Forest Management

Key Points

- Even-aged management systems with clear-cutting would produce more uniform stands in a mix of age classes without structural legacies. Two-aged management systems with variable-retention regeneration harvesting would produce stands in a mix of age classes with legacy structures and multiple canopy layers. Uneven-aged management systems with selection harvesting regimes would produce mostly older, structurally-complex stands and mature forests with multiple canopy layers.
- The allowable sale quantity (ASQ) under the alternatives would range from 120 million board feet (MMbf) per year under Sub-alternative B to 486 MMbf per year under Alternative C. The ASQ under the Proposed RMP would be 205 MMbf per year. The ASQ is primarily determined by the size of the Harvest Land Base, the intensity of forest management practices, and restrictions on timber harvest.
- Non-ASQ timber harvest volumes in the first decade would range from 4 MMbf per year under Alternative D to 122 MMbf per year under the No Action alternative. Non-ASQ timber harvest volume in the first decade for the Proposed RMP would be 73 MMbf per year.
- The proportion of harvest volume coming from large logs (i.e., > 20" diameter at the small end of the log inside the bark) would be lowest under Sub-alternative C, at 5 percent of total harvest volume, and highest under the No Action alternative and Alternative C, at 14 percent of total harvest volume. The proportion of harvest volume coming from large logs would be 9 percent under the Proposed RMP.

Summary of Notable Changes from the Draft RMP/EIS

- BLM revised the 2006 net inventory value in **Table 3-51**. In **Table 3-52**, the BLM revised inventory values by district, removed the acreage column and the gross inventory column, and added 2006 inventory data by district for direct comparison. The BLM revised the calculation of the 2006 value and the 2013 value directly from collected inventory data for a more accurate comparison between the 2 measurement periods.
- BLM added information about how reforestation of disturbed areas would be achieved in each alternative and the Proposed RMP, and how this relates to the abundance of the early successional structural stage under Issue 1.
- BLM added **Table 3-48** reporting average regeneration harvest ages through time under each alternative and the Proposed RMP under Issue 1.
- BLM added discussion and analysis in **Figure 3-60** regarding small inclusions of early successional forest created through implementation of group selection openings in the Late-Successional Reserve, Riparian Reserve, and Uneven-aged Timber Area, which are not reflected in stand average structural stage categories under Issue 1.

Issue 1

How would the age classes, structural stages, and inventory of merchantable timber volumes in forest stands change among alternatives in the Harvest Land Base and reserve land use allocations?

Summary of Analytical Methods

The BLM used Current Vegetation Survey plots and the Forest Operations Inventory to create a data set representing the current condition of the forest. The BLM then modeled a variety of silvicultural treatments, stand growth, and forest development through time using the ORGANON growth and yield model in conjunction with the Yield Table Generator (YTG Tools) and the Woodstock model. The BLM modeled silvicultural treatments to simulate the management that would occur under the various alternatives and the Proposed RMP, based on the management direction found in **Appendix B**.

For several aspects of this analysis, the BLM categorized the decision area into the 'coastal/north' areas (the Coos Bay, Eugene, and Salem Districts) and the 'interior/south' areas (the Klamath Falls Field Office, and the Medford and Roseburg Districts). This division represents a general divide in forest productivity and the current stand conditions within the decision area. The interior/south currently contains a higher proportion of lower productivity/fire-prone dry forests than the coastal/north areas.

For other aspects of this analysis, the BLM categorized the decision area into moist and dry forest areas. This division of the decision area is consistent with the discussion of moist and dry forest in the Fire and Fuels section in this chapter.

The BLM analyzed changes in age classes, structural stages, and standing inventory over a period of 200 years to provide a meaningful comparison of the effects of the alternatives and the Proposed RMP. This length of analysis is necessary given the varying and sometimes long periods between forest management treatments to capture forest structural development. The combined effects of forest management and forest growth across the landscape would take this longer analysis period to show meaningful changes in forest condition.

Acreage summaries in this section do not include Eastside Management Lands, non-forested lands, or other areas not given an age or structural stage classification in the Forest Operations Inventory. In the majority of this analysis, the BLM reports structural stage classifications as stand level averages.

For selection harvesting and commercial thinning, where development of structural complexity and high quality late-successional habitat are primary treatment objectives, implementation would include the creation of group selection openings > 0.25 acre in size. These group selection openings would function as small inclusions of early successional habitat within young, mature, and structurally-complex stands. Therefore, the BLM analyzed the abundance of acres in functional created canopy openings[54] to supplement the data presented as stand average structural classifications. In order to analyze the abundance of this condition in the decision area reported in **Figure 3-60**, the BLM calculated the area in functional created canopy openings as a percentage of harvest acres by land use allocation. The BLM based this calculation on management objectives and direction included for each alternative and the Proposed RMP in **Appendix B**. For this analysis, the BLM assumes that these created canopy openings are functional for two decades after the harvest entry is completed.

The Planning Criteria provides more detailed information on analytical assumptions, methods and techniques, and geographic and temporal scales, which are incorporated here by reference (USDI BLM 2014, pp. 56–61).

[54] These represent openings > 0.25 acre embedded in a larger stand which provide early successional habitat, but do not change the structural classification of the stand as a whole and are therefore not in the acreage calculation of the early successional structural stage.

Background

A wide variety of forest conditions exist within the decision area, which includes a variety of forest types, ages, structural stages, and productive capacity for timber production. While the forest conditions in many areas are the result of past fires and other natural disturbances, the BLM has altered much of the landscape through a variety of management activities and harvest. Timber harvest levels in the decision area have fluctuated substantially over the past 80 years, with a generally flat trend over the past two decades (**Figure 3-50**).

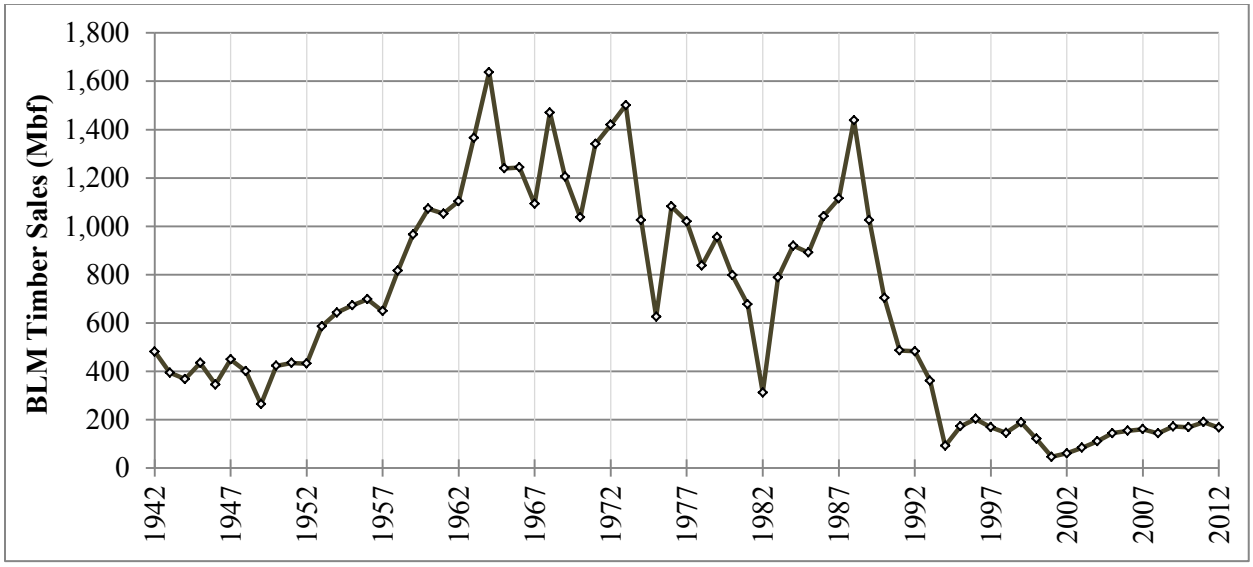


Figure 3-50. BLM historical timber sales; 1942–1961 data represents volume sold while 1962–2012 data represents volume harvested

Between 1962 and 1994, the BLM timber harvest from the planning area was 16 percent of western Oregon totals and averaged 980 MMbf per year. Since adoption of the 1995 RMPs, the BLM contribution has been less than 5 percent of western Oregon totals and has averaged 144 MMbf per year (**Figure 3-51**).

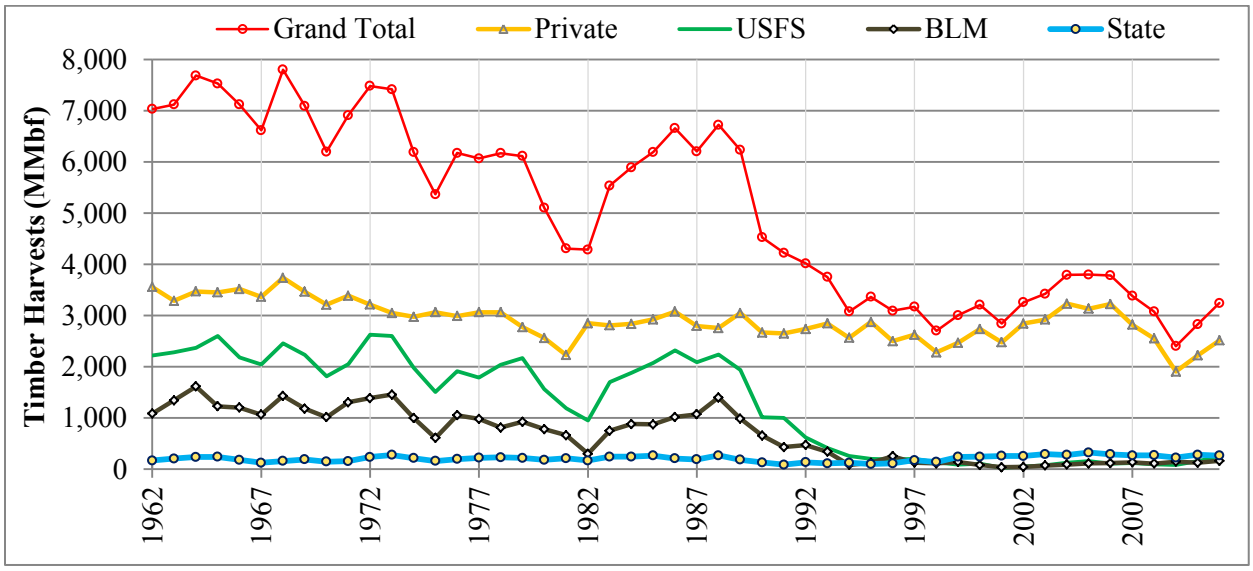


Figure 3-51. Western Oregon timber harvests by landowner, 1962–2011 (Tuchman and Davis 2013)

Age Classes

The natural disturbance and management history of the decision area has resulted in a mix of stand ages. The current age class distribution of lands in the decision area is shown in **Figure 3-52**.

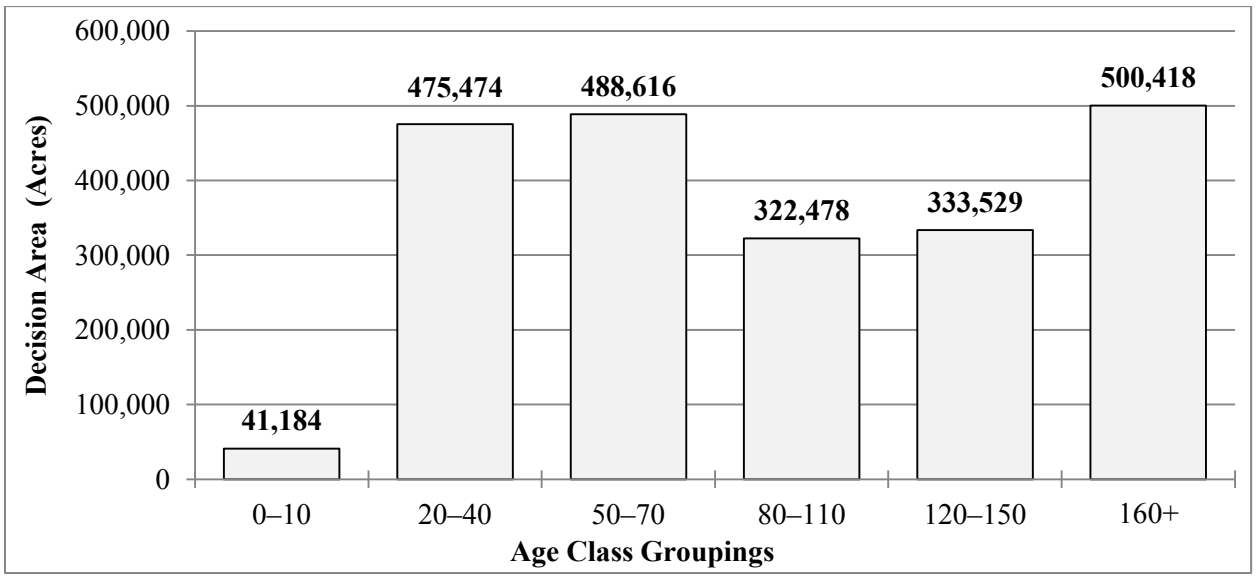


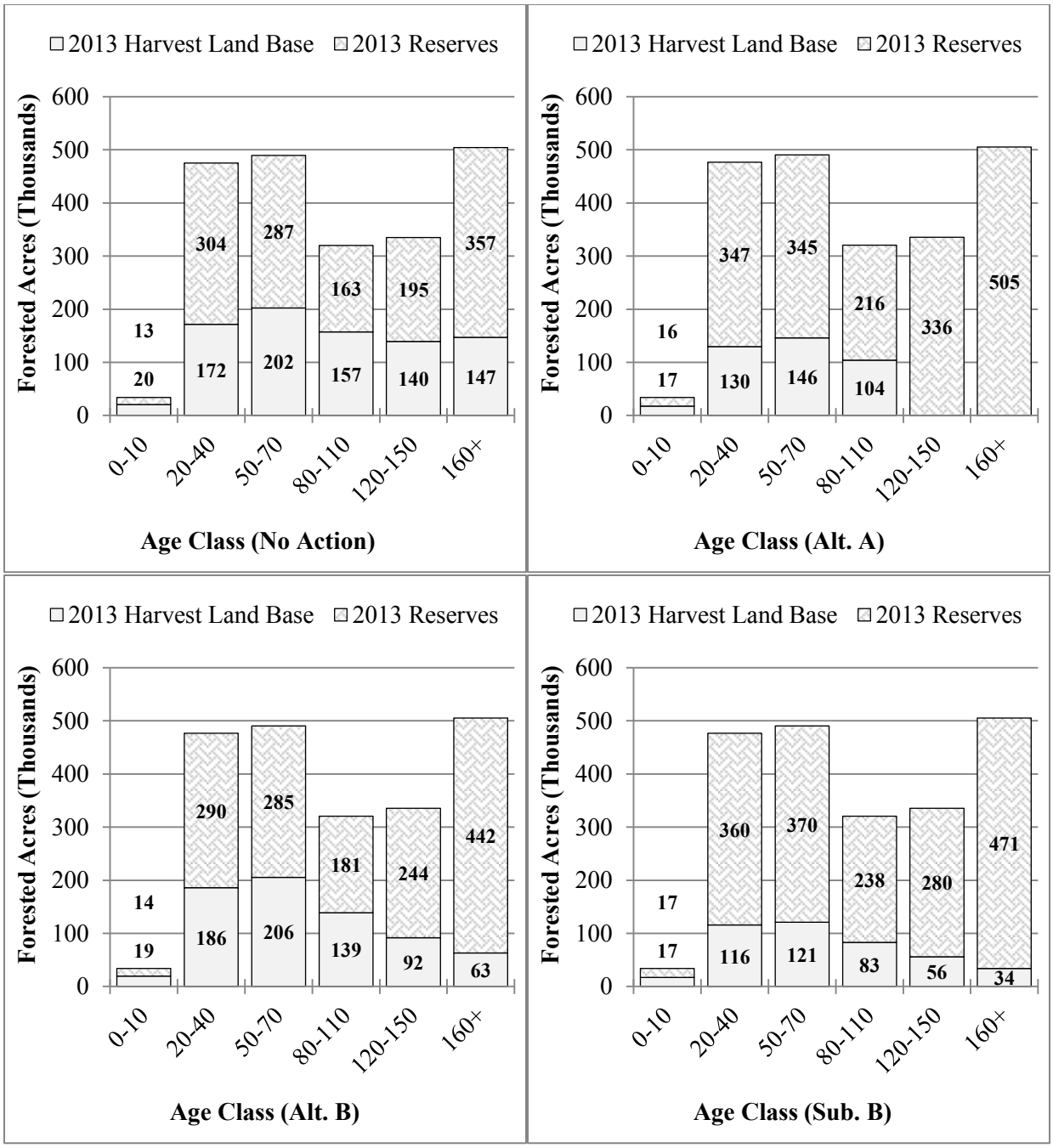
Figure 3-52. 2013 age class distribution for forested acres within the decision area (10-year increments)

The Coos Bay, Medford, and Roseburg Districts currently have the highest proportion of stands 160 years old and older with 24 percent, 29 percent, and 32 percent respectively. The Salem District has the lowest proportion of stands 160 years old and older with 9 percent. With the exception of the Klamath Falls Field Office, the districts only have 1–2 percent of their forested lands in the 0- to 10-year age class (**Table 3-47**). This is mostly due to the low levels of regeneration harvesting that the BLM has implemented since 1994 (**Figure 3-64**).

Table 3-47. 2013 age class distribution (10-year increments); forested acres and percent

District/Field Office		10	20–40	50–70	80–110	120–150	160+	Grand Total
Coos Bay	Acres	3,288	91,747	79,527	21,370	34,978	73,119	**304,030**
	Percent	1%	30%	26%	7%	12%	24%	
Eugene	Acres	2,669	78,887	112,471	41,556	17,022	44,617	**297,222**
	Percent	1%	27%	38%	14%	6%	15%	
Klamath Falls	Acres	5,442	4,100	7,643	17,819	6,691	5,077	**46,773**
	Percent	12%	9%	16%	38%	14%	11%	
Medford	Acres	22,889	105,129	91,529	142,002	164,556	214,014	**740,119**
	Percent	3%	14%	12%	19%	22%	29%	
Roseburg	Acres	4,490	106,530	74,120	34,980	50,640	128,403	**399,163**
	Percent	1%	27%	19%	9%	13%	32%	
Salem	Acres	2,406	89,082	123,325	64,751	59,641	35,186	**374,392**
	Percent	1%	24%	33%	17%	16%	9%	
Totals	**Acres**	**41,184**	**475,474**	**488,616**	**322,478**	**333,529**	**500,418**	**2,161,699**
	Percent	**2%**	**22%**	**23%**	**15%**	**15%**	**23%**	

The alternatives and the Proposed RMP vary in their approach to protection of older, more structurally-complex forest, affecting the distribution of older forests among the reserves and the Harvest Land Base. The No Action alternative allocates the largest acreage of forests 80 years old and older to the Harvest Land Base, while Sub-alternative C allocates the least (**Figure 3-53**). Of the forests 80 years old and older in the Harvest Land Base in Alternative B and the Proposed RMP, 90 percent and 74 percent of the acreage, respectively, are located in the interior/south portion of the decision area. The interior/south portion of the decision area contains the majority of dry forest types on BLM-administered lands.


2013 Harvest Land Base
2013 Reserves
Forested Acres (Thousands)
600
500
400
300
200
100
0
0-10
20-40
50-70
80-110
120-150
160+
Age Class (No Action)
13
20
304
172
287
202
163
157
195
140
357
147
Age Class (Alt. A)
16
17
347
130
345
146
216
104
336
505
Age Class (Alt. B)
14
19
290
186
285
206
181
139
244
92
442
63
Age Class (Sub. B)
17
17
360
116
370
121
238
83
280
56
471
34

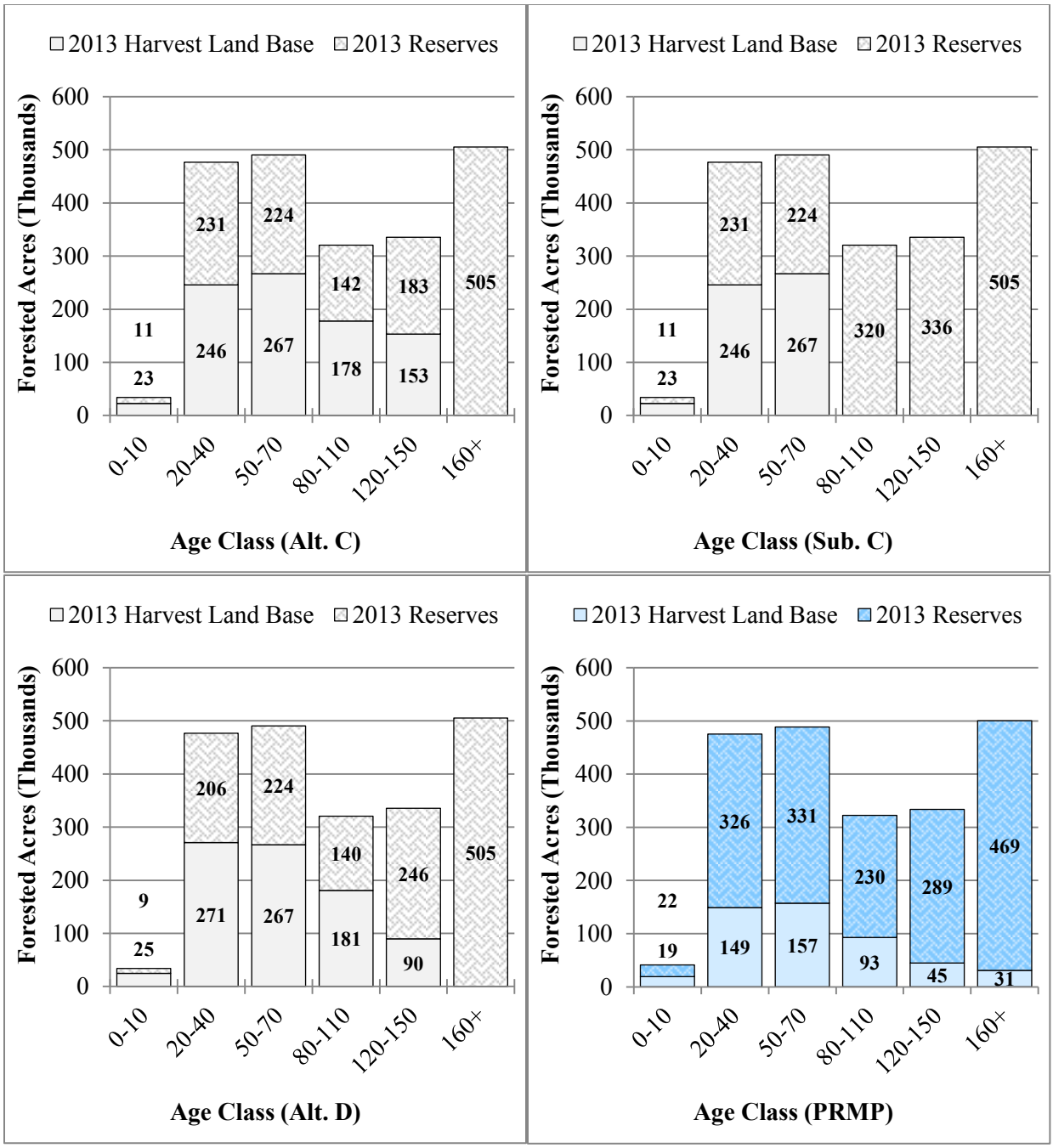


Figure 3-53. 2013 age class distribution by age class grouping and by the Harvest Land Base and the reserves (10-year increments)

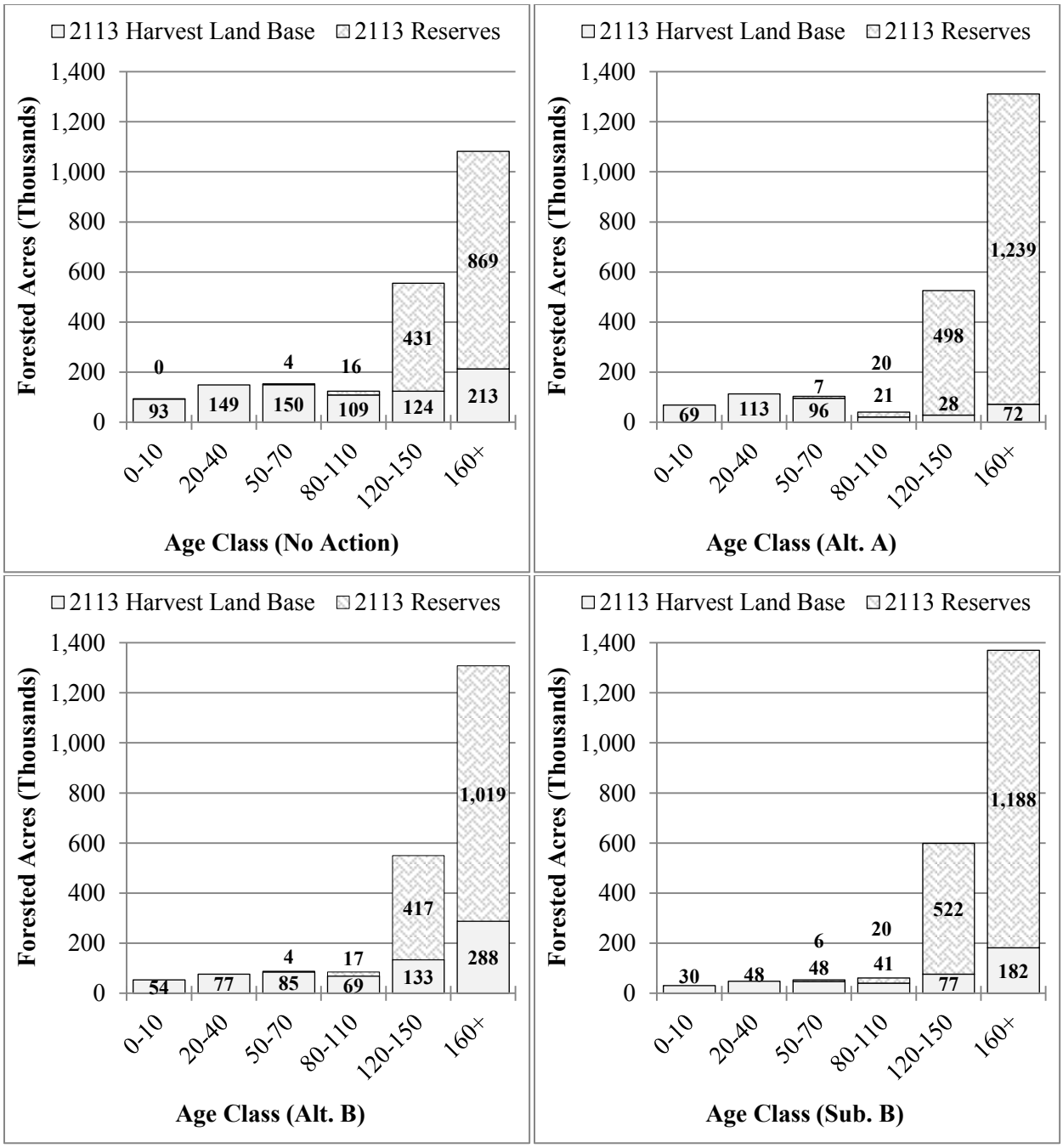
Dry forests typically are the product of relatively frequent low- to mixed-severity fire, which produces stands with multiple cohorts of trees of varying ages (Franklin and Johnson 2012, Sensenig *et al.* 2013). Therefore, the concept of stand age in these forests is less useful to approximate structural complexity or northern spotted owl habitat value. The BLM's approach to the protection of older, more structurally-

complex forests in Alternative B and the Proposed RMP is based on district-defined[55] maps, rather than stand age, which explains why Alternative B and the Proposed RMP would allocate some older stands, especially in the dry forest, to the Harvest Land Base.

Over time, the age class distribution in the decision area would represent the product of management under the different alternatives and the Proposed RMP. In 100 years, the forest stands in reserve land use allocations would be mostly greater than 120 years old, since the harvest types employed would not result in an alteration of stand structure sufficient to cause a reset of stand age. The BLM expects that wildfire would also play a role in shaping the future age class distribution of the decision area, but it would be a relatively limited role. The BLM did not simulate other large-scale episodic natural disturbances including wind-throw or insect and disease damage in the vegetation modeling.[56]

The BLM's simulations of wildfire impacts in the decision area reveal that a relatively small number of acres of BLM-administered lands are forecasted to experience high-severity wildfire per decade. On average, roughly 150 acres of BLM-administered lands in the coastal/north area and 2,950 acres in the interior/south area are forecasted to experience high-severity wildfire per decade. **Appendix H** contains more details of wildfire modeling on these simulations. In the absence of timber harvest, these and other natural disturbances would create the only areas in reserve land use allocations containing young stands. In the Harvest Land Base, the future age class distribution would be determined by the harvest intensity and cutting cycle under each alternative and the Proposed RMP (**Figure 3-54**).

[55] Districts defined "older, more structurally-complex forests" as stands meeting the definition high-quality northern spotted owl habitat as described in Recovery Action 32: "These high-quality spotted owl habitat stands are characterized as having large diameter trees, high amounts of canopy cover, and decadence components such as broken-topped live trees, mistletoe, cavities, large snags, and fallen trees" (USDI FWS 2011, p. III-67). Within the landscape of the entire planning area, forest types do not equally meet the definition of Recovery Action 32, meaning that there is not one age class or one measure of canopy cover that ensures this definition has been met, for the BLM to apply unilaterally across the Coos Bay, Eugene, Medford, Roseburg, and Salem Districts and the Klamath Falls Field Office of the Lakeview District. For example, a Douglas-fir stand near the Cascade Mountains may meet the definition of Recovery Action 32 at a different age, diameter, canopy cover, or decadence components than a Douglas-fir stand near the coast. BLM staff applied locally sourced information to stands within each district to determine which stands met this definition of Recovery Action 32 on their landscapes, and which ones did not.
[56] In the Woodstock vegetation modeling, the BLM accounted for reductions to timber growth and yield due to endemic levels of insects and diseases, but the BLM did not model large-scale episodic insect or disease outbreaks or windthrow that would affect stand structural stage classifications or age class distributions. The BLM modeled the predicted effects from wildfire and associated timber salvage for the first five decades in the planning area.


2113 Harvest Land Base
2113 Reserves
Forested Acres (Thousands)
1,400
1,200
1,000
800
600
400
200
0
0
93
149
4
150
16
109
431
124
869
213
0-10
20-40
50-70
80-110
120-150
160+
Age Class (No Action)
2113 Harvest Land Base
2113 Reserves
Forested Acres (Thousands)
69
113
7
96
20
21
498
28
1,239
72
Age Class (Alt. A)
2113 Harvest Land Base
2113 Reserves
Forested Acres (Thousands)
54
77
4
85
17
69
417
133
1,019
288
Age Class (Alt. B)
2113 Harvest Land Base
2113 Reserves
Forested Acres (Thousands)
30
48
6
48
20
41
522
77
1,188
182
Age Class (Sub. B)

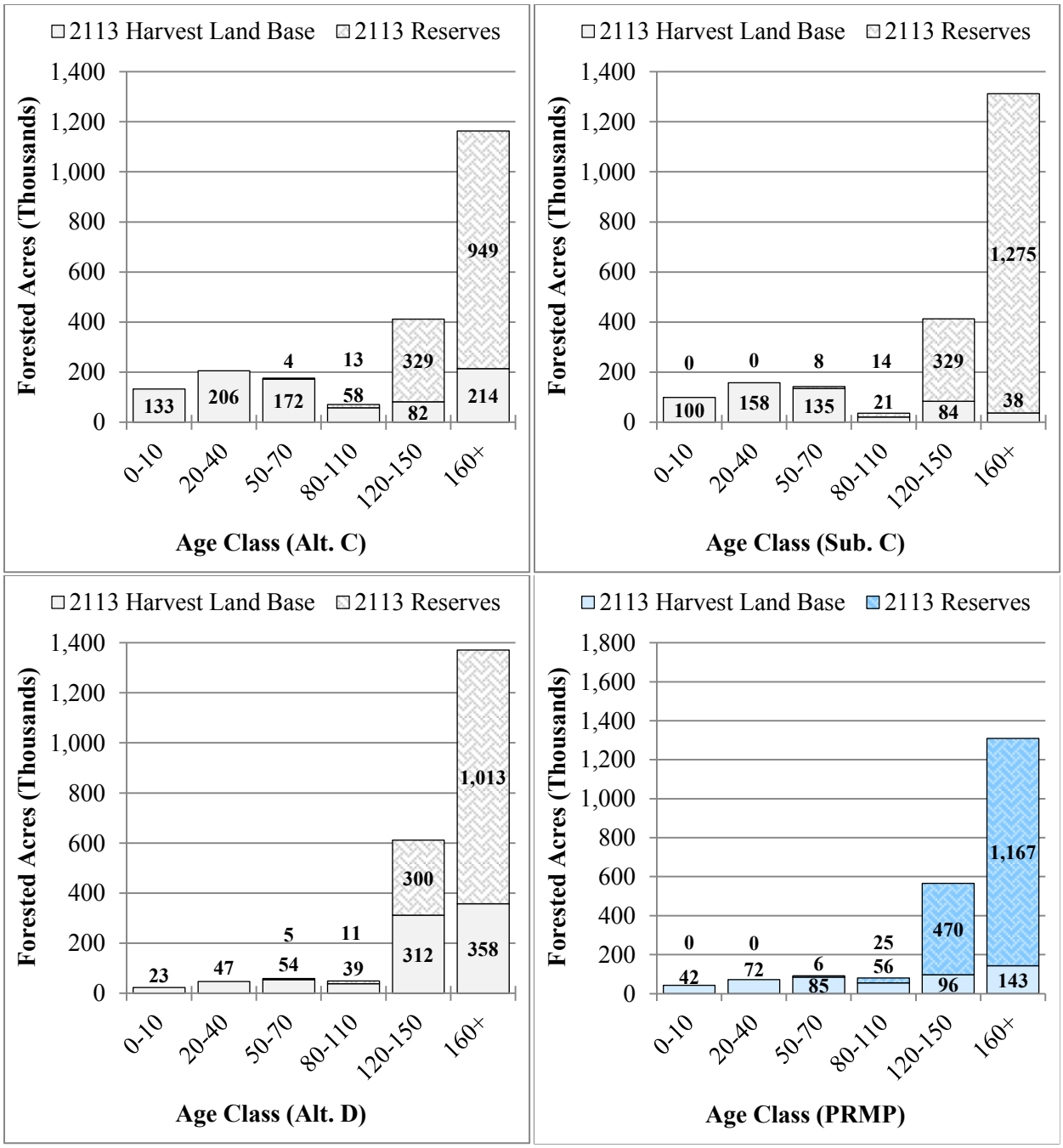


Figure 3-54. 2113 age class distribution by age class grouping, and broken out by the Harvest Land Base and the reserves (10-year increments)

In the long-term, the age class distribution in the Harvest Land Base in the No Action alternative (the Matrix and the Adaptive Management Areas) would approach forest regulation (i.e., an equal number of acres in each age class grouping). This would be the result of long-rotation, two-aged management on the entire Harvest Land Base. The portions of the Harvest Land Base in Alternatives A and C in the High Intensity Timber Area (HITA) would trend towards regulation in age classes 0–70 years, which would be the product of relatively short-rotation, even-aged management. In Alternatives B and D, and the Proposed RMP, the portions of the Harvest Land Base in the Moderate Intensity Timber Area (MITA)

and Low Intensity Timber Area (LITA) would generally trend towards regulation in age classes 0–140 years in the dry forest, and 0–100 years in the moist forest. **Table 3-48** displays average regeneration harvest age by decade, which reflects the trend towards longer rotations in the No Action Alternative, Alternatives B and D, and the Proposed RMP, when compared to the trend towards shorter rotations in Alternatives A and C, and Sub-alternative C.

Table 3-48. Average regeneration harvest age in years by decade in the decision area

Alternative/ Proposed RMP	2023 (Age)	2033 (Age)	2043 (Age)	2053 (Age)	2063 (Age)	2073 (Age)	2083 (Age)	2093 (Age)	2103 (Age)	2113 (Age)	2213 (Age)
No Action	162	167	157	136	117	130	125	130	125	125	123
Alt. A	65	74	74	75	77	75	78	64	61	61	51
Alt. B	87	79	75	73	89	96	89	103	97	100	99
Sub. B	82	70	70	72	82	85	77	98	99	99	98
Alt. C	80	91	88	87	86	85	86	78	71	76	54
Sub. C	61	65	70	70	73	75	76	67	67	67	65
Alt. D	71	83	74	78	76	82	61	122	124	120	122
PRMP	88	80	78	89	93	105	76	101	93	101	125

The portions of the Harvest Land Base in the Uneven-aged Timber Area (UTA) in all action alternatives and the Proposed RMP, and the Owl Habitat Timber Area (OHTA) in Alternative D would tend to get older at a similar rate as stands within reserve land use allocations, because stands in the Uneven-aged Timber Area and Owl Habitat Timber Area would be partially cut on a perpetual re-entry cycle. Stands partially cut under uneven-aged management regimes would never be reset to stand age zero by stand-wide regeneration harvest. These stands would transition to multi-aged, multi-cohort stands. The following table shows the percentage of the Harvest Land Base in each land use allocation category grouped in a way that is relevant to describe effects on the future age class distribution (**Table 3-49**).

Table 3-49. Percentage of Harvest Land Base in each land use allocation category

Alternative/ Proposed RMP	Longer Rotation Two-aged; GFMA, NGFMA, SGFMA, CONN, AMA, LITA, MITA (Percent)	Shorter Rotation Even-aged; HITA (Percent)	Uneven-aged; UTA, OHTA (Percent)
No Action	100%	-	-
Alt. A	-	84%	16%
Alt. B	51%	-	49%
Sub. B	54%	-	46%
Alt. C	-	75%	25%
Sub. C	-	81%	19%
Alt. D	25%	-	75%
PRMP	69%	-	31%

In summary, progression of the age class distribution of the decision area through time would be dictated by the harvesting practices directed in each land use allocation. Reserves and allocations dedicated to uneven-aged management regimes and associated selection harvesting, the Uneven-aged Timber Area and Owl Habitat Timber Area, would continue to age since the stand age would never be reset to zero, barring

an intense natural disturbance event. The relatively short rotation even-aged management regimes and associated clear-cutting in the High Intensity Timber Area land use allocation in Alternatives A and C would result in roughly an equal number of acres in each age class up to the 70-year class.

The emphasis on longer rotation two-aged management regimes and associated variable-retention regeneration harvesting would result in roughly an equal number of acres in each 10-year age class up to the 100-year age class in moist, higher productivity forest, and up to the 140-year age class in drier, lower productivity forests. This would occur in the No Action alternative, in the Moderate Intensity Timber Area and Low Intensity Timber Area in Alternative B, Sub-alternative B, and the Proposed RMP, and in the Moderate Intensity Timber Area in Alternative D. The more clear-cutting and variable-retention regeneration harvesting[57] in an alternative or the Proposed RMP, the more acres would be in the younger age classes in 100 years. Therefore, the overall age class distribution in Alternative C would contain the most acres in stands less than or equal to 40 years old in 100 years (**Figure 3-54**).

Structural Stages

In this analysis, the BLM evaluated the development of the forest categorized by structural stages (**Table 3-50**). **Appendix C** has a more detailed discussion of the structural stage classification system.

Table 3-50. Structural stage classification generalized definitions.

Code	Structural Stage Classification Label
ES-WSL	Early Successional with Structural Legacies
ES-WOSL	Early Successional without Structural Legacies
SE-WSL	Stand Establishment with Structural Legacies
SE-WOSL	Stand Establishment without Structural Legacies
YHD-WSL	Young High Density with Structural Legacies
YHD-WOSL	Young High Density without Structural Legacies
YLD-WSL	Young Low Density with Structural Legacies
YLD-WOSL	Young Low Density without Structural Legacies
M-SINGLE	Mature Single-layered Canopy
M-MULTI	Mature Multi-layered Canopy
SC-DEV	Structurally-complex, Developed Structurally-complex
SC-OF	Structurally-complex, Existing Old Forest
SC-VOF	Structurally-complex, Existing Very Old Forest

The natural disturbance and management history of the decision area has affected the mix of structural stages similarly to age classes. The decision area is currently comprised predominately of Stand Establishment without Structural Legacies, Young without Structural Legacies, Mature, and Structurally-complex forest (**Figure 3-55**).

[57] The BLM uses the term variable-retention regeneration harvest in this analysis to describe regeneration harvest practices in the Matrix and Adaptive Management Area land use allocations under the No Action alternative, and the Moderate Intensity Timber Area and Low Intensity Timber Area land use allocations in the action alternatives and the Proposed RMP. The 1995 RMPs require retention of green trees in regeneration harvests based on a range of trees per acre, while the Moderate Intensity Timber Area and Low Intensity Timber Area base retention levels on a target proportion of pre-harvest basal area.

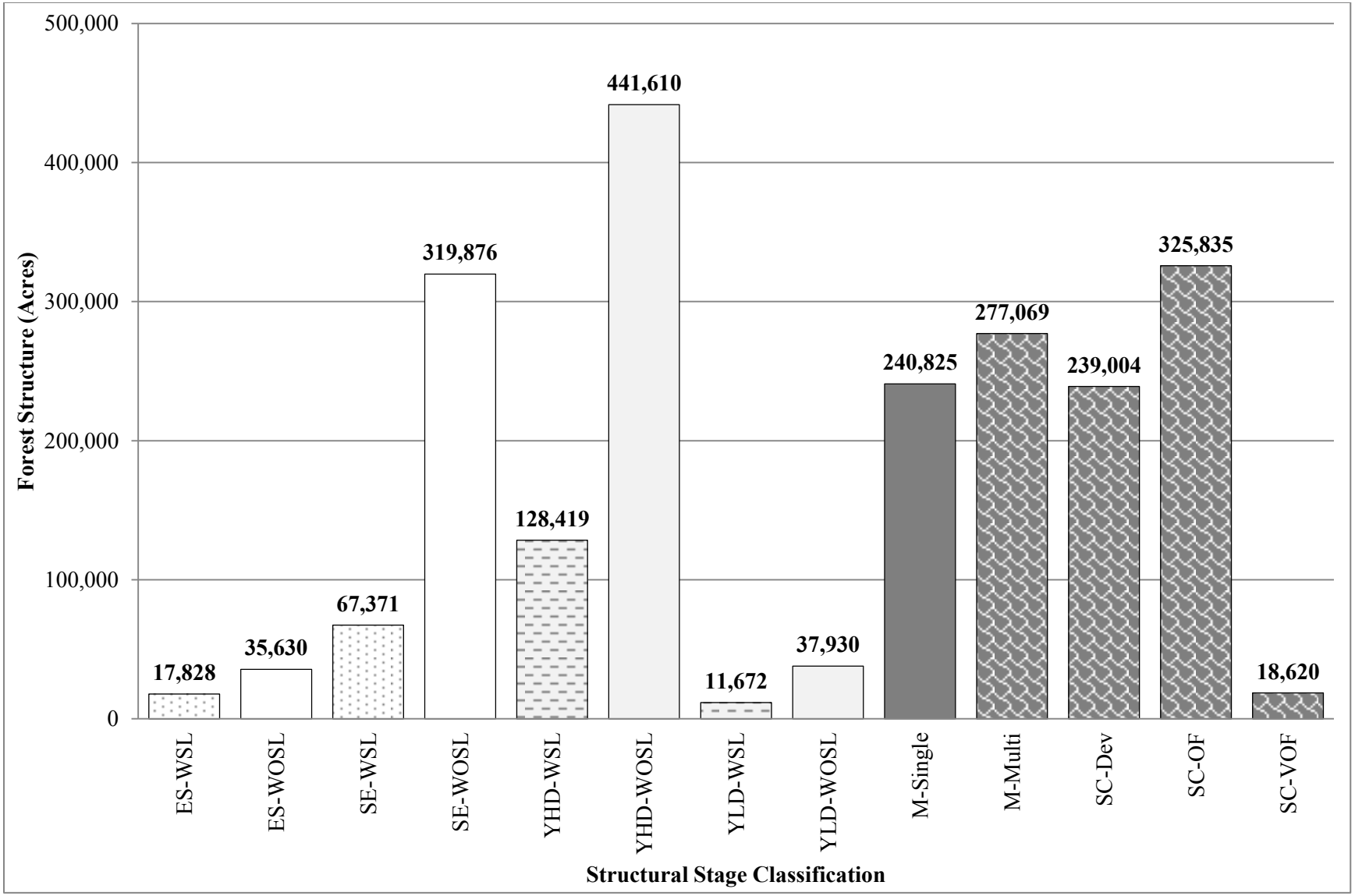


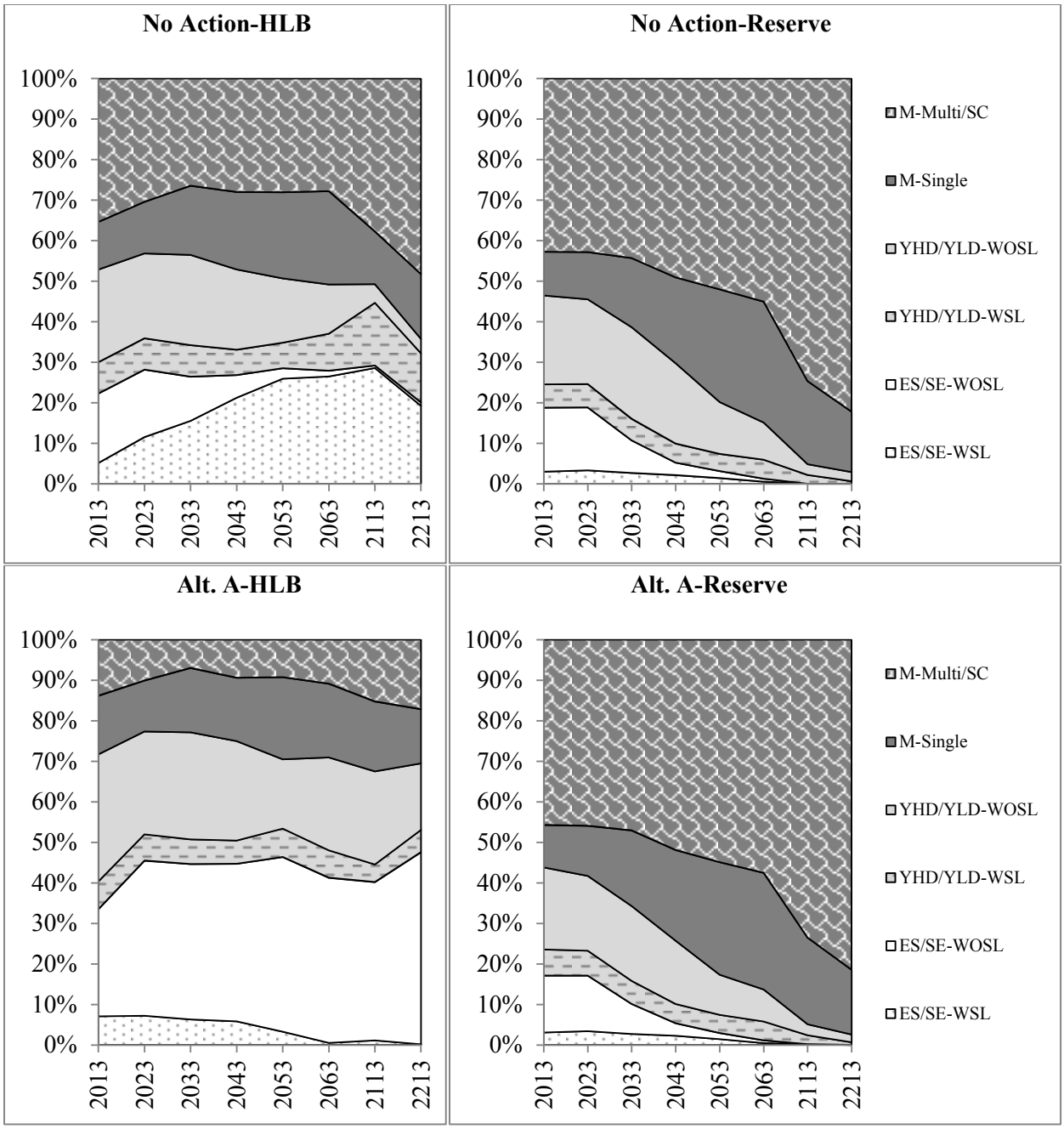
Figure 3-55. Current structural stage distribution for the decision area

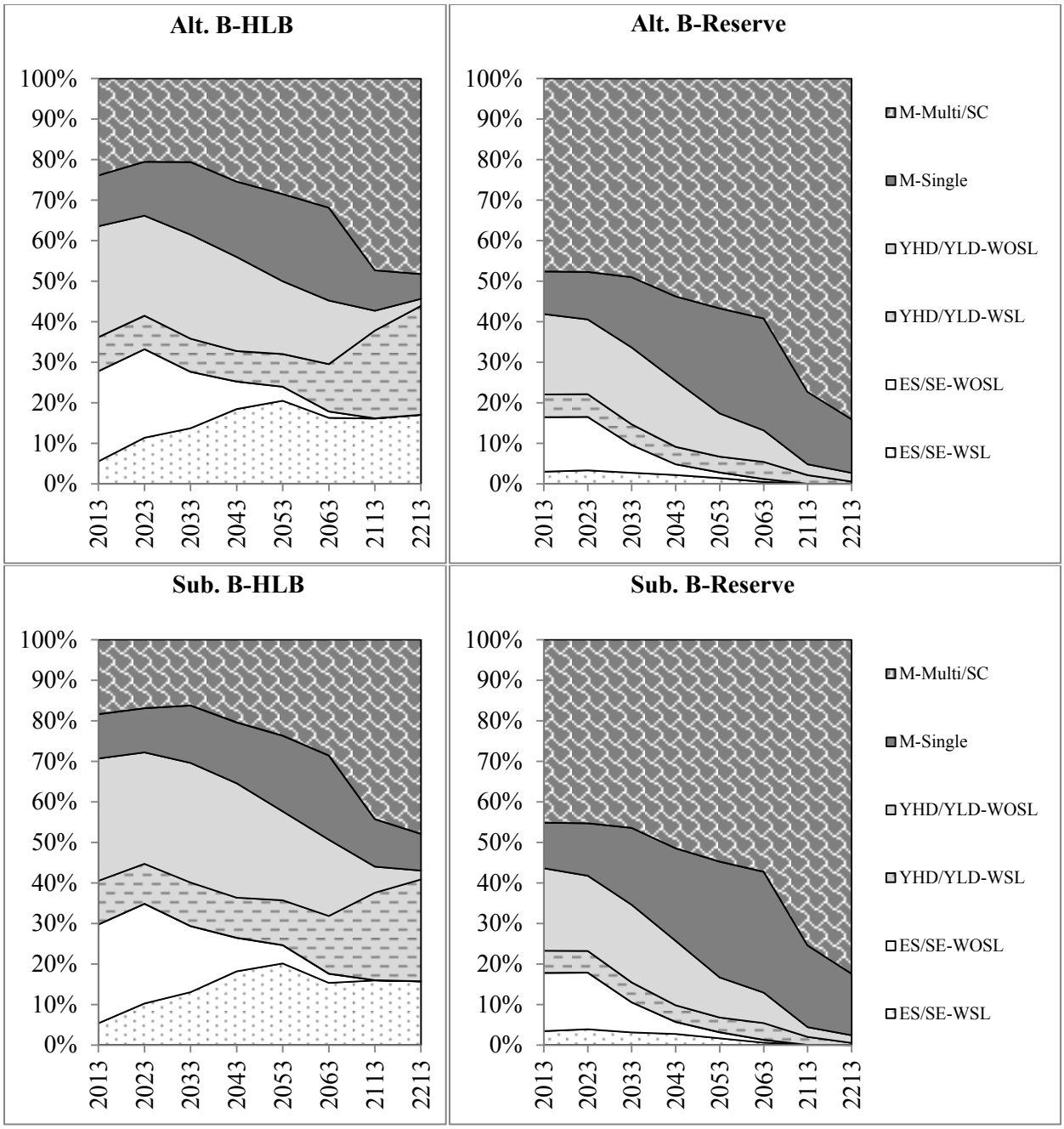
Note: See **Table 3-50** for label definitions and **Appendix C** for more details on structural stage classifications.

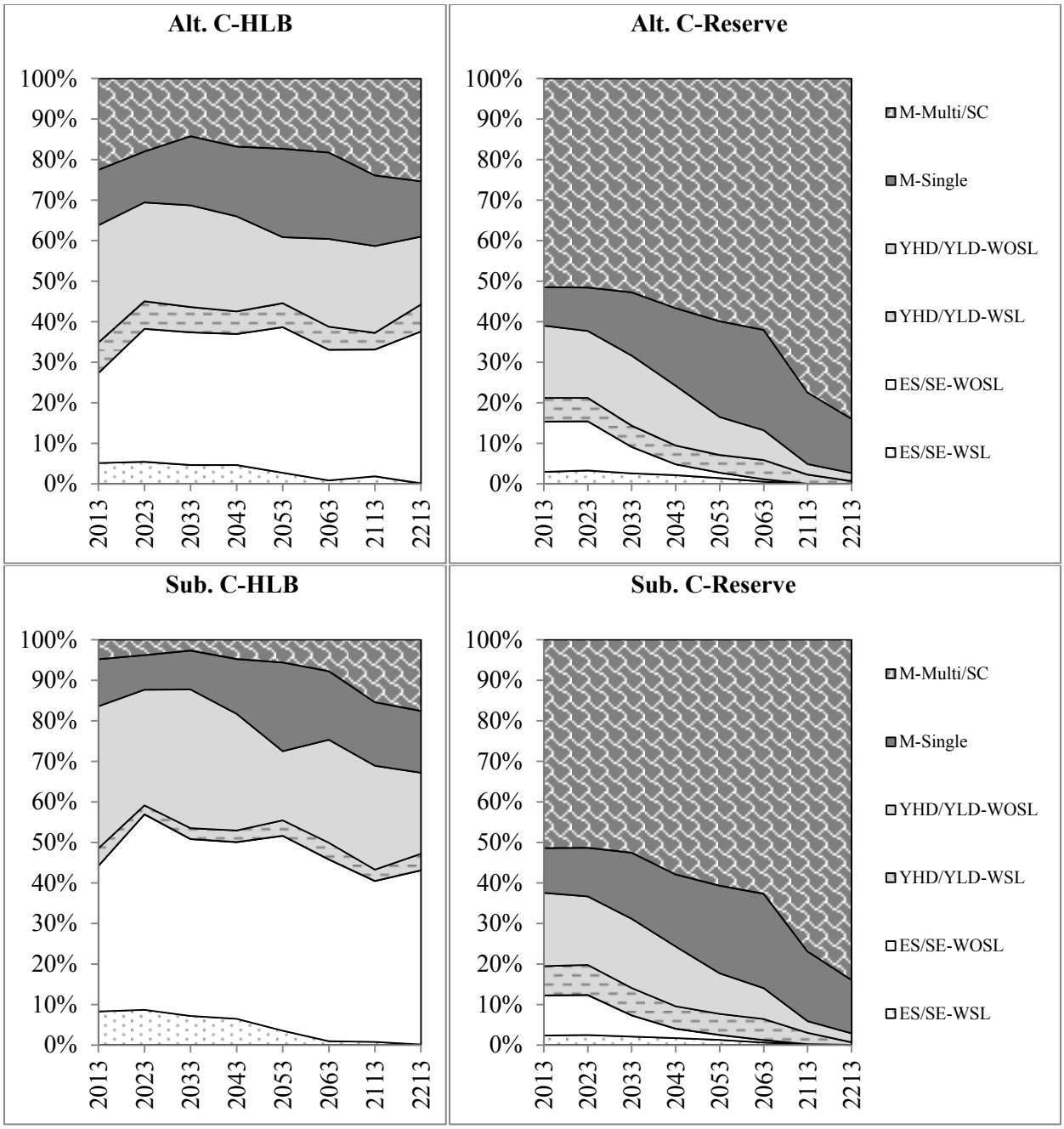
The BLM management has the potential to cause substantial changes to the structural stage distribution of forested lands in the decision area over time. The 2008 FEIS contains a robust spatial and temporal analysis regarding Forest Structure and Spatial Pattern compared to historic condition, which is incorporated here by reference (USDI BLM 2008, pp. 501–536).

The structural stage progression in the reserve land use allocations would represent the majority of the forested land in the decision area, because the BLM would allocate no more than 30 percent of the decision area to the Harvest Land Base in any alternative or the Proposed RMP. Since the majority of forested land resides in reserve land use allocations, structural stage differences between alternatives and the Proposed RMP are muted when the Harvest Land Base and reserves are combined, therefore they will be discussed and shown separately. **Figure 3-56** highlights the structural stage progression through time for each alternative and the Proposed RMP, grouped into similar categories, and broken out by the Harvest Land Base and reserves.

The proportion of the Harvest Land Base composed of Mature Multi-layered Canopy and Structurally-complex forests in 2013 in each alternative and the Proposed RMP would be mostly driven by the alternative-specific approach to the protection of older, more structurally-complex forests. The BLM has grouped Mature Multi-layered Canopy with Structurally-complex stands in the following figures and discussion due to their similarities related to northern spotted owl habitat quality.


No Action-HLB
No Action-Reserve
Alt. A-HLB
Alt. A-Reserve
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2013
2023
2033
2043
2053
2063
2113
2213
M-Multi/SC
M-Single
YHD/YLD-WOSL
YHD/YLD-WSL
ES/SE-WOSL
ES/SE-WSL


Alt. B-HLB
Alt. B-Reserve
Sub. B-HLB
Sub. B-Reserve
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2013
2023
2033
2043
2053
2063
2113
2213
M-Multi/SC
M-Single
YHD/YLD-WOSL
YHD/YLD-WSL
ES/SE-WOSL
ES/SE-WSL


Alt. C-HLB
Alt. C-Reserve
Sub. C-HLB
Sub. C-Reserve
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2013
2023
2033
2043
2053
2063
2113
2213
M-Multi/SC
M-Single
YHD/YLD-WOSL
YHD/YLD-WSL
ES/SE-WOSL
ES/SE-WSL

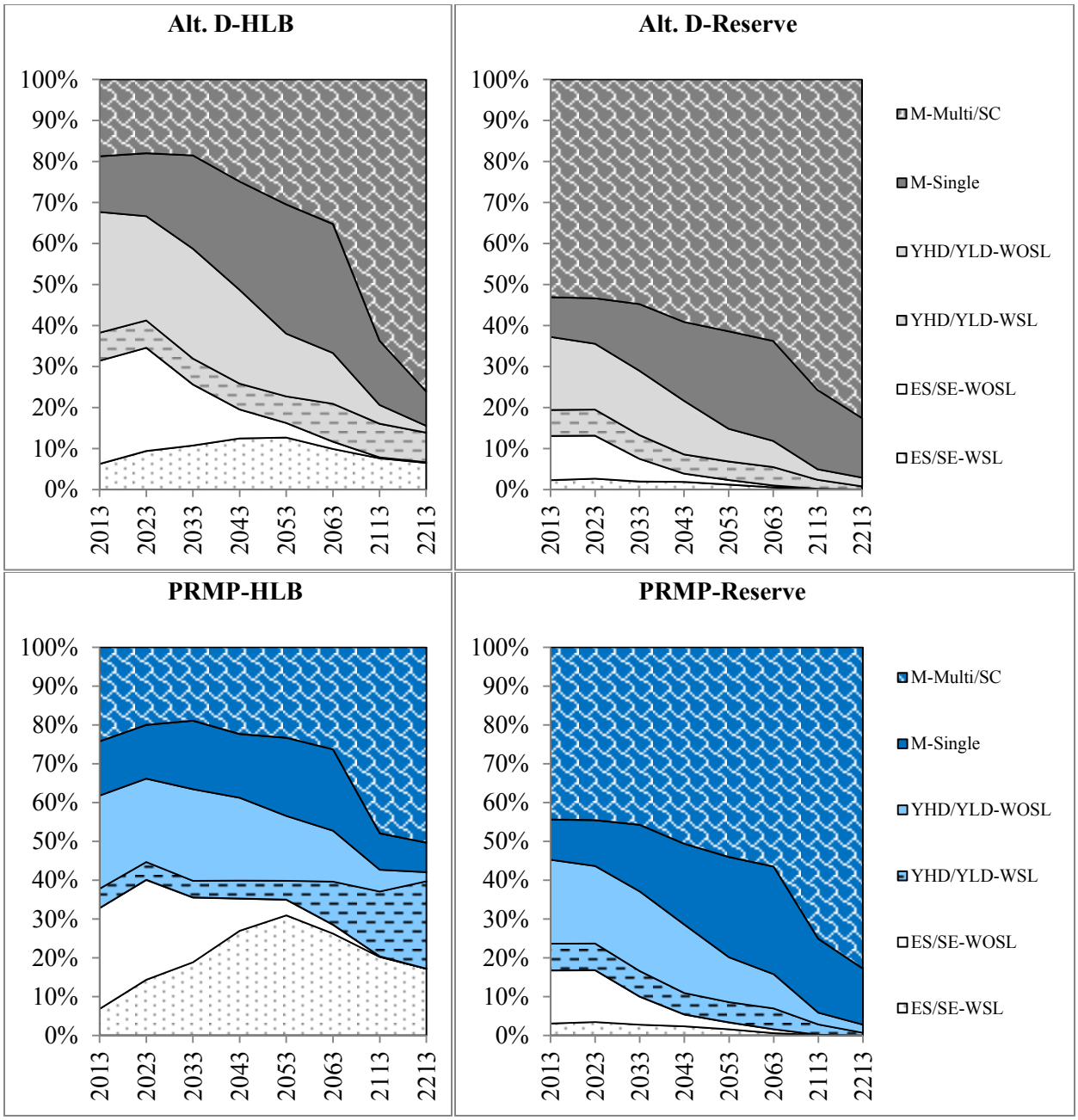


Figure 3-56. Structural stage progression over 200 years in the Harvest Land Base and reserves
Note: See **Table 3-50** for label definitions.

The No Action alternative contains the highest proportion of the Harvest Land Base in Mature Multi-layered Canopy and Structurally-complex structural stages (35 percent). Sub-alternative C contains the smallest proportion of these stands in the Harvest Land Base, with approximately 5 percent, since the BLM would reserve all stands greater than 80 years old in this sub-alternative. It is notable that while close to 25 percent of the Harvest Land Base is in the Mature Multi-layered Canopy and Structurally-complex structural stages in Alternative B and the Proposed RMP, over 70 percent of those acres are in the interior/south portion of the decision area. Alternative B and the Proposed RMP include a district-

defined designation of older, more structurally-complex forests. See Chapter 2 for a more thorough explanation of the varying approaches to older forest protection.

In the Harvest Land Base, the patterns of structural stage progressions would follow three distinct patterns (**Figure 3-57**). In Alternatives A and C, the Harvest Land Base would mostly trend towards single-story stands and structural stages without structural legacies, in almost equal parts of Early Successional, Stand Establishment, Young, Mature, and Structurally-complex in 100 years. In the No Action alternative, Alternative B, and the Proposed RMP, the Harvest Land Base would mostly trend towards multi-layered stands and structural stages with structural legacies, with Mature Multi-layered Canopy and Structurally-complex stands occupying around 50 percent of the area in 100 years. In Alternative D, in which 75 percent of the Harvest Land Base would be managed using uneven-aged management regimes (**Table 3-49**), the majority of the Harvest Land Base would develop into Mature Multi-layered Canopy or Structurally-complex stands in 100 years.

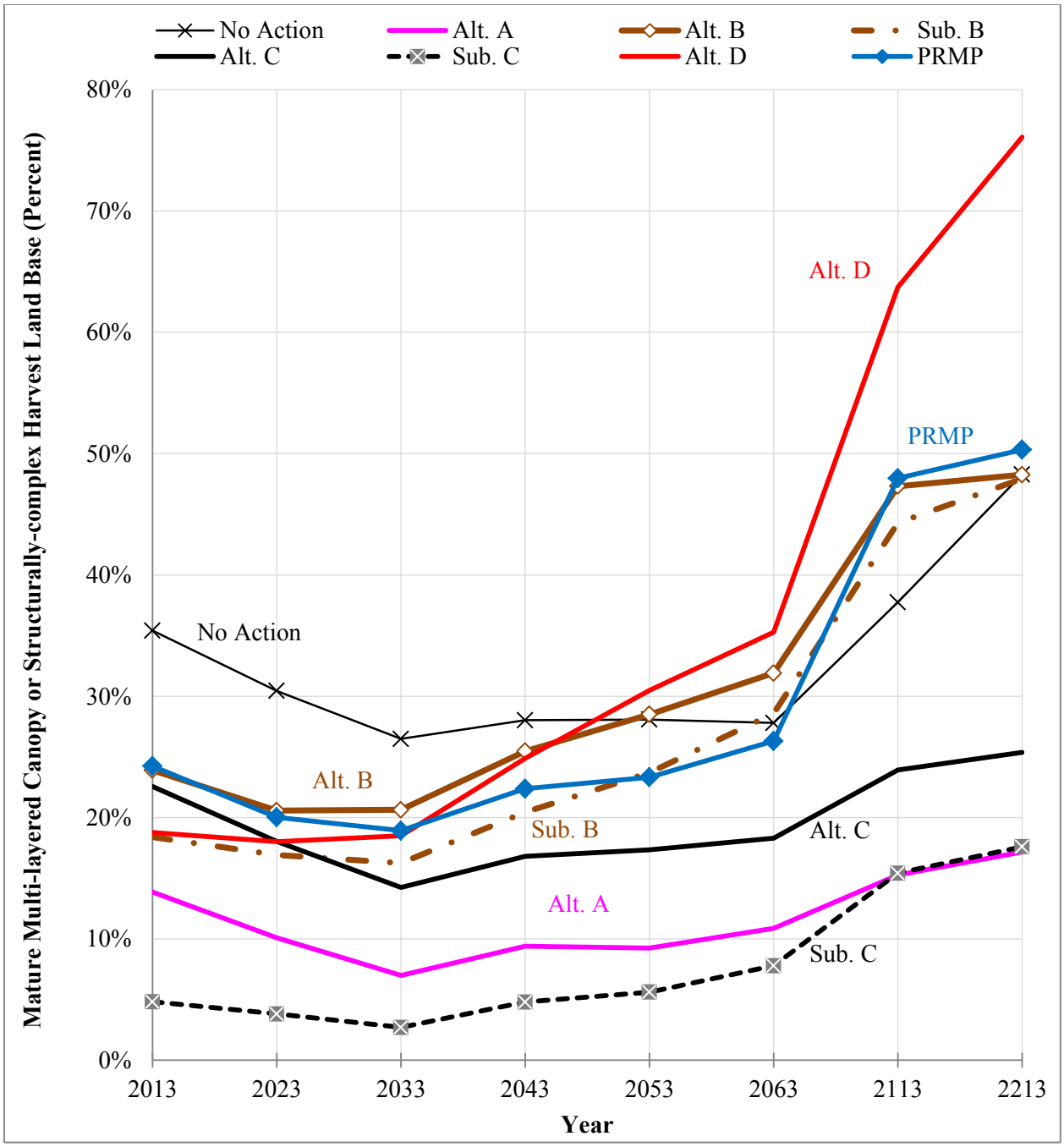


Figure 3-57. Proportion of the Harvest Land Base as Mature Multi-layered Canopy or Structurally-complex through time

Under Alternatives A and C, clear-cutting in the High Intensity Timber Area would produce relatively uniform, single–story stands, with little to no structural legacies. In contrast, the variable-retention regeneration harvesting in portions of the No Action alternative, Alternatives B and D, and the Proposed RMP would produce heterogeneous, multi-layered stands with structural legacies (**Figure 3-58**). This is consistent with the analytical conclusions about the effect of different regeneration harvest approaches on structural stage development in the 2008 FEIS (USDI BLM 2008, pp. 505–506, 508–513, 517) and recent publications on retention forestry (Gustafsson *et al*. 2012).

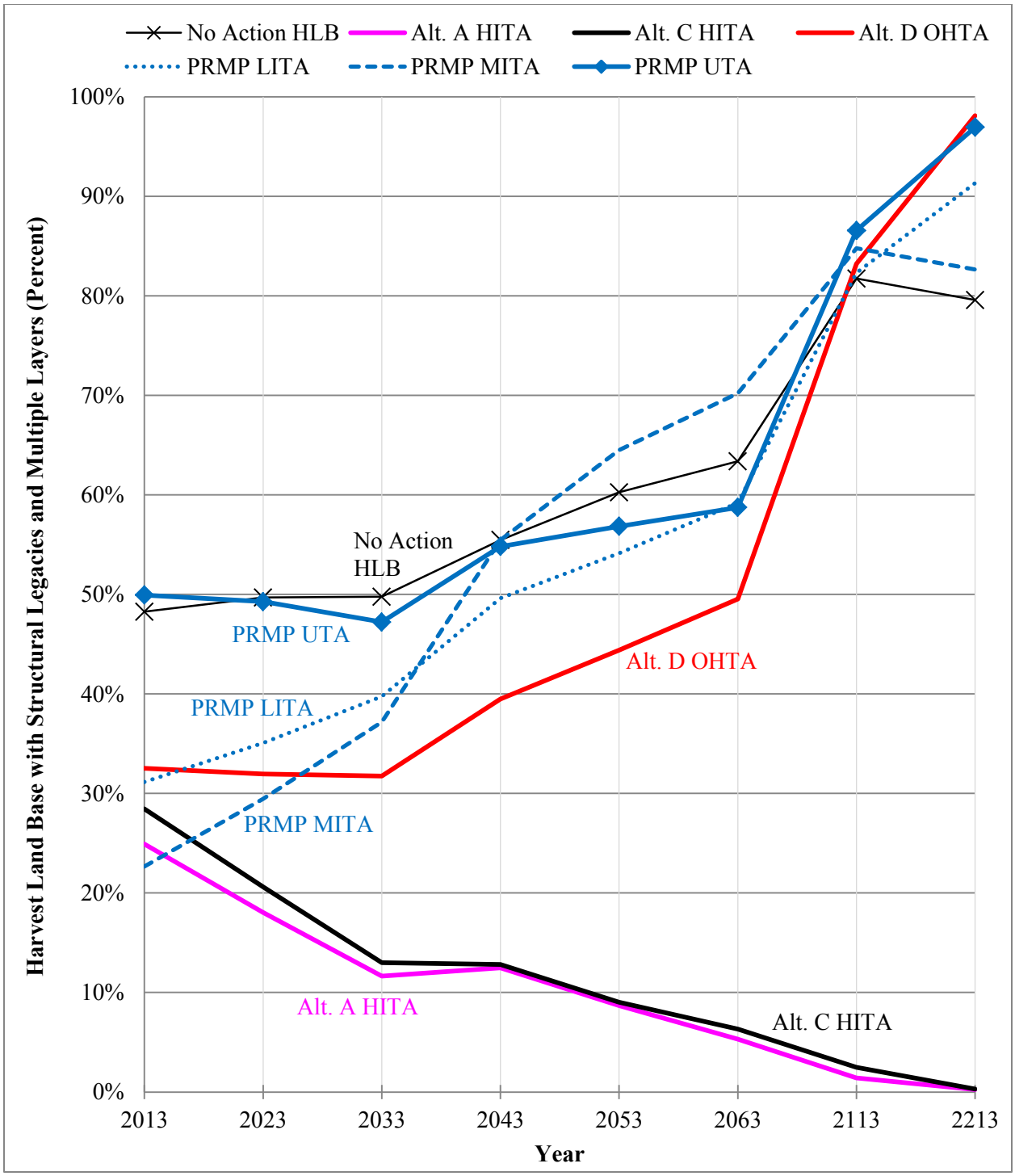


Figure 3-58. Proportion of the Harvest Land Base sub-allocations with structural legacies or multiple layers through time

Note: The data is not shown for Alt. B Low Intensity Timber Area, Alt. B and D Moderate Intensity Timber Area, Alt. A, B, C, and D Uneven-aged Timber Area since the land use allocation development trends within the Harvest Land Base sub-allocations are nearly identical among the action alternatives and would be indiscernible from the Proposed RMP on this graph.

Clear-cutting under Alternatives A and C would produce different post-harvest conditions than variable-retention regeneration harvesting under the No Action alternative, Alternatives B and D, and the Proposed RMP. Alternative C would produce the most Early Successional conditions, while Alternative B would produce the most Early Successional with Structural Legacies. Alternative D would produce the least amount of acres in Early Successional conditions of the alternatives and the Proposed RMP, the majority of which would contain structural legacies. The Proposed RMP would produce the second least number of acres of Early Successional condition, and the majority would be Early Successional with Structural Legacies (**Figure 3-59**).

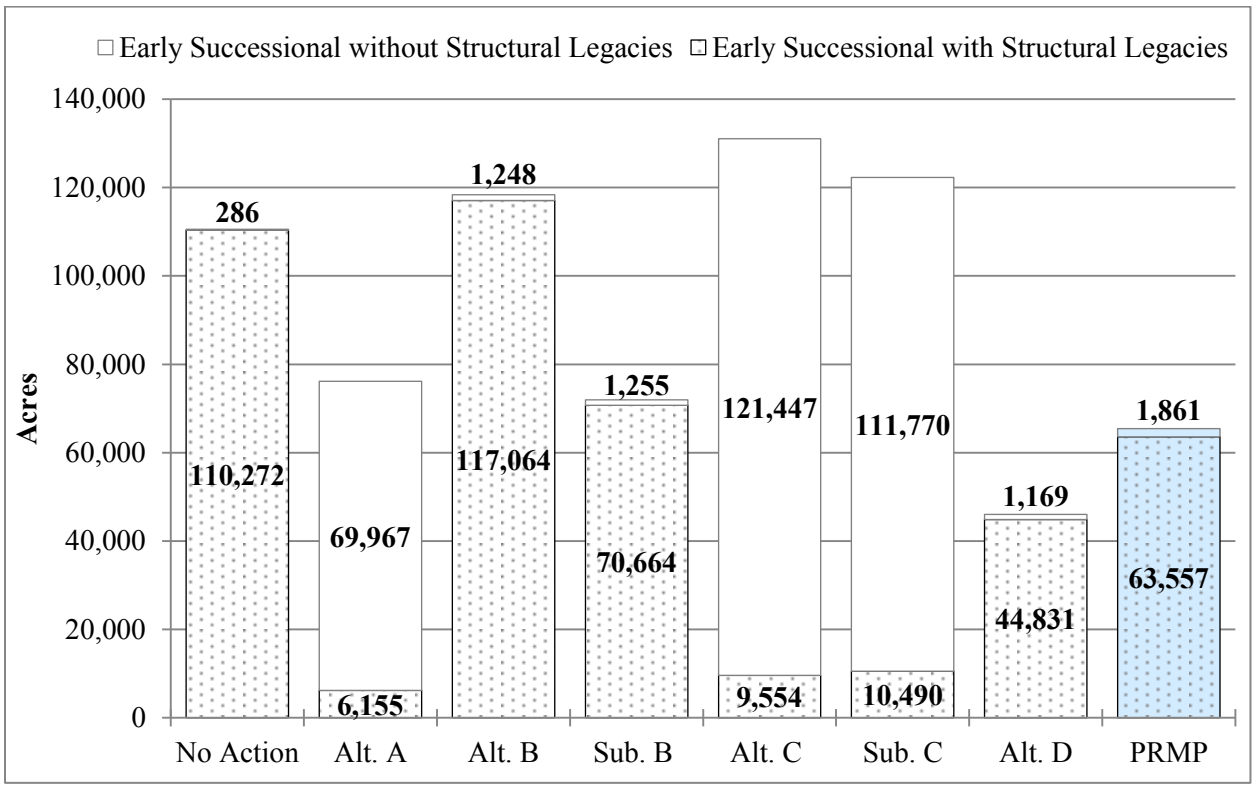


Figure 3-59. Structural complexity and abundance of the Early Successional structural stage in 2063

Reforestation practices after regeneration harvest would vary depending on the Harvest Land Base sub-allocation, and the alternatives and the Proposed RMP, which would affect duration and quantity of the Early Successional structural stage. For the Low Intensity Timber Area in Alternative B, the BLM would achieve reforestation using natural regeneration only, prohibiting tree planting. In addition, the BLM would delay canopy closure of regenerated trees on a portion of the harvest area for three decades after harvesting. In the Moderate Intensity Timber Area in Alternative B, the BLM would allow tree planting, but would delay canopy closure by three decades after harvesting. The BLM would achieve delayed canopy closure in Alternative B through altering the timing and intensity of pre-commercial thinning. The combination of delayed canopy closure of regenerated trees in the Low Intensity Timber Area and Moderate Intensity Timber Area, and the prohibition on planting trees in the Low Intensity Timber Area in Alternative B, would act to extend the duration and increase the abundance of the Early Successional structural stage, when compared with the other alternatives and the Proposed RMP. In the No Action alternative, the High Intensity Timber Area in Alternatives A and C, the Moderate Intensity Timber Area in Alternative D, and the Low Intensity Timber Area and Moderate Intensity Timber Area in the Proposed RMP, the BLM would require adequate reforestation within 5 years of completion of harvest. This explains why the Proposed RMP would produce fewer acres in the Early Successional structural stage

through time than Alternative B, despite the fact that the Proposed RMP would result in more regeneration harvesting per decade than Alternative B. Forest Management Issue 2 further discusses reforestation practices as they relate to intensity of management.

In the reserves, the pattern of structural stage development would vary little because the BLM would implement silvicultural treatments in the reserve land use allocations only for restoration purposes under all alternatives and the Proposed RMP. Therefore, the reserve land use allocations would generally trend towards Mature and Structurally-complex conditions, while Early Successional, Stand Establishment, and Young stands would mostly disappear over time.

Natural disturbances, especially wildfire, would create some Early Successional stands, regardless of land use allocation designation. Because the acreage of reserve allocations would vary by alternative and the Proposed RMP, the acreage of reserve allocations affected by wildfire would vary as well. Based on wildfire simulation, on average, between 41–115 acres of reserve land use allocations on BLM-administered lands in the coastal/north area and between 911–2,317 acres of reserve land use allocations on BLM-administered lands in the interior/south area would experience high-severity wildfire per decade. Assuming burned stands remain in an Early Successional structural stage for three decades, this would only yield up to 345 acres of Early Successional stands in the coastal/north areas, and 6,951 acres of Early Successional stands in the interior/south areas in any given decade. With the exception of wildfire, the BLM did not simulate the impacts of large-scale episodic natural disturbances (e.g., windthrow or insect and disease outbreaks) in the vegetation modeling to determine effects to stand structural development.

In the vegetation modeling, the BLM calculated structural stage classifications based on stand level average conditions. However, the BLM recognizes that selection harvesting and commercial thinning would create functional canopy openings resulting in small inclusions of Early Successional habitat in Young, Mature, and Structurally-complex stands. The amount of functional canopy openings the BLM would create through silvicultural treatments varies by the primary objectives for forest management. For selection harvesting and commercial thinning where production of a stable wood supply is the primary objective, forest management would create few functional canopy openings. For selection harvesting and commercial thinning, where development of structural complexity and high quality late successional habitat are primary treatment objectives, implementation would involve the creation of group selection > 0.25 acres in size. These group selection openings would function as small inclusions (i.e., functional created canopy openings) of Early Successional habitat within Young, Mature, and Structurally-complex stands, but do not show up in the calculation of acres by stand level average structural stage classification. Created canopy openings would enhance structural development by contributing to multiple layered canopies, creating growing space for desirable understory vegetation and hardwoods, and increasing edge-tree limb development and diameter growth. **Figure 3-60** reports the number of acres of functional created canopy openings > 0.25 acres in size in 2043 by land use allocation or sub-allocation. Alternative B would produce the highest acreage in functional created canopy openings in 2043, followed by the Proposed RMP, Alternative D, and Alternative C, with the No Action alternative producing the fewest acres.

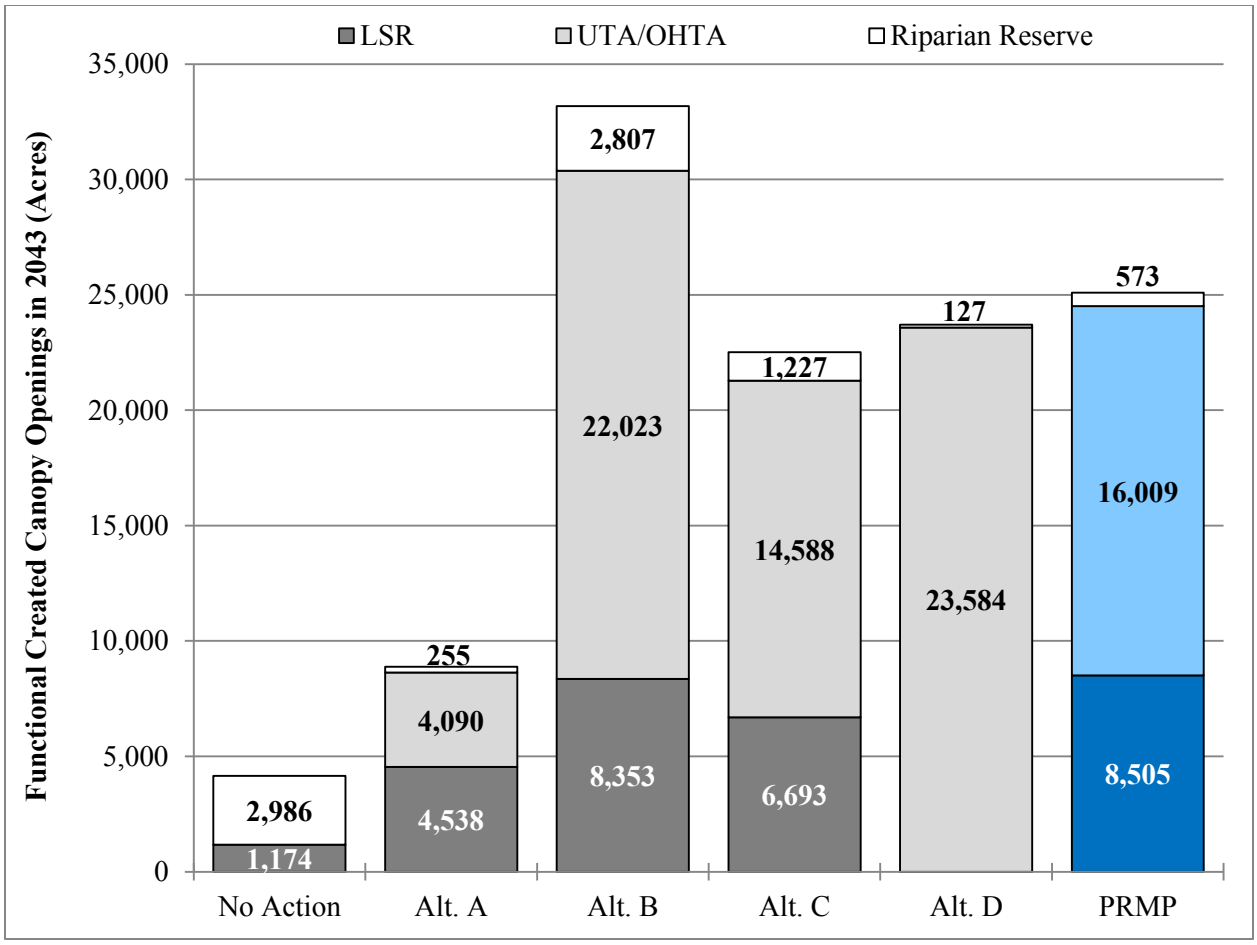


Figure 3-60. Acreage of functional created canopy openings > 0.25 acres in 2043 by alternative and land use allocation

Management direction for stand treatments within the Late-Successional Reserve would vary. The No Action alternative, Alternatives B and C, and the Proposed RMP would include timber harvesting as a tool for attainment of Late-Successional Reserve management objectives. Alternative A would achieve these management objectives in the moist forest Late-Successional Reserve through non-commercial management (i.e., cutting trees but not removing them from the stand). In Alternative D, the Late-Successional Reserve is comprised of older, more structurally-complex forest and thus would not require the same treatments to attain Late-Successional Reserve management objectives. However, the Owl Habitat Timber Area within the Harvest Land Base in Alternative D includes management direction to apply selection harvesting to speed the development of and then maintain northern spotted owl habitat, similar to the management direction within the Late-Successional Reserve in other action alternatives and the Proposed RMP. Therefore, the outcomes for the Owl Habitat Timber Area in Alternative D provide a relevant comparison to the outcomes for portions of the Late-Successional Reserve under other alternatives and the Proposed RMP.

The following figure (**Figure 3-61**) illustrates the differences in the proportion of forested acres in Mature Multi-layered Canopy and Structurally-complex conditions in 2013 and 2213. The BLM grouped the Mature Multi-layered Canopy and Structurally-complex structural stages together because they generally represent the highest quality spotted owl habitat. The difference in structural conditions in the moist forest Late-Successional Reserve managed using commercial thinning is indistinguishable from structural

conditions in the Late-Successional Reserve using non-commercial thinning only (Alternative A). However, 98 percent of stands develop into Mature Multi-layered Canopy and Structurally-complex stands in response to the uneven-aged management prescriptions in the Owl Habitat Timber Area in Alternative D.

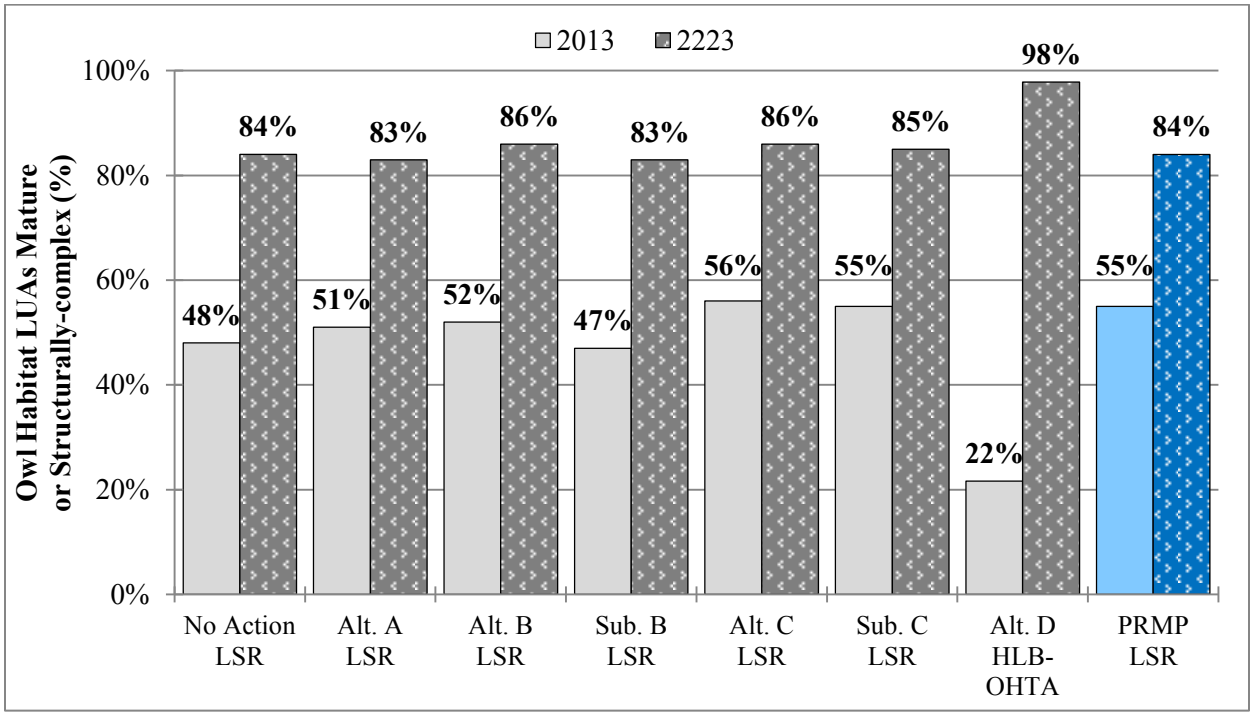


Figure 3-61. Proportions of owl habitat management land use allocations in Mature Multi-layered Canopy or Structurally-complex structural stages in 2013 and 2223

Figure 3-62 shows that the proportions of acres in Mature Multi-layered Canopy and Structurally-complex conditions in the Late-Successional Reserve, the Uneven-aged Timber Area, and the Owl Habitat Timber Area would range between 60 percent and 81 percent in 100 years. In the High Intensity Timber Area under Alternatives A and C, the acreage of Mature Multi-layered Canopy and Structurally-complex stands would decline to zero in 100 years due to the emphasis on relatively short-rotation clear-cutting harvest practices. The Low Intensity Timber Area and Moderate Intensity Timber Area in Alternative B, and the Moderate Intensity Timber Area in alternative D, would achieve moderately higher proportions in Mature Multi-layered Canopy and Structurally-complex forest than the High Intensity Timber Area under Alternatives A and C, with around 10 percent, due the trend towards longer rotation lengths and variable-retention regeneration harvest practices. The proportion of acres in Mature Multi-layered Canopy and Structurally-complex conditions in the Low Intensity Timber Area and Moderate Intensity Timber Area in the Proposed RMP in 100 years would be 22 percent and 28 percent respectively.

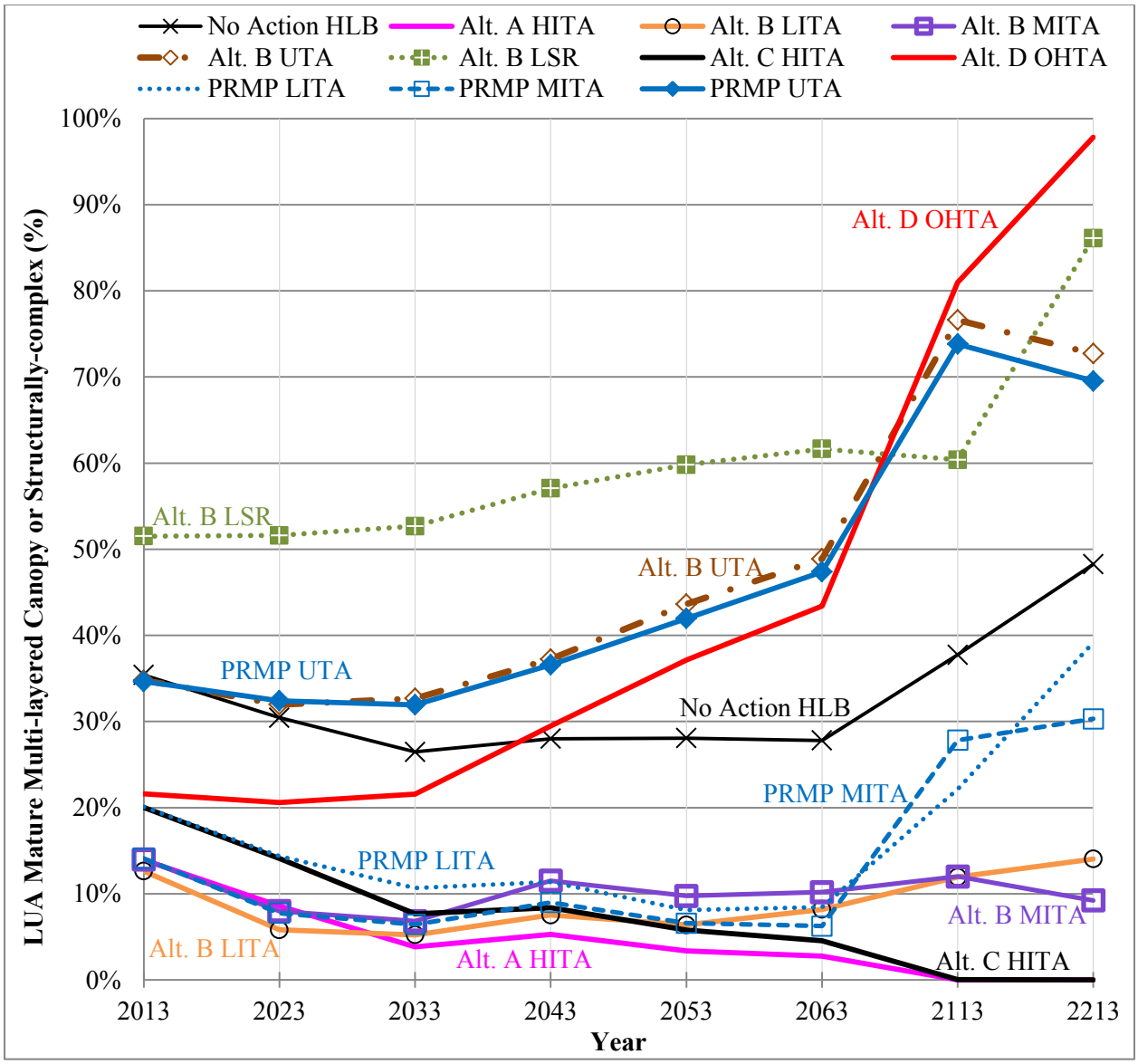


Figure 3-62. Proportions of land use allocations in Mature Multi-layered Canopy or Structurally-complex structural stages through time

Note: LSR is only shown for Alternative B since developmental trajectory within LSR land use allocations is nearly identical between alternatives and the Proposed RMP. The Uneven-aged Timber Area, Moderate Intensity Timber Area, and Low Intensity Timber Area are only shown for Alt. B and the PRMP, since structural development in the Uneven-aged Timber Area is nearly identical among the action alternatives and the Proposed RMP, and the Moderate Intensity Timber Area in Alternatives B and D show very similar trends.

The Harvest Land Base in the No Action alternative would contain 38 percent in Mature Multi-layered Canopy and Structurally-complex structural stage conditions within 100 years. This is due to the interaction between starting age class distribution and minimum rotation age assumptions in the vegetation modeling for the Harvest Land Base in the No Action alternative. Having a substantial acreage of stands beyond the culmination of mean annual increment (CMAI) of net timber volume in land use allocations dedicated to two-aged management regimes would allow the BLM to implement long rotations right away. Reserving older forests in the action alternatives and the Proposed RMP would reduce BLM's available acreage of older stands eligible for regeneration harvest, reducing average

regeneration harvest age for 100 years or more before the BLM could transition completely to longer rotations. See **Table 3-48** for more details on regeneration harvest ages by decade, alternative and the Proposed RMP, and land use allocation.

In summary, the mix of silvicultural systems and harvesting practices applied will determine the future of the structural stage distribution within the decision area. Wildfire is projected to play a relatively small role in the creation of early seral structural stages when compared to timber harvest, especially in the coastal/north areas. Early Successional stands in the High Intensity Timber Area in Alternatives A and C would not contain structural legacies. There is a substantial difference in the structural complexity of most future stands when comparing even-aged management (e.g., clear-cutting) practices in the High Intensity Timber Area in Alternatives A and C, to two-aged practices (e.g., variable retention-regeneration harvest) in the No Action alternative, the Low Intensity Timber Area and Moderate Intensity Timber Area in Alternative B, Sub-alternative B, and the Proposed RMP, and the Moderate Intensity Timber Area in Alternative D.

Even-aged management with clear-cutting would result in relatively simple structured stands lacking legacy structures, while two-aged harvesting would produce stands with multiple layered canopies and legacy structures. Land use allocations dedicated to uneven-aged management regimes in the Harvest Land Base, the Uneven-aged Timber Area and Owl Habitat Timber Area, would eventually produce Mature Multi-layered Canopy and Structurally-complex stands in proportions equal to or greater than Late-Successional Reserve management. The structural stage development of the moist Late-Successional Reserve would be similar among all alternatives and the Proposed RMP. Retention of cut trees in Alternative A versus commercial removal in other alternatives and the Proposed RMP would not result in differences in structural stage development. The Harvest Land Base in the No Action alternative would contribute a higher proportion of Mature Multi-layered Canopy and Structurally-complex stands to the decision area when compared to the action alternatives and the Proposed RMP because there are substantial acreages of stands beyond CMAI of net timber volume in the Harvest Land Base. This would allow the BLM to implement long rotations right away, rather than the gradual trend towards longer rotations that would be required in the Moderate Intensity Timber Area and Low Intensity Timber Area in Alternative B, Sub-alternative B, and the Proposed RMP, and in the Moderate Intensity Timber Area in Alternative D.

Inventory of Merchantable Timber

The inventory of merchantable timber volume in the decision area has increased since 1940 (**Table 3-51**).

Table 3-51. The standing net timber inventory at each measurement period

Historic Estimates	1940	1960	1970	1980	1990	2006
Timber Volume (MMbf)	46,000	49,100	50,300	46,900	49,900	64,854
Acres Considered in Calculation	2,165,900	2,145,072	2,391,172	1,771,657	1,794,420	2,478,857

A combination of factors caused the large increase between the 1990 and 2006 inventory of timber volumes. These include—

- The increase in acres included in the determination of volume;
- The increase in growth and volume resulting from the increase in faster-growing, younger stands; and
- Harvest levels below the maximum potential annual productive capacity (**Table 3-54** and **Figure 3-64**).

Although these inventories were conducted using different inventory systems, different assumptions, and occurred on different portions of the BLM-administered lands, the inventories provide the basis for broad comparisons and general trends. These historical records of timber inventories show that overall growth on the BLM-administered lands has exceeded harvest levels, especially in the last two decades. Current standing net timber inventory based on 2013 data is approximately 13 percent higher than the 2006 estimate, which reflects an average annual inventory increase of almost 2 percent per year since 2006 (**Table 3-52**).

Table 3-52. 2006 and 2013 Scribner 16' scale net standing timber volume MMbf inventory estimates

District/ Field Office	2006 Net Inventory (MMbf)	2013 Net Inventory (MMbf)
Coos Bay	11,358	13,036
Eugene	10,915	12,792
Klamath Falls	694	750
Medford	15,133	16,347
Roseburg	11,322	12,634
Salem	15,431	17,660
Totals	**64,854**	**73,220**

The amount of current timber inventory within the Harvest Land Base varies primarily with the extent of the Harvest Land Base under each alternative and the Proposed RMP. Alternative C contains the highest timber inventory within the Harvest Land Base of any alternative and the Proposed RMP, with approximately 24 billion board feet. Sub-alternative B has the lowest timber inventory within the Harvest Land Base, with approximately 9 billion board feet. The current timber volume in the Harvest Land Base ranges between 13–33 percent of total timber inventory in the decision area among the alternatives and the Proposed RMP. Conversely, reserve land use allocations contain between 67–87 percent of total timber inventory (**Figure 3-63**).

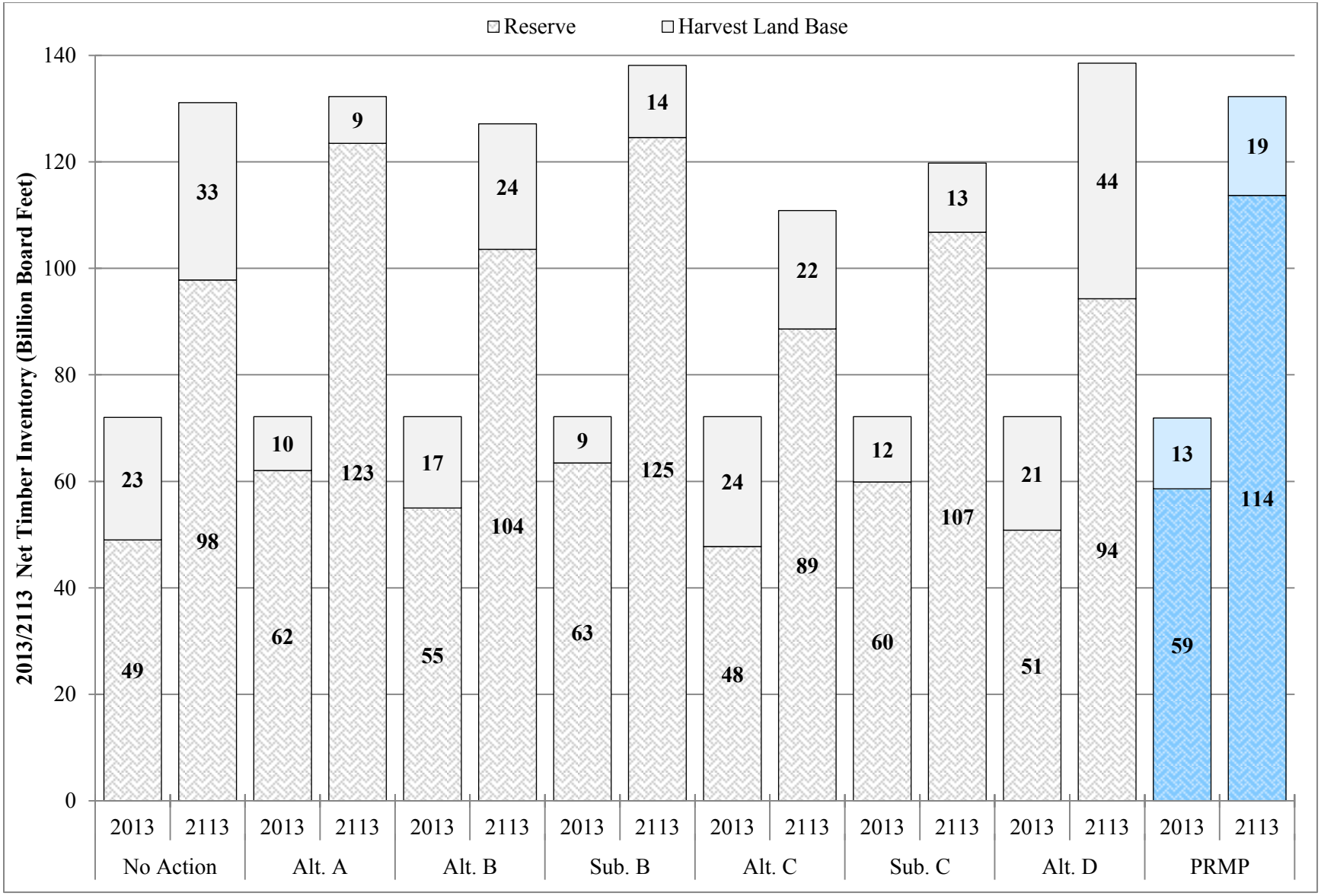


Figure 3-63. 2013 and 2113 net inventory broken out between the Harvest Land Base and reserves in the decision area

The timber inventory would increase under all alternatives and the Proposed RMP. This is mostly due to timber volume accumulation in the reserve land use allocations. Timber volume would increase between 58-100 percent in the reserves over the next 100 years, since the BLM would only be harvesting timber to achieve restoration purposes.

Table 3-53. Percent change in inventory between 2013 and 2113 broken out between the Harvest Land Base and reserves in the decision area

Inventory	No Action (Percent Change)	Alt. A (Percent Change)	Alt. B (Percent Change)	Sub. B (Percent Change)	Alt. C (Percent Change)	Sub. C (Percent Change)	Alt. D (Percent Change)	PRMP (Percent Change)
Reserve	100%	99%	88%	96%	86%	78%	86%	58%
Harvest Land Base	45%	-13%	37%	56%	-9%	6%	108%	12%
Overall	**82%**	**83%**	**76%**	**91%**	**54%**	**66%**	**92%**	**44%**

Note: Positive numbers indicate inventory increase, while negative numbers indicate inventory decrease.

The timber inventories in the Harvest Land Base would slightly decline in Alternatives A and C; they would remain relatively stable in Sub-alternative C, because of shorter rotations and even-aged timber harvest in the majority of the Harvest Land Base. In these alternatives, the BLM would convert sub-optimal timber production stands in the High Intensity Timber Area into fully stocked stands near the maximum timber production potential. The BLM would only hold the minimum inventory on the Harvest Land Base to ensure long-term sustainability of the timber harvest regime.

The timber inventory would increase in the Harvest Land Base under the No Action alternative, Alternative B, Sub-alternative B, the Proposed RMP, and, to the largest extent, Alternative D. For the No Action alternative, the modeling assumptions scheduling regeneration harvest at the CMAI of net harvest volume would interact with the modeling assumption for non-declining even flow to cause inventories to substantially increase on some districts. The Harvest Land Base inventory increases in Alternatives B and D, Sub-alternative B, and the Proposed RMP, is partly explained by the modeling assumptions guiding the transition to longer rotations on a relatively young Harvest Land Base, which would require an increase in the standing inventory on those stands as they age into the desired age classes for regeneration harvest. **Appendix C** contains more information on the modeling assumptions used for each alternative and the Proposed RMP.

Another contributing factor leading to the inventory increase in the Harvest Land Base in these alternatives and the Proposed RMP is the implementation of uneven-aged management regimes. The BLM would implement selection harvesting to achieve desired stand conditions in the Uneven-aged Timber Area in all the action alternatives and the Proposed RMP, and in the Owl Habitat Timber Area in Alternative D. Volume accumulation would outpace harvest until the desired conditions were reached, which could take 100 years or more, and then the inventory would flatten out as those conditions are maintained, where from that point forward timber harvest would equal growth. Since 75 percent of the Harvest Land Base would be in land use allocations dedicated to uneven-aged management regimes in Alternative D, this net inventory would increase more than any other alternative or and the Proposed RMP with a 108 percent increase in net timber inventory in the next 100 years (**Table 3-53** and **Figure 3-63**).

In summary, all alternatives and the Proposed RMP would result in an overall increase in net timber inventory of between 44 percent (Proposed RMP), and 92 percent (Alternative D) in the next 100 years. The net timber inventory in reserve land use allocations would increase more than 58 percent in all

alternatives and the Proposed RMP. Net timber inventories in the Harvest Land Base in Alternatives A and C would remain stable or slightly decrease in the next 100 years as the High Intensity Timber Area land use allocation would transition into a fully regulated relatively short-rotation forest. Net timber inventories in the Harvest Land Base in the No Action alternative, Alternatives A, B, and D, Sub-alternative B, and the Proposed RMP would increase between 12 percent (Proposed RMP) and 108 percent (Alternative D). The increase in net timber inventories in Alternatives B and D, and the Proposed RMP is due to the combination of the modeling assumptions guiding the transition of younger forests to long rotations and the implementation of uneven-aged management regimes. The increase in inventory in the No Action alternative's Harvest Land Base is explained primarily by the combination of the non-declining timber flow modeling assumption with the assumption that stands meet CMAI of net timber volume prior to implementing regeneration harvest, which causes inventories on some districts to increase substantially.

Issue 2

What would be the annual productive capacity for sustained-yield timber production under each alternative? How would different intensities of forest management and restrictions on timber harvest in the Harvest Land Base influence the annual productive capacity?

Analytical Methods

Through the RMPs, the BLM will determine and declare the annual productive capacity for sustained-yield timber production or allowable sale quantity (ASQ).[58] The ASQ is the annual timber volume that a forest can produce continuously under the intensity of management described in each alternative and the Proposed RMP for those lands allocated for sustained-yield timber production (i.e., the Harvest Land Base). The calculation of the ASQ is a direct output from the vegetation modeling analysis for each alternative and the Proposed RMP and would vary based on the timing and intensity of timber harvest, silvicultural practices, and restrictions on timber harvest in the Harvest Land Base. Because the ASQ volume reflects the capacity for sustained-yield timber production, it would not decline over time.

In contrast to the ASQ volume, timber volume produced as a by-product of silvicultural treatments in reserve land use allocations (i.e., non-ASQ volume) would change over time and eventually decline in moist forest areas. The calculation of the non-ASQ volume for each alternative and the Proposed RMP is also a direct output from the vegetation modeling, but reflects modeling assumptions about the intensity and extent of thinning or selection harvesting needed to achieve the management objectives of the reserve land use allocations.

The BLM calculated the ASQ and non-ASQ volume for each of the six sustained-yield units, which match the five western Oregon BLM district boundaries and the western portion of the Klamath Falls Field Office.

The vegetation modeling included forecasting future discovered marbled murrelet sites and North Coast Distinct Population Segment (DPS) red tree vole sites under alternatives and the Proposed RMP where surveys would occur. Under these alternatives and the Proposed RMP, the BLM would remove acres associated with discovered sites from the Harvest Land Base and manage them, instead, as Late-Successional Reserve. Therefore, these acres would no longer contribute to the ASQ volume. See the Wildlife section in this chapter for more detail on site management for these species. In the vegetation modeling, these forecasted discovered sites were calculated using prediction rates, and acres the model

[58] The terms 'annual productive capacity,' 'annual sustained yield capacity,' and 'allowable sale quantity' are synonymous.

predicted as future discovered sites were not included in the contributions to the calculation of sustained-yield timber harvest.

The forecasting of future marbled murrelet sites required slightly different methodologies for the No Action alternative, the action alternatives, and the Proposed RMP, and inherently includes substantial uncertainty. The modeling of future marbled murrelet sites in the No Action alternative assumed all stands currently 120-years old and older in Matrix and Adaptive Management Areas within 35 miles of the coast were occupied by marbled murrelets and reserved from timber harvest. The modeling assumed stands currently less than 120-years old in the Matrix and Adaptive Management Area were not occupied by marbled murrelets, even those stands that would become 120-years old or older during the modeling period. The modeling also assumed no stands greater than 35 miles from the coast were occupied by marbled murrelets. The assumption of all stands currently 120-years old and older within 35 miles of the coast are occupied by marbled murrelets is likely an overestimation, and the assumption that no stands currently less than 120-years old and no stands greater than 35 miles from the coast are occupied by marbled murrelets is likely an underestimation. Overall, the forecasting of future marbled murrelet sites for the No Action alternative likely underestimates the acres that would be reserved from timber harvest and consequently overestimates the ASQ. However, the BLM lacks sufficient data at this time to refine these assumptions about the No Action alternative or quantitatively describe the overestimation of ASQ. The BLM used this age-based assumption for future occupancy, because the No Action alternative, in contrast to the action alternatives and the Proposed RMP, includes harvest of older, more structurally-complex forest, which provides the highest quality marbled murrelet nesting habitat.

Because all of the action alternatives and the Proposed RMP would reserve older, more structurally-complex forest, the forecasting of future marbled murrelet sites within the Harvest Land Base focused on younger stands than the forecasting for the No Action alternative. Therefore, this analysis used a different methodology for the action alternatives and the Proposed RMP, which extrapolated from previous marbled murrelet survey results using the proportion of survey stations that had marbled murrelet occupancy. This approach has the advantage of using consistent data that is currently available across the entire decision area. The station-based methodology provided an estimation of marbled murrelet sites based on the existing BLM corporate data, from the perspective of analyzing the effects on marbled murrelets. This methodology may underestimate the acres reserved from timber harvest under an action alternative and the Proposed RMP that includes surveys for marbled murrelet sites and reserves occupied sites. Estimating the acres of occupied marbled murrelet habitat is not the same as estimating the acres reserved from timber harvest around an occupied site. Much of the difficulty in developing an effective methodology for analysis is in translating a positive survey result into an estimation of acres reserved from timber harvest. The station-based methodology provides an estimate for the purpose of analyzing the effects on marbled murrelets, but may underestimate the effects on timber harvest. However, the BLM lacks sufficient data at this time to describe quantitatively the uncertainty associated with ASQ estimates in the alternatives and the Proposed RMP that would require protection of future marbled murrelet sites.

Additionally, the detection rates that the BLM used to calculate acres by land use allocation reported in Chapter 2, and impacts to timber harvest in Alternatives A, B, and D, and Sub-alternatives B and C (24.4 percent 0–25 miles from the coast, and 5.6 percent 25–50 miles from the coast) are different than the detection rates the BLM used for these analyses in the Proposed RMP (54.8 percent 0–25 miles from the coast, and 10.2 percent 25–50 miles from the coast). The BLM updated marbled murrelet detection rates for the Proposed RMP to reflect recent survey results, in order to produce a more refined estimate of timber harvest volume. The BLM used the revised detection rates consistently across the action alternatives and the Proposed RMP in the Wildlife section in this chapter to analyze effects to marbled murrelets.

Under the No Action alternative, the BLM would conduct surveys to locate and manage for all populations of the Oregon red tree vole, not just the North Coast DPS of the red tree vole. The BLM did not quantitatively forecast the loss of Harvest Land Base area to future red tree vole sites in the vegetation modeling for the No Action alternative, and therefore likely overestimates the ASQ for this alternative. There is substantial variability in the detection rates of red tree voles and management requirements for detected red tree vole sites, which complicate any attempt to forecast the effects of future red tree vole sites on the ASQ under the No Action alternative. This analysis uses decision area-wide detection rates based on protocol surveys between 2000 and 2012 on BLM-administered lands irrespective of habitat condition outside of vegetation modeling. Detection rates range from 16.7 percent in the Salem District to 76.1 percent in the Coos Bay District, with an average of 42.1 percent for the decision area. The BLM uses the assumption that 40 percent of stands with red tree vole detections would be unavailable for long-term sustained-yield timber harvest, in order to bracket the potential effects of red tree vole site management on the ASQ for the No Action alternative. This estimate is not included in **Table 3-55**, but is shown in **Table 3-56**

In order to calculate estimated reductions to ASQ levels from predictions of red tree voles and marbled murrelet site occupancy and protection in all alternatives and the Proposed RMP, the number of acres where timber harvest was precluded was determined using geographic information system (GIS) analysis. The BLM then performed GIS analysis to determine which Harvest Land Base sub-allocation those acres of forested land would have been in had the BLM not predicted occupancy. The BLM then multiplied those acres by the expected board feet per acre per year ASQ contribution estimated for that sub-allocation and region based on values derived for **Figure 3-65**. This methodology produced an estimated ASQ reduction for each alternative and the Proposed RMP for predictions of site protection associated with red tree voles and marbled murrelets reported in **Table 3-56**.

A similar methodology was also used to determine the ASQ reductions associated with northern spotted owl site protection in Alternative D, where areas were mapped as Owl Habitat Timber Area or Late-Successional Reserve where needed to maintain spotted owl habitat around known, historic, and alternate sites. The BLM used GIS analysis to determine how many acres of Owl Habitat Timber Area or Late-Successional Reserve were mapped due to proximity of northern spotted owl sites, and the BLM estimated how many acres would have otherwise been mapped as either Uneven-aged Timber Area or Moderate Intensity Timber Area. The difference in productive contribution of those acres were used to calculate the estimated ASQ reduction associated with northern spotted owl site management in Alternative D, reported in **Table 3-56**. In Sub-alternative B, the impacts to ASQ from northern spotted owl site protection were reported directly, since this was the single difference between this sub-alternative and Alternative B. Since the BLM made these deductions to the Harvest Land Base in the vegetation modeling, ASQ values reported in **Table 3-55** include them, with the exception of red tree vole management in the No Action Alternative.

The BLM also made deductions to long-term yields based on both area lost and reduced growth and yield due to road construction and detrimental soil disturbances, endemic levels of insects and disease, defect and breakage, snag and downed wood requirements, and other factors. The Vegetation Modeling section earlier in this chapter and **Appendix C** provide more information on the calculations of ASQ and non-ASQ timber volume.

Background

The BLM has implemented timber harvest levels and a mix of harvest types that has differed from those anticipated in the 1995 RMPs. Specifically; the BLM has implemented less regeneration harvest and more commercial thinning (**Figure 3-64**). In 2012, the BLM conducted an evaluation of the 1995 RMPs in accordance with its planning regulations, and concluded that continuation of these trends in timber

harvest practices is not sustainable at the declared ASQ level. Implementation of timber harvest since the adoption of the 1995 RMPs is described in detail in the BLM plan evaluations and is incorporated here by reference (USDI BLM 2012, pp. 6–12, and Appendices 3–8).

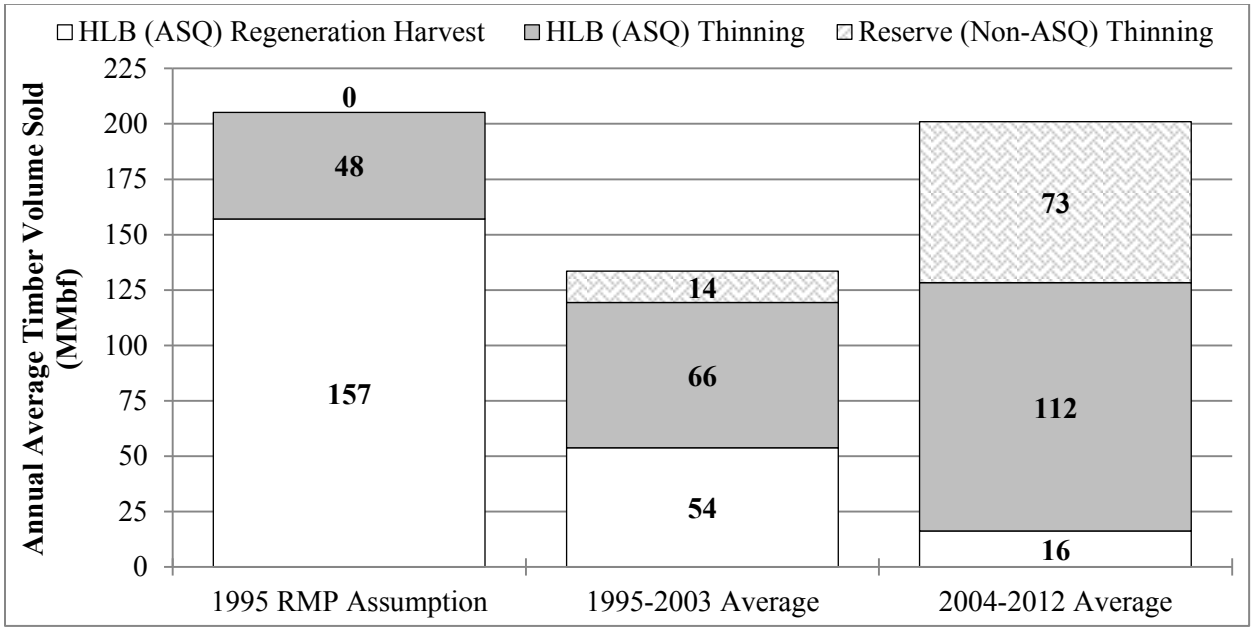


Figure 3-64. Assumed vs. implemented annual average sold timber volume levels and mix of harvest types, 1995 through 2012, in the Harvest Land Base (HLB) and Reserves in the decision area

The 1995 through 2010 data in **Figure 3-64** comes from district data requests for the 2012 plan evaluations. 2011 and 2012 data was generated from Forest Resource Information System data entered through 23 October 2014. Due to continual updates and data correction, these estimates may be different from other estimates generated at different times or from different sources.

Affected Environment and Environmental Consequences

The BLM performed a reference analysis of "Manage most commercial lands for maximizing timber production" in the 2008 FEIS (USDI BLM 2008, pp. 573–574) and that analysis is incorporated here by reference. This reference analysis evaluated the outcomes if all BLM-administered lands in the planning area capable of producing a long-term flow of commercial timber volume would be managed under intensive forest management, without regard for the requirements of other laws or the purpose and need for action. The results of this reference analysis concluded that the BLM-administered lands in the planning area are capable of producing approximately 1.2 billion board feet per year. Although there have been some changes in the decision area that would slightly alter these calculations resulting from timber harvest and growth since the calculations in the 2008 FEIS, these results provide an approximate outcome that is still relevant for the decision area.

Table 3-54. Reference analysis: "Manage Most Commercial Lands for Maximizing Timber Production" and 1995 RMP declared ASQ

District/ Field Office	Scribner 16' Scale (MMbf Per Year)	
	Reference Analysis ASQ	1995 RMP Declared ASQ
Coos Bay	257	27
Eugene	273	33
Klamath Falls	10	6
Medford	174	57
Roseburg	198	45
Salem	289	35
Totals	**1,201**	**203**

The 1995 RMPs declared ASQ levels for each of the sustained-yield units (**Table 3-54**). The ASQ for the No Action alternative calculated here (277 MMbf) is substantially higher than the ASQ declared in the 1995 RMPs (203 MMbf) because of improvements in data and changes in forest conditions since 1995. Improved field validation and mapping of stream classification and fish presence has revealed that the analysis for the 1995 RMPs overestimated the extent of the Riparian Reserve and thereby underestimated the extent of the area available for sustained-yield timber production. In addition, new inventory data, revised growth and yield information, and increases in timber inventory in the decision area since 1995 have increased the calculation of the ASQ under the No Action alternative. This is consistent with the conclusion in the 2008 FEIS, which calculated the ASQ for the No Action alternative to be 268 MMbf (USDI BLM 2008, p. 575), and that discussion is incorporated here by reference.

Alternative C would have the highest ASQ among the alternatives and the Proposed RMP, followed by Sub-alternative C, and the No Action alternative (**Table 3-55**). Major factors determining the ASQ include the size of the Harvest Land Base, the intensity of forest management practices, and restrictions on timber harvest (e.g., wildlife site protection, Visual Resource Management, and recreation management).

Table 3-55. First decade annual ASQ* timber harvest (MMbf/year Scribner 16' scale) [59]

District/ Field Office	No Action (ASQ)†	Alt. A (ASQ)	Alt. B (ASQ)	Sub. B (ASQ)	Alt. C (ASQ)	Sub. C (ASQ)	Alt. D (ASQ)	PRMP (ASQ)
Coos Bay	46	46	23	14	82	66	22	12
Eugene	58	63	56	25	138	103	45	53
Klamath Falls	8	3	7	4	10	3	5	6
Medford	73	27	42	15	54	24	28	37
Roseburg	55	25	35	14	78	51	22	32
Salem	37	71	71	47	124	85	54	65
Totals	**277**	**234**	**234**	**120**	**486**	**332**	**176**	**205**

* Reported ASQ volumes are rounded to the nearest MMbf, so there are minor errors associated with rounding.
† The BLM has made no deduction in the vegetation modeling for reductions due to management of future Survey and Manage sites. This and other issues place uncertainty around the expression of ASQ for the No Action alternative.

[59] These ASQ estimates for the alternatives and the Proposed RMP include modeled timber salvage from the first decade based on BLM's simulation of wildfire and subsequent timber salvage. Given the unpredictable nature of wildfire and timber salvage, the eventual declaration of the ASQ will include an average of simulated salvage volume over the first five decades to account for this uncertainty. Therefore, the eventual declaration of ASQ may be slightly different from what is reported here.

Size of the Harvest Land Base

The size of the Harvest Land Base is dependent on a number of factors including Riparian Reserve widths and the size of the Late-Successional Reserve, including the threshold for protection of older, more structurally-complex forest, and the protection of future reserved sites for some wildlife species under some of the alternatives and the Proposed RMP. Chapter 2 contains a description of the design of each alternative and the Proposed RMP and a description of the acreage in each land use allocation. The Harvest Land Base under Alternative C would be the largest (30 percent of the decision area) and Sub-alternative B the smallest (12 percent of the decision area). The Harvest Land Base under the Proposed RMP would be 20 percent of the decision area. Predicted marbled murrelet and red tree vole sites are not included in the calculation of Harvest Land Base size.

Sub-alternative B would be identical to Alternative B, except that it would include protection of habitat within the home ranges of all northern spotted owl known, alternate, and historic sites that would be within the Harvest Land Base in Alternative B. This single change in design reduces the Harvest Land Base from 22 to 12 percent of the decision area, which is smaller than any other alternative or the Proposed RMP. This difference in the size of the Harvest Land Base reduces the ASQ in Sub-alternative B by 114 MMbf per year from the ASQ in Alternative B.

Although the size of the Harvest Land Base has an important influence on the ASQ, it does not entirely determine the ASQ. For example, Alternatives A and B have almost identical ASQ levels, but the size of the Harvest Land Base would differ substantially (14 percent and 22 percent, respectively). Nevertheless, the size of the Harvest Land Base determines the number of acres of eligible forest stands that would be available for harvesting to meet the declared ASQ. Therefore, all other things held equal, the larger the Harvest Land Base, the higher the ASQ.

Intensity of Forest Management Practices

The more intensive the forest management practices applied, the more timber volume produced on a given acre of ground within a fixed unit of time. **Figure 3-65** shows a breakdown of calculated timber production rates by management intensity for the coastal/north areas, which generally have higher productivity lands, and the interior/south areas, which generally have lower productivity lands.

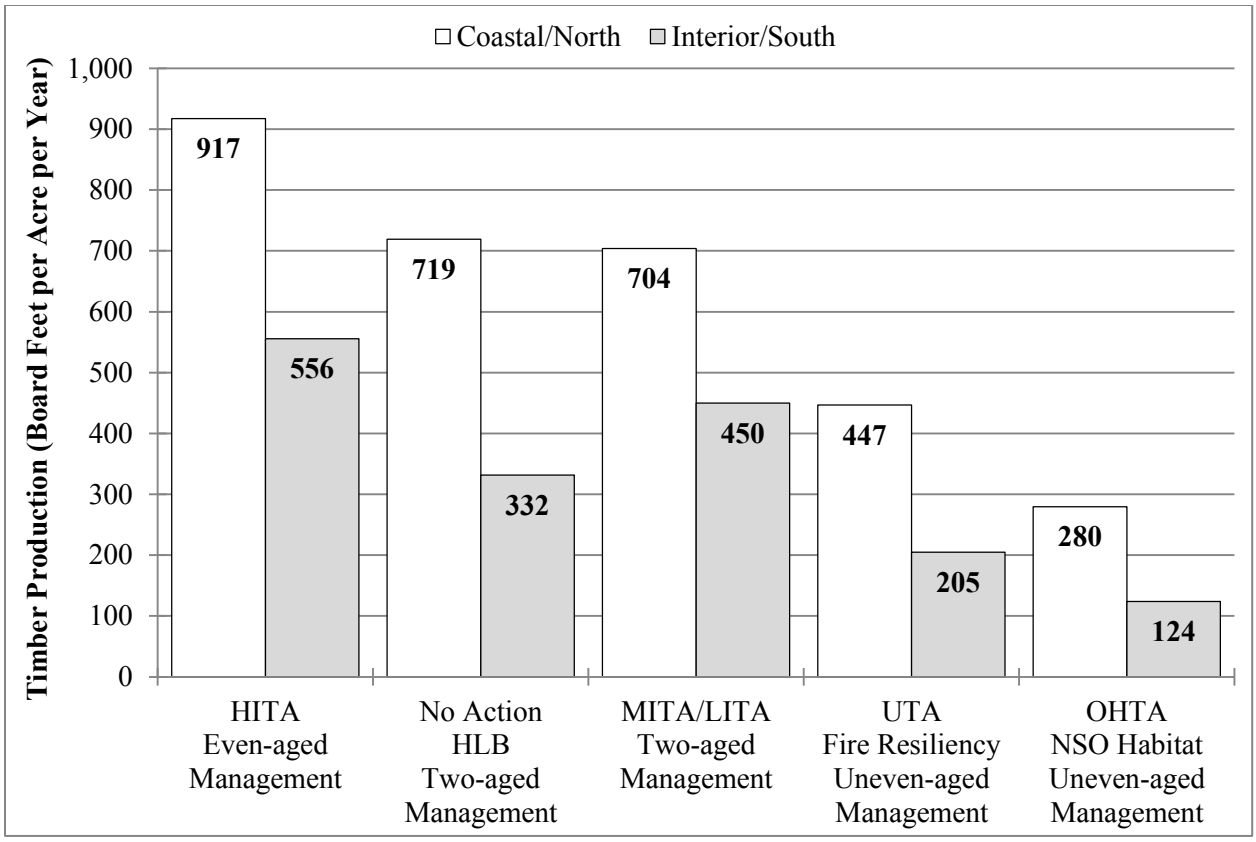


Figure 3-65. Timber production rates by management intensity (board feet per acre per year), broken out between coastal/north and interior/south areas

The highest timber yields per acre would come from the High Intensity Timber Area, because of even-aged management regimes including relatively short rotations, clear-cutting, rapid reforestation, fertilization, and control of competing vegetation. For every acre of High Intensity Timber Area in the Harvest Land Base, the ASQ contribution would be approximately 917 board feet per year in the coastal/north area, and 556 board feet per year in the interior/south areas.

The second-highest timber yields per acre would come from lands managed under two-aged management regimes, which includes variable-retention regeneration harvesting. This category includes the Matrix[60] and Adaptive Management Areas in the No Action alternative, the Moderate Intensity Timber Area and Low Intensity Timber Area in Alternative B, Sub-alternative B, and the Proposed RMP, and the Moderate Intensity Timber Area in Alternative D. The reduction in timber yield per acre in these land use allocations compared to the High Intensity Timber Area would result from the retention of a portion of the stand during regeneration harvest and the trend towards longer rotations (Birch and Johnson 1992, Long and Roberts 1992). The overstory retention in these land use allocations would also suppress the growth rates of regenerated trees compared the High Intensity Timber Area, but this effect would be highly variable, and in part dependent on the arrangement of retention trees (Di Lucca *et al.* 2004, Temesgen *et al.* 2006, Urgenson *et al.* 2013). It is not possible at this scale of analysis with the data available to quantify the effects of varying levels of retention on the growth of the regenerating stand. The

[60] The Matrix in the No Action alternative includes the General Forest Management Area, and Connectivity/Diversity Blocks, which identify differing levels of tree retention and other practices in regeneration harvest.

effects of varying retention levels in these land use allocations would also influence the timber yield per acre somewhat.

Nevertheless, for every acre of Moderate Intensity Timber Area or Low Intensity Timber Area land use allocations is in the Harvest Land Base in the action alternatives and the Proposed RMP, the ASQ contribution would average 704 board feet per year in the coastal/north area, and 450 board feet in the interior/south. For the No Action alternative, the ASQ contributions would be 719 board feet per acre per year in the coastal/north area, and 332 board feet per year in the interior/south. The reason the contribution from the interior/south is lower in the No Action alternative is that a substantial acreage of dry forest stands in the Harvest Land Base in the action alternatives and the Proposed RMP would be managed using uneven-aged management in the Uneven-aged Timber Area. In the No Action alternative, these dry forest stands are contained in lands dedicated to regeneration harvesting regimes. The dry forests tend to be lower productivity, thereby pulling the average production rate down in the interior/south in the No Action alternative.

Alternative B includes different reforestation practices after regeneration harvest than the other alternatives and the Proposed RMP. In the Moderate Intensity Timber Area in Alternative B, the BLM would delay canopy closure for at least three decades after regeneration harvest, in order to prolong and enhance the early successional stage of forest development. In the Low Intensity Timber Area in Alternative B, the BLM would rely on natural reforestation after regeneration harvest (i.e., natural seeding rather than planting). In all other alternatives and the Proposed RMP, the BLM would ensure rapid reforestation following regeneration harvest, consistent with current practices. There is no apparent difference in timber yields between delayed canopy closure in the Moderate Intensity Timber Area in Alternative B and prompt canopy closure in the other alternatives, including the Moderate Intensity Timber Area in Alternative D. The average delay in canopy closure in the Moderate Intensity Timber Area in Alternative B would be 10–15 years beyond what would typically occur with standard reforestation practices. This would theoretically delay attainment of timber merchantability and thereby reduce overall timber yield per acre (Miller *et al.* 1993). However, any effect of delaying timber harvest in the Moderate Intensity Timber Area would be diluted by the trend towards longer rotation lengths that would occur in the Moderate Intensity Timber Area. Additionally, there are so many factors affecting the varying timber yield per acre among the alternatives and the Proposed RMP that it is not possible to isolate the effect of this single factor.

The Low Intensity Timber Area would produce an average of 18 percent less timber yield per acre than the Moderate Intensity Timber Area in Alternative B, because of the higher level of retention and projected reforestation failures after regeneration harvest. Based on evaluation of past natural reforestation, the BLM concludes that an average of 10 percent of each regeneration harvest unit in the Low Intensity Timber Area would fail to reforest, 30 percent would reforest at very low levels of stocking, and 60 percent would reforest at target stocking levels. **Appendix C** contains more details about assumptions related to reforestation rates. Reforestation failures would eliminate future timber harvest opportunities; reforestation at very low levels of stocking would preclude commercial thinning opportunities. In addition to reductions in timber yield from reforestation failures in the Low Intensity Timber Area, the reliance on natural reforestation would limit the ability to manage the species composition of the regenerating stand. This would also preclude replanting stands with disease-resistant trees, such as rust-resistant sugar pine or root disease-resistant Port-Orford-cedar. This reliance on natural reforestation would also preclude the ability of the BLM to shift tree species composition or tree genotypes within stands to adapt to changing climate conditions (see the Climate Change section in this chapter). Since prompt reforestation using natural or artificial reforestation would be allowed under the Proposed RMP in the Low Intensity Timber Area and Moderate Intensity Timber Area, the only expected differences in timber yield between these two Harvest Land Base sub-allocations would come from the

additional post-harvest retention requirements (15–30 percent basal area retention in the Low Intensity Timber Area and 5–15 percent basal area retention in the Moderate Intensity Timber Area).

The third-highest timber yields per acre would come from the uneven-aged management in the Uneven-aged Timber Area, which is included in all action alternatives and the Proposed RMP. In this sub-allocation, the continuous retention of substantial portions of the stand would reduce the timber yields compared to the yields under regeneration harvest. For every acre of Uneven-aged Timber Area in the Harvest Land Base, the ASQ contribution would be approximately 447 board feet per year in the coastal/north area, or 205 board feet in the interior/south area.

The lowest timber yields per acre would come from uneven-aged management in the Owl Habitat Timber Area in Alternative D. In this sub-allocation, the continuous retention of substantial portions of the stand would reduce the timber yields, as in the Uneven-aged Timber Area. However, timber harvest would be further limited in the Owl Habitat Timber Area to meet direction to develop and then maintain northern spotted owl habitat function at the stand level, limiting the intensity of harvest and the size of openings, further reducing timber yield compared to the Uneven-aged Timber Area. **Appendix B** contains more details on management objectives and direction for each sub-allocation. For every acre of Owl Habitat Timber Area, the ASQ contribution would be approximately 280 board feet per year in the coastal/north area, or 124 board feet in the interior/south area.

The varying timber yield per acre of the different sub-allocations demonstrates the influence the intensity of forest management practices has on the ASQ. This influence on the ASQ can be as important as the size of the Harvest Land Base. For example, Alternative A has almost the same ASQ as Alternative B even though it has a much smaller Harvest Land Base because of the more intensive forest management practices in Alternative A. Alternative D, which has a larger Harvest Land Base than Alternatives A and B, and the Proposed RMP, has a lower ASQ because forest management practices would be less intensive.

Restrictions on Timber Harvest

The alternatives contain various potential restrictions on timber harvest in the Harvest Land Base that could influence the calculation of the ASQ. The restrictions in the action alternatives and the Proposed RMP include site protection for northern spotted owls, protection of future marbled murrelet sites, protection of future North Coast DPS red tree vole sites, management of Wild and Scenic Rivers, Visual Resource Management, and Recreation Management Areas. The calculation of the ASQ in this analysis predicted the quantitative effects of some of these potential restrictions. However, other potential restrictions are too uncertain to incorporate into the calculation of the ASQ. As a result, there are varying levels of uncertainty about the calculation of the ASQ among the alternatives and the Proposed RMP because of these potential restrictions on timber harvest, as detailed below.

The No Action alternative includes a variety of restrictions on timber harvest in the Matrix and Adaptive Management Areas, including protection of known spotted owl activity centers, protection of future marbled murrelet sites, Survey and Manage protections, and the retention of old-growth fragments in watersheds where little remains. The effects of implementation of these restrictions on timber harvest levels are difficult to forecast, especially the Survey and Manage protections. The 2004 Final Supplemental EIS to Remove of Modify the Survey and Manage Mitigation Measure Guidelines discussed the difficulties in evaluating the effect of the Survey and Manage measures on timber harvest and provided estimates (USDA FS and USDI BLM 2000, pp. 428–438), and those discussions are incorporated here by reference. Because of the difficulty in forecasting future site abundances and locations for Survey and Manage species and the uncertainty of specific site management approaches, the BLM did not attempt to forecast restrictions on timber harvest within the Matrix and Adaptive Management Areas in the vegetation modeling. Red tree vole detection rates across the decision area

between 2000 and 2012 irrespective of habitat condition are 42.1 percent. Assuming that 40 percent of stands in the Harvest Land Base where red tree voles are found become unavailable for long-term sustained yield timber production, this indicates that ASQ levels in **Table 3-55** for the No Action Alternative are 16.8 percent, or 47 MMbf/year too high (**Table 3-56**). Since the BLM did not include this assumption in vegetation modeling for the No Action alternative, the BLM believes that the ASQ predictions in **Table 3-55** for the No Action alternative are an overestimate. For the Adaptive Management Areas, the 1995 RMPs specifically directed developing and testing unspecified approaches to timber harvest and restrictions on timber harvest, lending considerable uncertainty to timber harvest levels within the Adaptive Management Areas.

Table 3-56. Estimated reductions to annual ASQ from wildlife surveys and site protection

Alternative/ Proposed RMP	Marbled Murrelet (MMbf/Year)	Northern Spotted Owl Site Management (MMbf/Year)	Red Tree Vole* (MMbf/Year)	Survey and Manage† (MMbf/Year)	Totals (MMbf/Year)
No Action	4	-	47	Unknown	**> 51**
Alt. A	-	-	-	-	-
Alt. B	6	-	6	-	**12**
Sub. B	6	115	6	-	**127**
Alt. C	2	-	-	-	**2**
Sub. C	-	-	-	-	-
Alt. D	29	57	4	-	**90**
PRMP	14	-	4	-	**18**

* The potential 47 MMbf per year reduction in ASQ for the No Action alternative due to future Survey and Manage red tree vole site management shown in **Table 3-56** was not deducted from the estimate of ASQ in **Table 3-55**. For the action alternatives and the Proposed RMP, red tree vole management and site protections varied around the North Coast DPS red tree vole population only. The estimated reductions to annual ASQ shown in this table for the action alternatives and the Proposed RMP are deducted from estimates of ASQ shown in **Table 3-55**.
† All other species on the Survey and Manage lists, including fish and plants

Northern Spotted Owl

Sub-alternative B includes protection of habitat within the home ranges of all northern spotted owl known and historic sites that would be within the Harvest Land Base in Alternative B, as described above. This would reduce the ASQ by approximately 115 MMbf per year (**Table 3-56**). Alternative D includes protection of habitat within the nest patch of all northern spotted owl known and historic sites, and sets thresholds for habitat within core areas and home ranges of all known and historic sites, limiting timber harvest. The BLM estimates that the combination of these two approaches to site management in Alternative D reduces the ASQ by 57 MMbf. None of the other action alternatives or the No Action alternative would require specific site management for known or historic northern spotted owl sites in the Harvest Land Base.

Under the Proposed RMP, the BLM would not authorize timber sales that would cause the incidental take of northern spotted owl territorial pairs or resident singles from timber harvest until implementation of a barred owl management program consistent with the assumptions contained in the Biological Opinion on the RMP has begun. The BLM assumes that the barred owl management program would begin within approximately 5 years of the signing of the Record of Decision, and subsequently the BLM would remove the prohibition on incidental take of northern spotted owl territorial pairs or resident singles resulting from timber sales. Given this assumption, northern spotted owl site management would not reduce long-term sustained yield from the Harvest Land Base in the Proposed RMP. Under the Proposed RMP,

avoiding incidental take of northern spotted owls from timber harvest would require avoiding timber harvest or reducing the intensity of timber harvest of nesting-roosting habitat within the home ranges of most occupied northern spotted owl sites (depending on the quantity of nesting-roosting habitat within the home range). There is sufficient flexibility in scheduling the order in which stands would be harvested in the Harvest Land Base during the first half of the first decade of RMP implementation to avoid harvest that would result in incidental take of northern spotted owls without reducing the long-term sustained yield. This conclusion assumes that stands in the Harvest Land Base that the BLM would avoid harvesting during the first half of the first decade would be available for timber harvest in subsequent years. During the first half of the first decade of RMP implementation, the BLM would be able to conduct timber harvest that would not result in incidental take of northern spotted owls (e.g., by harvesting in stands that are not nesting-roosting habitat, in stands outside of occupied northern spotted owl sites, and in stands within occupied northern spotted owl sites with sufficient habitat above threshold amounts, or by reducing the intensity of timber harvest to maintain nesting-roosting habitat). Because of the availability of stands in which harvest would not result in incidental take of northern spotted owls and the temporary duration on the avoidance of incidental take of northern spotted owls, the requirement to avoid incidental take of northern spotted owls from timber harvest until a barred owl management program has begun would not reduce the long-term sustained yield from the Harvest Land Base in the Proposed RMP.

Marbled Murrelet

All alternatives and the Proposed RMP, except Alternative A and Sub-alternative C require marbled murrelet surveys prior to habitat disturbing activities and site protection for newly discovered sites in a portion or the entirety of the range of the marbled murrelet in the decision area. The effect of protection of future marbled murrelet sites on the ASQ would vary with the extent of the Harvest Land Base subject to surveys and the extent of protection around newly discovered sites. Marbled murrelet surveys and site protection would have the greatest effect on the ASQ in Alternative D, which would require surveys in marbled murrelet Zones 1 and 2 and protection of habitat within 0.5 miles around newly-discovered occupied sites, with an estimated ASQ reduction of 29 MMbf per year. Alternatives B and C, Sub-alternative B, and the Proposed RMP would require surveys in marbled murrelet Zone 1 only, and protection of habitat within 300 feet around newly discovered occupied sites. The effect of this protection on the ASQ is predicted to be relatively small in Alternative B and C, and Sub-alternative B, compared to the Proposed RMP because, as discussed above, these alternatives model a lower detection probability rate (i.e., 24.4 percent 0–25 miles from the coast, and 5.6 percent 25–50 miles from the coast) than the Proposed RMP (i.e., 54.8 percent 0-25 miles from the coast, and 10.2 percent 25–50 miles from the coast). This explains the more-than-double ASQ reduction under the Proposed RMP from Alternative B when there are very similar Harvest Land Base acres and survey and protection requirements between them. The small reduction in ASQ projections in the No Action alternative relative to the action alternatives is due, in part, to the difference in modeling methodology used, as discussed above.

Red Tree Vole

Alternatives B and D, and Sub-alternative B require surveys prior to habitat-disturbing activities and site protection for newly discovered sites for the North Coast DPS red tree vole. The Proposed RMP requires surveys and site protection for the North Coast DPS red tree vole north of Highway 20 only. The site protection in these alternatives and the Proposed RMP would reduce the acres in the Harvest Land Base, thereby reducing the ASQ. Protection around newly discovered North Coast DPS red tree vole sites would reduce the ASQ in Alternative B and Sub-alternative B by 6 MMbf per year, and in Alternative D and the Proposed RMP by 4 MMbf per year. Red tree vole surveys and protection are required across the decision area in the No Action alternative under Survey and Manage measures and the potential reductions to the ASQ were not built into the vegetation modeling (**Table 3-56**).

Wilderness Characteristics

The alternatives and the Proposed RMP vary in the protection of lands identified with wilderness characteristics outside of designated Wilderness Areas (see the Lands with Wilderness Characteristics section of this chapter). However, the alternatives do not include the protection of lands identified with wilderness characteristics in the Harvest Land Base on O&C lands, as discussed in the section on the O&C Act and the FLPMA in Chapter 1. Therefore, there is no influence on the protection of wilderness characteristics on the calculation of the ASQ in any of the alternatives or the Proposed RMP.

Wild and Scenic Rivers

The BLM would vary by alternative and the Proposed RMP the types of rivers recommended for inclusion into the Wild and Scenic River System (see the Wild and Scenic Rivers section of this chapter). The decision area includes 9 congressionally designated Wild and Scenic Rivers under BLM administration. The 1995 RMPs recommended 13 segments for inclusion into the Wild and Scenic River System and the BLM currently manages these segments to protect their components until Congress designates or releases them for other purposes. Under all alternatives and the Proposed RMP, the BLM would retain these 13 segments' recommendation for inclusion into the Wild and Scenic River System. Alternatives B, C, and the Proposed RMP would recommend for inclusion 6 eligible rivers also found to be suitable. Alternative D would recommend for inclusion all 51 eligible rivers within the decision area. Acres of BLM land associated with each Wild and Scenic River segment are not exactly known. In general, corridor widths for Wild and Scenic Rivers are 0.25 miles on either side of the river from the high water mark. This boundary, by Section 3(b) of the Wild and Scenic Rivers Act, may vary on either side of the river and be narrower or wider, as long as the total corridor averages no more than 320 acres per river mile. The BLM used the standard 0.25-mile distance as an assumption in the effects analysis of Wild and Scenic Rivers later in this chapter and in delineating the land use allocation (Congressionally Reserved lands and National Landscape Conservation System Lands) for the river segments in GIS under the alternatives and the Proposed RMP. The BLM excluded detailed assumptions for Wild and Scenic River corridors in the vegetation modeling calculation of ASQ timber harvest, because the complexity of the calculation for such a small acreage across the decision area was not warranted. For all segments, the near-distance portion of these corridors under all alternatives and the Proposed RMP would be Riparian Reserve and would not have been included in ASQ calculations. The acres of Harvest Land Base within 0.25 miles of river segments recommended for inclusion into the Wild and Scenic River system varies by management direction for river recommendations described above, and the spatial arrangement of the Harvest Land Base under each alternative and the Proposed RMP. These variations in the river recommendations and arrangement of the Harvest Land Base result in variations of the amount of recommended Wild and Scenic River corridor acres that may have been modeled as part of the Harvest Land Base when determining ASQ. Therefore, potential reductions to total acreage to the modeled Harvest Land Base from rivers that would be recommended for inclusion in the Wild and Scenic River System adds some uncertainty to the ASQ calculations.

Visual Resource Management

The BLM would manage visual resources on the following special landscapes the same under all action alternatives and the Proposed RMP, as described in **Appendix B**: Congressionally Reserved lands; Wild and Scenic Rivers; District-Designated Reserve – Lands Managed for their Wilderness Characteristics; National Trails; Recreation Management Areas; and ACECs. The action alternatives and the Proposed RMP only differ in Visual Resources Management (VRM) outside of these landscapes in that Alternative D includes both VRM Class III and Class IV lands in the Harvest Land Base, whereas the other alternatives and the Proposed RMP only assign VRM Class IV to the Harvest Land Base (see the Visual Resource Management section of this chapter). Special landscapes listed above that overlap the Harvest Land Base, either through land use allocation designation or acres that may have been modeled as part of the Harvest Land Base, would be minimal under these alternatives and the Proposed RMP. However, BLM-administered lands within these special landscapes not managed as VRM Class IV may limit

intensity of timber harvest (**Table 3-57**). The calculation of the ASQ did not attempt to account for restrictions in timber harvest in these areas where there may be conflict between Visual Resource Management and timber management. These restrictions would likely reduce but not preclude sustained-yield timber harvest contribution from these areas. Potential mitigation measures, such as adjusting timber harvest practices to include or increase retention levels in regeneration harvests in these overlapping areas could reduce or avoid this conflict. Nevertheless, potential restrictions on timber harvest in these areas add a small level of uncertainty to the ASQ calculations.

Table 3-57. Compatibility of sustained-yield management regimes with VRM classifications

Classification	HITA (Even-aged Management)	LITA/MITA/No Action (Two-aged Management)	OHTA/UTA (Uneven-aged Management)
VRM I			
VRM II			
VRM III			
VRM IV			

Dark grey boxes indicate that the management regime would generally be incompatible.
Cross-hatched boxes indicate that the management regime may be compatible.
Light grey boxes indicate that the management regime would generally be compatible.

Recreation Management Areas

Within Special Recreation Management Areas (SRMA), the BLM would manage and protect specific recreation opportunities and recreation setting characteristics on a long-term basis. This recreation management may restrict timber harvest where SRMAs overlap with the Harvest Land Base, which occurs in varying amounts: no acres in Alternative A; 581 acres in Alternative B; 6,339 acres in Alternative C; 9,967 acres in Alternative D; and 7,926 acres in the Proposed RMP. In some areas of overlap, timber harvest may be compatible with recreation management. Where incompatible, recreation management would restrict, but not preclude, timber harvest. Potential mitigation measures, such as adjusting timber harvest practices to include or increase retention levels in regeneration harvests in these overlapping areas could reduce or avoid this conflict. The calculation of the ASQ did not attempt to account for restrictions in timber harvest in these areas for the No Action Alternative or Alternatives A, B, C, or D, but vegetation modeling did account for these effects for the Proposed RMP in order to ensure compatibility with SRMA management and produce a more accurate ASQ estimate. In the Proposed RMP, the BLM designated SRMAs overlapping the Harvest Land Base on O&C lands as Uneven-aged Timber Area in the western half of the Klamath Falls Field Office, the Medford District, and the South River Field Office of the Roseburg District. In the Coos Bay, Eugene, and Salem Districts, and the Swiftwater Field Office of the Roseburg District, the BLM designated these overlapping SRMAs as Low Intensity Timber Area.

In summary, restrictions on timber harvest in the Harvest Land Base would have varying levels of influence on the ASQ and would present varying levels of uncertainty about the ASQ calculation among the alternatives and the Proposed RMP. The quantified effects on the ASQ would be substantial for protection of future marbled murrelet sites in Alternative D and the Proposed RMP, and the management of known and historic northern spotted owl sites in Alternative D and Sub-alternative B. The northern spotted owl site management direction under the Proposed RMP of avoiding incidental take from timber harvest until the beginning of a barred owl management program would have no effect on ASQ projections. Although the effect is quantified here, the potential restrictions related to future marbled murrelet sites in the No Action alternative, Alternatives B, C, and D, Sub-Alternative B, and the Proposed RMP present uncertainty. Also quantified here, the action alternatives and the Proposed RMP would have potential uncertainty regarding restrictions to future North Coast DPS red tree vole sites. Unquantified

potential restrictions on timber harvest would present substantial uncertainty in the ASQ calculation for the No Action alternative, especially related to implementation of Survey and Manage measures and forest management within Adaptive Management Areas. Areas of modeled and overlapping designations could result in potential restrictions on timber harvest in some alternatives and the Proposed RMP, most notably where the High Intensity Timber Area in Alternative C would overlap with designations for Wild and Scenic Rivers, VRM Class II, VRM Class III, or SRMAs.

Issue 3

What would be the total timber harvest volume, including timber harvested from the reserve land use allocations, under each alternative?

Summary of Analytical Methods

In addition to the calculation of the ASQ described above, the Woodstock model also provided calculations of timber volume produced from reserve land use allocations. In contrast to the ASQ volume, timber volume that would be produced as a by-product of silvicultural treatments in reserve land use allocations (i.e., non-ASQ volume) would change over time and eventually decline in moist forest areas. Therefore, the volume from reserve land use allocations does not constitute sustained-yield timber production and does not contribute to the ASQ. The calculation of the non-ASQ volume for each alternative and the Proposed RMP was also a direct output from the vegetation modeling, but reflected modeling assumptions about the intensity and extent of thinning needed to achieve the management objectives of the reserve land use allocations.

Background

The management direction in the 1995 RMPs directed thinning in the Late-Successional Reserve and Riparian Reserve to attain the management objectives of those land use allocations and permitted timber salvage after disturbance under certain conditions. However, as noted in the BLM plan evaluations, the analysis for the 1995 RMPs did not include an assessment of the potential harvest volume from the reserve allocations, hardwood conversion, or reserve salvage harvest (USDI BLM 2012, p. 11).

Affected Environment and Environmental Consequences

Between 1995 and 2012, the BLM has sold an average of 167 MMbf of timber annually in the decision area, including both ASQ and non-ASQ volume. Between 2004 and 2012, the BLM sold an average of 73 MMbf of non-ASQ timber annually, out of an average total timber volume sold of 201 MMbf. In 2011 and 2012, non-ASQ volume averaged 38 percent of total timber volume sold in the decision area (**Figure 3-66**).

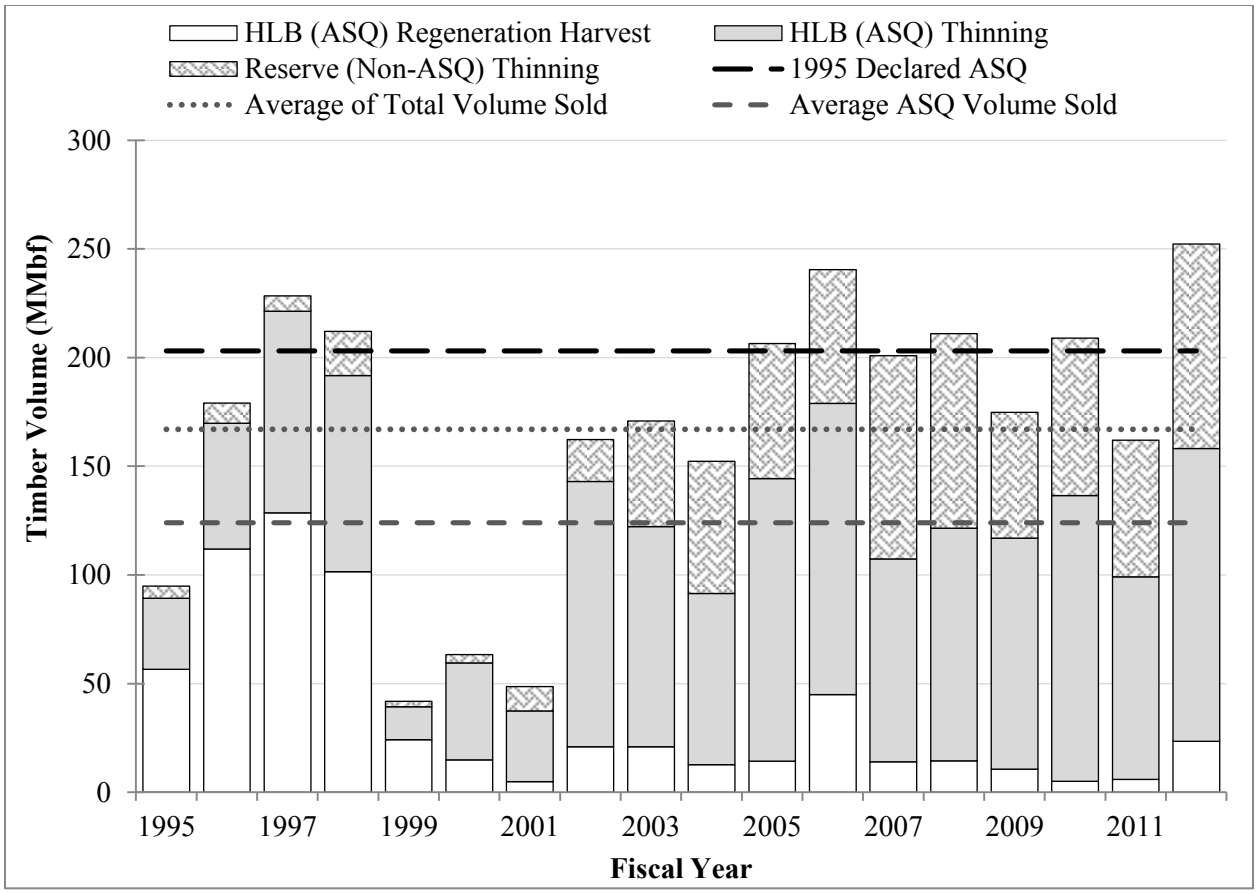


Figure 3-66. Total ASQ vs. Non-ASQ timber volume sold in the decision area between 1995 and 2012

In **Figure 3-66**, the 1995 through 2010 data comes from office data requests for the 2012 Resource Management Plan Evaluation Report. 2011 and 2012 data was generated from Forest Resource Information System data entered through October 23, 2014. Due to continual updates and data correction, these estimates may be different from other estimates generated at different times or from different sources.

Alternative C would have the highest total harvest volume at 555 MMbf per year during the first decade, while Alternative D would have the least, with 180 MMbf per year. The Proposed RMP would produce 278 MMbf of total timber harvest volume per year during the first decade (**Figure 3-67** and **Table 3-58**).[61] The No Action alternative would provide the most non-ASQ volume in the first decade, followed by Alternative B, Sub-alternative B, and the Proposed RMP. Alternatives A and D would provide the least non-ASQ volume. The amount of non-ASQ volume under the alternatives and the Proposed RMP would be influenced heavily by management direction for reserve thinning and the forest conditions within the reserve.

[61] Both **Figure 3-67** and **Table 3-58** contain minor errors associated with rounding.

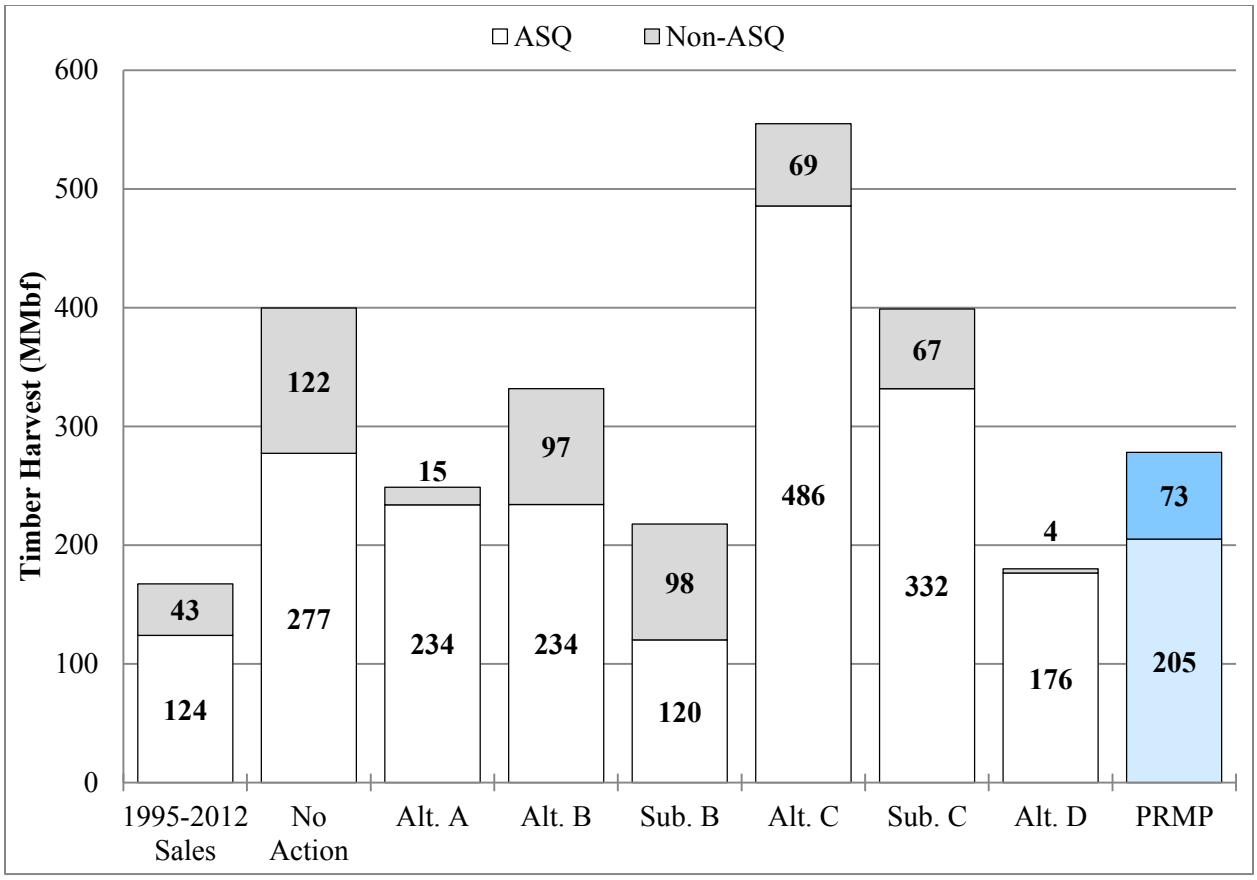


Figure 3-67. Total annual timber harvest in the decision area for the first decade compared to the 1995–2012 sold timber sale average, broken out between ASQ and non-ASQ sources

Table 3-58. Total annual timber harvest volume for the first decade by ASQ and non-ASQ sources

Alternative/ Proposed RMP	Coos Bay		Eugene		Klamath Falls		Medford		Roseburg		Salem		Totals (MMbf)
	ASQ (MMbf)	Non-ASQ (MMbf)	ASQ (MMbf)	Non-ASQ (MMbf)	ASQ (MMbf)	Non-ASQ (MMbf)	ASQ (MMbf)	Non-ASQ (MMbf)	ASQ (MMbf)	Non-ASQ (MMbf)	ASQ (MMbf)	Non-ASQ (MMbf)	
No Action	46	22	58	31	8	-	73	12	55	17	37	41	**400**
Alt. A	46	-	63	-	3	1	27	11	25	3	71	-	**249**
Alt. B	23	24	56	26	7	-	42	16	35	12	71	19	**332**
Sub. B	14	24	25	26	4	-	15	16	14	12	47	19	**218**
Alt. C	82	15	138	17	10	-	54	12	78	10	124	15	**555**
Sub. C	66	15	103	17	3	-	24	10	51	9	85	15	**399**
Alt. D	22	-	45	1	5	-	28	1	22	1	54	1	**180**
PRMP	12	18	53	20	6	-	37	14	32	9	65	12	**278**

The non-ASQ timber volume under Alternative D would be very low (4 MMbf per year during the first decade), because few if any stands allocated to the Late-Successional Reserve would require silvicultural treatments. Most timber harvesting in reserves in this alternative would be restricted to a small outer zone in the Riparian Reserve. This Riparian Reserve thinning would provide almost all of the non-ASQ volume under Alternative D.

The non-ASQ timber volume under Alternative A would be low (15 MMbf per year during the first decade), because Alternative A would employ non-commercial silvicultural treatments in moist forest reserves. The small non-ASQ volume in Alternative A would be produced almost entirely in the interior/south areas where removal of cut trees would be needed to manage fuels and promote forest resiliency.

The No Action alternative generally precludes management of stands over 80 years old in reserves. In the Late-Successional Reserve and Riparian Reserve in the dry forest, none of the action alternatives and the Proposed RMP specifies an age limit for determining treatment eligibility. Alternative B and Sub-alternative B limit timber harvest in the Late-Successional Reserve in the moist forest to stands less than 120 years old. None of the other action alternatives or the Proposed RMP would specify an age limit for silvicultural treatments in the reserve land use allocations in the moist forest. Instead, treatment eligibility for reserves would generally be based on habitat evaluations, rather than specific age limits. Regardless of the variation in age limits prescribed in the management direction, the BLM assumed that the majority of reserve treatments would occur in stands less than 80 years old in moist forests, and would not occur within older, more structurally-complex forests, as defined in the alternatives and the Proposed RMP in dry forests.

The non-ASQ volume would decline in future decades, as fewer moist forest stands would need silvicultural treatments to achieve Reserve land use allocation management objectives. This decline would be more pronounced in the coastal/north area than in the interior/south due to the higher proportion of dry forest reserves in the south. Under the action alternatives and the Proposed RMP, the BLM assumed that management in the Late-Successional Reserve in the dry forest would include stand density reduction, cultivation and release of large trees with old-growth characteristics, and introduction of heterogeneity into increasingly uniform stands. As described in more detail in the Fire and Fuels section in this chapter, the BLM assumed that mechanical treatments would be necessary to both restore dry forest stands and maintain them in a restored condition in order to increase stand resiliency to fire, disease, and the potential, yet unknown effects from climate change. This would involve selection harvest on a variable, but perpetual, re-entry cycle to keep stands from becoming overstocked. As a result, the non-ASQ volume associated with silvicultural treatments of the Late-Successional Reserve would not taper off to zero except in the No Action alternative and Alternative D (**Table 3-59**) in the dry forest.

Table 3-59. Annual non-ASQ timber harvest by decade: coastal/north vs. interior/south

Alternative/ Proposed RMP	Area	2023 (MMbf)	2033 (MMbf)	2043 (MMbf)	2053 (MMbf)	2063 (MMbf)	2113* (MMbf)
No Action	Coastal/North	94	87	76	63	46	-
	Interior/South	29	28	28	25	18	-
Alt. A	Coastal/North	0.1	0.1	0.2	0.8	0.3	0.3
	Interior/South	15	10	11	10	17	19
Alt. B	Coastal/North	70	66	57	47	33	-
	Interior/South	27	22	22	20	23	18
Sub. B	Coastal/North	70	66	57	47	33	-
	Interior/South	27	22	22	20	23	18
Alt. C	Coastal/North	47	45	38	31	22	-
	Interior/South	22	18	17	16	16	11
Sub. C	Coastal/North	48	45	38	31	22	-
	Interior/South	20	13	12	11	19	2
Alt. D	Coastal/North	2.6	2.4	2.0	1.6	0.9	-
	Interior/South	1.1	1.0	1.0	0.9	0.6	-
PRMP	Coastal/North	50	48	41	34	24	-
	Interior/South	22	18	17	14	17	16

* This table has minor errors associated with rounding.

In summary, all alternatives and the Proposed RMP would result in higher total harvest volumes in the first decade than the average annual timber sale volumes from the decision area since 1995, which averaged 167 MMbf per year. Although Sub-alternative B has the lowest ASQ volume, the total harvest volume would be 218 MMbf per year compared to 180 MMbf per year under Alternative D. Alternative C would have the highest total annual harvest in the first decade with 555 MMbf per year followed by the No Action alternative with 400 MMbf per year. The Proposed RMP would produce 278 MM bf per year of total timber harvest volume in the first decade. Non-ASQ timber harvest volumes would decline and eventually disappear in the moist forest Late-Successional Reserve, while non-ASQ timber harvest from dry Late-Successional Reserve would generally continue in future decades.

Issue 4

What log sizes would be harvested under each alternative?

Summary of Analytical Methods

The outputs from the Woodstock model grouped harvested timber volume into four generalized size/quality groups (**Table 3-60**). The BLM based these groupings on small end diameter inside bark from harvest tables, including taper assumptions by species group. Minimum merchantability standards were used in the vegetation modeling defining a minimum merchantable log as 8 feet long to a small end log diameter of 5 inches with 8 inches of trim, and a minimum tree DBH of 7 inches.

Table 3-60. Log size groups by small end diameter inside bark diameter class

Size Group	Small End Log Diameter Class (Inches)
1	> 20
2	12–20
3	8–11
4	5–8

Affected Environment and Environmental Consequences

Because the vast majority of BLM timber harvesting in the past decade has come from thinning stands less than 80 years old, most of the timber volume has been coming from log size groups 2 through 4, with relatively little timber volume being produced in log size group 1 (logs greater than 20").

The percentage of timber harvested in log size groups 2, 3, and 4 would differ only slightly among the alternatives and the Proposed RMP. However, the alternatives and the Proposed RMP would differ more substantially in the percentage of timber harvested in log size group 1. Log size is generally smaller in younger stands, and taking older, more structurally-complex forests out of the Harvest Land Base would increase the reliance on timber harvest in younger stands. The percentage of timber in log size group 1 would be lowest in Sub-alternative C, at 5 percent of total volume; because Sub-alternative C would reserve all stands currently older than 80 years old. The percentage of timber in log size group 1 would be highest in the No Action alternative, which does not specifically reserve older, more structurally-complex forest, and in Alternative C, which would reserve all stands currently older than 160 years old. Under the Proposed RMP, the BLM would produce 9 percent of total timber harvest volume in log size group 1 in the first 5 decades of implementation (**Table 3-61**).

Table 3-61. Percentage of total timber harvest volume in the decision area by log size group; first 5 decades

Log Size Group	No Action (Percent)	Alt. A (Percent)	Alt. B (Percent)	Sub. B (Percent)	Alt. C (Percent)	Sub. C (Percent)	Alt. D (Percent)	PRMP (Percent)
1	14%	10%	10%	9%	14%	5%	11%	9%
2	50%	52%	50%	48%	51%	47%	47%	50%
3	22%	23%	23%	24%	21%	28%	24%	24%
4	15%	16%	16%	18%	14%	20%	18%	17%

Issue 5

What harvest types and silvicultural practices would the BLM apply under each alternative?

Summary of Analytical Methods

In the vegetation modeling, the BLM made assumptions for harvest types consistent with the management direction for each alternative (**Appendix C**). These harvest types fall into the following five categories:

- Commercial thinning
- Selection harvest
- Variable-retention regeneration harvest
- Clear-cut harvest
- Salvage

Non-commercial thinning in the Late-Successional Reserve and Riparian Reserve in Alternative A and the middle zone of the Riparian Reserve – Moist of Class I subwatersheds in the Proposed RMP would generally not include timber harvest, as the BLM would fell the timber and leave it on site. Non-commercial thinning is not reported in the timber harvest categories, but it is included in the report on silvicultural treatments (**Table 3-63**). Timber harvest implemented in the Late-Successional Reserve in the dry forest is categorized as selection harvest in the action alternatives and the Proposed RMP, but as thinning in the No Action alternative, because of differences in management direction. Variable-retention regeneration harvesting would include all regeneration harvest practices in the Matrix and Adaptive Management Area in the No Action alternative, regeneration harvest in the Moderate Intensity Timber Area and Low Intensity Timber Area in Alternative B, Sub-alternative B, and the Proposed RMP, and regeneration harvest in the Moderate Intensity Timber Area in Alternative D. All timber harvesting in the Uneven-aged Timber Area in all action alternatives and the Proposed RMP, and in the Owl Habitat Timber Area in Alternative D, is in the selection harvest category, with the exception of salvage.

The Woodstock model predicted the acreage of silvicultural treatments associated with timber harvest for each decade under each alternative and the Proposed RMP. These silvicultural treatments include fuels reduction, site preparation, planting, stand maintenance and protection, pruning, stand conversion, pre-commercial thinning, and fertilization. The extent of many silvicultural treatments is linked directly to the amount and type of regeneration harvest implemented. For example, following a regeneration harvest, the BLM would typically implement site preparation, tree planting, and stand maintenance. The BLM assumed that no aerial fertilization would be implemented under Alternatives B and D, Sub-alternative B, and the Proposed RMP because of their forest management practices. Modeling assumptions about post-fire timber salvage are used to approximate the management direction for salvaging after natural disturbances included in **Appendix B** by land use allocation. For the Harvest Land Base in all alternatives and the Proposed RMP, except for the Owl Habitat Timber Area in Alternative D, the BLM assumed that timber salvage would occur after high- and moderate-severity fire events. In the Owl Habitat Timber Area in Alternative D, and the Late-Successional Reserve in Alternative C, the BLM assumed that timber salvage would occur only after high-severity fire events. The BLM only modeled timber salvage volume from reserves in Alternative C. With the exception of wildfire and associated salvage, the BLM did not simulate the occurrence of large-scale episodic natural disturbances in the vegetation modeling, including insect and disease outbreaks or wind-throw; however, the management direction in **Appendix B** provides salvage guidance for all natural disturbances.

Affected Environment and Environmental Consequences

The 1995 RMPs estimated levels of silvicultural treatments that would occur under implementation of the plan, but the BLM has generally not achieved these levels of treatments. The BLM plan evaluations concluded that implementation of the timber management program was departing substantially from the outcomes predicted in the 1995 RMPs (USDI BLM 2012). On average, implementation of regeneration harvests has been 26 percent of levels anticipated in the 1995 RMPs, varying from 9 percent to 36 percent among districts. Commercial thinning has averaged 137 percent of levels anticipated in the 1995 RMPs, varying from 95 percent to 569 percent among districts. With the exception of commercial thinning, the levels of silvicultural activities within the decision area (**Table 3-62**) have been substantially less than anticipated in the 1995 RMPs. Average decadal accomplishments in the decision area since 1995 include 14,275 regeneration harvest acres sold and 122,245 acres of thinning sold. For this calculation, timber salvage is lumped into either the regeneration harvest category or the thinning category where it is the most similar. The levels of reforestation treatments have been directly affected by the timber harvest activities that the BLM has implemented. The lack of anticipated regeneration harvest levels and the shift

to commercial thinning has reduced the extent of reforestation and young stand management activities since 1995.

Table 3-62. Average decadal silvicultural treatment accomplishment acres in the decision area, 1996–2012

Silvicultural Treatment	Coos Bay (Acres)	Eugene (Acres)	Klamath Falls (Acres)	Medford (Acres)	Roseburg (Acres)	Salem (Acres)	Totals (Acres)
Fertilization	14,213	1,511	-	1,389	3,440	2,903	**23,456**
Pre-commercial Thinning	18,135	21,374	10,352	26,423	36,428	27,082	**139,793**
Pruning	8,786	4,174	406	6,079	5,791	2,723	**27,960**
Slash Disposal and Site Preparation	2,928	2,759	30,727	129,829	4,573	6,522	**177,338**
Stand Conversion	489	-	92	-	-	121	**703**
Stand Maintenance and Protection	25,552	13,032	2,053	17,860	12,958	22,330	**93,784**
Tree Planting	5,170	4,243	2,236	22,156	4,726	4,851	**43,383**

Alternative C would have the largest acreage of clear-cutting and the largest acreage of regeneration harvest overall in the first two decades (**Figure 3-68**). The No Action alternative would have the largest acreage of variable-retention regeneration harvest. Alternative D would have the largest acreage of selection harvest. Based on simulations of wildfire occurrence and subsequent salvage harvest, salvage harvest would occur on a small acreage under all alternatives and the Proposed RMP (359 acres per year or less). Alternative C would have the largest salvage harvest acreage, in part because Alternative C would direct the salvage in the Late-Successional Reserve after natural disturbances to recover economic value. The Proposed RMP would result in the second highest level of variable-retention regeneration harvesting, and the third highest level of selection harvesting. Since the BLM did not simulate the occurrence of other large-scale episodic natural disturbances besides wildfire in the vegetation modeling, these salvage figures are likely underestimated.

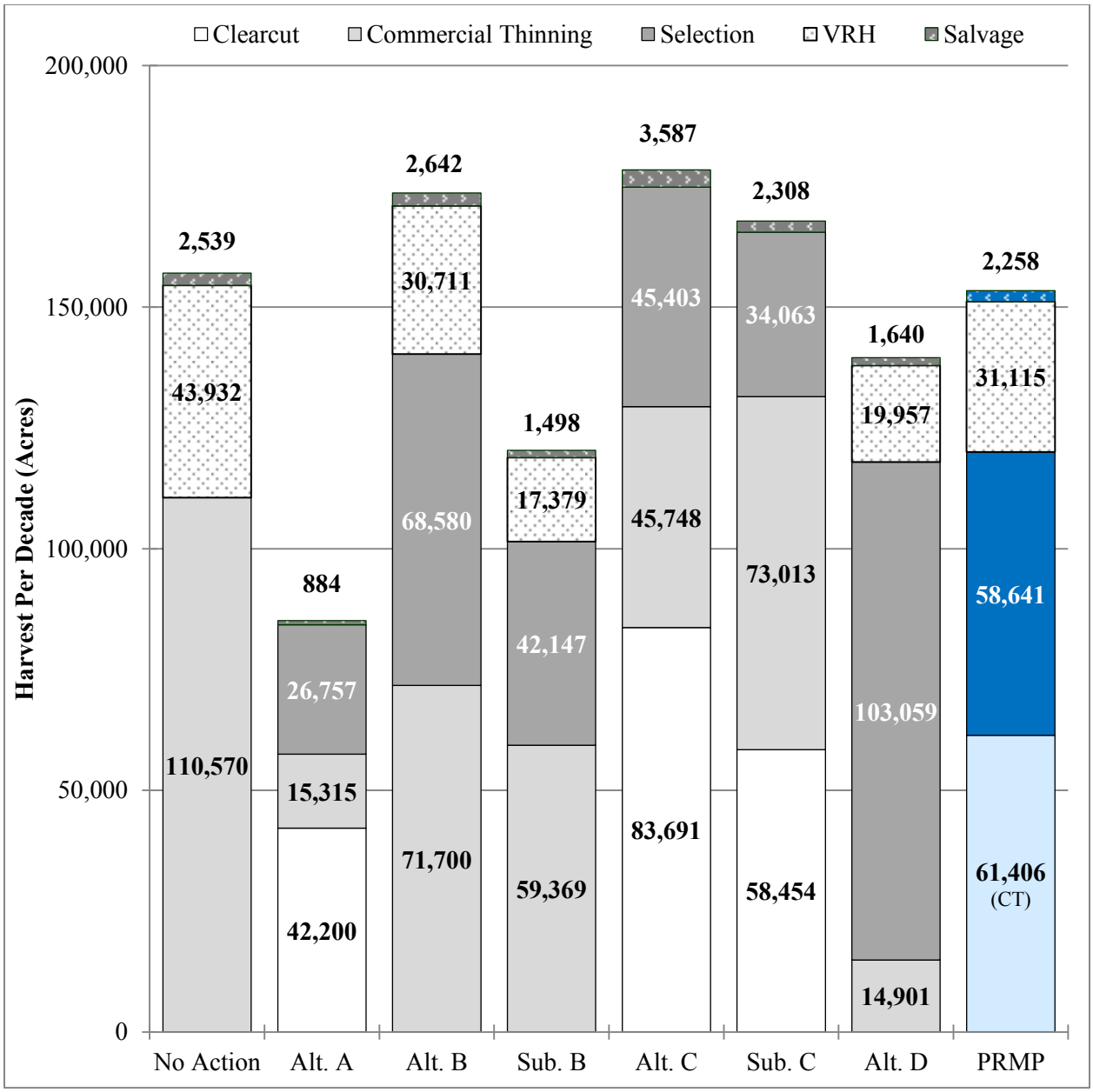


Figure 3-68. Harvest acres per decade by harvest type based on an average of the first two decades

The acreage of timber harvest would not mirror the volume of timber harvest, as discussed above in the issue on the annual productive capacity. The dramatic difference in the timber volume per acre among the harvest types results in different patterns in acres that would be harvested and timber volume among the alternatives and the Proposed RMP (**Figure 3-68** and **Figure 3-69**). For example, Alternative A would harvest the fewest total acres, but would harvest the sixth-highest timber volume. Alternative B would harvest the second-largest acreage, but would harvest the fourth-highest timber volume. Alternative D would harvest the fifth-highest acreage, but would harvest the least timber volume. These relationships are explained by the average timber volume per acre removed, which varies by harvest type, and is influenced by the log size class of timber eligible for harvest in each alternative and the Proposed RMP.

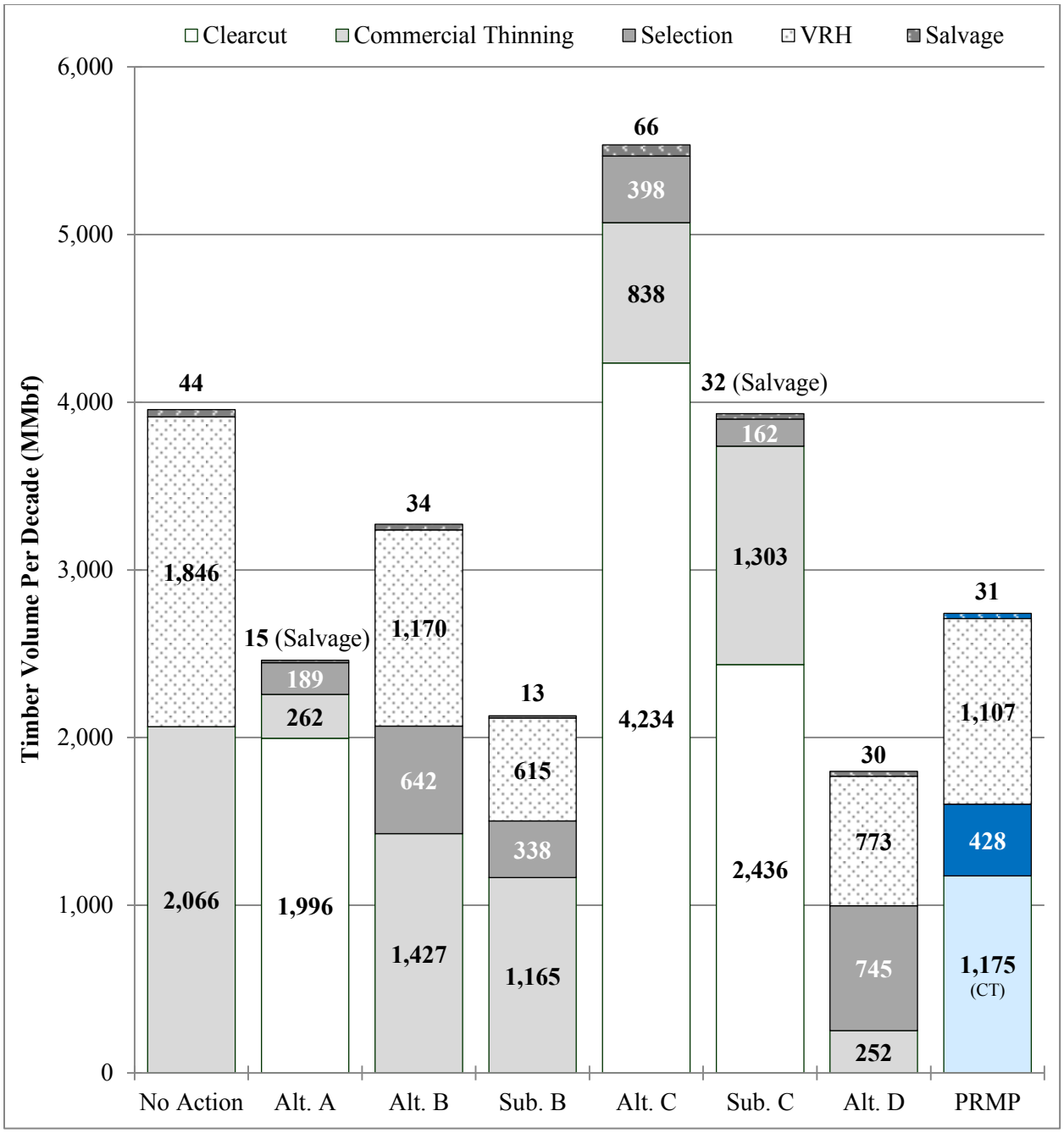


Figure 3-69. Harvested timber volume per decade by harvest type based on an average of the first two decades

Average timber harvest volume per acre also varies between the coastal/north and interior/south areas. Total annual timber harvest acreage is higher in the coastal/north area in the No Action alternative and Alternative C, and higher in the interior/south area in Alternative B and the Proposed RMP. Total annual harvest acreage in the other alternatives is relatively comparable between the coastal/north and the interior/south (**Figure 3-70**). However, total harvested timber volume per year is substantially higher in the coastal/north area than the interior/south in all alternatives and the Proposed RMP (**Figure 3-71**).

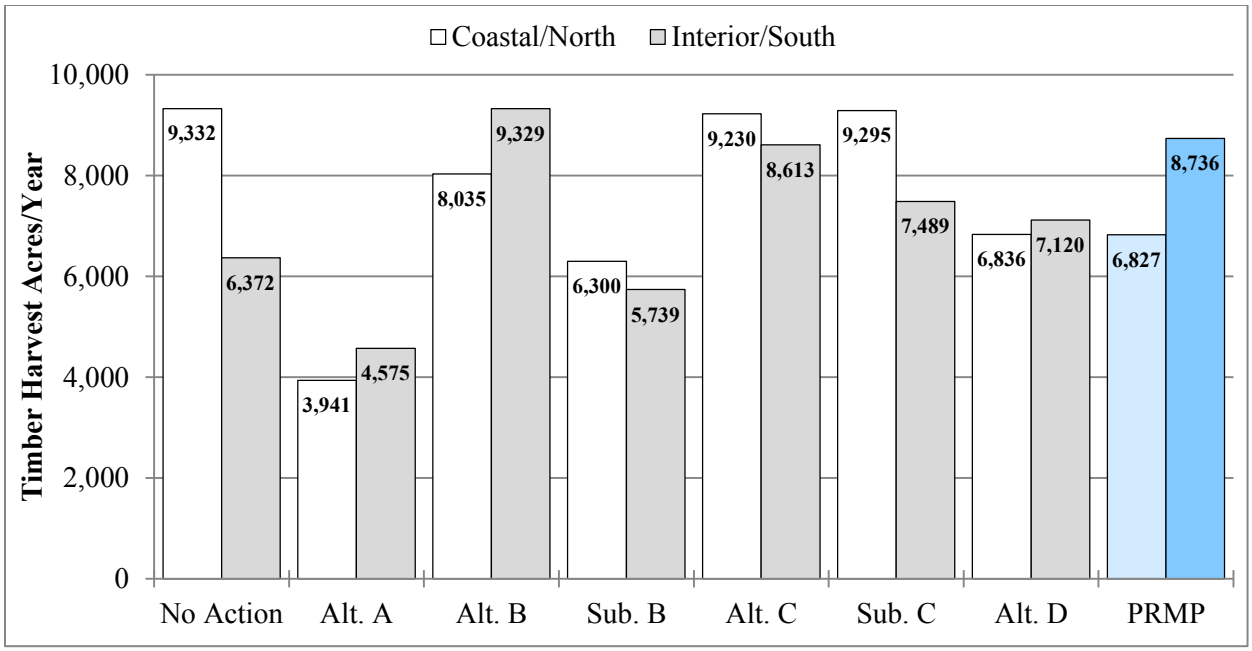


Figure 3-70. Total timber harvest acreage per year based on an average of the first two decades, broken out between coastal/north and interior/south areas

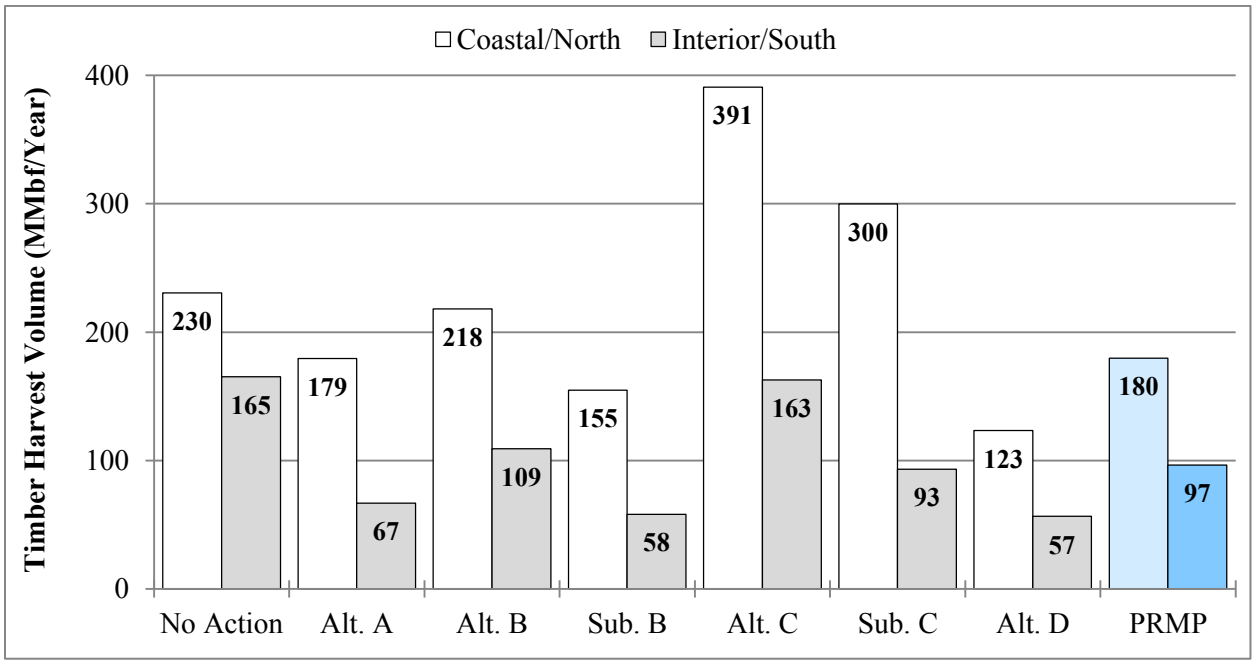


Figure 3-71. Total timber harvest volume per year based on an average of the first two decades, broken out between coastal/north and interior/south areas

The acreage of most silvicultural treatments, especially reforestation, site preparation, and stand maintenance activities that would occur under the alternatives and the Proposed RMP is correlated with the acreage of regeneration harvest (i.e., clear-cutting and variable-regeneration retention harvest). Uneven-aged management regimes would also require reforestation, site preparation, and stand

maintenance activities, but these activities would only be undertaken on a portion of the treatment acres in a given decade. Alternative C would have the most acres of total silvicultural treatments and Alternative D would have the least acres of treatments (**Table 3-63**).

Table 3-63. Silvicultural treatment acreages per decade based on an average of the first two decades

Treatment Type	No Action (Acres)	Alt. A (Acres)	Alt. B (Acres)	Sub. B (Acres)	Alt. C (Acres)	Sub. C (Acres)	Alt. D (Acres)	PRMP (Acres)
Non-commercial Thinning	-	12,957	-	-	-	-	-	2,215
Under Burn	8,907	16,760	16,571	9,871	33,152	23,792	10,410	15,832
Hand Pile and Burn	24,734	23,309	35,349	21,950	45,751	36,590	25,822	32,232
Landing Pile and Burn	5,402	3,089	6,313	3,926	6,479	7,158	4,955	5,468
Machine Pile and Burn	14,780	7,429	13,353	9,874	17,907	17,197	10,313	11,274
Slash and Scatter	20,201	14,231	30,092	18,390	27,437	22,248	22,280	28,109
Mastication	3,010	4,669	3,902	2,129	10,664	7,488	2,352	4,056
Planting	55,999	57,223	44,750	27,154	117,004	82,669	38,064	52,833
Stand Maintenance and Protection	82,573	89,061	77,213	45,432	181,801	130,114	60,578	82,696
Pre-commercial Thinning	54,366	49,570	43,778	25,429	97,420	69,758	26,148	41,108
Fertilization	10,989	15,606	-	-	19,139	36,222	-	0
Pruning	3,498	4,362	3,878	2,119	9,474	6,516	2,740	3,910
Stand Conversion	114	295	216	164	555	436	139	106
Totals	**284,573**	**298,561**	**275,415**	**166,438**	**566,783**	**440,188**	**203,801**	**279,839**

In summary, Alternative C would have the most acres of clear-cutting per decade, followed by Sub-alternative C and Alternative A. The No Action alternative would have the most acres per decade of variable-retention regeneration harvesting, followed by the Proposed RMP. Alternative D would have the most acres of selection harvest followed by Alternative B. Timber harvest acreages by harvest type for the Proposed RMP are bracketed by the alternatives. Silvicultural treatments acres would be correlated most strongly to the number of acres of clear-cutting and variable-retention regeneration harvesting, although other harvest types would also require silvicultural treatments to a lesser degree. Total annual timber harvest acreage is higher in the coastal/north area in the No Action alternative and Alternative C, and higher in the interior/south area in Alternative B and the Proposed RMP. However, total annual timber harvest is substantially higher in the coastal/north areas in all alternatives and the Proposed RMP.

Issue 6

How would each alternative affect the availability of special forest products?

Summary of Analytical Methods

In this analysis, the BLM divided special forest products into two broad categories:[62]

- **Category I**—Disturbance-associated special forest products – Christmas trees, wood products, manzanita, huckleberries, beargrass, pine cones, morels, etc.
- **Category II**—Disturbance-averse special forest products – ferns, wild ginger, mosses, hemlock cones, chanterelles and matsutakes, coniferous boughs, and burls, etc.

The BLM assumed for the analysis that disturbances such as timber harvest, prescribed fire, and wildland fire would produce the conditions that would support the availability of Category I special forest products; areas without these disturbances would support the availability of Category II special forest products. The BLM assumed that less intensive treatments such as pre-commercial thinning, fuels reduction, and fertilization would have no effect on conditions for the availability of either category of special forest products, although the BLM recognizes that there are site and species-specific exceptions to this assumption. The more acres that would be disturbed by timber harvest, prescribed fire, and wildland fire in the decision area, the more acres would be available for harvest of Category I species. The more acres that would be undisturbed in the decision area, the more acres would be available for harvest of Category II special forest products.

In this analysis, the BLM considered acres without timber harvest, prescribed fire, or wildland fire within the previous 20 years as undisturbed and therefore supporting Category II special forest products. The BLM used outputs from the Woodstock model to estimate future disturbed and undisturbed areas, in order to compare special forest product availability between the alternatives and the Proposed RMP.

This analysis only addresses broad characterizations of the availability of special forest products. The BLM lacks information on the extent to which availability would affect the collection of special forest products or other factors that would affect collection. The number of available acres suitable for the collection of these products does not forecast future demand or sustainable harvest levels for each of these products. The BLM also assumed that public access was available to all lands that would be available to special forest products harvesting, although the BLM recognizes reciprocal right-of-way agreements are distinctly different across the decision area, and may limit access for certain special forest products; legal access may also be limited on some portions of BLM-administered lands. Finally, each specific product has fine-scale associations by aspect, plant association, and other unique site-level factors beyond disturbance history. The BLM does not have sufficient product-specific, species-specific, or site-specific information at the scale of analysis to refine this analysis beyond the broad categories of special forest products and the broad characterizations of disturbance.

[62] These categories are not a formal designation and are simply labeled here for the purpose of analysis. Some products fit in both categories, and some are conditionally included in one category or the other. For example, manzanita may benefit from open conditions created by disturbance, and be considered to be a Category 1 species, or depending on the type of disturbance, manzanita abundance could be reduced, making it fit better as Category II. Despite acknowledged limitations and site-specific nature of these generalized conceptual categories, the BLM believes that this analytical framework is useful in evaluating relative differences in special forest product availability across large and diverse range of landscapes and species, and long timescales considered in the analysis.

Background

'Special forest products' is a term used to describe some of the vegetative material found on public lands that can be harvested for recreational use, personal use, or as a source of income. They include, but are not limited to, grasses, seeds, roots, bark, burls, berries, mosses, greenery (e.g., fern fronds, salal, and huckleberry), edible mushrooms, boughs, tree seedlings, transplants, poles, posts, and firewood. Trees or logs that are sold as saw timber are not considered special forest products.

Management of special forest products is an important component of resource management in Oregon/Washington BLM. Special forest products are commonly referred to as 'minor forest products' and are restricted to vegetative material. The special forest products program benefits the Oregon/Washington BLM and the public in many ways. These include contributing to the economic stability in local communities, providing critical cultural and subsistence benefits, supporting a variety of cottage industries, forming partnerships with groups concerned with the harvest of management of these products, and providing educational opportunities regarding the value of natural, renewable resources.

Commercial, personal, free use, and free use with a permit are distinct categories for public users on BLM-administered lands, although the boundaries between personal and free use blend. Commercial use of special forest products requires a permit and harvesters generally search for and harvest high value products from patches in a systematic and thorough method for maximum resale value. Many individuals enjoy harvesting or collecting special forest products for their own personal use and tend to harvest smaller quantities, searching less systematically and less thoroughly and at smaller spatial scales. All personal use special forest products, with the exception of those meeting free use conditions, require permits. Free use includes collection and gathering of berries and mushrooms for immediate use and gathering firewood for campfires. Although most commercial harvesters in the Pacific Northwest do not rely on special forest products for their sole source of income, these products do provide important supplemental or seasonal sources of income that contribute to household economies (Charnley 2006).

Permits for commercial use and personal use for special forest products include restrictions to help meet ecological and renewable resource standards and to protect other sensitive resource values. Permits may restrict the type of species, harvest quantity, harvest or collection method, location, access, and season.

Field inventories of special forest products that include distribution and abundance, harvest areas, and actual harvest amounts on BLM-administered lands are lacking.

Affected Environment and Environmental Consequences

Currently, approximately 12 percent of the forested lands in the coastal/north area are available for the collection of Category I special forest products, while 17 percent of forested lands in the interior/south area are currently available for collection of these products. Conversely, approximately 88 percent of the coastal/north area and 83 percent of the interior/southern area are currently available for the collection of Category II special forest products. Based on this analysis, the availability of Category I special forest products are more limited than Category II special forest products in the decision area.

Under all alternatives and the Proposed RMP, the interior/south area would consistently have a higher proportion of the forested lands available for the harvesting of Category I special forest products than the coastal/north area (**Figure 3-72** and **Figure 3-73**).

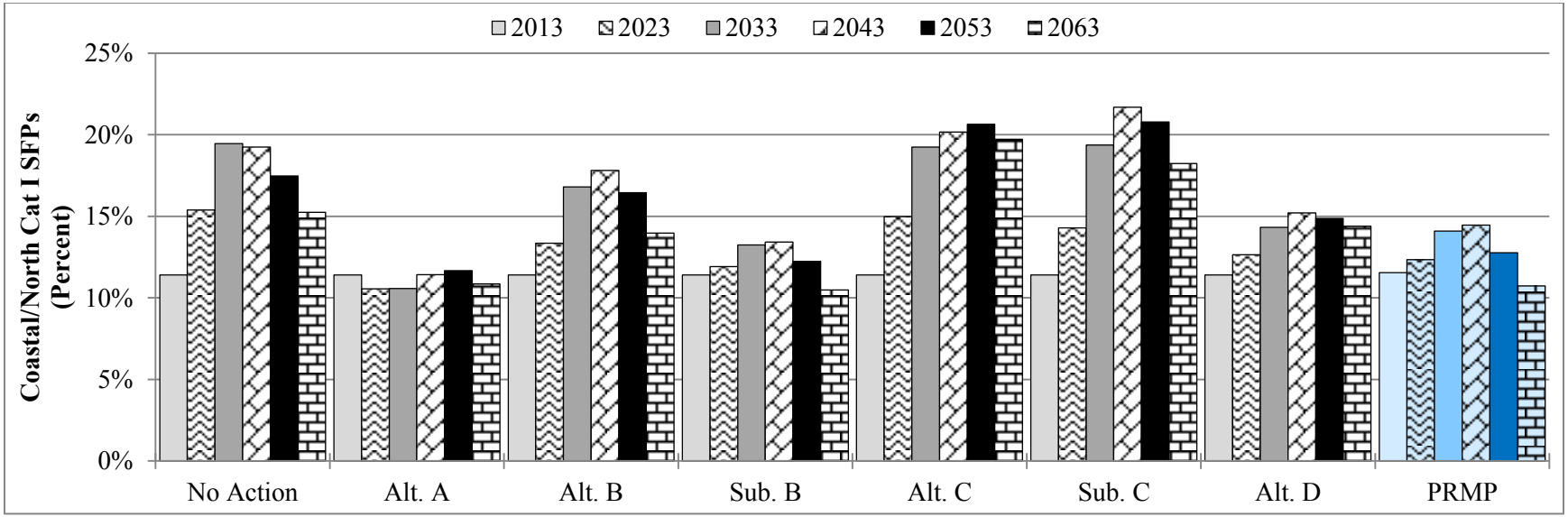


Figure 3-72. Percentage of forested acres available for the collection of Category I special forest products; coastal/north area

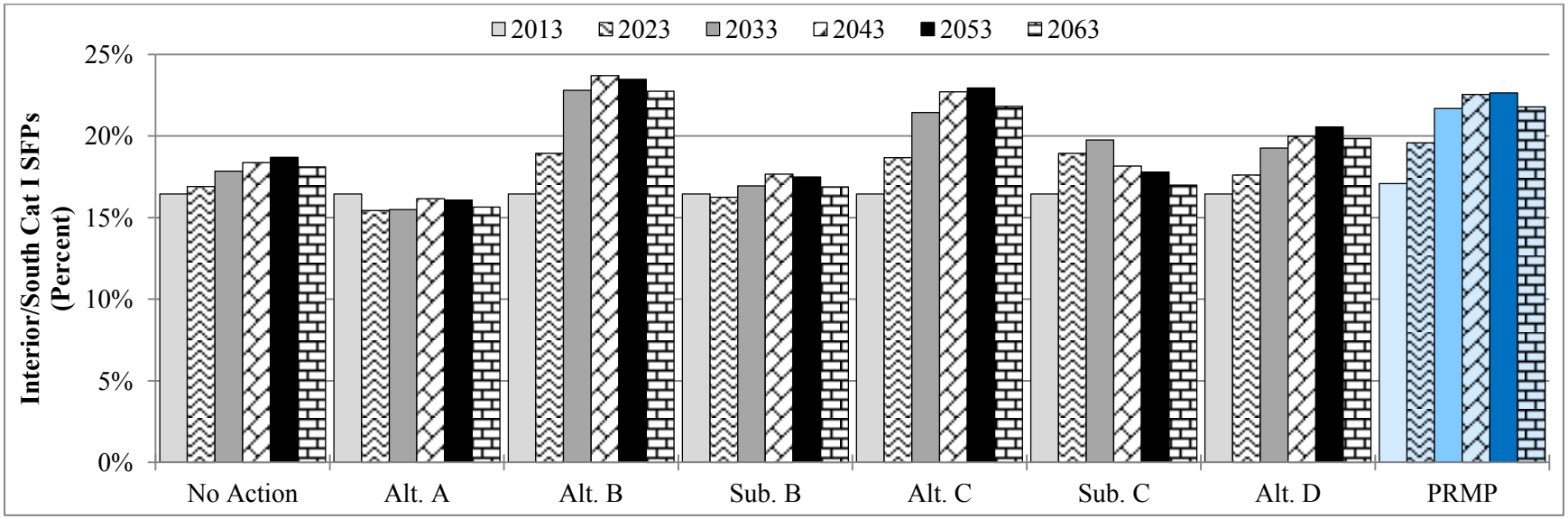


Figure 3-73. Percentage of forested acres available for the collection of Category I special forest products; interior/south area

In the coastal/north, Alternatives C and Sub-alternative C would have the largest acreage available for harvest of Category I special forest products, followed by the No Action alternative and Alternative B. Alternative A would have the smallest acreage suitable for these disturbance-related products. In fact, the acreage available for harvesting Category I special forest products would decline in the coastal/north in the first two decades from current conditions under Alternative A (**Figure 3-72**).

In the interior/south, Alternative B would have the largest acreage available for the collection of Category I special forest products, followed by Alternative C and the Proposed RMP. As in the coastal/north, Alternative A would have the smallest acreage available for the harvesting of these products. The acreage available for harvesting Category I special forest products in the interior/south would decline in the first five decades from current conditions under Alternative A (**Figure 3-73**).

Conversely, the coastal/north would consistently have more acreage available for the collection of Category II special forest products. Regardless of alternative or the Proposed RMP, decade, or region, the proportion of the forested lands available for the collection of Category II special forest products would be above 75 percent of the forested acres in the decision area (**Figure 3-74** and **Figure 3-75**).

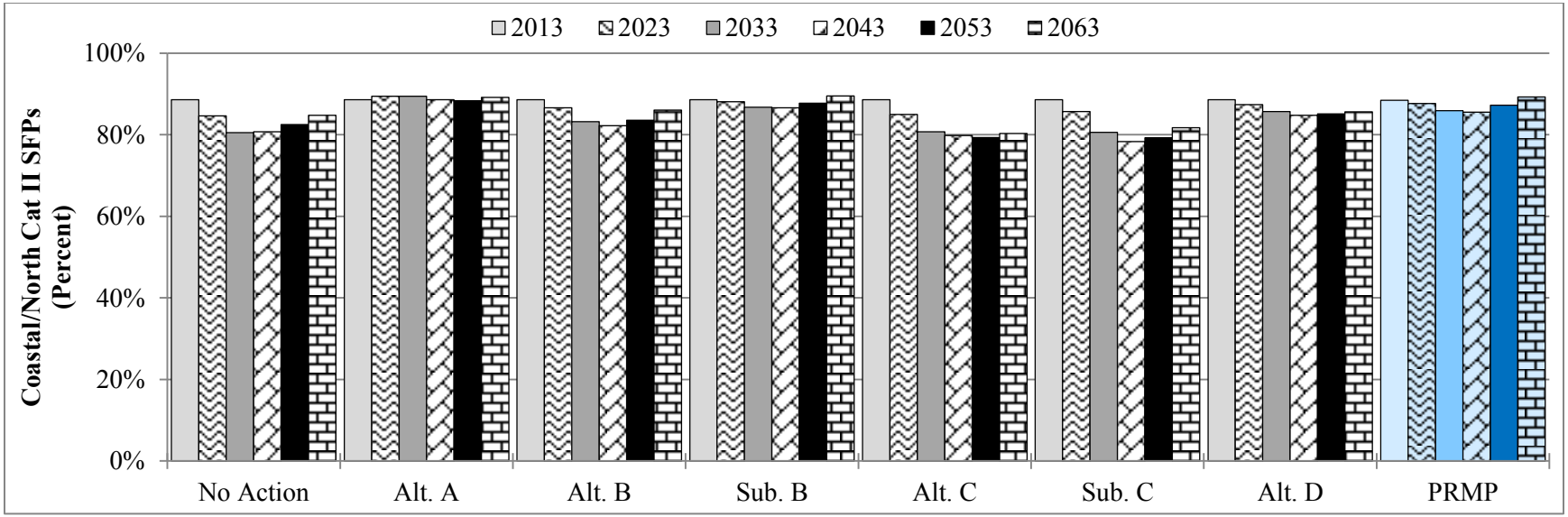


Figure 3-74. Percentage of forested acres available for the collection of Category II special forest products; coastal/north area

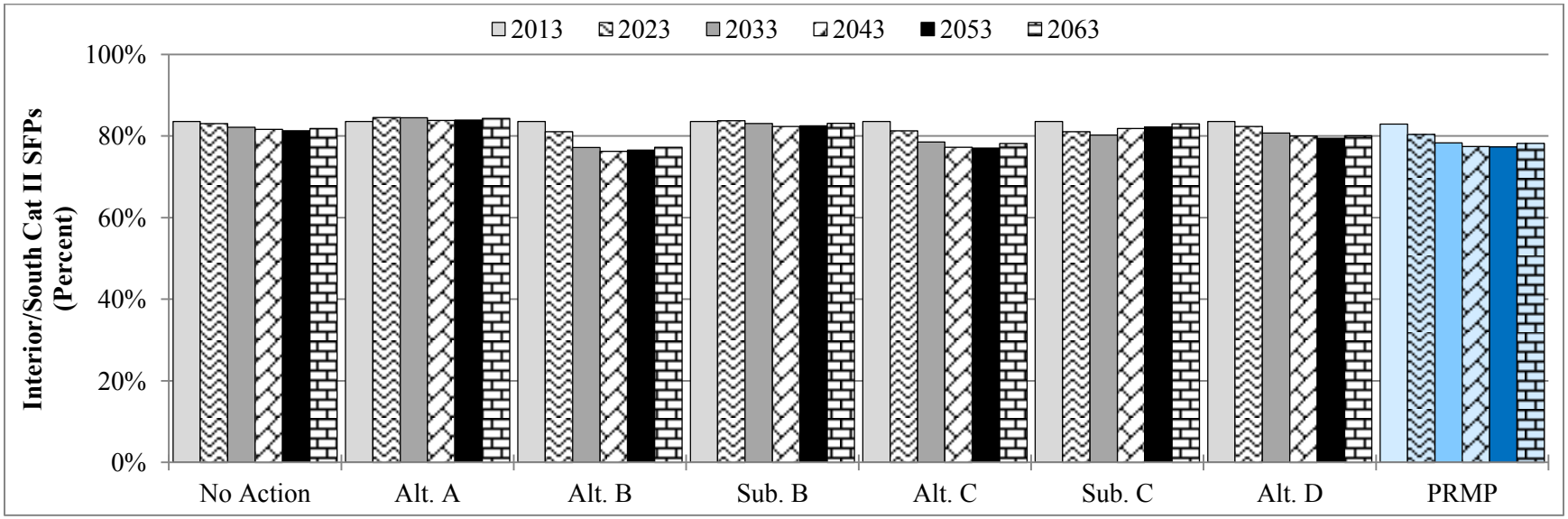


Figure 3-75. Percentage of forested acres available for the collection of Category II special forest products; interior/south area

In summary, the acreage of forests available for the harvesting of Category II (disturbance-averse) special forest products would remain abundant in all alternatives and the Proposed RMP, especially in the coastal/north areas. The acreage of forests available for the harvesting of Category I (disturbance associated) special forest products would be more limiting than Category II special forest products, and consistently higher in the interior/south than the coastal/north due to disturbed acres associated with timber harvest, prescribed fire, and wildland fire. Availability of these forest conditions in the coastal/north areas would be almost completely dependent on harvesting practices. Therefore, the alternatives that have the largest timber harvest acreage would also produce the largest number of acres available for the collection of Category I special forest products. In the coastal/north, Alternative C and Sub-alternative C would have the largest acreage available for harvest of Category I special forest products, followed by the No Action alternative and Alternative B. In the interior/south, Alternative B would have the largest acreage suitable for the collection of Category I special forest products, followed by Alternatives C and the Proposed RMP.

References

Birch, K. R., and K. N. Johnson. 1992. Stand-level wood-production costs of leaving live, mature trees at regeneration harvest in coastal Douglas-fir stands. West. J. Appl. For. **7**(3): 65–68.

Charnley, S. (tech. coord.). 2006. Northwest Forest Plan-The First Ten Years (1994–2003): Socioeconomic monitoring results. Vol. II (Timber and nontimber resources). General Technical Report PNW-GTR-649. USDA Forest Service, Pacific Northwest Research Station, Portland, OR. pp. 29–33. http://www.treesearch.fs.fed.us/pubs/22374.

Di Lucca, M. C., J. W. Goudie, and S. C. Stearns-Smith. 2004. Variable retention yield adjustment factors for TIPSY. Extension Note No. 69. British Columbia Ministry of Forests, Forest Science Program. Victoria, B.C.

Franklin, J. F., and K. N. Johnson 2012. A restoration framework for Federal forests in the Pacific Northwest. Journal of Forestry **110**(8): 429–439. http://www.blm.gov/or/districts/medford/plans/trail/files/forest-restoration.pdf.

Gustafsson, L., S. C. Baker, J. Bauhus, W. J. Beese, A. Brodie, J. Kouki, D. B. Lindenmayer, A. Lõhmus, G. M. Pastur, C. Messier, B. Palik, A. Sverdrup-Thygeson, W. J. A. Volney, A. Wayne, and J. F. Franklin. 2012. Retention forestry to maintain multifunctional forests: a world perspective. BioScience **62**(7): 633–645. http://dx.doi.org/10.1525/bio.2012.62.7.6.

Long, J. N., and S .D. Roberts. 1992. Technical commentary: Growth and yield implications of a "New Forestry" silvicultural system. Western Journal of Applied Forestry **7**(1): 6–9.

Miller, R. E., R. E. Bigley, and S. Webster. 1993. Early development of matched planted and naturally regenerated Douglas-fir stands after slash burning in the Cascade Range. Western Journal of Applied Forestry **8**(1): 5–10. http://www.fs.fed.us/pnw/pubs/journals/pnw_1993_miller001.pdf.

Sensenig, T., J. Bailey, and J. C. Tappeiner. 2013. Stand development, fire and growth of old-growth and young forests in southwestern Oregon, USA. Forest Ecology and Management **291**: 96–109. http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/38559/BaileyJohnDForestEngineeringResourcesManagementStandDevelopmentFire.pdf?sequence=1.

Temesgen, H., P. J. Martin, D. A. Maguire, J. C. Tappeiner. 2006. Quantifying effects of different levels of dispersed canopy tree retention on stocking and yield of the regeneration cohort. Forest Ecology and Management **235**(1–3): 44–53. http://dx.doi.org/10.1016/j.foreco.2006.07.025.

Tuchmann, E. T., and C. T. Davis. 2013. O&C Lands Report; Prepared for Oregon Governor John Kitzhaber. February 6, 2013. http://library.state.or.us/repository/2013/201302111127191/. Accessed 02/19/2015.

Urgenson, L. S., C. B. Halpern, and P. D. Anderson. 2013. Twelve year responses of planted and naturally regenerating conifers to variable-retention harvest in the Pacific Northwest, USA. Canadian Journal of Forest Research **43**: 46–55. http://www.fs.fed.us/pnw/pubs/journals/pnw_2012_urgenson001.pdf.

USDA FS and USDI BLM. 2000. Final Supplemental Environmental Impact Statement for Amendment to the Survey and Manage, Protection Buffer, and Other Mitigation Measures Standards and Guidelines. Vol. 1, Chapters 1–4, pp. 428–438. USDA FS and USDI BLM, Portland, OR. http://www.blm.gov/or/plans/surveyandmanage/files/rd-fseis_v1_ch1-4-2000-11.pdf.

USDI BLM. 2008. Final Environmental Impact Statement for the Revision of the Resource Management Plans of the Western Oregon Bureau of Land Management Districts. Portland, OR. Vol. I–IV. http://www.blm.gov/or/plans/wopr/index.php.

---. 2012. Resource Management Plan Evaluation Report, Western Oregon Districts. Bureau of Land Management. Portland, OR. http://www.blm.gov/or/plans/files/RMPEvaluation.pdf.

---. 2014. Resource management plans for western Oregon planning criteria. Bureau of Land Management, Oregon/Washington State Office, Portland, OR. http://www.blm.gov/or/plans/rmpswesternoregon/plandocs.php.

USDI FWS. 2011. Revised Recovery Plan for the Northern Spotted Owl (*Strix occidentalis caurina*). USFWS Region 1, Portland, OR. 258 pp. http://www.fws.gov/wafwo/pdf/NSO%20Revised%20Recovery%20Plan%202011.pdf.