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Working Paper 51

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Evaluating the Cost and Effectiveness of Forest Stand Structure Management Alternatives to Restore Environmental Values

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Executive Summary

Economic incentives and regulations are two means of achieving environmental outputs from managed forest lands. While regulations generally create disincentives for resource managers by increasing costs and reducing output, incentive mechanism may allow forest managers the flexibility and creativity to find the lowest cost means of providing environmental outputs. If properly formulated, incentives will equitably distribute the costs of increased environmental outputs.

This paper discusses the need to measure the costs and benefits associated with alternative management policies as prerequisite for an effective incentive system. Measuring the costs and benefits in a systematic manner will allow public officials and resource managers to agree upon realistic levels of compensation and expected benefits.

An illustrative model has been developed to demonstrate how a measurement system could work. The model uses a spreadsheet to project forest growth through time under different management scenarios. The data represents western Washington even aged commercial timberland for all owners in terms of age class by acres. The present distribution is skewed towards younger age classes as the result of past timber production policies.

Alternative management scenarios are examined for environmental benefits and costs. Management scenarios illustrated include combinations of: (a) wildlife thinning (thinning with extended rotation) for the 3Q-39 year age class; (b) a variable percentage of the area clear cut in the 60-69 year age class; and (c) and a variable percentage of the area clear cut in the 100-109

year age class. Scenarios are input as proportions of acres in the age class to receive each treatment. These combinations illustrate the relative impact of thinnings, short rotations, long rotations and set asides.

In each decade a marginal cost is measured as the difference in net revenue between the scenario being projected and an assumed profit maximizing scenario. These costs are summed and discounted over a 150 year (15 decade) planning horizon. As such only direct operating costs are measured. An incentive mechanism could also consider indirect costs.

An environmental index is calculated on the basis of stand structure distribution. Revenue loss for management alternatives are compared to progress in shifting the stand structure from the present distribution towards a target distribution over the 150 horizon. Restoration of a target stand structure distribution is used as proxy for the potential environmental benefits. Alternative indexes or variable(s) could also be used to measure environmental output.

For each forest management alternative considered, the marginal cost and stand structure shift are calculated and shown in Figure 3. Results show that a level of wildlife thinning from 20 to 60 percent combined with a modest reduction in the acres clearcut at 60 years characterize the more efficient solutions. Extending the rotation age or increasing the amount of set asides are extremely costly. The cost effectiveness of the solution is also shown to depend on the rate of the shift towards the target stand distribution; a greater rate will increase costs while a slower rate will reduce costs. The limitations and

assumptions of this model include the impact of a discount rate, which is assumed to be a real rate of 5 percent. The model is not spatially explicit

This paper demonstrates an approach to measure both the incremental costs and benefits that could be tied to environmental targets and linked to an economic incentive approach for increasing environmental outputs for managed forest lands. An effective system must identify management alternatives that impact forest dynamics in ways that contribute the most to both timber and environmental goals.

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