**PROJECT TITLE: Optimizing Management of Minnesota’s Forest Landscapes**

**I. PROJECT STATEMENT**

Minnesota forests provide many diverse products and services, from the production of sawtimber, pulp and new biochemicals and biofuels to provision of societally-important values such as water quality, wildlife habitat and recreational opportunities. The social, economic, and ecological benefits of forest lands provide the foundation for sustaining prosperous and resilient communities. Making sound, landscape-scale decisions on forest management that balance these products and services is becoming more and more challenging as forests change and industry needs evolve. Forests show a wide range of variation across Minnesota’s geographically complex landscape, and understanding regional variation in composition, productivity, and potential to provide ecological and social benefits is critical for making sound management decisions. The goal of this project is to develop a spatially-explicit decision tool that integrates forest productivity, ecosystem service, and economic information to identify the benefits and tradeoffs of land management decisions.

We will accomplish this goal by:

* mapping the variability of forest key forest attributes (composition, structure, biomass, habitat) across the regional landscape;
* predicting how future management decisions and climate change will affect forest resources;
* quantifying the value of forest ecosystem services such as maintaining or enhancing water quality, providing wildlife habitat, and producing timber for woods products industries;
* assessing new demands for forest resources given emerging biochemical and advanced biofuel industries;
* collaborating with end users to integrate this information into a publically-accessible decision support tool for optimizing decisions that balance economic, ecological and social concerns.

 **II. PROJECT ACTIVITIES AND OUTCOMES**

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| **Activity 1: Model forest response to a range of management, disturbance and climate change scenarios.**We will use existing maps of current forest conditions as a starting point for addressing forest response to management, disturbance and climate change. Working with stakeholders, we will develop management scenarios based on current and anticipated forest product needs, and use these to project future forest conditions at 5-10 year intervals. Included in the scenarios will be establishment of emerging forest industries (mass timber, advanced biofuels) with assessments of resource demand, supply chain and transportation needs. Management scenarios will be run under current and projected climate regimes to further understand how the products and services change in the future. Model runs will be implemented using LANDIS-II, a well-established forest landscape change model.**ENRTF BUDGET: $130,183** |  |

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| **Outcome** | **Completion Date** |
| *1. Engage stakeholders, develop management scenarios* | *Dec 2020* |
| *2. Run forest management and climate scenarios*  | *Sept 2021* |
| *3. Interpret and deliver results to stakeholders* | *June 2022* |

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| **Activity 2: Characterize the spatial distribution and value of forest-related ecosystem services**The ecosystems services provided by forests – carbon storage, water and air purification, wildlife habitat, recreation, and numerous others – must be maintained. We will quantify the ecosystem services provided by forest type and provide both market and non-market (e.g., social value) valuations of these services. The type and degree of ecosystem services vary across forest types; we will map the spatial distribution of services and use this information in determining optimal uses of forests across the landscape.

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| **Outcome** | **Completion Date** |
| 1. Quantify range of ecosystem services associated with forested landscape | Dec 2021 |
| 2. Quantify market and non-market valuation of services | Dec 2021 |
| 3. Map ecosystem services distribution and value | Dec 2021 |

**ENRTF BUDGET: $242,706**

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| **Activity 3: Develop a user-friendly decision support tool that assesses social, ecological and economic** **outcomes of forest management decisions.** |

We will integrate forest management modeling and ecosystem service valuations into an online map-based utility that will allow forest land managers and other stakeholders to weigh the costs and benefits of alternative management decisions based on current and future resource availability, supply chain issues, maintenance of ecosystem services, and predicted climate effects. We will assemble a group of end users that we will work with throughout the development process to ensure their needs are met and the software is stable, well-documented, and easy to use. Once development is complete outreach and training sessions targeted to forest land managers, decision makers and engaged citizens will be conducted.

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| **Outcome** | **Completion Date** |
| 1. Develop the decision support tool with collaborator input; beta-test with end users | April 2022 |
| 2. Deploy the model on a University of Minnesota web server | June 2022 |
| 3. Conduct outreach and training sessions in model use, present and publish results | June 2022 |

**ENRTF BUDGET: $122,574** |  |

**III. PROJECT PARTNERS AND COLLABORATORS:**Dr. George Host (NRRI-UMD) will serve as overall project manager and lead on Activities 1 and 3. Drs. Steven Polasky (UMTC-Applied Economics) and Lucinda Johnson (UMD-NRRI) will co-lead Activity 2. Drs. Ron Moen and Christopher Wright will coordinate wildlife and habitat modeling, respectively.

**IV. LONG-TERM IMPLEMENTATION AND FUNDING:**

The long-term goal of this project is to bring truly sustainable economic development to Minnesota’s forested regions. The outcomes of this project will support a forest products industry that can sustain the ecological services of the state’s forests while simultaneously sustaining family-supporting jobs and economic growth of the region. One major product will be contemporary characterization of available forest resources and a forecast of future wood availability to industry.