Joint Fire Science Program RESEARCH SUPPORTING SOUND DECISIONS

JFSP Research Needs

Date: 1/25/2010

Topic: Fire Ecology and Management of Wetlands

In landscapes such as the Lake States, managing both natural and prescribed fire in wetland ecosystems is an important problem facing resource managers and scientists. These issues are broad, ranging from how wetland ecosystems influence fire behavior across complex landscapes to how anthropogenic climate change may affect fire frequency and the source-sink dynamics of carbon in wetlands soils. Basic and applied research is needed to help address these issues in order to develop better predictive models that help policymakers and resource managers measure the potential impacts of fire and fuels management in wetland ecosystems across the region.

During the Lake States Fire Science Consortium activities in 2010, issues related to fire in wetland ecosystems were identified as a critical research need by Consortium members. These knowledge gaps are best described as extensive, with large gaps in how we understand the basic fire history, as well as the ecology and management of wetlands with respect to both natural and prescribed fire. The following three research needs were identified by Consortium members that are best described more broadly within the framework of increasing our knowledge associated with fire ecology and management in wetland ecosystems. We feel that these different types of research needs are indicative and reflective of the type of information that our Consortium members would be interested in from JFSP to help with the management of fire-dependent ecosystems in the Lake States.

A. Developing better information on historical fire in wetland ecosystems.

Some of the most important fires in the Lake States have burned through wetland fuels. A prominent recent example is the Sleeper Lake Fire, which burned over 18,000 acres in Michigan's eastern Upper Peninsula in 2007. The Boundary Waters Canoe Area, in northern Minnesota, has had an extensive history of fires burning through a mixture of uplands and lowlands. Despite this history, and recent efforts to understand fire history in these areas, fire regimes for these wetlands have been left to speculation.

With climate change, and expected changes in hydrology, there are a lot of unknowns as far as fuels, carbon, and habitat. Relating these findings to better historical climate data would improve our prediction.

Questions

1. What is the basic fire regime for the marshes, bogs, and fens in the Lake States?
2. Were these regimes affected by the changes brought on by the first logging era and subsequent settlement?
3. What climatic cues predisposed these wetlands to burn?

Products

1. Research report and peer-reviewed publication on fire regimes in Wetland Ecosystems.
2. Guidance on climatological cues and seasonal implications for fire management in wetlands.

Name of individual or group: David Mladenoff
Affiliation: University of Wisconsin - Madison

B. Understanding the effect of fire and fire frequency on carbon cycling in peatlands, and feedbacks to climate forcing.

Relevant geography is the northern tier of states, Canada and Alaska.

Studies would be more basic and probably need look both retrospectively at impacts from previous fires on peatlands and possibly manipulative studies conducting fires on peatlands.

Although peatlands only occupy about 3% of the earth's surface, they store about 20-30% of the terrestrial carbon. Fires release stored carbon back to the atmopshere but we know little how both historic fires and current fires contribute to the balance between carbon sequestration and sources to the atmosphere.

Questions

1. What are historic carbon emissions to the atmosphere from peatland fires?
2. What are the recent carbon emissions to the atmosphere from peatland fires?

Products

1. Better understanding of how fire in carbon dense peatlands contributes to carbon dioxide trends, and hence, climate warming.
2. Understanding how historic fire frequency controls the balance between carbon sequestration and carbon emissions.
3. Report and publications on these aspects of fire and carbon cycling in wetland ecosystems, as well as workshops on prescribed fire in wetlands.

Name of individual or group: Randall Kolka, Research Soil Scientist
Affiliation: USFS Northern Research Station

C. Influence of wetland ecosystems on fire behavior at both local and landscape scales.

Fire behavior models do not describe or deal with transition zones between fuel models. Transition zones between fuel models best fit the concept of ecological boundaries. Concepts of fire ecology and behavior that do not acknowledge fire boundaries and their often dynamic nature in fire-related work promote misconceptions about how fire moves across communities in complex landscapes, and in turn how to most effectively manage or suppress fires.

Fire personnel, mangers, scientists, and others that do not specialize in managing wetland fires often perceive entire wetlands as a fire barrier or a uniformly volatile fuel bed. These two common perceptions drive decision-making that waste money and resources due to the miss-

directions of fire suppression and management efforts. Decisions have caused, and continue to cause, significant damage to wetlands. The rare exceptions occur where the primary focus is on wetland fire management and, even when grasped, there are serious difficulties with documenting and translating that knowledge to others. This issue is most pressing in northern landscapes that are dominated by a complex wetland forest matrix.

Questions

1. What are dynamic fire boundaries in wetland systems?
2. How can their role as barrier or carrier to fire spread be anticipated and incorporated in to management decisions?
3. Is it possible to map [spatially identify] dynamic fire boundaries for use in planning and strategic decisions to reduce costs and environmental impacts and improve firefighter safety?

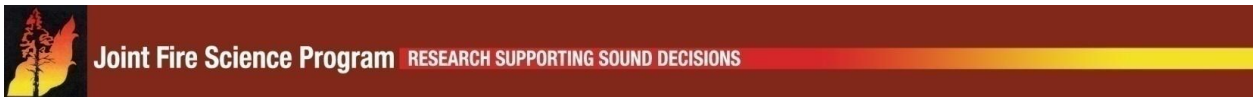
Products

1. Workshop(s) to capture how some of the more obvious wetland dynamic fire boundaries are thought to work via fire practitioners who specialize in wetland fire management.
2. Development of a Decision Support Tool; develop simple methodology to document dynamic fire boundaries and describe when they do and don't function as a barriers to fire spread. The tool should provide structure for fire personnel at the unit level to document dynamic fire boundaries from their observations on wildland fires.
3. Conduct field study using prescribed and other wildland fires to ground-truth assumptions, assess methods, and identify fire boundaries under a range of conditions. Use past fire events where aerial photographs and other method captured the workings of wetland dynamic fire boundaries.
4. Peer reviewed paper describing the concept, examples, and Decision Support Tool.

Name of individual or group and affiliation:
Gary Lindsay, Fire Management Officer, Seney NWR, US Fish & Wildlife Service
Jack McGowan-Stinski, Fire Manager, MI & WI Chapters of The Nature Conservancy
Steve Nurse, Fire Management Officer, Upper Peninsula Fire Management Unit
Sean Sallmann, Fire Management, Horicon NWR, US Fish & Wildlife Service
Steve Schumacher, Fire Management Officer, Detroit Lakes WMD, US Fish & Wildlife Service

An Interagency Research, Development & Applications Partnership

USGS science for a changing world



JFSP Research Needs

Date: (Note: must be received by JFSP before February 1)

Topic

In the Lake States, numerous attempts at developing Ecological Classification Systems (ECS) and attempts to build probabilistic models depicting successional development across different ecosystem types have been made. LANDFIRE data is one example of a "top down" attempt to classify ecosystems across ownerships in support landscape level planning. Conversely, "bottom-up" approaches, including those habitat typing models developed by Kotar (University of Wisconsin and other are based on soil moisture, nutrient gradients and successional pathways.

Hierarchical ECS's recognize the need to organize and group lands of similar character and concern and habitat typing systems provide complimentary approaches for planning and management. The Lake States Fire Science Consortium recognizes that Michigan, Minnesota and Wisconsin occur within 3 of Cleland's (USFS) ecological provinces. Efforts to identify ecosystems and their associations within the ecoregions in these three states are in various states of development. Currently most of the Lake States have delineated (but not consistently attributed or documented the process used) to delineate down to Land Type Association (LTA) level. However, Michigan's southern Lower Peninsula has never been classified at a finer scale than subsubsections (Albert) using a different methodology.

Effective description of fuel conditions (e.g. fuel model descriptions) require a more detailed classifications than these LTA's and better predictive ability of the general changes in fuels, diversity, and habitat that result from secondary succession. These Land Types and their sub-units (Land Type Phases) are analogous to the Native Plant (or Natural) communities. A few prototype efforts at classifying ecosystems at this level have been initiated. "Habitat Type" classifications have been developed to varying levels, encompassing uplands in some portions of some states and including lowland communities in others. For instance Michigan's southern Lower Peninsula does not have upland or lowland habitat types classified. Furthermore, some of these classification systems have been used to develop spatially explicit mapping products that again range in quality and documentation of the processes used. Recent US-wide (e.g., Schaetzl) soils classifications could be used along with other ancillary data and to develop consistent, spatially explicit, habitat classification systems across ecoregions in all three Great Lake States for both upland and lowland systems. However, more knowledge must be gleaned from the development of plant communities (fuels and successional pathways), particularly on wetland soils.

A consistent base of classifications and supporting geographic depictions could support better landscape planning and management decisions. It could dramatically improve fuels classifications and depictions here in the lake states.

Questions

1. Can consistent region wide ecological classifications be produced with currently available data?
2. Can and should these disparate Ecological Classification Systems be joined together into one single Great Lakes wide system?
3. What are the vegetation development pathways that may be encountered on wetlands soils across these ecoregions?

Products

1. Draft Land Type Association (LTA), Land Type (LT) and Land Type Phase (LTp) criteria and depictions
2. Updated LANDFIRE products (BpS, ESP, EVT, Fuels and Fire Regime data)
3. Completion of habitat typing products based on soils and resulting vegetation (habitat types for upland soils have been completed in northern Michigan)
4. Outreach and teaching tools and products.

Name of individual or group:

MDNR Wildlife Division & Greg Corace (other potential folks to include: Dave Cleland, Denny Albert, Mike Kost, Josh Cohen, John Kotar, Tim Burger, Randy Schaetzl)

Affiliations: Michigan Department of Natural Resources & US Fish & Wildlife Service, Seney National Wildlife Refuge, Albert (Oregon), USFS, MNFI, MSU

Other data, classification systems to consider:

USFS ECS systems and soil scientists involved in developing them

USFS Hiawatha lowland habitat classification

An Interagency Research, Development & Applications Partnership

USGS science for a changing world

Joint Fire Science Program RESEARCH SUPPORTING SOUND DECISIONS

JFSP Research Needs

Date: January 31, 2011

Topic: Interagency Wildland Fire Monitoring Database

Cooperative monitoring of wildland fire effects presents an opportunity for partnerships between agencies, universities, and advocacy groups. Further, it probably requires field data collection for long term utility. Resources are available to promote consistent, universal monitoring procedures. A variety of public and private entities have an interest in sharing in the effort. Long term monitoring of not only disturbance effects, but effects of climate impacts will require a cooperative effort over time spans that current users may not be able to manage.

Questions

1. Is FFI protocol robust and comprehensive for applications throughout the country?
2. Is FFI scaleable for both small private entities to post fire activity?
3. Can a Web Based interface provide for both input and outputs?
4. Should the interface/database be managed regionally or is a national database feasible?
5. Is there already a system that can be adapted to cross-ownership utility?
6. Is it necessary to establish permissions among potential FFI database users?
7. Can it accommodate unsolicitated anecdotal input from other users?
8. Can it be the source of Demonstration Site Information and formatted as such?

Products

1. Web based cooperative monitoring database with data useability for smoke management programs, field fire effects data collection and analysis, and public information for voluntary site visits and subsequent anecdotal reporting.

Name of individual or group: Robert Ziel, Program Coordinator
Affiliation: Lake States Fire Science Consortium