Implementing and evaluating landscape fuel treatments – SIERRA NEVADA ADAPTIVE MANAGEMENT PROJECT: Fire and Forest Ecosystem Health integration team meeting

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Primary focus is recent publication:

Collins BM, Stephens SL, Moghaddas JJ, Battles J (2010) Challenges and approaches in planning fuel treatments across fire-excluded forested landscapes. *Journal of Forestry* **108**, 24-31 (abstract and full color images available at: http://www.cnr.berkeley.edu/stephens-lab/Articles.htm)

Outline

- Landscape fuel treatment design: theoretical v. actual
    - current approaches:
        - strategically placed area treatments (SPLATs - Finney 2001)
        - defensible fuel profile zones (DFPZs - Weatherspoon and Skinner 1996)
        - treatment optimization module (TOM - Finney 2006)
    - constraints
        - land allocation: wildlife, stream buffer
        - appeals/litigation: time, avoidance
        - funding: budgets, revenues

- Management decisions
    - define landscape: larger landscapes needed, match extent of current fires
    - stand treatment (thin, burn) and surface fuel treatment (pile, masticate, broadcast burn) types
    - individual treatment unit size: generally larger is better (500-4000 ac)
    - landscape design: strategic outperforms random placement
    - landscape proportion: 20-30 %

- Modeling approaches and limitations for landscape fuel treatment evaluation
    - FlamMap (Finney 2006)
        - *use*: generate 'surfaces' indicating landscape 'flammability', quantify treatment effects
        - *advantages*: removes subjectivity associated with ignition locations and weather streams, computationally efficient
        - *limitations*: constant weather, crown fire difficult to separate out
    - FARSITE (Finney 1998)
        - *use*: individual fire growth and behavior based on detailed weather inputs

        - *advantages*: more capable of approximating actual fires, crown fire more explicit
        - *limitations*: ignition placement, weather stream, computationally intensive

    - Forest Vegetation Simulator (FVS - Dixon 2002), Fire and Fuels Extension (FFE - Reinhardt and Crookston 2003)
        - *use*: simulate treatments, grow treatments over time, uses actual plot data
        - *advantages*: tailor specific treatments, little parameterization
        - *limitations*: shrubs not modeled, user-defined regeneration, FUEL MODEL selection

    - ArcFuels (Ager *et al.* 2006)
        - *use*: integrated platform for evaluating landscape fire behavior and fuel treatment effects
        - *advantages*: too many to list
        - *limitations*: expertise to run FVS commands (kcp files), GIS manipulations, large dataset development/and manipulation

References

Ager AA, Bahro B, Barber K Automating the Fireshed Assessment Process with ArcGIS. In 'Fuels management - how to measure success', 2006, Portland, OR. (Eds. PL Andrews and BW Butler).U. S. Department of Agriculture, Forest Service, Rocky Mountain Research Station RMRS-P-41 pp. 163-168

Dixon GE (2002) 'Essential FVS: a user's guide to the Forest Vegetation Simulator.' U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. (Fort Collins, CO, USA)

Finney MA (1998) 'FARSITE: Fire area simulator - model development and evaluation.' U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station RMRS-RP-4. (Missoula, MT, USA)

Finney MA (2001) Design of regular landscape fuel treatment patterns for modifying fire growth and behavior. *Forest Science* **47**, 219-228.

Finney MA An overview of FlamMap modeling capabilities. In 'Fuels management - how to measure success', 28-30 March 2006, Portland, OR. (Eds. PL Andrews and BW Butler).U. S. Department of Agriculture, Forest Service, Rocky Mountain Research Station RMRS-P41 pp. 213-220

Reinhardt E, Crookston NL (2003) 'The Fire and Fuels Extension to the Forest Vegetation Simulator.' U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station RMRS-GTR-116. (Ogden, UT, USA)

Weatherspoon CP, Skinner CN (1996) 'Landscape-level strategies for forest fuel management. Pages 1471-1492. In: Sierra Nevada Ecosystem Project: Final Report to Congress, Vol. II: Assessments and scientific basis for management options. Wildland Resources Center Report No. 37. University of California, Davis, USA.'