

# Stand Level Inventory

The Stand Level Inventory (SLI) is a new forest inventory developed by ODF.

The SLI provides site-specific information on trees, down wood and understory vegetation on State Forest Lands. It will be a primary source of information for operational intensive management planning and decision-making, harvest scheduling, monitoring, watershed assessment, assessing wildlife habitat suitability, and determining stand structure classifications.

Implementation of SLI began in May of 2002, with two initial one-year contracts. In the NW and SW FMP planning areas, the initial contracts will produce inventory information on 771 stands, totaling 108,585 acres. The contracts contain an additional 219 stands located outside of the planning area (in Coos District).

In addition to contract inventory, additional stands will be inventoried by state personnel in pre- and post-operation monitoring projects and young stand stocking surveys.

The overall inventory project and sampling strategy is as follows:

## Stands

State Forest Lands have been divided into about 9,000 "stands" averaging around 85 acres in size. Stands are delineated and classified based on the tree species, sizes, and stocking density found within the stand. Stand boundaries are determined by foresters who are familiar with the vegetative conditions of their district. They review aerial photographs or digital orthophotos and draw the stand boundary lines where they see a change in species, size, and/or stocking.

In delineating stands, the forester tries to avoid delineating too small (<10 acres) or too large (>300 acres) an area. Due to the relatively large per acre cost of inventorying small stands, 10 acres is the minimum stand size planned for contract inventory work.

## Stand Categories

After stand boundaries have been determined, each forested stand is classified into one of 56 categories based on its combination of species (7 classes), size (4 classes), and stocking (2 classes). The categories are shown in the following table.

<b>Stand Categories</b>			
<b>Grouping Factors</b>	<b>Description</b>	<b>Parameters</b>	<b>Factor Code</b>
<b>Tree Species</b>	Single species (>80% in one species)	Douglas-fir	1D
		Hemlock	1W
		Hardwoods	1H
	Multiple species (>= 2 species, >20% of the stand)	Douglas-fir majority mixtures	DX
		Hemlock majority mixtures	WX
		Hardwood majority mixtures	HX
		All other species (singular or mixtures)	OT
<b>Tree Size</b>	Early and Mid-Seral	Seedling to 8" DBH	1
	Late-Seral; small	From 8" DBH to 20" DBH	2
	Late-Seral; large	20" DBH to 30" DBH	3
	OFS Candidate +	>30" DBH	4
<b>Stand Density + Horizontal Variety of Stocking</b>	Low density and or patchy stocking	SDI% <30, stand gaps or edges "prevalent"	L
	Higher density and or homogenous stocking	SDI% >=30, stand gaps or edges "not prevalent"	H

## Stand Sampling

Each inventoried stand is sampled for trees, snags, non-tree vegetation, down wood, and a variety of associated environmental factors (such as elevation, slope, aspect, and so on). These items are measured on between 16 and 24 temporary plots established at regularly spaced intervals throughout the stand. Careful measurements of representative items at each plot are made, then processing software is used to arrive at estimated totals and averages for the stand.

*Large trees and snags are sampled on variable radius plots. Small trees, snags, and vegetation are sampled on nested fixed radius plots. Down wood is sampled on transects.*

## "Double Sampling"

The Stand Level Inventory is designed to support a technique called double sampling. Instead of inventorying every stand on State Forest Land, the double sampling technique calls for measuring a portion of the stands, and then extrapolating the measured data for those stands to other similar stands that have not been measured.

Within an individual stand we measure the trees, snags, vegetation, and down wood on 16 to 24 plots, rather than measuring every tree, snag, plant, and piece of down wood in the stand. Double sampling simply extends the concept of sampling to the landscape level. Just as measuring a sample of trees results in good estimates of all trees in a stand, measuring a sample of stands can be done to arrive at good estimates of all stands.

Here is how double sampling works. Let's assume that we have 20 stands in one of the categories described above. In year 1 we inventory two of the stands. We compile all of the inventory information for those two stands, average the information on a per acre basis, and assign that average information to the 18 non-measured stands. In year 2 we inventory another two stands, average their information with that of the two previously measured stands, and then apply the new average to the 16 remaining non-measured stands. At this point we have measured 20% of the stands in the group.

We also look back at this point to determine how much the average changed from year 1 to year 2. Did it change a little, or did it change a lot? If it changed only a little, then this could indicate that the stand conditions within the group are relatively uniform. If it changed a lot, then this might indicate that the stands are fairly diverse. The more similar the stands within the group are, the fewer stands you need to measure to predict the conditions of the non-measured stands. The more stands we measure in the group, the closer the average of the measured stands will approach the true average of all of the stands in the group.

Our goal is to do a reasonably good job of predicting the conditions of non-measured stands, using the data from measured stands. Our intent is to continue with the initial inventory project until we achieve that goal. According to guidance from Dr. James Arney, a consulting biometrician, a minimum of 15% of stands should be measured before attempting an expansion from measured to non-measured stands.

Our current long-term goal is to maintain 50% of State Forest Lands with recent inventory. Once 50% of the total stands have been measured, the inventory amount will be reduced to a 4-5% per year maintenance mode, assuming that this amount of inventory will provide an adequate degree of confidence in the data assigned to non-measured stands.

## Selecting Stands for Inventory

The process of selecting stands for inventory balances a number of factors including sampling efficiency, operational needs, and the need for a good representation of stands within each category.

The process begins with deciding the total number of stands to inventory (the current goal is 1,000 stands per year). Each category is assigned a target number of stands for inventory such that, after the years inventory is complete, each category will have roughly the same percentage of stands inventoried. Stands are sorted by category, and then in descending order of size (acres) within each category. The target number of specific stands are then selected for inventory using a technique that gives larger stands a higher probability of selection (the larger the stand, the higher its probability of selection). Giving larger stands a higher priority for inventory increases sampling efficiency in terms of cost per acre sampled.

After the initial selections are made, the lists are sent to field foresters for review. The foresters add additional stands to the list when they have a need for information in the near term (1-2 years), and delete lower priority stands from the list to maintain the same total number of stands. Additions and deletions must balance out within a category. This step ensures that we are targeting inventory towards stands with the highest priority information needs, and maintains the relatively equal representation of stands within each category needed for double sampling expansion.

## **Action Plan for the Implementation Period**

1. Continue with SLI data collection. In the NW and SW FMP planning areas, inventory approximately 11% of state forest stands (about 732 stands) per year through fiscal year 2007, or until 50% of stands are inventoried.
2. Once 50% of the stands have been inventoried, reduce the inventory amount to a maintenance level of 4-5% of stands per year.