Program of Work for Sierra Nevada Public Lands Management Act

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This program of work describes anticipated accomplishments and deliverables for the third Sierra Nevada Public Lands Management Agency (SNPLMA) Lake Tahoe project for Portland State University. This project extends previous LANDIS-II modeling work done in the Lake Tahoe Basin to include new modeling scenarios, make explicit linkages to the science team, improve fire modeling under climate change, and tightly integrate hydrology.

*Staff and responsibilities*

Staff at Portland State University include:

Dr Robert Scheller, Associate Professor – will act as PI and project supervisor, and coordinate modeling efforts with project collaborators

Alec Kretchun, research staff – will act as day-to-day project manager, acquire necessary data, run LANDIS-II models, and analyze output

*Timeline*

Anticipated start date for this program of work is December 1, 2016 and is projected to last until May 30, 2018, with an accompanying budget of $200,000.

*Project Initialization and model evaluation*

This project leverages two previous rounds of LANDIS-II modeling in the Lake Tahoe Basin, much of which has now appears in published manuscripts. However, many model developments and innovations have taken place since the most recent simulations were completed. So, one of the first tasks to evaluate if any of the previous input parameters need to be updated to reflect the updates to the model architecture. Once a thorough evaluation of input parameters has been completed, simulations will be run with historic climate to further assess the need for updates to previously vetted input parameter values.

*Climate Data Acquisition and Management*

One of the major LANDIS-II model developments since the completion of the previous SNPLMA project is the tight coordination of climate data across all model processes, as managed by the NECN model extension and climate library. For the initial project phase, we will work with local collaborators to determine which climate change scenarios are most applicable and meaningful for the science and management teams, in order to project a range of anticipated ecological outcomes. We will then acquire data for these climate change scenarios and organize it for use within the climate library.

*Model Scenario Development*

One of the major proposed accomplishments of this project is to include new management scenarios that encompass fuel treatments beyond the Wildland Urban Interface (WUI). Prior research limited simulated management to areas immediately within or adjacent to the WUI, consistent with previous management plans. In this initial project phase we will design these scenarios through a highly collaborative process with local scientists and managers. Effective model scenario development is critical to the success of LANDIS-II as a centralized platform to serve data relevant to many ongoing research efforts including hydrology, smoke modeling, erosion, bird habitat, etc. In addition, a new initiative to expand treatments beyond the WUI will benefit from carefully designed simulations of effectiveness (measured as reduction of fire risk) and consequences for other ecosystem services.

*Explicit linkages to science team*

Our modeling platform can serve as a centralized platform to serve data relevant to many ongoing research efforts including hydrology, smoke modeling, erosion, bird habitat, etc. Doing so will require adding additional model outputs and/or providing cross-walks from model output to necessary inputs for these other efforts. For example, model linkage to hydrology can be facilitated by outputting projections of precipitation minus evapotranspiration, given climate change, disturbances, and management.

*Fire modeling improvement*

Prior simulations can be improved through a new integrated fire modeling module that, a) explicitly captures the influence of climate, fuels, topography, suppression, and fuel treatments, and b) can be parameterized from available exogenous (e.g., remote sensing, expert opinion) and endogenous (existing within the model: species, age, biomass) data. Inputs should be tractable with solutions that can be estimated from remotely sensed data and/or readily resolved using spatial data. This effort will also benefit related research in the southern Sierra Nevada and Klamath ecoregions.

*Hydrology integration*

After discussion with Adrian Harpold, we see a huge opportunity to advance hydrology and landscape change. LANDIS-II already incorporates some hydrologic processes. Adding a few key additional processes would allow for integrated assessments into the future, albeit at coarser resolution than for any one watershed.

*Final LANDIS-II calibration and analysis*

Final LANDIS-II model simulations will be calibrated and final results will be produced. Variables of interest to the science team and the manager/stakeholders will be analyzed and presented in both project reports and webinar formats.

*Project Meeting*

A project meeting is scheduled for January, to be held in South Lake Tahoe. Dr. Scheller and Alec will attend this meeting in order to meet all project participants and have breakout sessions on climate change projections and scenario development.

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| **Task** | **Start date** | **End date** | **Notes** |
| *Project Initialization and model evaluation* | Dec 2016 | January 2017 |  |
| *Climate Data Acquisition and Management* | January 2017 | February 2017 | Details of climate data will be addressed at project meeting |
| *Model Scenario Development* | January 2017 | April 2017 | Scenarios will be discussed in great detail at project meeting |
| *Explicit linkages to science team* | February 2017 | December 2017 | Making links to science team will require consistent communication and coordination |
| *Fire modeling improvement* | June 2017 | August 2017 |  |
| *Hydrology integration* | September 2017 | January 2018 |  |
| *Final LANDIS-II calibration and analysis* | January 2018 | May 2018 | This will be an iterative feedback process with science team and managers |
| *Project Meeting* | Jan. 12, 2017 | Jan. 12, 2017 | Meeting organized by Dorian Fougeres of National Forest Foundation |