

# 2018 Financial Analysis of DNR Silvicultural Investments

## Updated Summary

### August 21, 2019

#### **Context**

Following timber harvest, DNR invests in the regeneration of forest stands to meet multiple objectives which balance financial, regulatory, social, and ecological factors. There are strong financial incentives to accomplish this task as quickly as possible using various young stand treatments and management regimes best suited for each individual site. In recent years, budget shortfalls have limited DNR's ability to fully fund young stand investment needs, resulting in stands with reduced capacity to generate future revenue. Scott McLeod, State Lands silviculture scientist, conducted an initial financial analysis in fall of 2018 to justify the value of these investments to DNR Uplands managers. Scott's position has been vacant since his retirement in February of 2019. This document summarizes the results of his analysis, which was based on prior experience with growth and yield models (e.g. Forest Vegetation Simulator), professional experience, and knowledge of recent scientific forestry research. We have recently begun work on a more rigorous, modeled financial analysis as we consider alternatives to provide more funding for young stand silviculture treatments.

#### **Methods**

To better understand the financial implications of conducting young stand treatments in western Washington, management regimes common to the region were assessed. These regimes include:

- Natural regeneration (no planting) with no follow up treatments
- Site preparation (prior to planting) and planting with no follow up treatments conducted or needed
- No site preparation with planting and no follow up treatments needed or conducted
- Site preparation and planting with release (vegetation control after planting) when needed
- Site preparation with planting and pre-commercial thinning (PCT) when needed

Each regime was projected to a financially efficient harvest age (i.e. Payback Period) and the investment cost (i.e. Cash Flow), bare land value (BLV), net present value (NPV), and internal rate of return (IRR) were calculated on a per-acre basis. Recent contract labor and seedling prices for western Washington were used to assign costs to the different young stand treatments. The treatment regime with the greatest BLV was defined as the preferred regime and differences between the preferred regime and others were calculated as lost value. The regimes were investigated for a pure Douglas-fir stand with a 50-year site index of 115 feet (near average for ownership), a General Ecological Management (GEM) objective, and no commercial thinning. A discount rate of 3% was used for this analysis.

#### **Results**

The preferred regime was the site preparation and planting regime, as this combination of treatments resulted in the greatest IRR and BLV (Table 1). Although natural regeneration has the lowest investment cost, indicated by this regime having the greatest reduction in initial investment, it does not perform well and is difficult to predict, resulting in slow growth and increased risk of poor stocking which could result in regulatory penalties. The BLV per acre for the site preparation with planting regime was \$1,182 greater than that of the planting without site preparation regime, and \$2,630 over natural regeneration.

Implementing release and PCT treatments when stand conditions warrant increases per acre BLV, with PCT resulting in a greater gain in BLV than release.

**Table 1: Analysis of Young Stand Investment Opportunities - Summary Table – 10/2/2018**

Regime	Investment Cost Reduction (\$/ac)	Harvest Age (yrs)	Lost** NPV (\$/ac)	Lost** BLV (\$/ac)	(IRR) ***	Lost Future Value (\$/ac)	Lost Mgmt Funds (\$/ac)	Comment
No SP or Planting	\$519	70	(\$1,794)	(\$2,630)	5.96%	(\$10,585)	(\$2,964)	Natural Regeneration
SP & Plant	\$0	45	\$0	\$0	7.27%	\$0	\$0	Preferred Regime
No SP*	\$155	48.5	(\$810)	(\$1,182)	6.19%	(\$2,703)	(\$757)	Planting without SP
No Release*	\$155	44.5	(\$402)	(\$618)	6.95%	(\$1,556)	(\$436)	When Necessary
No PCT*	\$155	37.5	(\$591)	(\$1,098)	7.10%	(\$2,417)	(\$677)	When Necessary

\*No Site Prep (SP), Release, or Pre Commercial Thinning (PCT) results in a decreased investment cost and reduced future value if treatments are not conducted when necessary.

\*\*Lost values can be regained by conducted treatments when necessary.

\*\*\* IRR values represent the rate of return of the entire treatment regime.

### **Conclusions and Discussion:**

In This analysis shows that the utilization of site preparation and planting results in the greatest IRR, BLV, and future value. This is based upon what is considered an average western Washington site. Not all sites will require site preparation (e.g. coastal western hemlock sites) and others may require release and PCT treatments (e.g. high site class sites with hardwood competition). Site preparation will result in an increased BLV of \$1,182 on the average DNR managed acre. Although PCT shows a greater increase in BLV than release, the treatments should be applied when appropriate and they can not necessarily be substituted for one another. The use of a site preparation treatment will reduce the likelihood of future stand tending treatments (e.g. release or PCT). Development of a heavy hardwood tree and shrub component early in stand development would result in the need for a release treatment (often age 4-7) while development of a heavy conifer component (e.g. greater than 600 trees per acre) would likely result in the need for a PCT (often age 7-12). The decision of when and how to utilize each treatment on each piece of land is based upon field observations by professional foresters with the intent of maximizing financial returns from young stand investments.

This analysis did not estimate the financial impacts of varying management practices or techniques (e.g. aerial vs. ground herbicide application). Recent developments in growth and yield modeling tools from the Center for Intensive Planted Forest Silviculture (CIPS) may allow for further analysis of the interaction effects when these treatment regimes are applied to land with varying site quality. These growth and yield models are built upon research data sets and to date there is more data available for planted Douglas-fir stands than for western hemlock or other species. Some of the CIPS model development progress may allow for investigation into effects on pure western hemlock stands. However, these tools were developed and released in the spring and early summer of 2019 and have not been tested by DNR staff as of this analysis.