Analysis of Small-Diameter Wood Supply in Northern Arizona

Forest Ecosystem Restoration Analysis (ForestERA) Project, Northern Arizona University

Synopsis: Forest restoration stakeholders across northern Arizona have identified the importance of developing community-based industries capable of utilizing wood fiber harvested during restoration and community protection-related forest management activities. In order to clarify the availability of such wood fiber across the region for such industries, a comprehensive landscape-scale analysis of wood byproducts stemming from collaboratively derived treatment scenarios (recommendations on the type and location of treatments), is needed. As such, the ForestERA project proposes to build on its five years of work in developing spatial data on forest composition and structure (Sisk et al 2006) to estimate and assess tree density and wood volume for ponderosa pine forests across northern Arizona.

We will also support a series of collaborative working sessions using GIS data, ecological modeling, or other technical information aimed at building agreement on ecologically appropriate treatment scenarios across the region. Such scenarios that specify the location and intensity of restoration and fuel reduction treatments will further clarify wood fiber deemed by the group to be available for utilization within the study area.

Analysis Area: The analysis area will include ponderosa pine-dominated areas within selected National Forest boundaries in north-central Arizona. The area is located south of the Grand Canyon and spans the full extent of the Mogollon Plateau to the border of New Mexico. We will also include pinyon pine and juniper lands within and adjacent to the analysis area when efficient from an analysis stand point. Native American lands south of the Apache-Sitgreaves NFs can also be added at no extra cost if collaborative group members can reach agreement with the White Mountain Apache tribe.

Collaborative process: In discussions with the ad hoc committee from which the idea for this proposal originated, a plan has emerged to hold six to eight collaborative working group meetings to accomplish the goals of this project (approximately one per month). The ad hoc committee selected five Steering Committee members to advise and convene the collaborative process. The Steering Committee has selected 15 additional Working Group members to join them in participating in the 6 to 8 collaborative meetings. They used several criteria to select a sufficiently diverse Working Group with the necessary background to participate in the proposed collaborative process including: 1) expertise, 2) representation from a variety of organizations, 3) geographic purview (range) and 4) availability. We have included funds in this proposal for both process administration of the collaborative meetings and for the ForestERA team to support this group using our spatial decision support system (Hampton et al. 2005, 2006) and new spatial analyses. Available spatial data layers covering large portions of the proposed analysis extent include fire hazard, fire risk (Dickson et al. 2006), wildlife (e.g., tassel-eared squirrel and Mexican spotted owl habitat; Prather et al. 2005, 2006), and post-fire watershed effects (Piehl et al., in review).

Early in the process, we will support the Working Group in prioritizing the need for different spatial layers and other information they will use to aid in specifying the location and type of treatments. The White Mountains and Western Mogollon Plateau landscape assessments (ERI and ForestERA 2005, ForestERA and ERI 2004) offer collaboratively defined information from which to draw. We will assist the group in developing additional priority datasets and analytical capabilities as time and resources allow. For example, although not an explicit goal of this proposal, the Working Group may propose conducting a preliminary economic analysis.

In order to involve a broader range of stakeholders beyond the 15-20 Working Group members, we will implement a "fish bowl" process. In this process, all interested parties will be welcome to attend Working Group sessions as observers with an opportunity to comment at the end of each meeting. Comments and questions will be integrated in the meeting minutes and either addressed at that meeting, depending on the remaining time available, or at the following Working Group meeting. The beginning of each Working Group meeting will be set aside to discuss a summarized list of questions pooled from both the public comment period of the preceding meeting and provided via email, phone, or post to ForestERA between meetings. In addition, Steering Committee members have agreed to maintain contact with various elected officials and other key players during the collaborative analysis for the purpose of obtaining their input and keeping them abreast of developments. Working Group members not serving on the Steering Committee will also be invited to serve this function. We will develop a list of key players with whom to maintain contact and their respective Working Group members.

Estimation of Wood Supply: To estimate wood supply, we plan to augment our existing forest structure layers with newly developed estimates of forest volume by tree diameter classification using proven methods in use elsewhere (e.g., Silverstein et al, 2006) and adapted for Southwest forests. Specifically, we will apply allometric relationships between forest metrics derived from FIA and other field plot data to currently available forest structure layers to characterize tree-size volumes. ForestERA has developed forest structure layers for the vast majority of the study area including basal area, stem density, and canopy cover based on advanced exploratory data analysis (Xu et al. 2006) and other techniques. We have assessed the accuracy of these forest structure layers using various methodologies, including substitution accuracy analysis and cross-validation. To obtain size-class information and better assess map accuracy, we will expand our existing database of vegetation ground plot data with both new field information and Forest Inventory Analysis (FIA) data. The application of these techniques will result in “wall-to-wall” map-based information on tree density and wood volume in multiple size classes designed for use in wood utilization economic analyses.

To determine the amount of potential fiber resulting from prescription recommendations defined by the collaborative group, we will add volume estimates to our treatment models. The results will be presented in the context of ranges of supply/volume, under a variety of treatments.

To the extent that wood volume estimates need to account for future net growth, estimates of annual net growth in Arizona ponderosa forests do exist (O'Brien 2002, FIA 1999). We propose to conduct a brief review of available methods (e.g., algorithms used in the Forest Vegetation Simulator) to present to the collaborative group for consideration. Modeling forest growth is possible, but the value that this would add to future wood supply estimates is currently unknown and such growth modeling is not achievable under the desired time line and budget of this project. Nevertheless, stakeholders have expressed interest in gaining greater scientific clarity on how much growth is reasonable to include in wood byproduct estimates, and we believe this can be accomplished with a literature review and, if warranted, simple growth projections.

Deliverables: This seven month project has the following deliverables:

- Mobilize the best-available science to quantify wood volume by size-class across the region.
- Fully engage agency representatives and stakeholders in a collaborative process to build agreement on ecologically appropriate map-based treatment scenarios.
- Estimate the volume of wood byproducts removed following each treatment scenario.
- Review and recommend methods for estimating future net growth.
- Prepare a database of existing wood harvesters, processors, and users.

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