

Northwest Boreal LCC

2012 Annual Report

Introduction

The Northwest Boreal Landscape Conservation Cooperative (NWB LCC), formerly known as the Northwest Interior Forest LCC, is one of the nation's largest LCCs, consisting of more than 330 million acres of boreal forests, alpine habitat, wetlands and rivers, spanning an altitudinal range from sea level to the highest point in North America. The LCC includes the major metropolitan hubs and transportation infrastructure of the region, including the two largest cities in Alaska and the largest city in the Yukon Territory. The geographic region of the NWB LCC includes the boreal and boreal transition zones of Alaska, Yukon Territories, northern British Columbia and westernmost Northwest Territories (Figure 1). As a true international collaboration, the NWB LCC is a growing partnership among more than twenty U.S. and Canadian federal and provincial/territorial agencies, nongovernmental organizations, Tribes/First nations, and institutions of higher education.

If the NWB LCC was a country, it would be the 20th largest in the world. This vast area is underlain with discontinuous permafrost, which contains enormous deposits of immobilized organic carbon, and is a major determinant on vegetation type, hydrologic regimes, and species distributions. Permafrost is clearly sensitive to climate warming and is also impacted by changing fire regimes throughout the region. There is a strong interplay in the landscape-scale dynamics between wildfire distribution, frequency and intensity, the depth of soil active layers and change in permafrost distribution. This interplay has ecosystem-scale effects such as wetland shrinking and formation, sedimentation and soil nutrient leaching, and drastic effects on vegetation type (to the level of shifting biomes) all of which will likely have significant effects on wildlife, subsistence resources, and the carbon cycle.

Over the last 100 years, recorded air temperature within the NWB LCC region has warmed 2.52 °F, twice the global average. The growing season length has increased by 50% and although precipitation is expected to moderately increase, an increase in evapotranspiration, caused by higher temperatures and longer growing seasons, is expected to result in an overall drying trend in the region. These factors, combined with melting permafrost, are expected to have drastic impacts on the boreal ecosystems within NWB LCC. Predicted impacts include a transition from conifer-dominated forests to deciduous-dominated forests or non-forested ecosystems such as grass/shrublands. This is coupled with an increase in the number and extent of invasive species and insect pest outbreaks associated with a warming climate. Land and resource managers from various agencies and organizations within the NWB LCC struggle with how to incorporate climate change-related projections into management strategies, primarily due to lack of information and high uncertainties associated with modeling and predictions.

Climate change and other landscape stressors have the potential to drastically reshape the region's biota, ecosystem services, and human infrastructure, including the TransAlaska

pipeline. Advances in road construction and building technology have increased the safety margins of infrastructure within the region, however, landscape-scale changes in parameters such as permafrost and wildfire are projected to result in billions of dollars of damage to infrastructure in the next century.

The need for large-scale collaborations and directed, applied science to inform management decisions within in the NWB LCC region has never been greater. Land and resource managers are in need of decision support tools, integrated monitoring, and the latest results from climate and ecosystem models. Northwest Boreal LCC is a vehicle to provide the cross-agency communication and information exchange that is necessary for conservation and sustainable management in the context of an uncertain future.



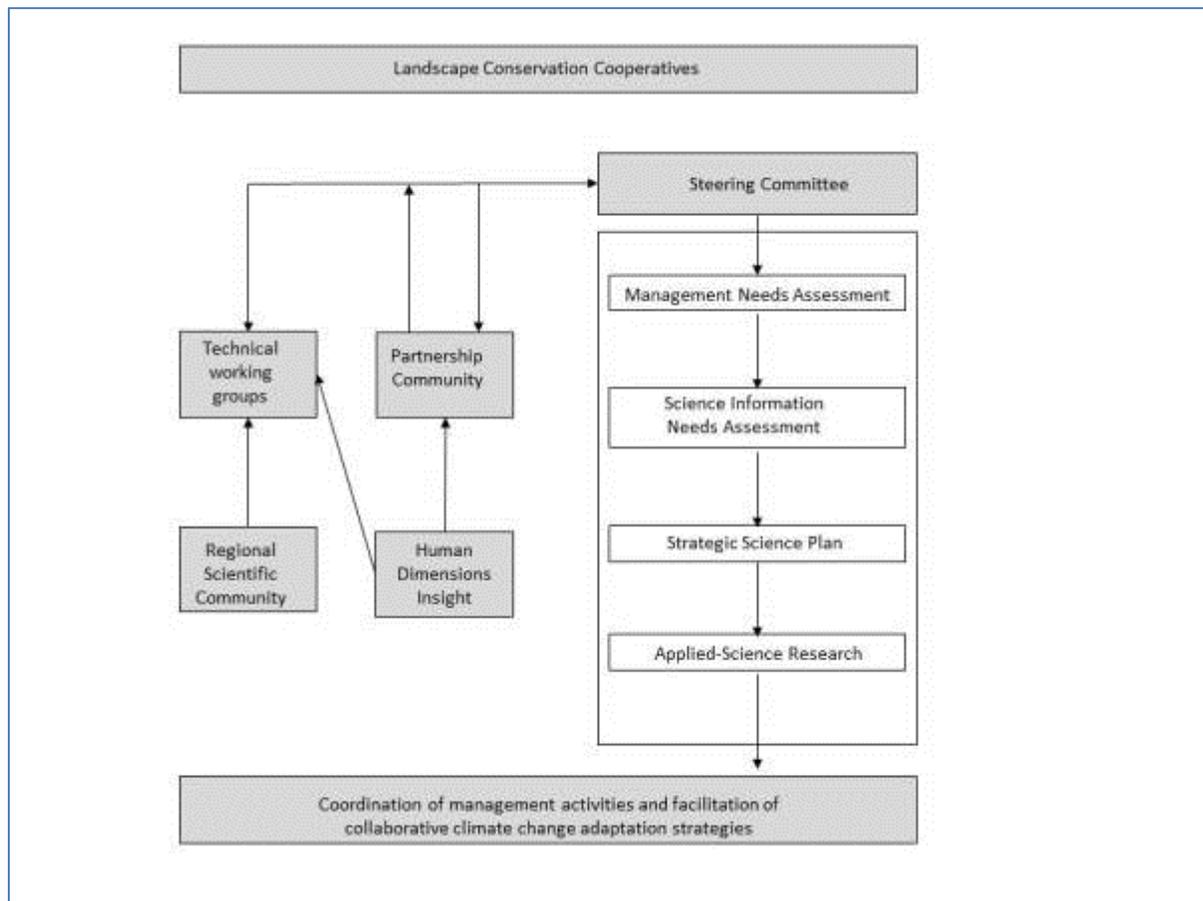
Figure 1. The geographic area of the Northwest Boreal LCC is shown in purple. The LCC includes the boreal forests of Alaska, Yukon Territory, Northern British Columbia, and the western mountains of the Northwest Territories.

Formation of the NWB LCC

The Northwest Boreal LCC, under its original name of the Northwestern Interior Forest LCC, was among the LCCs to be initiated in 2011. In 2012 the Steering Committee took action to rename the LCC. The Steering Committee felt that Northwestern Interior Forest (based on the Bird Conservation Region of the same name) was an inaccurate descriptor of the ecoregion and proved confusing to some potential partners. The LCC Steering Committee felt the new name, Northwest Boreal Landscape Conservation Cooperative, more accurately describes the ecoregion, avoids redundancy in the name, specifically refers to the boreal ecosystems in the northwestern region of the continent, and is consistent with the Canada National Framework ecozone name for the same region (Boreal Cordillera).

Although a young LCC, the NWB LCC continues to mature into a significant member of the region's conservation and natural resource community. There are high levels of excitement among partner agencies and organizations, partly due to the successes of previously established LCCs, such as Arctic LCC and Western Alaska LCC. The NWB LCC will pursue its mission and goals as described in the Landscape Conservation Cooperative depicted in Figure 2 below.

Figure 2. A conceptual model of the structure and function of the NWB LCC.



Staffing

LCC core staff was hired in 2012, with John DeLapp as LCC coordinator and Amanda Robertson as science coordinator. John has been a USFWS employee in the Service’s conservation partnerships programs for the past twelve years. Amanda comes to the Service from the University of Alaska Fairbanks, where she completed her PhD in plant ecology in August 2012. Additional staff support has been provided by our student trainee, Brett Parks, who is completing an interdisciplinary Master’s degree in natural resources at the University of Alaska Fairbanks. With core staff in place, a Steering Committee was formed and LCC Charter drafted.

In 2012 core staff facilitated the transition from LCC Interim Steering Committee to the formal Steering Committee in place today. Staff supported the development of key NWB LCC governance documents, including the NWB LCC Charter. Staff initiated development of an Interim Management Information Needs Assessment, and the implementation of a Management Framing Workshop. These efforts, paired with the LCC Science Workshop, scheduled for the second quarter of 2013, will guide LCC activities for the next 3-5 years.

Core staff also served as an information clearing house for new funding and educational opportunities in support of LCC and LCC partnership mission and goals. Staff support also included improved information exchange on aquatic invasive species across Yukon Territory and Alaska; the coordination of fire and permafrost research opportunities with USGS, NRCS, FWS NWR, UAF; and the development of Alaska/Canada trans-boundary geospatial datasets.

Steering Committee

The Northwest Boreal LCC Interim Steering Committee had its first meeting on October 14, 2011 in Fairbanks, Alaska. During that meeting, it was set as a first priority to engage Canadian partners and a Canadian Outreach Subcommittee was formed. An initial Tribal/First Nations Involvement Strategy was also drafted. At the subsequent meetings, Alaska Native liaisons were present to provide insight and advice for the strategy which is slated to be implemented early in 2012.

On December 12, 2011 a second Interim Steering Committee meeting was held in Anchorage, Alaska. This meeting began the governance process for the NWB LCC. The Interim Steering Committee drafted shared goals and visions statements for review in January 2012 and initiated charter development. Also discussed at this meeting was a timeline for initiating informal or formal information needs assessments to identify management needs as well as science information gaps. A follow-up meeting in February 2012 resulted in formalization of this timeline as well as progress on a charter and articulating shared goals.

As the meetings progress, participation on the Steering Committee has grown, particularly from Canadian partners. Table 1 lists the agencies/organizations currently represented on the Interim Steering Committee.

Table 1. Current list of agencies/organizations represented on NWB LCC Steering Committee

Agency/Organization	Nationality	Federal	State/Provincial	NGO/other
Alaska Climate Science Center	US	X		
British Columbia Ministry of Forests, Lands & Natural Resource Operations	CA		X	
Bureau of Indian Affairs	US	X		
Bureau of Land Management	US	X		
Canadian Forest Service	CA	X		
Council of Athabaskan Tribal Governments	US			X
Ducks Unlimited Canada	CA			X
Environment Yukon	CA		X	
National Oceanic and Atmospheric Administration	US	X		
National Park Service	US	X		
Natural Resources Conservation Service	US	X		
Northwest Territories Dept. of Environment and Natural Resources	CA		X	
Tanana Chiefs Conference	US			X
United States Army	US	X		
United States Fish & Wildlife Service	US	X		
United States Forest Service	US	X		
United States Geological Survey	US	X		
Yukon Research Center of Yukon College	CA			X
Yukon River Intertribal Watershed Council	US/CA			X
Yukon Territory Climate Change Secretariat	CA		X	

Yukon Territory Parks & Protected Areas	CA		X	
Wildlife Conservation Society Canada	CA			X

The Steering Committee held four quarterly meetings in 2012. These meetings played a critical role in developing a cohesive and productive team of resource managers across the LCC geography that is working together to address the highest priority resource management information needs in the region.

The NWB LCC Winter 2012 Interim Steering Committee meeting took place in Fairbanks, Alaska on February 10. Highlights from the agenda included the following:

- Interim Steering Committee members discussed and approved minor changes to the shared boundaries between the NWB LCC and the Western Alaska LCC in the regions of the Nulato Hills and Lake Clark drainage.
- Members of the LCC’s Canadian Outreach Subcommittee discussed their report and made three recommendations, all of which were approved by the Interim Steering Committee:
 - Formally invite Canadian partners
 - Schedule an ISC meeting in Whitehorse, YT in 2012
 - Continue outreach efforts as partnership continues to grow and develop.
- The Information Needs Assessment Subcommittee presented its initial report identifying a process to conduct an informal information needs assessment in order to prioritize LCC efforts and funding to meet the shared information needs of the partnership. This assessment would inform a more formal management-focused workshop scheduled for later in 2012 and Science Workshop planned for 2013.
- Members of the Interim Steering Committee expressed concern about the (original) LCC name, Northwestern Interior Forest LCC, feeling that it did not accurately describe the geographic location of the LCC. The new LCC name, Northwest Boreal LCC, was proposed and agreed upon by the Steering Committee members and the coordinator was directed to submit a memo to LCC leadership requesting that change.
- Members of the LCC’s Tribal Outreach Subcommittee discussed its progress towards implementing a Tribal involvement strategy. The outreach effort involved mailing/faxing letters and phone calls. LCC staff and/or ISC members will take advantage of appropriate meetings/forums to engage the partnership community, capitalizing on existing relationships both in Alaska and in Canada.

The Spring 2012 Steering Committee meeting took place in Whitehorse, Yukon Territory on May 2-4, and was hosted by the Yukon Research Centre of Yukon College. This meeting represented the first meeting on foreign soil since the establishment of the Landscape Conservation Cooperative effort. The US Bureau of Land Management and the Alaska Fire Center provided transportation support for LCC staff and the Alaska members of the Interim Steering Committee

to travel from Fairbanks to Whitehorse. This 600 mile drive served as a valuable team-building exercise, with an opportunity extended discussions of resource and conservation issues. The group travel also reduced the group's carbon footprint when compared with the carbon cost of comparable air travel from Alaska to Whitehorse. Meeting highlights included the following:

- The ratification of the NWB LCC Charter, which established the NWB LCC as the first Alaskan LCC to allow Non-Governmental Organizations to serve on its Steering Committee.
- As provided for in the Charter, two LCC co-chairs were elected by the SC, one from the US and another from Canada. Carl Markon of the USGS was elected as US chair and Eric Schroff of the Yukon Territory's Climate Change Secretariat was elected as Canadian chair.
- The presentation of the preliminary results from informal information needs assessment, with the identification of broad themes and a roundtable discussion of how the information can help inform LCC priorities and goals. The results suggested ways to improve the questions themselves and generated information on what SC members would like to see from the LCCs. Responses were predominantly from US federal agencies. Efforts should continue to solicit responses from non-federal and Canadian entities. The problem of data sharing and data management across the US/Canada border was discussed as being a particularly relevant issue.
- A panel of Alaska Tribal Partners discussed the interest of Alaska Tribes and Tribal organizations within the LCC region, including the status of efforts to include Alaska Tribal partners in the NWB LCC. The presentation included a discussion of the First Nations within the LCC, including status on efforts to include First Nations partners. It was agreed that the use of existing relationships will likely be the most efficient and productive approach to initiating our discussions. A consistent LCC message and strategy will be formulated by the Tribal Working group
- The SC discussed potential projects that could receive funding from the LCC in FY 12. The Steering Committee agreed to support an ongoing project that was already demonstrating benefits to the LCC, the Alaska/Yukon Integrated Ecosystem Model (IEM). The project had received support from other Alaska LCCs and the Alaska Climate Science Center. The project goal is to develop a dynamically linked model framework to link climate-driven changes to vegetation, disturbance, hydrology and permafrost, and their interactions and feedbacks.
- The SC also directed the LCC Science Coordinator to initiate an assessment of the "state of the science" within the LCC geographic area.
- The NWB LCC Steering Committee discussed and endorsed a project in support of Alaska's Bering Strait School District entitled "Raising Educational Achievement Through Cultural Heritage". This project consists of a K-6 program to develop climate-change curricula through scientific community and elders within each community.

Figure 3. Member organizations of the Northwest Boreal LCC Steering Committee



The Summer 2012 Steering Committee meeting took place in Fairbanks on July 31, 2012. The purpose of this meeting was to initiate a more formal information needs assessment by prioritizing biological and cultural resources; to introduce the LCC Steering Committee members to staff and activities of other LCCs in Alaska; and to continue the NWB LCC partnership scoping effort. Meeting highlights included the following:

- Tribal/ First Nations Outreach Strategy update
- The LCC Science Coordinator reported on the status of the NWB LCC State of the Science project:
 - The synthesis of the State of Science within the region included partnership scoping, the development of a partnership list, and a summary of management goals of more than 200 natural resource management organizations within the LCC region.
 - A draft literature review of the State of the Science is projected for Spring 2013, with a final version anticipated in the Fall of 2013
- Staff from the Arctic and Western Alaska LCCs shared lessons learned in their LCC planning, in the development of information needs assessments, and in the prioritization of project activities.
- Two new initiatives were described within the LCC geographic area:
 - The Bureau of Land Management has initiated a Rapid Ecological Assessment for an area of Western Alaska, including the Yukon Lowlands, Kuskokwim Mountains, and the Lime Hills. The NWB LCC Coordinator and Science Coordinator will participate in this effort, which should provide the LCC with an assimilation of valuable information on fish and wildlife species and their habitats.
 - The National Marine Fisheries Service (NMFS) plans to conduct a vulnerability

assessment of the aquatic habitat of the Susitna watershed specific to climate change in Southcentral Alaska. LCC staff will request NMFS to present additional information to the LCC Steering Committee through a future webinar.

- The Steering Committee heard and approved requests for Steering Committee membership from two non-governmental organizations, the Yukon River Intertribal Watershed Council and Ducks Unlimited Canada.
- LCC staff was directed to initiate development of a conservation land status map for the NWB LCC. A geospatial data working group was established to evaluate the availability of this and other relevant natural resource geospatial data.

And in the Fall of 2012, a second meeting was hosted by Yukon College in Whitehorse, from October 30 – November 1, 2012. This meeting consisted of the NWB LCC's Management Framing Workshop and consisted of the prioritization of biological and cultural resources and the identification of primary drivers of change in boreal ecosystems. This workshop was a large-scale partnership scoping effort to identify the management questions, priorities, and information needs of the larger conservation community within the NWB LCC.

- The NWB LCC worked with its partners to determine commonalities in what science and management information is needed, at what scale, and in what format (to inform but not direct) local and landscape level management and planning across the region. This Framing Workshop was the first of several workshops and meetings to identify shared information needs that are intended serve as the foundation of the LCC's science planning process. The workshop participants began defining science and management information end users' needs to help establish a decision context for future LCC activities. Participants identified shared information needs in a logical, consistent manner, following these steps:
 - Identify potential resource information end users
 - Identify outcomes that are of interest to users
 - Identify information needs
 - Develop criteria for evaluating the list of information needs
 - Prioritize science/information needs
- The results of this workshop and associated report will inform the identification of science needs and funding priorities to be formalized in 2013.

International Partnership

LCCs were established to transcend political boundaries; to be a true partnership, NWB LCC is committed to working across the international border to coordinate applied science to inform shared land and resource management needs. Nearly half of the land area (47.5%) in the NWB LCC is in Canada (Figure 1) and the Steering Committee feels strongly that Steering Committee composition and participation should reflect this. Substantial progress has been made in contacting potential Canadian partners. Several Canadian agencies and organizations have shown interest and enthusiasm in participating in NWB LCC, as evidenced in Table 1.

Based on the recommendations of our Canadian Outreach Subcommittee the LCC Steering Committee held two meetings in Whitehorse, Yukon Territory in 2012. The Steering Committee fully engaged our Canadian partners in the dialogue leading to articulation of shared goals, vision and mission statements, and the development of a charter for the NWB LCC.

There are multiple agencies and organizations that would like to participate in the Northwest Boreal LCC in the future. Efforts are being made on a continual basis to engage new partners in both Canada and the U.S, particularly within the Alaska Native and Canadian First Nations Communities.

LCC Projects

While the LCC has received limited funding in support of project activities, we have been successful in leveraging significant amounts of other federal and non-federal funds in support of priority management information needs. The following projects were funded or co-funded by the NWB LCC in 2012:

Cooperative agreement with Wildlife Management Institute – The NWB LCC entered into a cooperative agreement with the non-profit Wildlife Management Institute in support of the facilitation, implementation, and reporting on the LCC’s Management Framing and Science Workshops scheduled for 2012 and 2013. The final reports are due in 2013.

Synthesis of the state of science within the NWB LCC partnership community - *Federal and territorial/provincial agencies and governments, science-based non-governmental organizations, Tribal and First Nations governments, and universities.*

This project will inform the NWB LCC information needs assessment process by broadly identifying the existing knowledge bases as well as the priorities and objectives for science and landscape activities within the region. The purpose of this synthesis is to develop an understanding of the NWB LCC partnership community’s management responsibilities and inform how the NWB LCC can most effectively direct future support of applied science to inform management and landscape planning. Cooperators will work closely with the NWB LCC SC in the identification of priorities and scope of the synthesis. The resulting deliverables will be suitable for distribution to a broad range of stakeholders within the LCC community (scientists, managers, administrators, general public) and will address management information needs. A primary need of the NWB LCC is to identify and describe the greater partnership community (i.e. science and land/resource management organizations that operate within the NIWF geographic region but are not currently represented on the SC). The cooperators are working with the NWB SC to target known

Figure 4. Amanda Robertson, Science Coordinator, speaking to CBC Yukon about the goals of the NWB LCC.



organizations and to characterize the scope of the partners into broad categories. Categories are defined by broad science or management objectives and priorities of each partner organization. This information will directly inform the Steering Committee in its prioritization of biological and cultural Resources.

Integrated Ecosystem Model for Alaska and Northwest Canada:

The NWB LCC is providing financial and technical support in the development of the Alaska and Yukon Integrated Ecosystem Model (IEM) Project. This effort is designed to help resource managers' understand the nature and rate of landscape change. Maps and other products generated by IEM will illustrate how arctic and boreal landscapes may be altered by climate-driven changes to vegetation, disturbance, hydrology, and permafrost. IEM uses three ecosystem models that link changing climate scenarios to different ecological processes:

- The Alaska Frame-Based Ecosystem Code (ALFRESCO). ALFRESCO simulates wildland fire, vegetation establishment, and succession.
- The Terrestrial Ecosystem Model (TEM). TEM models characteristics of organic soils, hydrology, vegetation succession, biomass, and carbon balance in soil.
- The Geophysical Institute Permafrost Lab model (GIPL). GIPL simulates permafrost dynamics such as active layer thickness (the depth of summer seasonal thaw in perennially frozen ground) and mean annual soil temperatures.

The individual models provide important information on how the Alaskan and Northwestern Canada landscapes may respond to climate change. However, these processes do not act in isolation, and they each influence processes simulated in the other component models. Linking ALFRESCO, GIPL, and TEM together will produce a more realistic picture of potential future landscape conditions because it allows the models to simulate known interactions of ecosystem components and physical processes. In addition to linking the models together, new functionality is being developed so that IEM can better simulate ecosystem dynamics such as tundra fire and treeline dynamics, landscape-level thermokarst dynamics, and wetland dynamics.

Figure 5. Geographic extent of Integrated Ecosystem Model



Alaska Stream and Lake Temperature Monitoring Workshop

This workshop was made possible through collaboration between the NWB LCC, the Western Alaska LCC, and the Alaska Climate Science Center. The purpose of the workshop was to address basic questions concerning landscape scale impacts of climate change on Alaska's freshwater fisheries. While some of the data needed to address these questions exists, it is scattered across many different organizations, hindering systematical compilation and regional scale analyses. The Stream and Lake Temperature Monitoring Workshop brought together 28 hydrologists, researchers, fisheries biologists, local experts and managers to address these water temperature questions that are 'bigger' than any one organization. Participants focused on the actions necessary to expand water temperature collection efforts to the point where they provide adequate data for developing regional-scale predictive models of changes in water temperature as a function of changes in air temperature. Such models provide a critical method of advancing our understanding of how changes in water temperature may affect fisheries habitat over the next century.

Conclusions

The Northwest Boreal LCC (formerly known as the Northwestern Interior Forest LCC) was formed in the second half of 2011. During that time, a comprehensive team effort from NWB Interim Core Staff and Region 7 Science Applications staff was central to forming the base of an international, inter-agency partnership. The greater partnership community continues to grow, as does interest in the NWB LCC. The need for and interest in conservation planning at the landscape scale is great in this region; increasing participation in the NWB LCC reflects this need.

At a year and a half old, the Northwest Boreal LCC is developing into a strong regional conservation presence. Our Coordinator and Science Coordinator are working with a diverse Steering Committee consisting of members from Alaska and neighboring Canada to formalize LCC governance and determine the LCC's science focus.

In 2012 the NWB LCC ratified its charter, formalized its Steering Committee membership, and provided technical and financial support to address several important landscape scale resource information needs.

In 2013 the NWB LCC will embark on an effort to strategically identify management and science information needs and to prioritize research, monitoring and modeling efforts within the region. The results of the management information needs workshop and the planned 2013 Science Workshop will guide us in our selection of several high priority projects designed to provide immediate results. The LCC will leverage our modest level of FY13 project funding with additional external funding to improve our shared scientific understanding of the boreal landscape.