File Code: 1920
Date: March 15, 2004

Dear Forest User:

Enclosed for your review is an abbreviated Forest Plan Monitoring and Evaluation Report for Fiscal Years 2002-2003. This report focuses on two of the Forest Plan monitoring items and provides some updated information related to old growth and snag densities using data compiled through the Forest Inventory and Analysis (FIA) program. The information helps the Forest address several issues identified through litigation regarding amount and distribution of old growth and snag habitat across the Lewis and Clark Forest.

The Forest plans to release an expanded monitoring report later this year to include up-to-date old growth survey results from site-specific inventories to augment this information. In addition, we will report on other resource issues of current concern.

Thank you for your continued interest in the Lewis and Clark National Forest. For more information on programs and events on the Lewis and Clark Forest, please visit our website at www.fs.fed.us/r1/lewisclark. We hope you will continue to be involved in the management of your National Forest System lands.

Sincerely,

/S/ LESLEY W. THOMPSON
LESLEY W. THOMPSON
Forest Supervisor

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Lewis and Clark National Forest
Forest Plan Monitoring Report

Fiscal Years 2002-2003
SUMMARY

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The Lewis and Clark Forest is providing an abbreviated Forest Plan monitoring report to address issues that have been of particular concern during fiscal years 2002 and 2003. The issue of amount and distribution of old growth habitat in support of species dependent on those habitats has been raised during appeal on projects involving vegetation management. The Lewis and Clark Forest Plan monitoring requirements include monitoring of active goshawk nesting territories (monitoring item C-8). The goshawk is an indicator species for old growth habitat.

The Lewis and Clark Forest Plan sets objectives for old growth habitat as follows:
 "A minimum of 5 percent of the commercial forest land within a timber compartment should be maintained in an old growth forest condition. A minimum stand size of 20 acres is recommended for old growth management. In management areas included in the regulated timber harvest base (Management Areas A, B, C, and O) a rotation of at least 200 years is recommended on the 5 percent of the commercial forest land to be maintained in an old growth condition."

The Forest Plan defines commercial forest land as:
 "Forest land that is producing or is capable of producing crops of industrial wood and (a) has not been withdrawn by Congress, the Secretary or the Chief; (b) existing technology and knowledge is available to ensure timber production without irreversible damage to soils, productivity, or watershed conditions; and (c) existing technology and knowledge, as reflected in current research and experience, provides reasonable assurance that adequate restocking can be attained within 5 years after final harvesting (FSM 2410.5)."

The Forest Plan also recognized there was no inventory of timber stands on the Forest which met the old growth forest definition. Those stands were to be identified as a part of resource program and project level wildlife inventories and evaluations. These inventories have been conducted during project development and an update of inventory results are provided as part of this monitoring report.

This report also contains information on old growth and snag densities on forested lands in the Lewis and Clark National Forest. As detailed in the attached report entitled "Detailed Estimates of Old Growth and Large-Snags on the Lewis and Clark Forest" January 25, 2004, vegetative plots gathered as part of the Forest Inventory and Analysis (FIA) program were screened by commercial forest lands, landscapes (mountain range) and watersheds (5th HUC (hydrologic unit code)). FIA is a Congressionally mandated, comprehensive, field-based forest inventory consisting of

data collected from 120,000 forested field plots in the United States. It is not practical to measure billions of trees within millions of acres of forests. The plots measure a diverse spectrum of forest conditions. Therefore, FIA draws a representative sample of field plots, located at randomized points within a standardized grid across the entire US, and uses data from those plots to estimate conditions across a larger landscape. FIA uses a probability sample, which allows it to quantify the uncertainty in its estimates that are caused by random sampling. The grid evenly covers all lands, regardless of whether or not they are suitable for timber production. FIA utilizes sampling and there is uncertainty in estimates from any sample. The Forest Survey scientist makes these estimates and characterizes the degree of this uncertainty (Czaplewski et al. 2003). This level of inventory is not spatially explicit, but quantities of old growth can be estimated with statistical confidence for large, 5th code watersheds.

The report provides estimates of old growth percentages and snag densities across the forest. Forested lands are comprised of both commercial and noncommercial forest. Commercial forest lands were determined using landtype information and the forest plan criteria for defining commercial forest lands. A subset of commercial forest land are those lands identified in the Forest Plan as suitable for timber harvesting, hence the focus on maintaining adequate old growth habitat on those lands. Roughly 41% of commercial forest lands were identified in the Forest Plan as suitable for timber harvest.

The report estimates 12.06% old growth on all forested lands within the Lewis and Clark National Forest, with a 90% confidence interval of 9.5% to 14.47%. On commercial forest lands, the FIA data analysis shows an estimated 9.67 percent old growth, with a 90% confidence interval of 5.86% to 13.83%. This is well within the Forest Plan objectives of maintaining 5% old growth on commercial forest land within timber compartments. The report estimated snag density at 11.37 per acre with a 90% confidence interval of 8.90 to 14.04 snags per acre.

C-8   Old Growth Habitat for Goshawk
C-10 Cavity Nesting Habitat

This Forest Plan Monitoring and Evaluation report focuses specifically on old growth and snag habitat data and the results of statistical sampling at a forest-wide scale to help answer the large scale question of amount and distribution of these habitats throughout the Lewis and Clark Forest.

On January 25, 2004, the Lewis and Clark Forest received data related to old growth and snag densities across the forest using data compiled through the Forest Inventory and Analysis (FIA) program. As detailed in the attached report entitled "Detailed Estimates of Old Growth and Large-Snags on the Lewis and Clark Forest", vegetative plots gathered as part of the Forest Inventory and Analysis (FIA) program were screened for the whole forest, and by commercial and non-commercial forest lands, landscapes (mountain range) and watersheds (5th HUC (hydrologic unit code)). The FIA data provides a forest-wide perspective on old growth density across the Lewis and Clark forest to aid in understanding the amount of habitat relied on by old growth-dependant species, such as goshawk, and its distribution across the planning area.

FIA is a Congressionally mandated, comprehensive, field-based forest inventory consisting of data collected from 120,000 forested field plots in the United States. It is not practical to measure billions of trees within millions of acres of forests. The plots measure a diverse spectrum of forest conditions. Therefore, FIA draws a representative sample of field plots, located at randomized points within a standardized grid across the entire US, and uses data from those plots to estimate conditions across a larger landscape. FIA uses a probability sample, which allows it to quantify the uncertainty in its estimates that are caused by random sampling. The grid evenly covers all lands, regardless of whether or not they are suitable for timber production. The FIA inventory is not spatially explicit, but quantities of old growth can be estimated with statistical confidence for large, 5th code watersheds and across large landscapes such as the lands encompassed by the Lewis and Clark Forest.

The attached report provides estimates of old growth percentages and snag densities across the forest. Forested lands are comprised of both commercial and noncommercial forest. Commercial forest lands were determined using landtype information and the forest plan criteria for defining commercial forest lands. A subset of commercial forest land are those lands identified in the Forest Plan as suitable for timber harvesting, hence the focus on maintaining adequate old growth habitat on those lands. Roughly 41% of commercial forest lands were identified in the Forest Plan as suitable for timber harvest.

The report estimates 12.06% old growth on all *forested* lands within the Lewis and Clark National Forest, with a 90% confidence interval of 9.5% to 14.47%. On *commercial forest lands forestwide*, the FIA data analysis shows an estimated 9.67 percent old growth, with a 90% confidence interval of 5.86% to 13.83%. The report estimates snag density at 11.37 per acre with a 90% confidence interval of 8.90 to 14.04 snags per acre.

In addition, the report provides a breakdown of old growth by commercial and non-commercial forest land on the various mountain ranges within the Lewis and Clark Forest. Table 3 of the report shows a point estimate of 12.13 percent old growth on *commercial forest lands* in the Little Belt Mountains with a 90% confidence interval of 6.91 to 17.89 percent.

Tables 2 and 3 of the report reflect the difficulty of using FIA at the site-specific level in assessing old growth proportion when the number of plots collected on a particular landscape are limited. For example, because of the standardized sampling grid used to identify field plots, only 3 plots fell within each of the Highwood and Little Snowy mountains. None of these plots encountered old growth habitat on commercial forest lands. However, the Forest has conducted site-specific inventories during project analysis, in accordance with Forest Plan direction. For example, an old growth inventory has been completed for the Little Snowies in conjunction with Little Snowies Vegetation and Travel Planning EIS which showed approximately 15% of that mountain range in an old growth condition (Forest Plan Monitoring and Evaluation Report Fiscal Years 2000-2001, page 42). This difference between site-specific inventories and FIA sampling does not reflect on the statistical confidence of the FIA data. The FIA data is statistically reliable at a broad scale level.

Tables 2 and 4 of the attached report and the map in Appendix C show that old growth is well distributed throughout the Lewis and Clark Forest as a whole.

As discussed above and in the attached report, the FIA data is statistically valid at the Forest scale. It can be used to answer the question of old growth amount and distribution at the landscape scale, but its reliability is limited at a scale smaller than 5th hydrologic unit code watersheds. The Forest will continue to inventory old growth by timber compartment at the project scale to ensure compliance with old growth standards outlined in the Forest Plan. The Forest will be completing a more in depth monitoring report this year that will include up-to-date old growth survey results from site-specific project inventories to augment this sampling information. The expanded report will also include updates on goshawk nesting data, snag habitat, and other resource issues of current concern.

Detailed Estimates of Old Growth

And Large-Snags on the

Lewis and Clark National Forest

Renate Bush [1,2]
Andy Leach [3]

January 25, 2004

Analysis was done using Forest Inventory and Analysis (FIA) data, see *Application of Forest Inventory and Analysis (FIA) Data to Estimate Amount of Old Growth Forest and Snag Density in the Northern Region of the National Forest System* for an overview on why it is appropriate to use this data for broad-scale analysis. All forested[4] FIA plots that were located on the Lewis and Clark National Forest were used to estimate the proportion of old growth and density of snags with a minimum diameter breast height of 10.0 inches or larger. Those FIA plots in which wildfire or harvest have occurred since the 1996-1997 inventory was coded to: (1) not meet the old growth definition; and (2) represent that there were no snags remaining at these plot locations. This results in a conservative estimate of old growth and snag density as not all wildfire and harvest activities remove all old growth and snags on the landscape. The following provides estimates of old growth and snag density for the Lewis and Clark National Forest, by commercial lands, and by landscapes. Additionally, snag density is compiled by species cover type.

Estimates of Old Growth and Snag Density for the Lewis and Clark National Forest:

Estimated percentage of Old Growth on all forested lands on the Lewis and Clark National Forest is 12.06% with a 90% confidence interval of 9.50% to 14.74%. The estimated density of snags is 11.37 per acre with a 90% confidence interval of 8.90 to 14.04 snags per acre.

Table 1 - Estimates of percentage of Old Growth and snag density by Commercial lands and associated 90% confidence intervals follow.

Forest land	Ave Snags/Acre ≥ 10" DBH			Percent Old Growth			Plot Frequency	
	90% CI Lower Bound	Point Estimate	90% CI Upper Bound	90% CI Lower Bound	Point Estimate	90% CI Upper Bound	Number of Plots (Number of Subplots)	% of the Plots
Noncommercial	9.57	12.85	16.43	10.00	13.30	16.77	176(880)	52.38
Commercial	5.23	8.49	12.14	5.86	9.67	13.83	91(455)	27.08

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[1] USDA Forest Service, Region 1, Forest and Range Management, 200 E Broadway, Missoula, MT, 59801.
[2] Forester, Inventory and Analysis.
[3] Statistician, USDA Forest Service; Washington Office Inventory and Monitoring Institute/METI; 2150 Centre Ave. Bldg. A., Fort Collins, CO 80526. 970-295-5731.
[4] "..land at least 10 percent stocked, or currently nonstocked but formerly having such stocking, with timber and/or woodland trees, and where human activity on the site does not preclude natural succession of the forest (i.e., the site will be naturally or artificially regenerated)." *Interior West Forest Land Resource Inventory Field Procedures, 1995-1996.*

Table 2 - Estimates of snag density and proportion of old growth and associated 90% confidence interval by Landscapes. These Landscapes are shown in Appendices A and B.

Landscape	Ave Number of Snags/Acre ≥ 10" DBH			Percent Old Growth			Plot Frequency	
	90% CI Lower Bound	Point Estimate	90% CI Upper Bound	90% CI Lower Bound	Point Estimate	90% CI Upper Bound	Number of Plots (Number of Subplots)	Percent of the Plots
Big Snowy Mountains	0.00	3.14	6.86	1.82	11.67	23.64	12(60)	3.57
Castle Mountains	0.00	4.36	16.34	0.00	10.00	30.00	6(30)	1.79
Crazy Mountains	1.57	10.08	19.81	0.00	13.33	30.00	6(30)	1.79
Highwood Mountains	0.00	0.00	0.00	0.00	0.00	0.00	3(15)	0.89
Little Belt Mountains	6.98	10.16	13.68	10.39	14.62	19.06	119(595)	35.42
Little Snowy Mountains	0.00	4.89	14.67	0.00	0.00	0.00	3(15)	0.89
Rocky Mountains	9.91	14.29	19.10	6.67	10.17	13.98	118(590)	35.12

Table 3 - Estimates of snag density and proportion of old growth and associated 90% confidence intervals by Landscape and Commercial/Non-commercial lands

Landscape		Ave Number of Snags/Acre ≥ 10"			Percent Old Growth			Plot Frequency	
		90% CI Lower Bound	Point Estimate	90% CI Upper Bound	90% CI Lower Bound	Point Estimate	90% CI Upper Bound	Number of Plots (Number of Subplots)	Percent of the Plots
Commercial	Big Snowy Mtns	0.00	3.84	10.71	0.00	13.33	33.33	6(30)	1.79
	Castle Mountains	0.00	6.53	26.14	0.00	0.00	0.00	4(20)	1.19
	Crazy Mountains	0.00	4.39	11.21	0.00	6.67	20.00	3(15)	0.89
	Highwood Mtns	0.00	0.00	0.00	0.00	0.00	0.00	3(15)	0.89
	Little Belt Mtns	5.17	9.05	13.46	6.91	12.13	17.89	61(305)	18.15
	Little Snowy Mountains	0.00	4.89	14.67	0.00	0.00	0.00	3(15)	0.89
	Rocky Mountains	0.53	13.06	31.37	0.00	3.64	10.00	11(55)	3.27
Non-commercial	Big Snowy Mtns	0.00	2.44	7.17	0.00	10.00	25.71	6(30)	1.79
	Castle Mountains	0.00	0.00	0.00	0.00	30.00	80.00	2(10)	0.60
	Crazy Mountains	0.00	15.77	31.34	0.00	20.00	46.67	3(15)	0.89
	Little Belt Mtns	6.34	11.33	17.02	10.70	17.24	24.29	58(290)	17.26
	Rocky Mountains	9.84	14.42	19.39	6.97	10.84	14.95	107(535)	31.85

Table 4 - Estimates of snag density and proportion of old growth and associated 90% confidence intervals by 5th code HUC. These HUCs are shown in Appendices C and D.

5th Code HUC	Ave Number of Snags/Acre ≥ 10" dbh			Percent Old Growth			Plot Frequency	
	90% CI Lower Bound	Point Estimate	90% CI Upper Bound	90% CI Lower Bound	Point Estimate	90% CI Upper Bound	Number of Plots (Number of Subplots)	Percent of the Plots
1003010201	0.00	17.56	45.41	0.00	0.00	0.00	7 (35)	2.08
1003010202	0.00	41.09	87.92	0.00	0.00	0.00	4 (20)	1.19
1003010217	0.00	0.00	0.00	0.00	0.00	0.00	2 (10)	0.60
1003010301	0.00	17.18	35.65	0.00	10.00	26.67	6 (30)	1.79
1003010302	0.00	0.00	0.00	0.00	0.00	0.00	1 (5)	0.30
1003010304	0.00	21.68	57.98	40.00	70.00	100.00	2 (10)	0.60
1003010306	0.00	0.00	0.00	0.00	0.00	0.00	1 (5)	0.30
1003010307	0.00	11.53	29.44	14.00	32.73	52.73	11 (55)	3.27
1003010309	1.04	9.36	20.45	0.00	5.00	13.33	8 (40)	2.38
1003010310	0.00	3.46	12.98	0.00	0.00	0.00	5 (25)	1.49
1003010401	13.18	27.52	43.57	5.00	15.20	26.67	25 (125)	7.44
1003010402	9.80	20.87	34.50	6.25	16.92	28.89	13 (65)	3.87
1003010403	0.98	4.20	8.09	4.00	18.46	35.00	13 (65)	3.87
1003010404	0.00	0.00	0.00	0.00	11.43	29.09	7 (35)	2.08
1003010405	0.00	0.00	0.00	0.00	0.00	0.00	1 (5)	0.30
1003010407	0.00	41.77	103.88	0.00	0.00	0.00	3 (15)	0.89
1003010408	0.00	13.92	33.22	0.00	0.00	0.00	3 (15)	0.89
1003010501	0.00	3.48	9.01	0.00	8.57	22.11	14 (70)	4.17
1003010502	1.76	11.67	24.73	1.67	12.31	25.33	13 (65)	3.87
1003010503	0.00	0.00	0.00	0.00	0.00	0.00	1 (5)	0.30
1003020101	0.00	1.94	6.06	0.00	0.00	0.00	8 (40)	2.38
1003020102	3.76	8.81	14.52	2.00	13.33	26.67	12 (60)	3.57
1003020106	0.00	2.19	8.75	0.00	0.00	0.00	6 (30)	1.79
1003020108	0.00	0.95	2.85	0.00	0.00	0.00	3 (15)	0.89
1003020501	1.41	8.10	16.16	2.00	12.00	24.00	10 (50)	2.98
1003020503	0.00	0.00	0.00	0.00	0.00	0.00	2 (10)	0.60
1003020505	0.00	0.00	0.00	0.00	0.00	0.00	1 (5)	0.30
1004010201	0.00	6.28	19.57	0.00	20.00	60.00	3 (15)	0.89
1004010202	0.00	0.00	0.00	0.00	0.00	0.00	2 (10)	0.60
1004010301	9.19	18.70	29.48	6.00	14.62	24.44	26 (130)	7.74
1004010302	0.00	7.06	17.81	0.00	4.00	15.00	5 (25)	1.49
1004010303	0.00	0.00	0.00	0.00	0.00	0.00	1 (5)	0.30
1004010304	0.00	0.00	0.00	0.00	0.00	0.00	2 (10)	0.60
1004010306	0.00	10.71	21.43	0.00	20.00	40.00	1 (5)	0.30
1004010308	0.00	0.00	0.00	0.00	40.00	100.00	2 (10)	0.60
1004010310	0.00	6.54	14.73	4.00	25.71	50.00	7 (35)	2.08
1004020101	0.00	6.83	15.96	0.00	16.67	37.50	6 (30)	1.79
1004020102	0.00	4.11	14.37	0.00	0.00	0.00	7 (35)	2.08
1004020103	0.00	3.79	11.73	0.00	16.00	46.67	5 (25)	1.49
1004020104	8.04	19.52	31.86	10.00	40.00	80.00	1 (5)	0.30

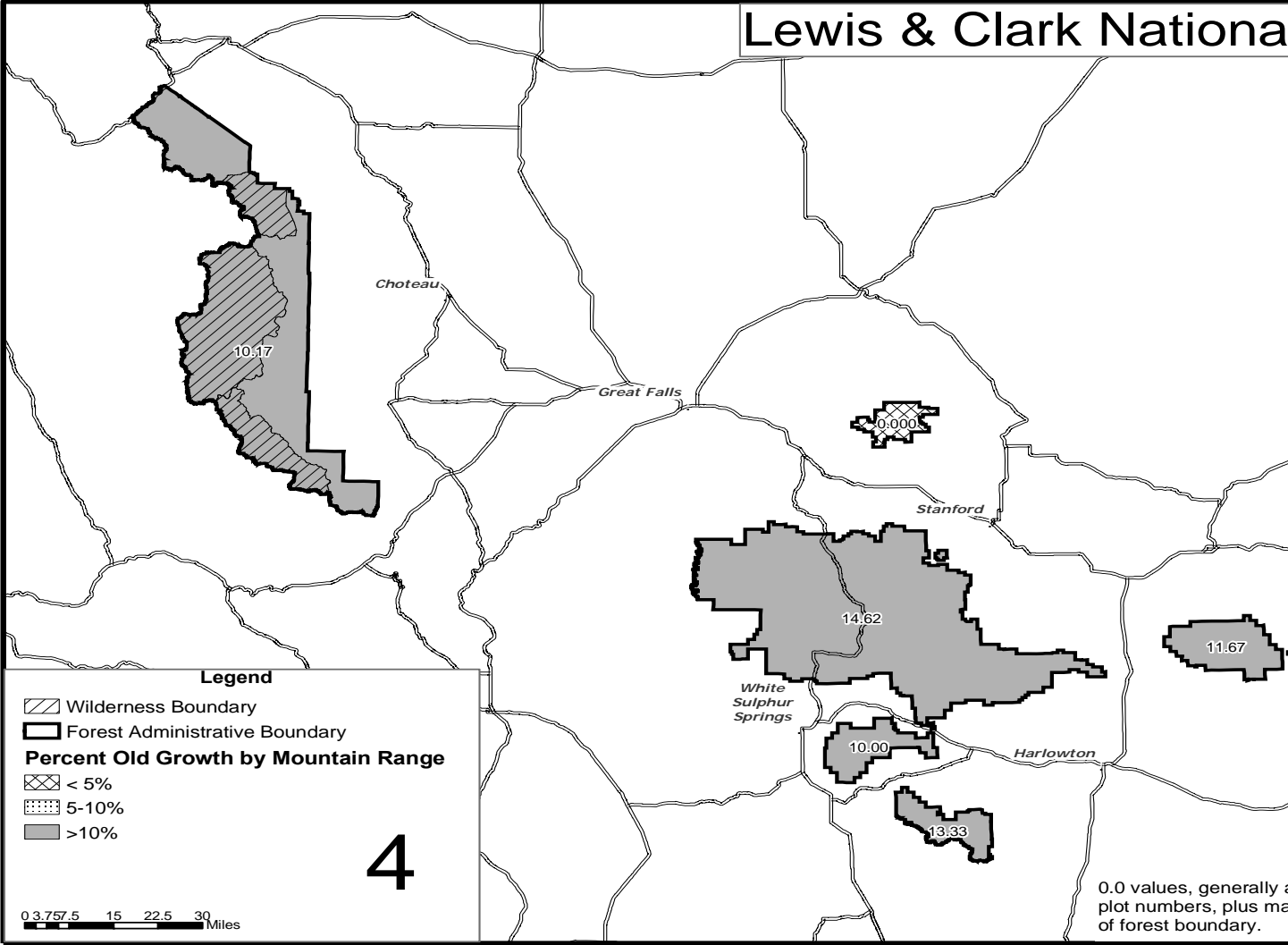| 5th Code HUC	Ave Number of Snags/Acre ≥ 10" dbh			Percent Old Growth			Plot Frequency	
	90% CI Lower Bound	Point Estimate	90% CI Upper Bound	90% CI Lower Bound	Point Estimate	90% CI Upper Bound	Number of Plots (Number of Subplots)	Percent of the Plots
1004020105	0.00	8.90	20.04	0.00	15.00	45.00	4 (20)	1.19
1004020110	0.00	2.49	7.48	0.00	13.33	40.00	3 (15)	0.89
1004020111	0.00	0.00	0.00	0.00	20.00	60.00	3 (15)	0.89
1004020117	0.00	14.67	29.34	0.00	0.00	0.00	1 (5)	0.30
1004020118	0.00	0.00	0.00	0.00	20.00	40.00	1 (5)	0.30
1004020201	0.00	0.00	0.00	0.00	0.00	0.00	1 (5)	0.30
1004020301	0.00	4.88	13.01	0.00	0.00	0.00	4 (20)	1.19

Table 5 - Estimates of snag density and associated 90% confidence intervals by species cover type

Cover Type	Ave Number of Snags/Acre ≥ 10" DBH			Plot Frequency	
	90% CI Lower Bound	Point Estimate	90% CI Upper Bound	Number of Plots (Number of Subplots)	Percent of the Plots
ABLA-PIAL	8.76	19.29	31.67	23 (115)	6.85
HW	0.00	0.00	0.00	2 (10)	0.60
MIXCon	7.13	10.10	13.47	99 (495)	29.46
NONE	0.00	19.84	45.57	8 (40)	2.38
PICO	9.07	15.40	22.35	72 (360)	21.43
PIPO-PSME	2.77	5.13	7.89	63 (315)	18.75

Note: ABLA = subalpine fir, PIAL = whitebark pine, HW = hardwoods, Mix Con = mixed conifers, None = density of live trees precludes the assignment of a cover type, PICO = lodgepole pine, PIPO = ponderosa pine, PSME = Douglas-fir.

Attachment A: Estimates of Old Growth on the Lewis and Clark National Forest by Landscapes.

Choteau

Great Falls

10.17

0.000

Stanford

14.62

11.67

White
Sulphur
Springs

10.00

Harlowton

13.33

Legend

Wilderness Boundary
Forest Administrative Boundary
Percent Old Growth by Mountain Range
< 5%
5-10%
>10%

4

0.0 values, generally a
plot numbers, plus ma
of forest boundary.

0 3.75 7.5   15   22.5   30
Miles

Appendix B: Estimate of Large-Snags for Lewis and Clark National Forest by Landscapes.

Lewis & Clark National

Choteau

Great Falls

Stanford

White
Sulphur
Springs

Harlowton

14.2

0.00

10.1

3.14

4.36

10.0

Legend

▨ Wilderness Boundary
▭ Forest Administrative Boundary

Snags/Acre > 10" dbh by Mountain Range

▦ < 1 Snag Per Acre
▓ > 1 Snag Per Acre

4

0 3.75 7.5   15   22.5   30
                              Miles
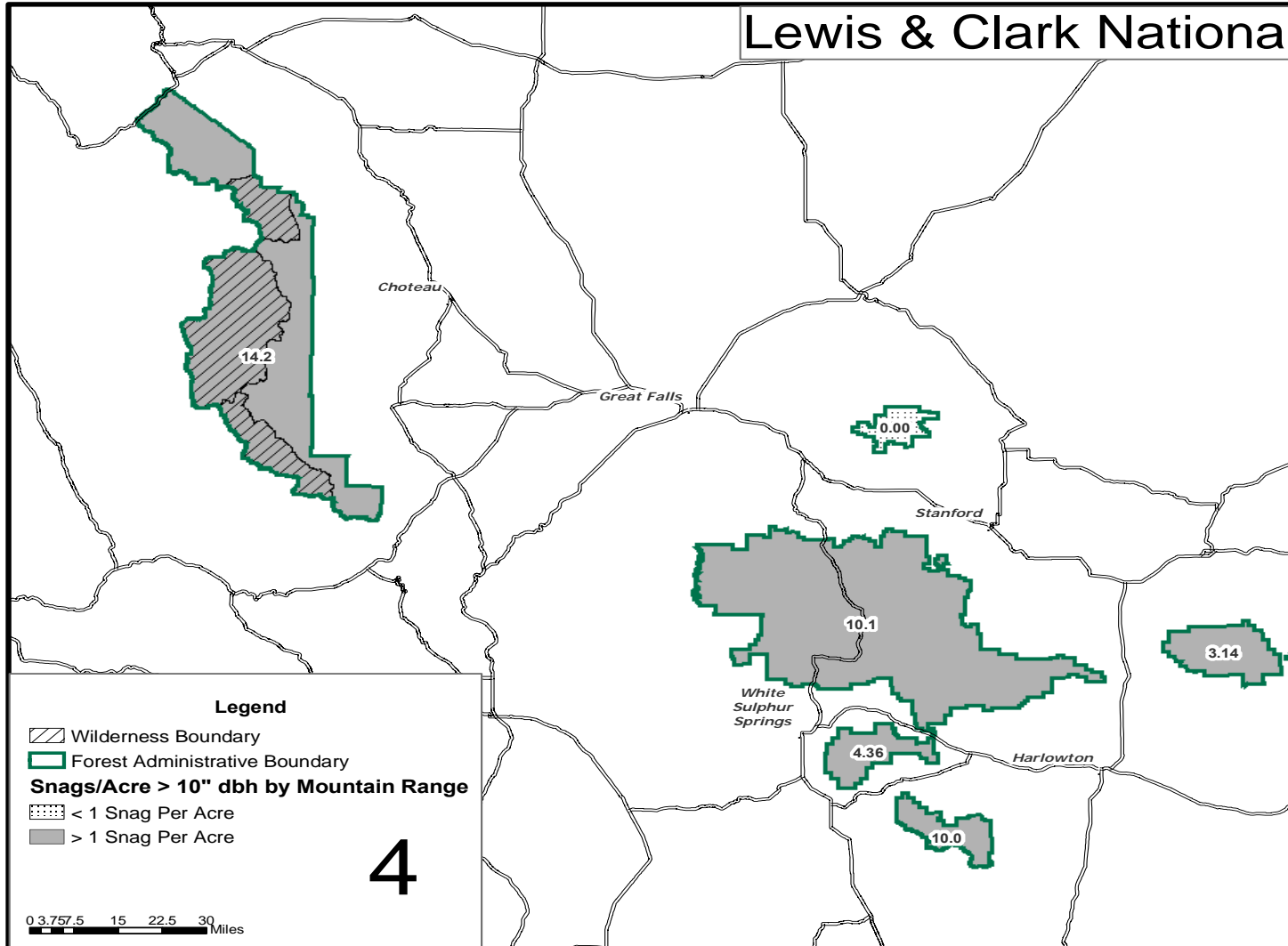
Appendix C: Estimate of Proportion of Old Growth by 5th Code HUC.

Lewis & Clark Nationa

Legend
- ⬚ Wilderness Boundary
- ⬚ Forest Administrative Boundary

Percent Old Growth by Watershed
- ⬚ < 5%
- ⬚ 5-10%
- ⬚ >10%

4

0 3.75 7.5   15   22.5   30 Miles

0.0 values, generally a
plot numbers, plus ma
of forest boundary.

Choteau
Great Falls
Stanford
White Sulphur Springs
Harlowton
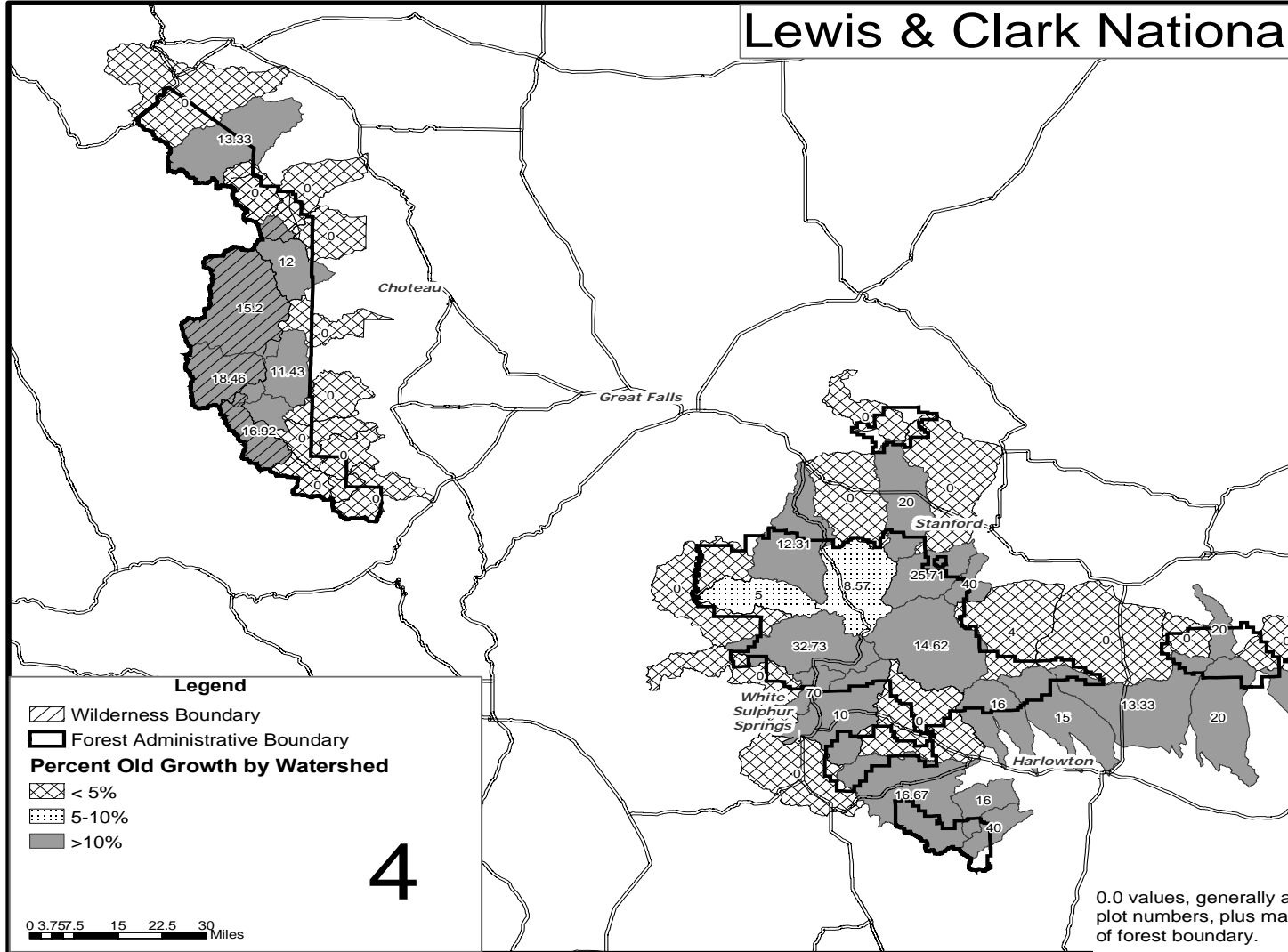
Appendix D: Estimate of Large-Snag Density by 5th Code HUC.

Lewis & Clark National

Legend

- ⊟ Wilderness Boundary
- ☐ Forest Administrative Boundary

Snags/Acre > 10" dbh by Watershed

- ⊡ < 1 Snag Per Acre
- ▨ > 1 Snag Per Acre

4

0 3.75 7.5   15   22.5   30
Miles