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PRESENTATIONS – TUESDAY

Climate/Fire Relationships on Forested and Non-Forested Landscapes in California

Tuesday, December 4, 2012 | 11:00 a.m. PST | B118
USGS Contributors:
Jon Keeley – USGS Western Ecological Research Center
http://www.werc.usgs.gov

Current understanding of fire/climate interactions largely stems from studies conducted in higher-elevation forested ecosystems on public lands in the western U.S. The results of these studies have encompassed broad swaths of landscape comprising diverse ecosystems, making it challenging to parse out temporal from spatial variation, or to tease out the influence of different fuel types and human impacts. Here we examine sub-regions within California and contrast climate/fire interactions in forested and non-forested landscapes over the 100 year period from 19:10 AM – 2010. Our study included two comprehensive data sets of all recorded fires on USFS national forests in California comprising nearly 25 million acres of mostly forested landscape and all recorded fires on CalFire state responsibility lands, comprising nearly 30 million acres of largely non-forested landscape. We analyzed spatial and temporal variation in burning relative to long-term climate and human demographic data, as well as biophysical variables such as vegetation type and topography. On both USFS and CalFire lands, the peak decade for area burned was the 1920s, with burned area declining in subsequent decades, not unlike the pattern observed throughout the West in other studies. Also similar to other studies, USFS lands showed a marked increase in burning beginning in the latter portion of the 20th century with a peak in the last 10 years comparable to the 1920s peak. However, largely non-forested CalFire lands presented a very different pattern as fire activity declined after the 1920s peak and it has not increased over the past 40 years. Annual climatic variation showed a weak relationship with area burned on two of the interior USFS regions but was unrelated to fire activity over the past century on most of the other USFS lands and none of the CalFire lands. Changes in human demography appears to play a significant role in fire activity on many of these lands, and climate / fire relationships affect fire differently in different regions, likely due to the mediating influence of other factors, such as fuel, terrain, and human demographics.

Understanding Massive Catastrophic Fires in Southern California

Tuesday, December 4, 2012 | 11:25 a.m. PST | B118
USGS Contributors:
Jon Keeley – USGS Western Ecological Research Center
http://www.werc.usgs.gov/socalfirerisk

Massive high intensity wildfires are a natural part of the legacy of southern California landscapes. The largest such fire documented from detailed newspaper reports occurred in the late 1880s and burned over 300,000 acres but no homes were destroyed or lives lost. However, with the massive influx of humans into the region an average of over 500 homes have been lost from wildfires since 19:50 AM and the losses have accelerated in the past decade. Detailed studies of historical fires show that over the last 130 years there has been no significant change in the incidence of large fires greater than 10,000 ha, consistent with the conclusion that fire suppression activities are not the cause of these fire events. Eight megafires (>50,000 ha) are recorded for the region and half have occurred in the last 5 years. These burned through a mosaic of age classes which raises doubts that accumulation of old age classes explains these events. Extreme drought is a plausible explanation for this apparent rash of such events and it is hypothesized that drought leads to increased dead fine fuels that promote the incidence of firebrands and spot fires.

Regional patterns of wildfire emissions in the conterminous United States

Tuesday, December 4, 2012 | 11:25 a.m. PST | C125
USGS Contributors:
Todd Hawbaker – USGS Geosciences and Environmental Change Science Center
http://esp.cr.usgs.gov/

Wildfires are a critical component of the global carbon cycle producing an immediate release of greenhouse gases as biomass is consumed during combustion. Many studies have quantified greenhouse gas emissions from wildfires using a variety of fire atlases and satellite data; however, few have calculated emissions with fine spatial resolution data (< 1 km) and examined the patterns of emissions across the U.S. For this analysis, we asked (1) What were patterns and trends of wildfire emissions in the United States?, and (2) How did they vary among ecological regions? We calculated pixel-based emissions for each wildfire in the monitoring trends in burn severity database between 2001 and 2008 using the First Order Fire Effects Model, the LANDFIRE fuel loading models, and daily fuel moistures. Emission estimates were summarized by EPA Level 2 ecoregions, and within three broad regions of the United States: the East, the Great Plains, and the West. Across the coterminous U.S., annual emissions averaged 51.5 TgCO2-eq/year and ranged between 10.6 and 101.4 TgCO2-eq over the eight years. In the West, emissions averaged 36.7 TgCO2-eq/year and were as high as 75.3 TgCO2-eq in 2007. The Western Cordillera ecoregion, where fires predominantly occur in forested ecosystems, accounted for 77% of emissions in the West. In the Great Plains and the East, wildfire emissions were relatively lower than in the West and averaged 7.5 and 7.3 TgCO2-eq/year respectively. Emissions in the East were as high as 22 TgCO2-eq in 2008 mostly from fires of coastal woody wetlands. Emissions in the Great Plains, predominantly from grassland fires, reached as high as 25 TgCO2-eq in 2006 and 2008 when extensive areas were burned in Oklahoma and Texas. Our results demonstrate the utility of satellite-based burn severity and fuel load information for quantifying fire emissions across broad spatial scales. In addition to our results, we discuss limitations of our approach and future work that could potentially improve the methodology.

The Development of an Automated Burned Area Prediction Algorithm Based on Landsat Imagery

Tuesday, December 4, 2012 | 1:40 p.m. PST | C125
USGS Contributors:
Susan Stitt – USGS Geosciences and Environmental Change Science Center
http://esp.cr.usgs.gov/

The United States Geological Survey (USGS) is the steward of the Landsat archive which includes satellite imagery dating back to 1972. The United Nations Framework Convention on Climate Change and the Intergovernmental Panel on Climate Change have specified requirements to systematically observe atmosphere, ocean, and land characteristics, known as Essential Climate Variables (ECVs). The Global Climate Observing System has developed formal specifications for ECVs that are technically and economically feasible for systematic observation. Fire Disturbance is one of 16 Terrestrial ECVs, and is defined as “burned area” supplemented by “active fires” and "fire radiated power" (FRP) measurements. Landsat's temporal resolution and sensor characteristics make it suitable for mapping burned area, but not suitable for monitoring active fires or FRP. Existing burned area products are based on twice daily MODIS data with a 500m cell size. Landsat, with a 30m or a historical 90m cell size would provide a finer spatial resolution product, with a trade-off in temporal resolution. The development of a burned area prediction algorithm for Landsat data is being undertaken by researchers at the USGS. The burned area ECV algorithm implements boosted regression trees to identify burned pixels in Landsat scenes using training data derived from the Monitoring Trends in Burn Severity database and Landsat surface reflectance. A series of validation sites across the U.S. with detailed fire perimeters have been selected for testing. Ultimately, the algorithm will be implemented on the Landsat image archive at the USGS. Current algorithm development efforts, initial results, and validation plans will be described.

Effectiveness and Effects of Mastication Fuel Treatments in Non-forested Vegetation of Southern California

Tuesday, December 4, 2012 | 4:40 p.m. PST | B116
USGS Contributors:
Teresa Brennan – USGS Western Ecological Research Center
http://www.werc.usgs.gov/socalfirerisk

To date, most of our information on the effectiveness and effects of mastication treatments comes from forested ecosystems. In the last decade however, mastication and related mechanical treatments have been used extensively on the nonforested landscapes of southern California. Due to the extensive wildland-urban interface in the region and dangers associated with prescription burning, such mechanical treatments are expected to receive even greater application in the future. This 3 year Joint Fire Science funded project is investigating both the effectiveness and effects of mastication and related mechanical treatments on the four southern California national forests. Before finalizing our study design our research team held workshops on each of the four forests to ascertain goals and concerns associated with mechanical fuel treatments with USFS fire, fuels and resource management staff. These workshops contributed significantly to identifying vegetation management goals and refining our research design. This project focuses on 1) quantifying fuel loading and fuel profiles among various treatments with and without prescribed fire 2) creating a masticated fuel photo series for non-forested fuel types 3) identifying treatment intervals for long term treatment effectiveness 4) quantifying changes in fire behavior using Behave Plus fire models and 5) evaluating the effects and impacts to soil, native and non-native plant re-colonization and shifts in community composition. To date we have quantified changes in fuels and vegetation structure and composition on 220 masticated sites in mixed-chamise chaparral dominated shrublands on the Angeles, Cleveland, Los Padres, and San Bernardino national forests. Study sites were stratified by forest, treatment type, and time since treatment. Preliminary analyses are currently underway to establish fuel loads in various masticated fuel types for the masticated fuel photo series and for use in the Behave fire models.

PRESENTATIONS – WEDNESDAY

Response of the Mojave Desert Tortoise to Post-fire Changes in Habitat
Wednesday, December 5, 2012 | 11:00 a.m. PST | B115
USGS Contributors:
Todd Esque – USGS Western Ecological Research Center
http://www.werc.usgs.gov

Wildlife responses to burned desert habitat are largely unknown. Wildfires burned more than 36,000 acres of critical habitat for the desert tortoise (*Gopherus agassizii*) in southern Nevada in 2005 and additional acreage in 2006. Direct effects of fire on desert tortoises include mortality due to acute heat exposure and loss of food and cover. Indirect effects include long-term changes in vegetation composition and structure, and these are hypothesized to affect the quality of desert tortoise habitat. Because of the Threatened status of the tortoise, resource managers wanted to understand the indirect effects of wildfire on tortoises. We compared behavior, reproduction, and survival for desert tortoises located in and adjacent to burned habitat. Annual plant production in burned habitat was higher than in adjacent unburned habitats and primarily consisted of invasive annual grasses. Burned habitat had lower perennial plant cover throughout the study. Despite these vegetation changes, observations across years indicated that tortoises moved further into burned habitat with each successive year following the fire. Foraging behavior was most often observed in burned habitat and "resting" was the most frequent behavior observed in unburned habitat. Tortoises were more likely to use burrows for shelter in burned habitat, while vegetation was used as a shade resource more often in unburned areas. Survival and reproduction were the same for tortoises regardless of the amount of burned habitat within their home ranges. This study illustrates that tortoises will re-colonize a one-time burned area in a short period of time following wildfire. However, the effects of repeated fires that further reduce the quality of tortoise habitat are currently unknown. The boundaries between burned and unburned areas are very important for tortoise re-colonization and for natural vegetation recovery, and these areas should be managed for desert tortoise habitat.

An Overview of Past, Current, and Future LANDFIRE Data Products and Methods
Wednesday, December 5, 2012 | 11:00 a.m. PST | B110
USGS Contributors:
Matt Rollins – USGS Wildland Fire Science Coordinator
http://www.usgs.gov/ecosystems

Since its inception in 2003, the LANDFIRE project has employed a wide range of nationally consistent methods in order to produce a large suite of vegetation and fuel and fire regime products for the fire management community. These products have also been found to be useful for many other applications. Over this time, a number of versions of the data products have been produced and distributed in order to implement improvements to the original products and well as account for agents of landscape change that have occurred since the "base" circa 2001 dataset. This presentation will provide an overview of the evolution of the project in terms of data products and their applications. It will also illustrate the "data flow" process and methods used to produce the currently available versions of the data products as well future versions.

Recovery and Rehabilitation of Desert Tortoise Critical Habitat in the Northeast Mojave Desert

Wednesday, December 5, 2012 | 11:25 a.m. PST | B115
USGS Contributors:
Lesley DeFalco – USGS Western Ecological Research Center
http://www.werc.usgs.gov

Long-term studies of post-fire recovery are lacking for Mojave Desert shrublands, and few landscape-level success stories are available for guiding management of burned habitat for sensitive species. Approximately 75,000 acres (4.8%) of critical habitat for the desert tortoise (*Gopherus agassazii*) burned during the unprecedented 2005 and 2006 wildfire seasons in the northeast Mojave Desert. While much of the creosote/bursage/Joshua tree and mixed blackbrush shrublands burned for the first time during these recent fires, other shrubland areas re-burned following fires in recent decades. We expected these contrasting burn scenarios to result in different habitat quality for the desert tortoise. We annually monitored the natural recovery and re-vegetation success across a network of burned/unburned sites in southern Nevada and northwestern Arizona since the 2005/2006 fires. Re-seeding and herbicide application aims to re-establish essential shrub cover and herbaceous forage in tortoise habitat following wildfire. Sites that burned multiple times depleted perennial cover and forage species for tortoises than sites that burned once. Recovery of shrublands in repeatedly-burned tortoise habitat has been limited because seed banks are less abundant, have low diversity, and are dominated by non-native brome grasses. In contrast, once-burned habitat still provides short-term structure for tortoises (e.g., dead creosote bush and Joshua trees), and based on perennial frequency and density, is responding to seeding and herbicide treatments with significant treatment effects following treatment implementation. Even though seeded habitat appears visually similar to unseeded habitat, a continued trajectory of higher plant establishment in treated once-burned habitat implies that managers prioritize limited resources to those areas, and more intense management is recommended for repeatedly-burned habitat.

Effects of land treatments on subsequent wildfire and vegetation state transitions in the Great Basin

Wednesday, December 5, 2012 | 11:25 a.m. PST | C125
USGS Contributors:
David Pilliod – USGS Forest and Rangeland Ecosystem Science Center
http://fresc.usgs.gov

Thousands of hectares of federal land in the Great Basin are "treated" annually with the goal of providing forage for livestock, improving wildlife habitat, combating invasive species, reducing fuels, and stabilizing soils. We investigated whether this mosaic of land treatments influenced subsequent wildfire and vegetation state transitions using data from MTBS and LANDFIRE. Using the Land Treatment Digital Library, we found 6,800 land treatments were conducted between 1940 and 2010 covering approximately 2.75 million hectares (6.8 million acres). Preliminary results suggest over a third of all land treatments in the Great Basin have burned since being treated with many re-burning 1-2 times and some up to 14 times. Drill seeding and aerial seeding treatments, which were usually conducted to stabilize soils after wildfire, frequently re-burned within 10 years. The probability of wildfire decreased over time for most treatments. Vegetation state transitions from sagebrush shrubland to invasive grassland could be detected by LANDFIRE data. Land treatments in invasive grasslands were unlikely to transition to native shrubland, partly because of frequent wildfires.

LANDFIRE Reference Data
Wednesday, December 5, 2012 | 11:25 a.m. PST | B110
USGS Contributors:
Brenda Lundberg – Stinger Ghaffarian Technologies/USGS EROS Contractor
http://eros.usgs.gov

To help develop and update LANDFIRE data products, LANDFIRE has relied on a vast collection of geo-referenced data. LANDFIRE 2001 National data collection efforts were focused on vegetation and fuel plot data, which were processed into the LANDFIRE Reference Database (LFRDB). The LFRDB provided "ground-truth" data for mapping and modeling vegetation patterns and conditions and for calibrating models developed by the LANDFIRE team. The LFRDB contains 817,393 vegetation and fuel plots located throughout the United States. There are 629 different sources of data archived in the LFRDB. Multi agency data sources, US Forest Service, State agencies, and the Bureau of Land Management made significant data contributions. The data archived in the LFRDB includes species composition data, vegetation structure data, community classification labels, exotic plant data, and fuels data. During LANDFIRE's update phase, LANDFIRE 2008 (Refresh), data collection efforts were focused on disturbance, vegetation/fuel treatment, and exotic plant polygon data that were processed into the Events geodatabase. Events data were used to update existing LANDFIRE products to reflect landscape changes due to disturbances and treatments. The Events geodatabase contains 929,267 event perimeters located throughout the United States. There are 408 different sources of data archived in the Events geodatabase. The US Forest Service, multi agency data sources, the Bureau of Land Management, and State agencies made significant data contributions. The data archived in the Events geodatabase includes information on wildland fires, mechanical treatments, chemical treatments, weather disturbances, insect and disease, and exotic plant locations. Data were added to the LFRDB during LANDFIRE 2008 (Refresh) on an as need basis. As LANDFIRE moves into the next update phase our data collection efforts continue to focus on Event or disturbance and treatment polygon data and the LFRDB will be maintained and updated as needed.

LANDFIRE Existing Vegetation Cover and Height: Improving the National Products
Wednesday, December 5, 2012 | 1:40 p.m. PST | B110
USGS Contributors:
Birgit Peterson – ASRC Research and Technology Solutions/USGS EROS Contractor
http://eros.usgs.gov

Among the myriad of LANDFIRE products available are layers representing forest canopy cover and forest canopy height. These data layers are critical for a number of applications. For LANDFIRE National 2001 forest canopy height was derived using Landsat imagery and Forest Inventory and Analysis (FIA) field plot observations as well as a suite of ancillary data layers. The LANDFIRE National 2001 forest canopy cover values were largely obtained from the National Land Cover Data forest cover product. The LANDFIRE National 2001 updating process for forest canopy height and cover relied on regression tree models with FIA plot values of forest canopy height or cover as the dependent variables, using predictor variables derived from Landsat imagery, terrain data, and a Shuttle Radar Topography Mission (SRTM) basal-area-weighted canopy height metric. The SRTM data provide a vertical structure measurement not available from Landsat imagery, and particularly valuable to the canopy height modeling process. Updating the 2001 base vegetation maps to the 2008 era relied on a set of annual disturbance layers that combined vegetation disturbance information derived from Landsat time series data with contributed polygonal data describing management activities on federal and state lands. Once disturbed areas were delineated, the existing structure data were updated based on pre-determined vegetation transitions. In forested areas, FIA data were used to model ten years of growth for each vegetation/disturbance combination using the Forest Vegetation Simulator (FVS). The vegetation conditions predicted by FVS were used to define vegetation transitions in disturbed areas. FVS was also implemented without incorporating disturbances to determine vegetation transitions in undisturbed areas. The forest canopy height product will continue to be refined through inclusion of Geoscience Laser Altimeter System (GLAS) data. GLAS observations are correlated with canopy structure and can be used to augment plot data, especially where field data are scarce

Role of Fire in Rangeland Restoration
Wednesday, December 5, 2012 | 1:40 p.m. PST | B115
USGS Contributors:
David Pyke – USGS Forest and Rangeland Ecosystem Science Center
http://fresc.usgs.gov

Fire as a natural disturbance often triggers successional trajectories shifting dominance among species with varying tolerances to fire. Woody non-resprouting species are killed and require seeds for re-establishment, while resprouting species maintain viable roots where shoots can re-emerge and their position within the community dominance hierarchy is only minimally impacted. Rangelands typically include non-forested ecosystems. Fires may become the restorative agent that eliminates fire-sensitive trees that have spread into rangelands. The tall grass prairie and the sagebrush biomes are examples where fire controls tree boundaries. Fire may not always restore rangeland ecosystems, but it may act as a driver of ecosystem change when fire tolerant species invade ecosystems and change fire regimes in such a way that fire provides a positive feedback to maintain invasive species. Examples of these include red brome (Mojave Desert), buffelgrass (Sonoran Desert) and cheatgrass (Great Basin). Through their invasion and dominance, they are increasing the frequency of fires and through positive feedbacks increase their own dominance at the expense of native species in the ecosystem. Once these species dominate, a biological threshold has likely been crossed to an alternative stable state that will require active restoration to recover the previous structure and function of these ecosystems. When annual grasses trigger these changes, we have preliminary evidence that as distances among perennial plants increases, as can occur with inappropriate livestock grazing, then ecosystem resistance is threatened and these invasive annual grasses will likely become abundant in patches. If perennial grasses become more associated with shrubs then fire may also threaten perennial grasses thus expanding the space for annual grasses. Wildfire rehabilitation is often the only potential method for recovery in these situations, but reviews of the literature and of monitoring reports indicate success of these projects is unlikely when precipitation is low.

LANDFIRE Fuel Attributes Layer Development
Wednesday, December 5, 2012 | 2:05 p.m. PST | B110
USGS Contributors:
Tobin Smail - Stinger Ghaffarian Technologies/USGS EROS Contractor
http://eros.usgs.gov

This presentation will provide spatial fuel analysts an evolutionary assessment on the development of LANDFIRE (LF) fuel attributes. Reviewing the progression of LANDFIRE fuel data layers will point out critical junctures, important user input, processing procedures, and the strengths and weaknesses of the current data suite. LANDFIRE has produced three iterations of spatial fuel layers, LF National (ver.100), LF 2001 (ver.105), and LF 2008 (ver.110). This assessment will focus on these three versions and the important issues, mechanics, concepts, and processes used in the development. This presentation also provides a glimpse at processes being instituted and considered for the future versions and revisions of these data.

Deriving Regional Burn Severity Thresholds from Remotely Sensed Data
Wednesday, December 5, 2012 | 3:25 p.m. PST | C125
USGS Contributors:
Josh Picotte – ASRC Research and Technology Solutions/USGS Contractor

The Monitoring Trends in Burn Severity (MTBS) program has mapped the spatial variation of burn severity for over 14,000 large fires that burned in the United States between 1984 and 2010. For MTBS the low, moderate, and high burn severity was manually interpreted from Landsat 30m Normalized burn ratio (NBR) and differenced NBR (dNBR) satellite imagery. Subjectivity in the creation of the burn severity datasets can make comparisons between fires problematic. To address this limitation, we utilized Lutz et al. (2011) method to determine the continuous probability distribution of the burn severity for all 14,000 MTBS fires. For each fire, we randomly sampled NBR or dNBR pixels from each burn severity category (low, moderate, and high) in proportion to the area they represented within the fire perimeter. Probability distributions were fitted using sigmoid functions, and a burn severity metric was subsequently calculated for each fire by estimating the area underneath the curve. The calculation of a continuous burn severity metric for each fire allows for more robust comparisons of burn severity between fires, when compared to the previous method of characterizing fires by the number of pixels in each burn severity category.

Disturbance Mapping
Wednesday, December 5, 2012 | 3:25 p.m. PST | B110
USGS Contributors:
Joel Connot – Stinger Ghaffarian Technologies/USGS EROS Contractor
http://eros.usgs.gov

Updating the LANDFIRE data layers is an ambitious undertaking. Updates to LANDFIRE datasets reflect the best available data depicting the landscape. LANDFIRE relies upon field contributed spatial information reflecting landscape change and fire severity mapping products from national programs, such as Monitoring Trends in Burn Severity (MTBS), Burned Area Reflectance Classification (BARC) and Rapid Assessment of Vegetation Condition after Wildfire (RAVG).

Although, these contributions are necessary to create the best product possible, LANDFIRE also relies upon a process known as Remote Sensing of Landscape Change (RSLC) to supplement contributed data and other map products. For the LANDFIRE 2008 RSLC, the Vegetation Change Tracker (VCT) algorithm was used to identify pixels likely to have experienced disturbance. Using VCT, Landsat Time Series Stacks (LTSS) consisting of one scene per year from 1984 to 2009 were processed to create change products (approximately 11,000 scenes for CONUS). To create LANDFIRE 2010 RSLC, MultiIndex Integrated Change Analysis (MIICA) algorithm was used to identify likely disturbance. Image stacks consisting of two scenes (one leaf on and one leaf off) per year (approximately 4,380 scenes for CONUS) for the years 2007-2011 were selected and processed to identify probably change. Outputs from these algorithms are combined with contributed events, other fire mapping products and ancillary data sources in a hierarchical process. The result is a unique, seamless data product that is a convergence of data products for a time period that assigns severity, causality and confidence of disturbance for each pixel.

PRESENTATIONS – THURSDAY

Climatic Stress Increases Forest Fire Severity Independent of Fire Intensity
Thursday, December 6, 2012 | 11:25 a.m. PST | B114
USGS Contributors:
Phillip van Mantgem – USGS Western Ecological Research Center
http://www.werc.usgs.gov

Pervasive warming can lead to chronic stress on forest trees, potentially causing greater sensitivity (increased mortality) to fire-caused injuries. Longitudinal analyses from over 300 forest plots from across the western United States show that higher pre-fire water deficits substantially increase post-fire mortality probabilities. This climate-fire interaction was present after accounting for fire defenses and injuries, and was persistent across geographic regions, major genera and tree size. Warming trends have been linked to increasing probabilities of severe fire weather and fire spread; our results suggest that warming may also increase forest fire severity (the number of trees killed) independent of fire intensity (the amount of heat released during a fire).

Fire Adapted Communities
Thursday, December 6, 2012 | 1:15 p.m. PST | B117
USGS Contributors:
Jason Kreitler – USGS Western Geographic Science Center
http://geography.wr.usgs.gov/

The goal of the Fire Adapted Communities element of the Cohesive Strategy is for human populations and infrastructure to be able to withstand a wildfire without loss of life and property. In this talk I will present a national map of county level participation in programs and activities that move communities in the direction of becoming more fire adapted, including the national Firewise, Ready Set Go!, and Fire Learning Network programs, and the implementation of county and local level community wildfire protection plans (CWPPs) and state/county/local building codes. This effort represents the first national view of fire adapted community program participation and activities, and is a preliminary step in determining what future actions could help communities address their wildland fire threats. Using exploratory spatial data analysis I will share an analysis of the heterogeneity in program participation, and determine how participation is a function of social, economic, and demographic variables or the level of risk a community faces. This data will then be used to illustrate where program support could assist communities in need, and where program participation is already established. This will help answer the larger question of how additional efforts could be allocated to assist communities that lack the capacity or capability to effectively mitigate their wildland fire risk, as well as understanding the characteristics of communities that have made progress in becoming fire adapted.

Wildfire Mitigation in the Landscape or Near the Houses? An Australian Perspective
Thursday, December 6, 2012 | 1:40 p.m. PST | B118
USGS Contributors:
Owen Price – University of Wollongong/USGS Southern CA Wildfire Risk Scenario Project
http://www.werc.usgs.gov/socalfirerisk

The great majority of house loss in Australia occurs in the forested regions of the south-east and south-west, and under extreme weather conditions. The range of mitigation measures is broad, and research has been conducted into the effectiveness of some but not all of these. Some salient points are:

- Rapid attack is effective at containing most single occurrence fires.
- About 80% of fires that burn the WUI under extreme weather ignite within 2 km of homes.
- Prescribed burning has a limited effect on reducing fire spread, area or severity, especially under extreme weather.
- The nature of the garden, the presence of other nearby houses and the amount of forest within 1 km of houses have strong effects on the likelihood of houses burning.
- Levels of community preparedness are generally low and difficult to improve.
- Although campaign suppression is a major strategy, there is little evaluation of its effectiveness.
- Extreme weather compromises all aspects of fire mitigation.

Taken in totality, these results suggest that there is strong benefit from making houses and gardens more resilient and from fuel treatments in the immediate vicinity of houses. Landscape treatments have less value. There are large unknowns, including evaluation of the cost/benefit equations for many of these strategies, especially for campaign suppression and community education. There is also a poor understanding of the spatial variation in house vulnerability. In this talk I will review the evidence and make comparisons where possible with southern California.

Predicting the Spatial Distribution and Potential Consequences of Postfire Debris Flows to Native Trout Populations in Headwater Streams
Thursday, December 6, 2012 | 2:30 p.m. PST | B115
USGS Contributors:
Robert Gresswell – USGS Northern Rocky Mountain Science Center
http://www.nrmsc.usgs.gov

Many native salmonids have experience substantial reductions in available habitat, and current most populations are found in headwater stream systems. Headwater streams in the intermountain west are susceptible to disturbances such as postfire debris flow. Because the probability of debris flow increases in landscapes that have recently burned, identifying susceptible areas before the occurrence of wildfire may provide information necessary to protect remnant headwater populations. Predicting the timing, extent, and severity of wildfires and subsequent precipitation and runoff events is difficult; however, it is possible to identify channels in stream networks that are prone to debris flows. We conducted fine-scale spatial analyses of debris flow potential in 11 high-elevation stream networks of the Colorado Rocky Mountains. We identified at-risk channels using a model based data from geographic information systems (GIS) describing topographic characteristics, and assessed the potential for catastrophic population disturbance given an extreme fire event and severe postfire storm scenario. Results from the GIS model suggests that trout populations in many of the study watersheds occupy areas with a high probability of experiencing post-wildfire debris flows, but the extent of their distribution and location within the stream network provide sufficient refuge to prevent watershed-scale extirpation of trout. These models yield a decision making tool that is intended to provide qualitative assessment of debris flow potential in stream reaches within a basin context.
The reach-scale model was designed for simplicity and flexibility; thus, it can be used to develop comprehensive management strategies for restoration, protection, and post-disturbance remediation of headwater stream networks that support remnant populations of native fishes.

Land Use Planning to Reduce Housing Loss to Wildfire in Southern California
Thursday, December 6, 2012 | 2:30 p.m. PST | B118
USGS Contributors:
Alexandra Syphard – Conservation Biology Institute/USGS Southern CA Wildfire Risk Project
http://www.werc.usgs.gov/socalfirerisk

Southern California is a Mediterranean-climate region with one of the largest areas of wildland-urban interface (WUI) in the US. Extensive housing development amidst highly flammable shrublands and annual Santa Ana winds set the stage for the nearly 10 000 structures that burned by wildfires since 2000. The primary strategy to alleviate fire hazard is wildland fuel reduction, with some focus on house characteristics and homeowner responsibility. Land use planning, however, has been overlooked as an alternative to fire risk reduction, despite large numbers of homes being constructed in the most hazardous areas of the landscape. We evaluated the role of land use planning for reducing housing loss to wildfire through analysis of existing structure loss data and simulation of future development scenarios. Using an extensive geographic dataset of residential structure locations, with more than 5500 burned by wildfire since 2001, we modeled and mapped structure loss as a function of explanatory variables that included housing pattern and location. Structures were most likely to burn at low densities, in small, isolated neighborhoods, and when they were surrounded by wildland vegetation. Structure location relative to the coast and historic fire patterns were also significant. To project future housing loss, we applied an econometric subdivision model to three land use planning simulation scenarios characterized by: infill of existing development; expansion from existing urban areas; and leapfrog growth into undeveloped areas. After developing a fire hazard model conditioned upon existing structure loss data, we calculated probability of future housing loss. Leapfrog development was predicted to result in the highest structure loss, whereas infill development had a lower likelihood of burning. The importance of housing pattern and location in these analyses of past and future structure loss suggest that land use planning may be an important alternative for reducing wildfire risk in the WUI.

The Role of Urban Fuels in Structure Loss

Thursday, December 6, 2012 | 3:25 p.m. PST | B118
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C.J. Fotheringham – USGS Western Ecological Research Center
http://www.werc.usgs.gov/socalfirerisk

The relatively new focus of fire management in California on the Wildland-Urban Interface (WUI) has a greater potential to decrease losses of property relative to the previous focus of mitigation on wildland landscapes. As part of the USGS MultiHazards Demonstration Project we conducted a study that focused primarily on the urban side of the wildland-urban interface (WUI) to determine factors contributing to structure loss. All fires studied were wind-driven fires with propagation by embers and fire-brands well ahead of the fire front. These types of fires have three immediately discernible traits; 1) a rapid and large amount structure loss 2) damage primarily on the windward side of neighborhoods adjacent to open space and 3) an apparent random pattern to structure loss at a local scale. This is a post-hoc study of houses that were loss in large, wind-driven fires over the last decade throughout southern California. The study utilized historical oblique aerial photos to assess ornamental vegetation characteristics, structural traits such as decks, patios and outbuildings, and location characteristics such as adjacent slope angle, distance to open space and primary road. Data were collected for both burned and unburned structures and statistically analyzed to assess risk factors. Findings indicate that location on the landscape and within neighborhoods, ornamental vegetation characteristics, accessory structures such as decks and outbuildings impact whether a structure will survive. Somewhat surprising was that fuel modification zone width showed no effect on structure survival and structure age was only important for interior placed homes.

Integrated Wildfire Risk Modeling

Thursday, December 6, 2012 | 5:05 p.m. PST | B118
USGS Contributors:
Trent Penman – University of Wollongong/USGS Southern CA Wildfire Risk Scenario Project
http://www.werc.usgs.gov/socalfirerisk

Wildfire can result in significant losses to people and property. Management agencies undertake a range of preventative (the shield) and responsive (the sword) actions to reduce this risk. Data relating to the success of individual treatments varies, with some approaches well understood and others less so. Research has rarely attempted to consider the interactive effects of treatments in order to determine optimal management strategies that reduce the risk of loss. Bayesian Networks provide a statistical framework for undertaking such an analysis. Here we apply

Bayesian Networks to examine the tradeoffs in investment in preventative actions (e.g., fuel treatment, community education, development controls) and suppressive actions (e.g., initial attack, landscape suppression, property protection) in the Sydney Basin, Australia. Fuel treatment within 500m of the interface has the largest effect in reducing the risk of high intensity fires reaching property. Once a fire has reached property there is a strong interactive effect of suppression and development controls. The framework presented provides a quantitative method for improving expenditure in fire management actions.

Banquet and Awards Ceremony
Thursday, December 6, 2012 | 6:00 p.m. PST | Oregon Ballroom

Jan van Wagtendonk, researcher emeritus with the USGS Western Ecological Research Center and past president of the Association for Fire Ecology, will welcome guests as a master of ceremonies.

PLENARIES - FRIDAY

The Influence of Frequent Previous Fire Occurrence on Large Fire Management
Friday, December 7, 2012 | 8:45 a.m. PST | Oregon Ballroom
USGS Speaker:
Matt Rollins – USGS Wildland Fire Science Coordinator
http://www.usgs.gov/ecosystems

Over millennia wildland fires have created a shifting mosaic of patterns across the landscapes of the United States. From a functional standpoint, fires interacted with the evolutionary ecology of vegetation, topography, geomorphology, other disturbances, land-use, local weather, and regional climate to define the demography of vegetation and ecosystems that we see today. Fires change the structural and compositional characteristics of vegetation, changing the fuelbed that is available for future fires. This process is illustrated in montane and subalpine forests of the Northern Rocky Mountains where the size, behavior, and extent of current fires are regulated by fuelbed patterns created by past fires. This self-regulatory process is a foundation of the 'Prescribed Natural Fire', wildland fire use, and adaptive management strategies implemented by fire management organizations over the last several decades. Fire history data show us that the landscape patterns created by wildland fires have changed dramatically over the last several decades. The conventional wisdom is that this is due to changing climate, changing land-use patterns, and the exclusion of wildland fire from ecosystems where it previously played an important part in the evolutionary environment for landscapes. Because fire is such a critical ecosystem process of many healthy landscapes, it is a natural tool for Fire Managers to maintain in their toolbox for affecting this dynamic Natural Hazard. This talk will examine recent science showing the effects of past fires interacting with the effects of current fires, and will draw heavily on examples from the 2012 Fire Season.

The Department of the Interior Strategy for Policy Implementation
Friday, December 7, 2012 | 9:35 a.m. PST | Ballroom
DOI Speaker:
James Douglas – Senior Advisor, Public Safety, Resource Protection, Emergency Services
http://www.doi.gov/pmb/oles/kimthorsen.cfm

The 1995 Federal fire policy, along with the 2001 update, continue to provide a solid foundation for federal fire management – recognizing the importance of the response to wildfire, adapting communities to wildfire threats, and recognition of the integral role wildland fire to improve the health of the land. The 2009 guidance for implementation of Federal fire policy recognizes that use of management tools such as prescribed fire and fuels management to reduce the impacts of wildfires on local communities and increase land health is not sufficient in itself. We need to continue to wisely manage our response to wildfires to achieve land management objectives, to reduce risk to the public and firefighters, and to protect high-value assets in a cost-effective manner. Managing wildland fire for multiple management objectives cannot be an exclusively federal undertaking. Federal lands are largely interspersed and adjacent with those under non-federal fire protection. Management actions federal agencies take have immediate and long-term consequences for neighboring jurisdictions. Taking a "national" not "federal" approach to fire management is critical for our success in reducing risks to communities, to improving long-term land health, and reducing firefighter and fiscal risk. This approach requires engagement with all partners, neighbors, and stakeholders early and often – well prior to smoke in the air. We need to better communicate why we choose to take various management actions to help the public understand the short-term tactical requirements as well as the long term consequences. The Cohesive Strategy is one tool for building the necessary social and political compact that will allow us to work effectively across agencies and landscapes. We will also need to continue to invest in better land management planning and decision support tools that allow managers to make wise decisions and the public to understand and support those decisions.

PRESENTER INDEX