment, Inventory, and Monitoring
BpS	Biophysical Settings
BLG	Business Lead Group
BLM	Bureau of Land Management
BLT	Business Lead Team
CONUS	Conterminous United States
DOI	Department of the Interior
EROS	Earth Resources Observation and Science Center
EVC	Existing Vegetation Cover
EVH	Existing Vegetation Height
EVT	Existing Vegetation Type
FBFM	Fire Behavior Fuel Models
FBFM40	40 Scott and Burgan Fire Behavior Fuel Model
FIA	Forest Inventory and Analysis
FMI	Fire Modeling Institute
FS	Forest Service
FY	Fiscal Year
GAP	National Gap Analysis Program
GeoAreas	Geographic Areas
JFSP	Joint Fire Science Program
LF	LANDFIRE
LF FFD	LANDFIRE (LF) Fine Fuel Dynamic
MoD-FIS	Modeling Dynamic-Fuels with an Index System
MOU	Memorandum of Understanding
NDVI	Normalized Difference Vegetation Index
NLCD	National Land Cover Database
NRCS	Natural Resource Conservation Service
NRI	National Resource Inventory
NVCS	National Vegetation Classification
SClass	Succession Classes
TLG	Technical Leadership Group
TNC	The Nature Conservancy
U.S.	United States

USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
VCC	Vegetation Condition Class
VDEP	Vegetation Departure Index
WCAG	Web Content Accessibility Guideline
WHAM!	Web-Hosted Application Map