2008 Review of Fire Research Topics

AWFCG Fire Research Needs 2008 **October, 2008**

These research topics were distributed throughout the interagency fire and land management agencies in 2008. Respondents prioritized the topics within each category. The AWFCG Reseach Committee recommended rankings for topics which had no clear ranking dominance to the AWFCG. "RC Notes" reflect the rationale used by the Research Committee to make recommendations. The AWFCG approved these rankings on October 1st, 2008.

The categories are NOT ranked, only the topics within each category are prioritized.

Category	ID #	RESEARCH TOPIC/QUESTION	Description	Rank within category	2005 ID #
Fire Ecology				**(H,M,L)**	
Fire Ecology	2008-1	*How do site conditions and fire variables affect vegetation response?*	The goal is to have the knowledge and tools needed to model habitat response to fire. We are currently getting good information on black spruce and white spruce successional pathways under different site and severity conditions, but we lack information on other vegetation communities (tussocks, shrub, bryophyte, and lichen).	**H**	2005-12 and 2005-11
Fire Ecology	2008-2	*What is the relationship between fire, climate change, and wetland drying?*	There are several projects underway that are evaluating wetland drying across the state. Ultimately, we'd like to be able to predict how wetlands may change under different climate scenarios and fire regimes.	**H**	2005-13 partial
Fire Ecology	2008-3	*What is the likely impact of "reburns" on successional pathways?*	We are seeing a lot of areas within old fire scars burn at shorter intervals than we had previously expected. How will the timing and severity of these reburns affect forest establishment? This is information that would be useful in modeling future habitat availability.	**M**	2005-10
Fire Ecology	2008-4	*Empirically test the assumption that a particular wildlife species will return to post-fire habitat within a range of years following fire.*	Evaluate the relative abundance of wildlife species within burn scars of different ages. Ideally, this would be tied to a reconstruction of the fire condition that led to the current habitat condition (i.e. burn severity level on different site conditions).	**H**	2005-8

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Fire Ecology	2008-5	*How long does it take for a desired vegetative condition (species mix, fiber or forage biomass, stem density or height, canopy cover) to re-establish following fire?*	This could involve monitoring networks established in recent burns or retrospective studies that reconstruct fire conditions (e.g., pre-burn community and spatial pattern in fire severity) that led to the current condition in a variety of burned communities of different post-fire seres. It would be most instructive if tied to specified conditions desired by subsistence communities or land managers.	**H**	new
Fire Ecology	2008-6	*How does burn severity influence permafrost, nutrient cycling, water quality, and water availability?*	In addition to the effects of fire severity on these physical parameters, climate warming is expected to influence reestablishment of permafrost following fires.	**M**	2005-12
Fire Ecology	2008-7	*How does fire alter hydrological processes?*	The impacts of fire on hydrology is poorly understood in Alaska. Baseline data on the impact of fire on water budgets, sediments, temperature, water chemistry, debris, subsidence, nutrients and aquatic organisms in stream drainages, rivers, lakes and ponds would provide valuable insights for managers. These data could also be integrated to fish, wildlife and climate change studies to respond to subsistence and resource concerns. **RC Note: scored Low because of concerns about tech transfer in a way that would be meaningful to fire managers. This may warrant higher ranking as climate changes to hydrological processes are more apparent.**	**L*** based on current conditions	2005-13 partial and 2005-6
Fire Ecology	2008-8	*How are the predictions of fire occurrence and climate change going to affect wildlife and subsistence resources?*	Building on the fire occurrence modeling accomplished by Rupp & Mann evaluate how current fire management practices will effect wildlife habitat for populations of interest to communities and land managers. Applications of the model have been used to assess habitat for the Nelchina caribou herd and are currently being incorporated into an NSF-funded project to forecast moose habitat and abundance near communities.	**H**	2005-1 continuation

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Fire Ecology	2008-9	*How do site conditions and fire variables affect tundra vegetation response?*	Very few studies pertain to the effects of fire on tundra and tree-line ecosystems in the western and northwestern regions of Alaska. Information on post-fire recovery is needed for tundra habitats (tussocks, shrub, bryophyte, and lichen dominated tundra), shrub thickets, and tree-line forests. We lack knowledge about successional relationships, fire return intervals and expected impacts with potential climate change.	**H**	2005-11
Fire Ecology	2008-10	*How will fire influence the predicted conversion of forest to grasslands under future fire/climate scenarios.*	The current Boreal ALFRESCO developed by Dr. Rupp et al includes transitions within and among black spruce, white spruce, deciduous and tundra. The potential to expand this model to incorporate a grass module would enable managers to explore predictions about increasing grasslands throughout interior Alaska.	**M**	new
Subsistence					
Subsistence	2008-11	*Does fire history and spatial pattern influence timing or location of caribou harvest near communities in northern and western Alaska?*	Subsistence hunters must constantly adapt to changes in wildlife distribution, such as those caused by disturbance events that influence vegetative succeession. Few studies have addressed the effects of fire in tundra and tree-line ecosystems on key subsistence species such as caribou, their habitat (Saperstein 1993), or subsistence hunting patterns. Some species of lichens are critical winter forage for caribou, and caribou migration patterns can be modified by fire disturbance (Joly et al 2003). With rising cost of fuel for boats and snowmachines limiting travel by hunters, the effect of tunrda or treeline fires near rural communities may influence harvest success on caribou in northern and western Alaska. Better understanding of fire effects would enable informed community input on fire suppression options, particularly as climate change may influence fire regime.	**H**	partial 2005-1

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Subsistence	2008-12	*How do fire history and spatial patterns affect abundance of subsistence resources near communities?*	With rising cost of transportation fuel, concerns are frequently raised at public meetings about how fire will affect subsistence resources close to communities (e.g., fish, wildlife, edible plants, fuel, timber). Factors of resource availability include trend (increase, no change, decrease) and associated time lag to recovery (or persistence of fire effect). Studies could be retrospective (sample resources in burns of different age and interview subsistence users relative to fire history), contemporary (establish monitoring program), or predictive (forecast future conditions based on present paradigms). Results could inform decisions on fire suppression or prescribed fire near communities.	**H**	2005-9 and 2005-8
Fuel Treatments					
Fuel Treatments	2008-13	*Which fuel treatments can be used to create desired type conversions from black spruce to deciduous?*	Although there is some research that has been done on this topic, new information is now available on natural successional pathways from black spruce to deciduous. Which mechanical fuel treatment types best mimic these natural conditions?	**M**	2005-23
Fuel Treatments	2008-14	*What are the optimal specifications for different fuel treatments to produce an X% reduction in risk to nearby communities?*	Tools *(such as RapidSpot and WFDSS-FSPro)* are now available to model probable fire response to fuel treatments. These tools could be used to 'game' different fuels treatments in different vegetation types to determine the optimal size, shape, and treatment needed to create desired results. A research project that would run simulations using different vegetation types and treatments could provide fire managers with a general guide book for designing fuel treatments. **RC Note: initially this would probably be community-specific but could result in a automated program for fire managers.**	**M**	new

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Fuel Treatments	2008-15	*How do the costs of different fuel treatments in Alaska compare to those of other ecosystems in the Lower 48 states when the duration of the treatment effectiveness is taken into account?*	Our cost/acre of treatments in Alaska is far higher than those in many regions in the Lower 48; however, many of those acres must be re-treated frequently to maintain the treatment benefit. If our treatment costs are less different when adjusted to account for the lifetime of the treatment benefit, it may improve our ability to justify and secure funding for treatment projects.	**L**	2005-2 variation
Fuel Treatments	2008-16	*How do fuel treatments affect life styles of nearby residents (i.e. subsistence availability, recreation opportunities etc…)*	As we work with communities to reduce hazardous fuels, what are the social consequences of these projects on other aspects of their lives? Research is needed on the second order effects on biological diversity (species presence and relative abundance) that have implications for wildlife viewing, hunting opportunity, and ecosystem function near the urban interface. Research topics include success of stand-level type conversion (including retention of late-seral features like snags), loss of fire disturbance, landscape-level fragmentation of forest canopy, and potentially increased access.	**L**	2005-20 and 2005-22
Fuel Treatments	2008-17	*What conditions determine how/when Calamagrostis dominates a site?*	*Calamagrostis canadensis* appears to be increasing its domination of sites post treatment and can be a flash fuel under some conditions. What are the characteristics that lead to this vegetation response and how can it be mitigated to enhance hardwood regeneration? Research should define operational factors of disturbance that enhance type conversion. Research by Johnstone et al (results in 2008) provide site characteristics that lead to conversion to grass following fire.	**M**	2005-23
Fuel Treatments	2008-18	*How does a particular wildlife species respond to habitat altered by fuel treatments?*	There have been few studies that link wildlife response to mechanical fuel treatments. It is difficult for land managers to respond to questions from the public on the effects of fuel treatment projects on these local wildlife populations. **Note: existing treatments may be too small in scale to determine wildlife responses; however, a thorough literature synthesis could be very useful.**	**L**	new

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Fuels					
Fuels	2008-19	*What are general fuel loading levels in the following vegetation types: white spruce with bark beetle mortality; shrub communities; tussock tundra?*	Understanding fuel loading is important in determining fire behavior. No empirical data are available for these vegetation types. The natural fuels photo series is one approach to providing this information. These series provide an important land management tool that can be used to assess the fuel loading and stand characteristics of fuel types throughout the United States. Within Alaska we currently have only two photo series: Spruce Types and Hardwoods with Spruce.	**M**	2005-19
Fuels	2008-20	*What are the characteristics of old burns that allow older fires to act as fuel breaks?*	Recent research has revealed that the relationship of age to flammability varies under different weather patterns (i.e. younger sites will burn during drought years, but not "normal" years), and a on-going project at AFS is updating the large fire database. If we can determine what other characteristics cause a fire to be a good fire break, we could evaluate existing fire history and incorporate that information into risk assessment and community planning.	**M**	2005-17
Fuels	2008-21	*Develop an approach to measure the current cost of action against the potential net value lost.*	Cost plus net value lost is used for decision making within Wildland Fire Situation Analyses in the Lower 48. At the current time, land managers do not have a good tool to measure the current cost of taking action against the net value lost, future cost of action or the deferred cost of action. This links to effectiveness of various fuel treatments, the fire return intervals across the state, and the effectiveness of old fires as barriers to the spread of new fires.	**L**	2005-2

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Smoke					
Smoke	2008-22	*How does local topography influence smoke transport?*	The existing smoke transport models available for use in Alaska are all developed for the Lower 48 states. Different terrain, weather and jet stream dynamics in Alaska potentially will alter the models' effectiveness. Computer simulation techniques can be used to provide an assessment of how well the models capture the important characteristics of smoke transport in Alaska. Understanding how well the models function for Alaska will enable fire managers to make better predictions and provide better capabilities for smoke management. **RC Note: If this is focused on larger communities and is applied to smoke and health issues this might raise to High priority, though it may benefit community and health managers more than fire managers.**	**M**	2005-27
Smoke	2008-23	*What are baseline emissions levels for different communities?*	There is concern amongst fire and land managers that emissions effects on communities from prescribed or wildland fires will not be accurately assessed because of limited baseline air quality data in rural communities or airsheds.	**L**	new
Fire Danger					
Fire Danger	2008-24	*Can we improve ability to predict the upcoming season's fire potential for severity and program planning?*	Several agencies within the AWFCG have contributed to a pilot project in 2008 to see if new analytical techniques would enable us to make better predictions for fire weather in the upcoming season. This pilot project could be expanded and improved if it returns promising results. We will also need a program and public interface so that future predictions can be made by predictive services and other fire analysts.	**H**	new

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Fire Danger	2008-25	*How do the algorithms developed for the Canadian Forest Fire Danger Rating System relate to Alaska vegetation types?*	The CFFDRS parameters were based on empirical data from eastern red and jack pine stands. Empirical studies are needed to determine if our vegetation/fuels should have modified algorithms to better relate observed data to the CFFDRS indices. Some investigations have been done, but research is needed to: 1) evaluate CFFDRS indices and drying trends across Alaska, 2) evaluate if weather station and soil moisture probes data adequately represent duff moisture, 3) determine whether over-winter drying values or default startup values should be utilized, 4) evaluate the relationship between CFFDRS indices and probability of ignitions, rate of spread, duration and depth of organic fuel consumption.	**H**	2005-5
Fire Danger	2008-26	*Are dozer lines more effective than natural barriers? What are the long-term effects of dozer lines?*	Natural barriers include water, bare ground, and some vegetation type changes. The effectiveness of dozer lines versus natural barriers as firing breaks as well as the long-term effects of dozer lines needs to be redocumented. Older studies dating back to the Chicken fire of 1967(?) and other work on dozer lines in unstable soils could be brought into one document for current fire managers and the public.	**L**	2005-15
Fire Danger	2008-27	*What is the probability of burning for areas near communities?*	Development of an approach that would assign a probability of burning to areas in Alaska would enable managers to develop risk assessment models for communities and establish long-term monitoring and research sites to gather integrated baseline data related to wildland fires.	**M**	2005-4

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Prevention and Education					
Prevention and Education	2008-29	*How do property insurance rates reflect FIREWISE treatments in Alaska?*	The cost and landscape tradeoff borne by homeowners, businesses, and municipalities in complying with Firewise guidelines may be partly offset with reduced rates on fire insurance. A review of site factors used in setting rates by insurance companies would be instructive to Firewise program trainers and consumers. **RC Note: This is very important but it is not a research question, consider AWFCG agency-sponsored project.**	**L**	2005-26
Prevention and Education	2008-30	*Develop K-12 lesson plans on fire occurrence and climate change.*	There are currently no curricula that address fire and climate change in Alaska. New lesson plans could be developed.	**M**	new
Prevention and Education	2008-31	*What preventative methods can be implemented to reduce introduction of invasive plants during suppression operations?*	Determine the type and abundance of plant propogules brought into Alaska on equipment used by firefighters and IMT members and evaluate the potential opportunity for the spread of invasive plants.	**M**	2005-24