APPENDIX 3 – LOLO NATIONAL FOREST INVENTORY AND ANALYSIS (FIA) DATA

INTRODUCTION

Recent monitoring of old growth across the Forest indicates that the Forest has met or exceeded the Forest Plan's quantitative old growth standard after over 20 years of management. Furthermore, the distribution of old growth reflects the assumptions made during the original allocation process that unsuitable areas would provide for a portion of the old growth allocation. However, the distribution of old growth across the Forest continues to display a need for the recruitment of old growth within the lower elevation, warm/dry areas of the Forest.

QUANTITY AND DISTRIBUTION OF OLD GROWTH

Using the Lolo National Forest Plan's 1986 definition of old growth, the Forest Inventory and Analysis (FIA) data collected between 1995 and 1996 conservatively estimates that ***at least 14.4% of the forest is old growth or overmature timber***; represented by stands with trees of large size and over 160 years of age (USDA Forest Service 2003). This estimate exceeds the eight percent standard of the Plan.

Using the definition in Green *et al* ***the percentage is 9.5%***, still slightly above the eight percent standard (USDA Forest Service 2006).

Appendix 3 – Table 1 – Lolo National Forest Old Growth

% Old Growth	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	Total Plots	Total Forested Plots
9.5%	7.6%	11.4%	347	327

(Source: Bush, R., Berglund, D., Leach, A., Lundberg, R., Zack, A., 2006, Estimates of Old Growth for the Northern Region and National Forests, USDA Forest Service, Region 1, forest and Range Management, Missoula, MT.)

An assessment of old growth distribution indicates significantly higher amounts of old growth within the Cold / Moderately Dry Habitat Group across the Forest (USDA Forest Service 2003). This partially reflects the location of roadless and wilderness areas across the Forest which are typically situated at higher elevations. The distribution of old growth within this Habitat Group confirms the allocation assumptions made in the 1986 Plan that these areas would provide for a significant portion (6%) of the 8% of old growth habitat across the Forest. Habitat Group 6 is not managed for commercial timber production due to its low site potential and physical site conditions.

Lower numbers within the Warm / Dry Habitat Group reflect the impacts of historic logging and possibly fire suppression across the lower elevations of the Forest. These sites are typically characterized by open-grown stands of ponderosa pine or Douglas-fir with bunchgrass understories. Because this Habitat Group includes sites of south and westerly aspects with shallow and rocky soils, overall site productivity is low and growth is generally slow. Because of fire exclusion, in many areas stands of pure or nearly pure understories of Douglas-fire are developing, contrary to the natural open-grown park like conditions typical of this Habitat Group.

Appendix 3 – Table 2 – Lolo National Forest Old Growth Distribution

Habitat Group	Habitat Group Description	90% Confidence Interval Lower Bound	Mean Percent Old Growth	90% Confidence Interval Upper Bound
1	Warm - Dry	0.0%	***5.7%***	16.0%
2	Moderately Warm - Dry	4.4%	***8.1%***	12.3%
3	Moderately Cool - Dry	6.5%	***11.3%***	16.6%
4	Moderately Cool - Moist	9.8%	***13.4%***	17.2%
5	Cool Moderately Dry	3.3%	***7.8%***	13.0%
6	Cold Moderately Dry	11.9%	***22.1%***	33.1%

Approximately 45,227 acres of the Forest is currently allocated to MA 21 (Lolo National Forest GIS Data). The increase of almost 4,000 acres from that of the 1986 Plan reflects reallocations of old growth made during the Ecosystem Management Area analysis process and through Forest Plan Amendment.

RELIABILITY OF FIA OLD GROWTH DATA

The national Forest Inventory and Analysis (FIA) program provides a congressionally mandated, statistically-based, continuous inventory of the forest resources of the United States. Since 1930, the FIA program has been administered through the Research and Development branch of the Forest Service, which makes it administratively independent from the National Forest System.

FIA inventory design is based on a national hexagon of inventory plots. Data is collected on all forested portions of the plots, throughout the United States, regardless of ownership. FIA protocols specify sample plot location within this hexagonal grid. Data collection standards are strictly controlled by FIA protocols. The sample design and data collection methods are scientifically designed, publicly disclosed, and repeatable. There are also stringent quality control standards and procedures, carried out by FIA personnel of the Rocky Mountain Research Station. All of this is designed to assure that data is collected consistently throughout the United States, and that stated accuracy standards are met by the field crews.

To estimate the percent old growth for large areas, such as the Lolo National Forest, it is infeasible to maintain an inventory for every acre of the millions of acres of forestland. FIA provides a statistically-sound representative sample designed to provide unbiased estimates of forest conditions at broad- and mid-levels. The FIA sampling frame uniformly covers all forested lands, regardless of management emphasis. Therefore, wilderness areas, roadless areas, and actively managed lands all have the same probability of being sampled.

Using FIA data to assess the percent of old growth allows the Lolo National Forest to base its monitoring on an unbiased, statistically sound, independently designed and implemented representative sample of forest lands. This inventory is also reasonably current.

The FIA plots in which wildfire or harvest have occurred since the dates of inventory until November, 2003 were assumed to not meet the old-growth criteria. This results in conservative estimates as not all wildfire and harvest activities remove all old growth on the landscape. To

remain current, FIA has started to re-measure 10% of its plots every year. As these re-measured plots accumulate, the FIA old growth analysis and report we will be periodically updated.

COLLECTION OF FIA DATA

All plots installed on the Lolo National Forest (1995 - 1996), utilized a sample location (field plot) composed of five to seven variable-radius plots with trees 5 inches and larger diameter at breast-height (dbh) tallied with a basal area factor of 40. The number of plots installed depended upon the year of inventory; early inventories had a seven-plot cluster, whereas those inventories collected between 1995 and 1996 had five plots. After 1996, FIA adopted a national plot layout consisting of a cluster of four plots. Trees 5-inches dbh and larger were measured on a 1/24th-acre plot. In 2002, Region 1 worked with IW-FIA to modify the national layout by adding a ¼-acre macro-plot. These protocols were integrated into the IW field procedures and data collection software, and loaded into IW-FIA's database. These protocols dictate that trees 5.0 – 20.9 inches dbh were measured on the 1/24th- acre plot and trees 21.0 inches dbh and larger were measured on the ¼-acre plot. All plots that did not have the ¼-acre plot installed in 2002 had the ¼-acre plot augmented to the standard FIA plot layout in 2003 and 2004. FIA field procedures dictate that age for trees 3.0" dbh and larger is measured by counting annual growth rings at breast height, and recorded as "breast-height age". Breast-height (bh) is defined as 4.5' tall. It follows that bh age is the number of years the tree has survived since it reached 4.5 feet tall, which is less than its total age. In temperate regions similar to the Northern Region, coniferous trees always take several years to reach breast height, and these years need to be added to "breast-height age" to get the total age of the tree. The minimum age criteria for old growth used in *Green et al* (the Lolo's definition for old growth) is total age rather than breast-height age. A conservative estimate of the number of years a currently large tree took to reach bh is added to the bh age (ring count) to account for the difference between the old-growth definition of tree age and FIA field measurement protocols. Therefore, the data used for estimating old growth should be consistent with *Green et al*.

STATISTICAL ACCURACY

The R1-FIA Summary Database was used to conduct this analysis. As its name suggests, this database is comprised of several tables of summarized attributes derived from FIA field-collected data. This database has the functionality to compute the mean, standard error, and confidence intervals for percent old growth. Because FIA data comes from a statistical sample rather than a 100% census, attributes calculated from this data are estimates and the accuracy of these estimates can be computed and reported as confidence intervals. To calculate the confidence intervals a technique called "bootstrapping" is used. Bootstrapping is a statistical method that is independent of the distribution of the underlying data. The Northern Region uses a 90%-confidence interval for describing the reliability of these estimates. The 90% level was chosen to provide a fairly precise level for a biological attribute that can be very variable. It can be thought that if a different set of randomized sample points were collected 100 different times, the estimates of the percent old growth would be within the 90%-confidence interval 90% of the time. This also indicates that if every tree on every acre were measured, there is a 90% probability that the true proportion of old growth for the population would be within this confidence interval. Or that 9 out of 10 times, the true population mean is within the confidence interval derived from the sample.