LTER: Cross-scale controls over responses of the Alaskan boreal forest to changing disturbance regimes

Section I. Direct effects of climate change on ecosystems and disturbance regimes (Hollingsworth)

Task C1: Quantify the climate sensitivities of vegetation communities across multiple temporal and spatial scales, with an emphasis on relationships among plant species diversity, life history and functional traits, and productivity	Hollingsworth, Verbyla, Mulder
Task C2: Determine the direct and interactive effects of climate sensitivity vs. intrinsic factors on wide-spread patterns of browning in the boreal forest	Johnstone, Mack, Goetz, Ruess
Task C3: Examine the relationship between climate and the spatial heterogeneity of fires (variation in burn area and severity, fragmentation of burn scars, composition of unburned islands) and determine what parts of the landscape are most vulnerable to reburn and vegetation change	Hollingsworth, Verbyla, Turetsky
Task C4: Examine how interactions among climate, fire severity, and landscape characteristics govern patterns of permafrost thaw and subsequent recovery	Turetsky, Romanovsky, Schuur

Section II. Scale-dependent climate-disturbance interactions as drivers of ecosystem and landscape change (Mack, Jones, Ruess)

Task D1: Examine the effects of plant and microbial propagule dispersion on post-fire establishment of key plant species and successional trajectories, and determine how propagule availability will respond to an altered fire regime	Johnstone, Hollingsworth, Ruess, Taylor, Mack
Task D2: Examine the spatial patterning and strength of plant-herbivore interactions across the post-fire landscape in relation to plant growth, species dominance, successional pathway, and biogeochemical cycling	Kielland, Ruess, Genet
Task D3. Determine the consequences of a changing fire regime and fire-driven permafrost thaw for biogeochemical connectivity between past and present ecosystems	Mack, Turetsky, Schuur, Johnstone, Hollingsworth, Taylor, Harms, Genet
Task D4: Examine the interactions among changes in climate, permafrost, and vegetation on soil water retention, hydrologic partitioning, and stream export of C and N across upland boreal forest catchments	Jones, Harms
Task D5: Determine influences of vegetation and permafrost thaw on soil C storage and soil water retention and hydraulic properties	Turetsky, Schuur, Mack

Task D6: Use global change experiments situated in contrasting upland and lowland ecosystems to determine ecosystem responses to changes in permafrost extent and surface hydrology	Schuur, Turetsky
Task D7: Characterize patterns and drivers of recent changes in regional distributions of key plant pathogens, assess pathogen effects on plant growth, community composition, and successional dynamics, and predict future impacts on ecosystem function at regional scales	Ruess, Wagner, Rupp
Task D8: Examine the direct and interactive effects of insect herbivores and vertebrate browsers on plant growth, biogeochemical cycling, and vegetation development in early successional stands	Wagner, Kielland, Ruess
Task D9: Determine how post-fire stand age and area influence aspen's susceptibility to insect herbivory and impact the population dynamics of an outbreak insect herbivore	Doak, Wagner
Task D10: Examine population dynamics of snowshoe hares and their spatial synchrony across a latitudinal boreal transect in relation to the abundance and space use of their primary mammalian predators	Kielland
Section III. Linking landscape heterogeneity with regional and global climate feedbacks (Rupp, Euskirchen, Genet)	
Task CF1: Modify the integrated model framework of fire regime and ecosystem structure and function to incorporate information developed from Sections I & II to the effects of intermediate-scale patterning and processes. Compare retrospective analyses of disturbance regime and landcover change between applications of the modeling framework that do and do not consider intermediate-scale patterning and processes	Rupp, McGuire, Genet, Turetsky, Romanovsky
Task CF2: Compare changes in ecosystem structure estimated by the new integrated model framework for future scenarios of climate for interior Alaska to applications of the integrated model framework that do not consider intermediate-scale patterning and processes	ıp, Euskirchen, Genet, Turetsky, McGuire, Romanov
Task CF3: Evaluate if simulated future changes in boreal ecosystems are unprecedented in the context of natural variability at decadal to millennial timescales	Hu, Rupp, McGuire, and Mack
Task CF4: Analyze water and energy feedbacks to future change in climate for interior Alaska between applications of the model that do and do not consider intermediate-scale patterning and processes	kirchen, Turetsky, Genet, Rupp, McGuire, Romanov
Task CF5: Analyze C feedbacks to the climate system to future change in climate for interior Alaska. Compare applications of the modeling framework that do and do-not consider intermediate-scale patterning and processes	Genet, Turetsky, McGuire, Romanovsky

Section IV. Coupled Social-Ecological Dynamics for Interior Alaska (Brinkman, Kofinas)

Task SES1: Build and evaluate partnerships between LTER scientists and rural communities to increase two-way communication, develop metrics to assess impact, and ultimately expand the utility of LTER research to local stakeholders	Brinkman, Hollingsworth
Task SES2: Advance the practice of community-based ecological monitoring through development of methods for documenting local observations	Kofinas, Brinkman
Task SES3: Evaluate interactions among environmental change, harvest regulations, and hunter access to wildlife to assess how environmental change has influenced the association among wildlife distribution, harvest regulations, and hunter access to wildlife resources	Brinkman, Hollingsworth
Task SES4: Assess the capacity of different communities to respond to environmental changes	

Section V. Integrating LTER science and resource management with regional environmental change through co-production (Johnstone, Brinkman, Ruess)

Task CP1: Document the impacts of alternate successional trajectories on the abundance and composition of fuels through succession for dominant vegetation types in interior Alaska	Johnstone, Mack, Rupp
Task CP2: Estimate the landscape consequences of different scenarios of changing fire regimes and fire management on patterns of carbon sinks and sources in interior Alaska	Johnstone, Mack, Rupp
Task CP3: Quantify vegetation composition and change within fire break and timber/biofuel harvest areas, and assess use by both moose and hunters	Brinkman, Kielland, Ruess
Task CP4: Design and implement a landscape-level experiment to test management scenarios affecting forage availability, moose distribution, habitat use, and hunter behavior	Ruess, Brinkman, Kielland