Enhancement of Terrestrial Carbon Sinks through the Reclamation of Abandoned Mined Lands

Quarterly Report

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DISCLAIMER

ABSTRACT

This project will determine the optimal forest management method to employ for each of the major commercial tree species so that profitability of timber production only or the combination of timber production and carbon sequestration is maximized. The goal of this project is to achieve DOE's long-term cost goal of sequestering carbon at $10 or less per ton. Because the potential of a forest ecosystem to sequester carbon depends on the species, site quality and management regimes utilized, this project will determine how to optimize carbon sequestration by determining how to optimally manage each species, given a range of site qualities and economic variables. This project also will determine the effects of a carbon credit market on the method and profitability of forest management, the cost of sequestering carbon, and the amount of carbon that can be sequestered. Information from this project will be used to produce user-friendly manuals which will contain economic and biological data for each of the species. These manuals will inform landowners and forest managers how to manage forests for timber and/or carbon credits, how to maximize financial returns, how much money can be earned, and how much carbon can be stored. Manuals will be disseminated through state and federal agricultural extension services and the forest service of each state, and will be published in forest landowner magazines.

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INTRODUCTION

This goal of this project is to determine the optimal forest management method to employ for each of the major commercial tree species so that profitability of timber production only or the combination of timber production and carbon sequestration is maximized. The specific objectives of the project are:

OBJECTIVE 1: For each major tree species, calculate the optimal management regimes to use to maximize financial returns from timber production, calculate the potential amount of carbon that can be stored in trees and forest ecosystems, and determine profitability, total cost and per ton cost of carbon sequestration given optimal forest management.

OBJECTIVE 2: Assuming the existence of a carbon credit market, assess the effects of this market on the profitability of forest management for each major tree species, determine the forest management regime to use to maximize financial returns, and calculate the cost of sequestering carbon and the amount of carbon that can be sequestered.

OBJECTIVE 3: For each major tree species, write user-friendly management manuals which include economic and biological data for timber and/or carbon credit management. Each manual will include:

- the optimal management regime to use to maximize profit from timber production only and from the combination of timber production and the sale of carbon credits;
- financial returns from forest management, including net present worth and internal rate of return;
- total tons of carbon sequestered over a rotation, the average cost per ton of sequestration and the net revenue earned for each ton of carbon stored.

EXECUTIVE SUMMARY

We have accomplished the most difficult aspects of this research: we have developed the dynamic program called FORMOP. FORMOP combines FVS with our economic optimizing computer programs. FVS (The Forest Vegetation Simulator), developed by the U.S.D.A. Forest Service and containing the best growth and yield equations, will be used to simulate growth and yield for each of the major commercial tree

species. The FVS programs in FORMOP will produce millions of possible combinations of thinning intensities, thinning frequencies, and timing of thinnings and final harvest. This data will provide stand and stock tables and volume yield data for every feasible biological combination and will be analyzed by the economic programs in FORMOP. This will result in determining the optimal rotation, the rotation which maximizes financial return from timber production only, from carbon sequestration only, or from the combination of timber production and carbon sequestration.

To date, we have accomplished "task 1" and "task 2". The objective of task 1 was to obtain growth and yield data for the major commercial tree species in the United States. The objective of task 2 was to gather economic data necessary to determine the financially optimal timber rotation. Data gathered for each species, in each state where it is a major component of the forest ecosystem, includes stumpage prices, labor costs, and real price increases for sawtimber, pulpwood and labor.

We have begun work on tasks 3, 4, 5 6 and 7:

Task 3. Conduct economic analyses to determine the financially optimal timber rotation.

Task 4. Determine the financially optimal timber management regimes for each species.

Task 5. Quantify the potential amount of carbon that can be stored in trees for each of the financially optimal timber management regimes.

Task 6. Calculate the potential amount of carbon stored in each forest ecosystem.

Task 7. Calculate the total cost and per ton cost to sequester carbon.

We are conducting literature reviews and gathering more detailed management costs and stumpage price data on our "first round" of species. These include:

In the western U.S.: Douglas fir, Ponderosa pine, Lodgepole pine.

In the Lake states: Red pine, Aspen, Sugar maple.

In the Northeast: White pine, Balsam fir, Black cherry.

In the South: Longleaf pine, Yellow poplar, Slash pine.

EXPERIMENTAL

No experiments have been conducted to date.

RESULTS AND DISCUSSION

No results have been obtained.

CONCLUSION

No conclusions can be drawn.

LIST OF ACRONYMS AND ABBREVIATIONS

FVS is the Forest Vegetation Simulator.

FORMOP is the Forest Resource Management Optimizer.

APPENDICES

No appendices are included.