AWFCG Fire Research Needs 2014

AWFCG - Alaska Wildland Fire Coordinating Group, Fire Research Development and Application Committee

The following list of fire research topics and questions were generated by personnel from agencies and organizations within AWFCG during 2014 Fall Fire Review and through other solicitations. The topics were initially ranked by the AWFCG Fire Research, Development and Application Committee (FRDAC) based on 3 criteria: direct management application, data needs, and use to multiple agencies. AWFCG reviewed the rankings and made some minor adjustments. The list below is sorted by highest priority (1 through 25). The Research-ID is a unique identifier that can be used to refer to the topic. Please note that there are change in priority order from the 2011 list.

Category	General Topic	Description (why needed/more detail)	Research Questions/Needs	Priority	Research ID
Fire Behavior	Fire Behavior Models: Validation and Application	Research is needed to improve the knowledge of fire behavior and appropriate fuel models for Alaska. More information on the 40 Fuel Models and the Canadian Forest Fire Behavior Prediction (FBP) Fuel Models is needed on a spatial scale and in relation to fire behavior modeling. Fire modeling tools are currently utilized by Alaska fire managers (e.g. Fire Spread Probability [FSPro] in the Wildland Fire Decision Support System [WFDSS]). However the confidence level of model outputs from the tools is unknown. Efforts have been made to relate LANDFIRE ecotypes to Alaskan Fuel Models. However, questions remain about the accuracy of the LANDFIRE vegetation classifications and crosswalks between LANDFIRE and Alaskan fuel types. There is a need for research that will improve the knowledge of fire behavior and appropriate fuel models for several unique fuel types; wetlands, shrublands, and tundra ecosystems as well as in forested ecosystems with insect and disease damage. Additionally, fuel models and fire behavior in early successional post-fire forest types are also of particular interest since shortened fire return intervals are occurring and recent burned areas are no longer acting as fuel breaks.	• Fire behavior validation of the 40 Fuel Models and Canadian Fuel Models used in Alaska. • Are fire behavior modeling tools accurately reflecting drought conditions? How well do the models correlate with CFFDRS indices, fuel moisture, and observed fire behavior? • Landscape-level landcover classifications and fuels maps need to be updated to incorporate succession within recent burns before modeling application. • How accurate are the LANDFIRE vegetation classifications? How accurate are the crosswalks between LANDFIRE and Alaskan fuel types? • Which fuel models should be used for non-forested tundra ecosystems, early successional post-fire forests and forested ecosystems with insect and disease damage? Validate fuel models against actual fire behavior. • What climatic, weather and fuels conditions allow fires to burn into recently burned areas?	1	2010-29
Fire Danger	CFFDRS Fire Weather Indices: Evaluation and	In Alaska, fire planners, fire managers, and firefighters heavily utilize the CFFDRS indices for prescribed burn planning, daily resource availability and allocation, operational strategies and	• Evaluate CFFDRS fire weather indices and drying trends throughout Alaska. Are there variations across regions? • Evaluate relationships between CFFDRS	2	2010-04

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	Calibration	suppression tactics. The CFFDRS Fire Weather Indices are based on empirical data from eastern red and jack pine stands. Further empirical studies are needed to determine if Alaskan fuels should have modified algorithms to better relate observed data to the CFFDRS indices. Specifically, there is a strong need for calibration of the CFFDRS indices for Alaskan boreal fuel types to ensure accurate representation of seasonal changes in duff moisture. Also needed is a mechanism for standardization of spring start-up values for the CFFDRS indices to adequately reflect the effects of over-winter drought conditions, snowmelt date, and soil thaw on fire danger.	indices and: 1) probability of ignition, 2) rate of spread, 3) fire duration and 4) depth of organic fuel consumption. • Are indices calculated from remote automated weather stations (RAWS) accurately representing duff moisture? Do they adequately reflect the effects of over-winter drought conditions, snowmelt date, and soil thaw? • Should over-winter drying values or default startup values be utilized for drought codes, particularly in relation to the occurrence of fires that overwinter? Can these codes be tied to early season fire danger predictions? • How does soil moisture fluctuate throughout spring melts and summer drying? How accurately are these fluctuations represented by the moisture codes?		
Climate Change	Climate Impacts on Fire Regimes: Past, Present, and Future	Fire and land managers, along with policy-makers, seek research which will provide a clearer understanding of: 1) climate linkages to past and present natural fire regimes and 2) current and future departures from historic conditions. A concerted effort is needed to document and model future fire regimes in response to climate change across all vegetation cover types in Alaska. Resulting possible scenarios will be used to inform fire and land managers on potential changes in fire intervals, fire extent, seasonality, and severity. Knowledge of expected change will allow for a planned response to predicted changes in fire activity. Recent syntheses, which incorporate records from the last decade and historical data, have improved our understanding of past and present fire regimes but are not yet comprehensive, are limited in scale, and do not clearly illustrate potential for future regime shifts.	• What are the historical departures from current fire regimes? • What changes in fire size, return interval, intensity, severity and seasonality can we expect under a changing climate? How will changes in these elements differ between vegetation types? • What are historic fire regimes for Alaska tundra ecotypes and what are predicted responses to climate change? • What are potential feedback mechanisms which could alter the probability of future fires? • How will possible changes in future fire regimes impact management strategies and suppression tactics?	3	2010-16

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Fuels Treatment	Fuels Treatments: Short- and Long-term Effectiveness	Information on fuel treatment effectiveness continues to be a top research priority. Specifically, evaluation of the continued effectiveness of existing fuels treatments in various ecotypes and in different stages of recovery is needed. Monitoring of existing fuel breaks needs to continue beyond treatment implementation to determine short-term and long-term effectiveness in reducing fire risk and smoke emissions. Also, post-treatment vegetation recovery could affect fuel loading and lead to seasonal variations in fire risk. It is essential for managers and planners to understand vegetative succession within fuel treatments to avoid promotion of undesirable species, insect infestations, and highly flammable surface fuels.	• How long are various fuels treatments effective, what types of fuels regenerate, and what are associated fire risks? • What are the financial costs of maintaining effective fuels treatments? • What alternative treatments should be tested to maintain fuel breaks (e.g., domestic livestock foraging of grass regeneration, planting/seeding of desirable species)? • Should post-fuels treatment reforestation be considered? What landscapes would be most suitable? • Should desirable vegetation establishment be considered in planning operations? • What treatment methods and timing can be used to minimize bark beetle infestations? • Are fire risk and smoke emissions reduced by fuels treatments?	4	2010-18
Fire Effects	Human Subsistence Livestyles	People practicing a subsistence lifestyle must constantly adapt to changes in resource distribution, including changes caused by disturbance events. With rising costs of transportation fuel, concerns are frequently raised at public meetings about how fire will affect subsistence resources on public lands near communities (e.g. fish, wildlife, edible plants, fuel, timber). There is a need for more study of fire impact on human communities in Alaska. Recommended studies include: 1) retrospective studies (sample resources in burns of different age and interview subsistence users relative to fire history), 2) contemporary studies (establish monitoring program), or 3) predictive (forecast future conditions based on present paradigms). Results from these types of investigations could be invaluable to land owners and managers facing with decisions about prescribed fire or fire suppression near communities.	• How does fire history and spatial distribution affect subsistence resource (e.g. fish, wildlife, edible plants, fuel, and timber) abundance and accessibility by humans? • How should land owners and managers respond to fire impacts on subsistence resources?	5	2010-09