Appendix D
Salvage

Stand Exam Procedures

Initial units identified by Butte Falls Resource Area Inventory Specialist – Ed Park.
Areas where potential salvage existed were identified on post fire aerial photos. Stands of predominantly dead trees generally 5 acres and greater were identified and mapped for potential salvage. These areas typically were in the high and moderate fire severity areas. Crews took stand exams in these units.

Stand exam plots:

- 1 plot/5 acres on units >40 acres
- minimum 5 plots on units < 40 acres
- nested plots used to gather data
  - variable plot: > 8" trees, 20, 40 Basal Area Factor (BAF) used
  - fixed plot: 4"– 8" trees, 15.5' on 20 BAF plots, 11.0' on 40 BAF plots
  - CWD linear transect: 200' transect from plot center

Plot data collected

- tree type (Code numbers)
  - 11 – live trees
  - 12 – fire killed trees
  - 13 – 60% probability of mortality – (include definition of dying trees graph)
  - 14 – Hardwoods
  - 15 – Dead – pre-fire
  - 18 – No tree on plot
- Species
- DBH
- Tree height 1 plot/unit
- Live crown ratio (some trees)
- Plot crown closure
- Physiographic class
- Coarse Woody Debris (CWD) Class
- CWD length
- CWD intersect diameter
- CWD diameter @ small and large end

Data was entered into Atterbury Stand Exam Program. Statistical information reports from this program summarized information on overstory, understory, and coarse woody debris.

How other areas were sampled? (Low and very low/unburned)
Units were stratified based on the following criteria.

- Plant Series
  - ABCO
  - PSME
  - QUGA
- Seral Stage (pre-fire)
  - Early
  - Mid-
  - Late
- Aspect
  - North
  - South
- Burn Severity
  - High
  - Moderate
  - Low
  - Very low/Unburned
- Elevation
  - < 3500'
  - > 3500'

Within the low and very low/unburned severity areas, 17 stratifications were developed from these criteria. Within these stratifications, 10 percent of the acres were sampled with stand exams. Nested plots similar to original units were taken. In addition, a fixed plot for smaller trees and other vegetation (< 4" diameter) was gathered. Information from these stands was applied across all stands that fall within each stratification.

Definition of Dying Trees

Dying trees are defined as those trees that have a 60% or greater probablility of mortality due to the affects of fire. This probability is based upon a correlation of tree diameter (bark thickness) and the amount of crown scorch. The probablity of mortality of seven western conifers can be determined as a function of observed crown volume killed and bark thickness calculated from diameter at breast height (see Figure D-1).

Figure D-1. Probability of mortality of seven western conifers

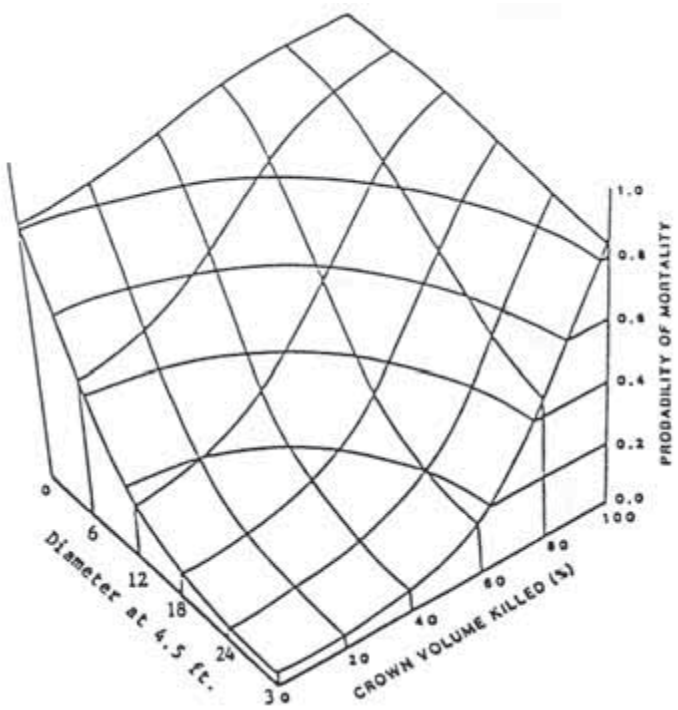

Table D-1. Comparison of Snag and CWD Levels by Alternative and Other Local References

	Alternative C	Alternative D	Alternative E	Alternative F	Alternative G	DecAID	Diane White Paper
	LSRA	DecAID 50/80	120 Linear ft. (16"x 16') +	Beschta	120 Linear ft. (16"x 16') +	30/50	
Salvaged							
Acres	247 acres	820 acres	1,930 acres	213 acres	679 acres		
Douglas-fir Plant Series							
Snags > 15"	Target 29 snags/acre. Snags provided in unsalvaged stands.						
Snags > 10"		Target 8 snags/acre. Snags provided in unsalvaged stands.					
Snags > 14"			Target 8 snags/acre.		Target 8 snags/acre. Snags provided in unsalvaged stands.		
Snags				2 acre patches within 3-10 acre salvage patches. Unmerchantable trees in harvest acres.		Target 5 snags/acre.	
Snags 10-19"							Douglas-fir Moist - PAG Decay class 1 and 2 4 snags/acre
Snags 20"+							Douglas-fir Moist - PAG Decay class 1 and 2 2 snags/acre

Table D-1. Comparison of Snag and CWD Levels by Alternative and Other Local References

	Alternative C	Alternative D	Alternative E	Alternative F	Alternative G	DecAID	Diane White Paper
	LSRA	DecAID 50/80	120 Linear ft. (16"x 16') +	Beschta		30/50	
CWD	CWD provided in unsalvaged stands and by existing CWD and unmerchantable trees within harvested units.	Target 3.6% ground cover. CWD provided in unsalvaged stands and by existing CWD and unmerchantable trees within harvest units.	120 linear ft+ nonmerchantable trees.	All existing and nonmerchantable trees.	Target 2.0% ground cover. CWD provided in unsalvaged stands and by existing CWD and unmerchantable trees within harvest units.	2.0 % ground cover	
CWD 10-19"							Decay class 1 and 2; 15 pieces/ acre; 5.8 tons/acre.
CWD 20"+							Decay class 1 and 2; 15 pieces/acre; 5.8 tons/acre.
White Fir Plant Series							
Snags >15"	Target 52 snags/acre. Snags provided in unsalvaged stands.						
Snags >10"		Target 17 snags/acre. Snags provided in unsalvaged stands.					
Snags >14"			Target 12 snags/acre		Target 12 snags/acre. Snags provided in unsalvaged stands.		
Snags				2 acre patches within 3-10 acre salvage patches. Unmerchantable trees in harvest acres.		Target 8 snags/ac	Douglas-fir-White Fir PAG Decay class 1 and 2 ; 17 snags/acre.

Table D-1. Comparison of Snag and CWD Levels by Alternative

	Alternative C	Alternative D	Alternative E	Alternative F	Alternative G	DecAID	Diane White Paper
	LSRA	DecAID 50/80	120 Linear ft. (16"x 16') +	Beschta		30/50	
CWD		Target 6.7% ground cover. CWD provided in unsalvaged stands and by existing CWD and unmerchantable trees within harvest units.	120 linear ft+ nonmerchantable.		Target 3.6% ground cover. CWD provided in unsalvaged stands and by existing CWD and unmerchantable trees within harvest units.	3.6 % ground cover	
CWD 20"+							Decay class 1 and 2; 8 pieces/acre; 1.8 tons/acre.
Research Units							
Acres					288 acres		
Snags> 20"					Target 6 snags/ac		
CWD					CWD provided in unsalvaged stands and by existing CWD and unmerchantable trees within harvest units.		
Unsalvaged Stand-Replacement							
Acres	2339 acres	1,766	656	2,373	1,625		
Douglas-fir Plant Series							
Snags > 15"	42 snags/acre						
Snags > 14"			27 snags/acre				
Snags > 10"	60 snags/acre			63 snags/acre	52 snags/ac		

Table D-1. Comparison of Snag and CWD Levels by Alternative

	Alternative C	Alternative D	Alternative E	Alternative F	Alternative G	DecAID	Diane White Paper
	LSRA	DecAID 50/80	120 Linear ft. (16"x 16') +	Beschta		30/50	
CWD	All existing and potential.	Average leave tree 13" dia. 53' ht. = 0.099% cover/tree. 6.6% groundcover.	Existing CWD.	All existing and nonmerchantable trees.	Average leave tree 13" dia. 53' ht. = 0.099% cover/tree. 5.1% groundcover.		
White Fir Plant Series							
Snags >15"	53 snags/acre						
Snags >10"		72 snags/acre		63 snags/acre	56 snags/ac		
Snags >14"			27 snags/acre.				
CWD	All existing and potential.	Average leave tree 16" dia. 59' ht. = 0.129% cover /tree. 9.1% ground cover.			Average leave tree 16" dia. 59' ht. = 0.129% cover /tree. 7.2% ground cover.		
Unsalvaged >40% canopy stands							
Acres	6,445	6,445	5,106	6,445	6,445		
Snags > 15"	3 snags/acre	6 snags/acre	1.5 snags/ac				
Snags > 10"				3 snags/acre	3 snags/acre		
CWD	All existing and potential.	All existing and potential.	Existing 128 linear ft./ac. and potential	All existing and potential.	All existing and potential.		
Salvage Areas > 40% canopy stands							
Acres			1,339 acres.				
Snags > 14"			4 snags/acre.				
CWD			120 linear ft/acre.				

Table D-2. Alternative C Snag and CWD Levels per Unit

A	B	C	D	E	F	G	H	I	J	K	L	M
AUNIT	Acres	Salvage Potential	Typical 15" - 18"	Existing 15"- 18"	Typical 19" - 22"	Existing 19" - 22"	Typical 23" +	Existing 23" +	(D+F+H) Total Typical	(E+G+I) Total Existing	(((K-J)/J)*100) % Existing Snag Level	(B*10 - 20%) Salvageable Acres
321e29u5	88	yes	7	10	6	8	16	28	29	46	59	18
321e7u4	86	yes	7	18	6	11	16	15	29	44	52	17
321e29u6	82	yes	7	8	6	11	16	20	29	39	34	16
321e29u7	76	yes	7	15	6	14	16	24	29	53	83	15
321e11u4	58	yes	7	15	6	4	16	17	29	36	24	12
321e3u3	43	yes	7	21	6	16	16	26	29	63	117	9
321e5u1	70	yes	13	28	11	5	28	25	52	58	12	8
321w13u1	42	yes	7	10	6	8	16	25	29	43	48	8
321w1u2	83	yes	13	13	11	11	28	30	52	54	4	8
321w1u6	69	yes	13	22	11	7	28	29	52	58	12	8
331e7u2	35	yes	7	19	6	11	16	16	29	46	59	7
321w1u11	38	yes	13	45	11	10	28	37	52	92	77	6
331e7u7	39	yes	7	17	6	7	16	9	29	33	14	5
331e8u1	27	yes	7	12	6	9	16	19	29	40	38	5
321e15u6	27	yes	7	8	6	13	16	21	29	42	45	5
321e29u8	26	yes	7	14	6	12	16	18	29	44	52	5
321e9u2	26	yes	7	13	6	3	16	20	29	36	24	5
321w25u4	26	yes	13	5	11	23	28	36	52	64	23	5
321e3u9	25	yes	7	22	6	11	16	10	29	43	48	5
321e17u5	24	yes	7	32	6	13	16	12	29	57	97	5
321e33u1	22	yes	7	20	6	13	16	10	29	43	48	4
321e17u7	21	yes	7	25	6	4	16	22	29	51	76	4
321e33u6LU	40	yes	7	15	6	7	16	9	29	31	7	4
321e17u1	19	yes	7	22	6	9	16	6	29	37	28	4
321e7u6	19	yes	13	50	11	24	28	13	52	87	67	4
321w24u2	38	yes	13	7	11	9	28	39	52	55	6	4
331w1u5	17	yes	7	4	6	19	16	32	29	55	90	3
321e19u5	16	yes	7	16	6	10	16	13	29	39	34	3
321w1u5	30	yes	13	12	11	5	28	35	52	52	0	3

Table D-2. Alternative C Snag and CWD Levels per Unit

A	B	C	D	E	F	G	H	I	J	K	L	M
AUNIT	Acres	Salvage Potential	Typical 15" - 18"	Existing 15"- 18"	Typical 19" - 22"	Existing 19" - 22"	Typical 23" +	Existing 23" +	(D+F+H) Total Typical	(E+G+I) Total Existing	(((K-J)/J)*100) % Existing Snag Level	(B*10 - 20%) Salvageable Acres
321e9u1	28	yes	7	10	6	8	16	11	29	29	0	3
331w1u6	14	yes	0	0	0	0	16	47	16	47	194	3
321w12u1	13	yes	13	36	11	6	28	21	52	63	21	3
331e5u1	13	yes	7	17	6	20	16	14	29	51	76	3
321e30u2	13	yes	13	51	11	27	28	23	52	101	94	3
321e3u5	14	yes	7	11	6	5	16	18	29	34	17	2
321e19u6	21	yes	13	12	0	0	28	30	41	42	2	2
331w1u4	11	yes	7	53	6	22	16	29	29	104	259	2
321e8u1	11	yes	13	38	11	12	28	15	52	65	25	2
321e5u5	10	yes	13	38	11	12	28	15	52	65	25	2
331w1u3	10	yes	7	11	6	11	16	30	29	52	79	2
331e7u4	10	yes	7	36	6	9	16	7	29	52	79	2
321e4u1	10	yes	7	16	6	9	16	14	29	39	34	2
321w11u3	18	yes	13	14	11	10	28	29	52	53	2	2
321e17u3	17	yes	7	13	6	7	16	10	29	30	3	2
321e9u3	15	yes	7	10	6	8	16	11	29	29	0	1
321e17u4	13	yes	7	13	6	7	16	10	29	30	3	1
321e29u3	13	yes	7	9	6	6	16	16	29	31	7	1
321e5u2	12	yes	13	22	11	9	28	22	52	53	2	1
321e33u4	11	yes	7	10	6	10	16	11	29	31	7	1
321w1u1	11	yes	13	14	0	0	28	28	41	42	2	1
321e7u10	10	yes	0	0	11	17	28	24	39	41	5	1
321e10u1	46	yes	13	16	11	10	28	24	52	50	-4	0
321e15u1	26	yes	13	19	11	8	28	18	52	45	-13	0
321e15u3	19	yes	13	19	11	9	28	2	52	30	-42	0
321e15u5	12	yes	13	6	11	7	28	28	52	41	-21	0
321e19u1	15	yes	13	15	11	13	28	6	52	34	-35	0
321e19u3	15	yes	13	48	11	12	28	15	52	75	44	0
321e19u4	34	yes	13	17	11	8	28	19	52	44	-15	0

Table D-2. Alternative C Snag and CWD Levels per Unit

A	B	C	D	E	F	G	H	I	J	K	L	M
AUNIT	Acres	Salvage Potential	Typical 15" - 18"	Existing 15"- 18"	Typical 19" - 22"	Existing 19" - 22"	Typical 23" +	Existing 23" +	(D+F+H) Total Typical	(E+G+I) Total Existing	(((K-J)/J)*100) % Existing Snag Level	(B*10 - 20%) Salvageable Acres
321e21u1	18	yes	13	6	11	2	28	23	41	31	-24	0
321e21u2	44	yes	7	12	6	5	16	8	29	25	-14	0
321e29u4	24	yes	13	17	11	5	28	18	52	40	-23	0
321e33u2	30	yes	7	10	6	2	16	8	29	20	-31	0
321e4u2	20	yes	7	9	6	5	16	7	29	21	-28	0
321e5u3	11	yes	13	18	11	10	28	23	52	51	-2	0
321e5u6LU	21	yes	13	18	11	10	28	23	52	51	-2	0
321w11u2	23	yes	13	18	11	4	28	18	52	40	-23	0
321w13u3	21	yes	13	10	11	7	28	5	52	22	-58	0
321w13u4	14	yes	13	2	11	2	28	24	52	28	-46	0
321w25u1	18	yes	13	10	11	4	28	29	52	43	-17	0
321w25u3	14	yes	13	0	11	6	28	25	52	31	-40	0
321w25u6	9	yes	13	30	11	4	28	32	52	66	27	0
331w1u2	20	yes	7	11	6	11	16	30	29	52	79	0
Total	**1,966**											**247**

Alternative D

Determination on the number of acres available for salvage in Alternative D using the DecAID Wood Advisor. Snag and CWD levels were determined based on a landscape approach. The following summarizes the calculations used in determining the levels of snags and CWD needed and the number of acres available for salvage within this alternative.

Determination of salvage acres within White Fir Plant Series

80% DecAID Tolerance Level
Total number of stand-replacement acres within White Fir Plant Series = 1138 acres
Acres available for salvage within 10-acre stand-replacement units = 872 acres
DecAID Target wildlife snags (10" DBH and greater) = 12 tpa
DecAID Target percent ground cover = 6.2%
Existing average snag size = 16.5" DBH and 60'
Percent ground cover of the average snag = 0.129% cover
Average existing percent ground cover = 1.55% cover
Average needed to meet Target ground cover = (Target - Existing) = 6.2% - 1.55% = 4.65%
Additional snags needed/acre to meet Target = average needed/existing average snag % ground cover = 4.65/0.129 = 36 tpa
Total Trees within available salvage acres in White Fir Plant Series >10" = 76,417 snags
Average tpa = 67 tpa

Wildlife snags - 12 snag/acre x 1138 acres =	13,656 snags
Additional snags to meet ground cover – 36 snags/acre x 1138 acres =	40,968 snags
Total snags needed to meet DecAID 80% Tolerance Level =	54,624 snags
Total trees within unavailable salvage acres (<10 acre units) >10" =	17,822 snags
Additional snags needed within salvage acres to meet Target =	36,802 snags
Number of acres needed to meet Target = 36,802/67 tpa =	549 acre
Number of acres available for harvest (872 -549) =	323 acres

Determination of salvage acres within Douglas-fir Plant Series

50% DecAID tolerance Level
Total Acres of stand replacement acres within DF Plant Series = 1448 acres
Acres available for salvage within 10 acre stand replacement units = 1112 acres
DecAID Target Wildlife Snags (10" DBH and greater) = 8 tpa
DecAID Target % ground cover = 3.6%
Existing average snag size = 13.5" DBH and 53'
% ground cover of the average snag = 0.099% cover
Average existing % ground cover = 0.69 % cover
Average needed to meet Target ground cover = (Target - Existing) = 3.6% - 0.69% = 2.91%
Additional snags needed/acre to meet Target = avg. needed/existing avg. snag % ground cover = 2.91/0.099 = 29 tpa
Total Trees w/in available salvage acres in WF Plant Series > 10" = 82,786 snags
Average tpa = 57 tpa

Wildlife snags - 8 snag/acre x 1448 acres =	11,584 snags
Additional snags to meet ground cover = 29 snags/acre x 1448 acres =	41,992 snags
Total snags needed to meet DecAID 50% Tolerance Level =	53,576 snags
Total trees within unavailable salvage acres (<10 acre units) >10" =	19,152 snags
Additional snags needed within salvage acres to meet target =	34,424 snags
Number of acres needed to meet target = 34,424/57 tpa =	604 acre
Number of acres available for harvest (1112 - 604) =	508 acres
Total Salvage Acres WF and DF plant series (508 + 323) =	831
(Minus USACE acres) (831 – 9) =	822

Table D-3. Alternative D Snag and CWD Levels by Unit

AUNIT	Plant Series	Acres	Total DecAid* Snags	Total Existing Snags	Existing % Cover** (cu. ft.)	DecAid Target % Cover***	Needed % Cover	Number of Trees Needed/Acre	Total Trees Needed	Number of Salvage Trees/Acre	Acres Available
331e7u1	PSME	28	8	10	0.13	3.60	3.47	61	69	-59	0
321e7u4	PSME	86	8	37	0.04	3.60	3.56	58	66	-29	0
321w14u2	ABCO	10	17	9	2.01	6.70	4.69	47	64	-55	0
321e4u2	ABCO	20	17	26	0.64	6.70	6.06	83	100	-74	0
321e5u6LU	ABCO	21	17	49	0.73	6.70	5.97	98	115	-66	0
321w13u3	ABCO	21	17	47	0.51	6.70	6.19	85	102	-55	0
321e3u4	PSME	21	8	25	0.24	3.60	3.36	46	54	-29	0
321e17u3	PSME	17	8	25	0.38	3.60	3.22	41	49	-24	0
321w23u1	ABCO	18	17	37	1.32	6.70	5.38	53	70	-33	0
321e15u3	ABCO	19	17	77	0.62	6.70	6.08	113	130	-53	0
321e17u4	PSME	13	8	25	0.38	3.60	3.22	41	49	-24	0
321w25u1	ABCO	18	17	37	0.86	6.70	5.84	39	56	-19	0
321e9u1	PSME	28	8	48	0.21	3.60	3.39	56	64	-16	0
321e19u6	ABCO	21	17	53	1.05	6.70	5.65	58	75	-22	20
321e8u1	ABCO	11	17	73	0.42	6.70	6.28	103	120	-47	0
321e5u5	ABCO	10	17	73	0.42	6.70	6.28	103	120	-47	0
321e4u1	ABCO	10	17	46	1.05	6.70	5.65	57	74	-28	0
321e19u7	ABCO	18	17	78	0.29	6.70	6.41	82	99	-21	0
321e9u3LU	PSME	14	8	48	0.21	3.60	3.39	56	64	-16	0
321e5u2	ABCO	12	17	66	1.10	6.70	5.60	72	89	-23	0
321e19u4	ABCO	34	17	62	0.62	6.70	6.08	51	68	-6	0
321e21u1	PSME	19	8	30	0.99	3.60	2.61	26	34	-4	0
321e7u10	ABCO	10	17	40	0.18	6.70	6.52	28	45	-5	0
321e29u4	ABCO	24	17	90	0.62	6.70	6.08	78	95	-5	0
321e15u5	ABCO	12	17	46	0.11	6.70	6.59	32	49	-3	0
321e3u5	PSME	14	8	35	0.87	3.60	2.73	28	36	-1	0
321e7u6	ABCO	22	17	107	0.33	6.70	6.37	82	99	8	3
321e29u2	ABCO	26	17	73	0.59	6.70	6.11	51	68	5	2

Table D-3. Alternative D Snag and CWD Levels by Unit

AUNIT	Plant Series	Acres	Total DecAid* Snags	Total Existing Snags	Existing % Cover** (cu. ft.)	DecAid Target % Cover***	Needed % Cover	Number of Trees Needed/Acre	Total Trees Needed	Number of Salvage Trees/Acre	Acres Available
321e5u7	PSME	11	8	73	0.42	3.60	3.18	52	60	13	2
321e17u1	ABCO	19	17	95	0.34	6.70	6.36	65	82	13	10
321e9u3	PSME	15	8	73	0.42	3.60	3.18	52	60	13	3
321e5u3	ABCO	11	17	56	3.65	6.70	3.05	24	41	15	7
321e9u2	PSME	26	8	52	1.29	3.60	2.31	38	46	6	13
321w13u4	ABCO	14	17	49	2.78	6.70	3.92	21	38	11	8
321w12u1	ABCO	13	17	45	2.23	6.70	4.47	17	34	11	10
321e29u3	PSME	13	8	56	0.32	3.60	3.28	33	41	15	23
331e7u6	QUGA	18	6	31	0.56	2.00	1.44	19	25	6	13
321e8u3	PSME	10	8	48	0.38	3.60	3.22	22	30	18	8
331w1u3	PSME	10	8	67	1.61	3.60	1.99	25	33	34	4
331e7u2	PSME	35	8	64	0.25	3.60	3.35	46	54	10	18
331e7u7	PSME	42	8	76	0.13	3.60	3.47	57	65	11	29
321w1u1	ABCO	11	17	53	4.85	6.70	1.85	6	23	30	6
331e8u1	PSME	27	8	58	0.75	3.60	2.85	37	45	13	12
321e19u5	PSME	16	8	78	0.74	3.60	2.86	37	45	33	10
321e33u4	QUGA	11	6	51	0.49	2.00	1.51	13	19	32	6
321e17u5	ABCO	24	17	98	0.51	6.70	6.19	52	69	29	14
321e19u3	ABCO	15	17	111	0.84	6.70	5.86	40	57	54	7
331e7u4	PSME	14	8	112	0.10	3.60	3.50	45	53	59	10
331w1u6	PSME	14	8	48	0.92	3.60	2.68	13	21	27	8
321w1u10LU	ABCO	18	17	70	2.18	6.70	4.52	22	39	31	7
321e15u6	PSME	27	8	42	0.40	3.60	3.20	22	30	12	14
331e5u1	PSME	13	8	83	0.63	3.60	2.97	20	28	55	10
321w25u3	ABCO	14	17	63	5.07	6.70	1.63	5	22	41	10
331w1u4	PSME	11	8	192	1.02	3.60	2.58	17	25	167	5
321w13u1	ABCO	42	17	70	1.21	6.70	5.49	37	54	16	18
321w25u4	ABCO	26	17	79	2.00	6.70	4.70	32	49	30	20

Table D-3. Alternative D Snag and CWD Levels by Unit

AUNIT	Plant Series	Acres	Total DecAid* Snags	Total Existing Snags	Existing % Cover** (cu. ft.)	DecAid Target % Cover***	Needed % Cover	Number of Trees Needed/Acre	Total Trees Needed	Number of Salvage Trees/Acre	Acres Available
331w1u2	PSME	20	8	67	1.61	3.60	1.99	25	33	34	0
331w1u5	PSME	17	8	53	1.96	3.60	1.64	14	22	31	7
321e3u9	PSME	24	8	58	1.64	3.60	1.96	25	33	25	8
321e33u1	QUGA	22	6	63	0.41	2.00	1.59	26	32	31	13
321w11u2	ABCO	23	17	72	4.13	6.70	2.57	20	37	35	15
321e15u1	PSME	26	8	88	0.47	3.60	3.13	40	48	40	15
321e29u8	PSME	26	8	62	1.23	3.60	2.37	23	31	31	14
321e30u2	ABCO	20	17	164	0.64	6.70	6.06	41	58	106	15
321w1u5	ABCO	30	17	57	1.76	6.70	4.94	13	30	27	20
321w11u3	ABCO	18	17	69	7.66	6.70	-0.96	-3	14	55	13
321e17u7	PSME	21	8	67	1.19	3.60	2.41	13	21	46	10
321w24u2	ABCO	33	17	57	1.14	6.70	5.56	15	32	25	15
321e21u2	PSME	44	8	99	0.15	3.60	3.45	57	65	34	17
321w1u2	ABCO	61	17	64	0.97	6.70	5.73	31	48	16	24
321e11u4&10u1**		80	12	59	0.74	5	4.26	35	47	12	40
321e33u2	PSME	30	8	80	0.38	3.60	3.22	27	35	45	21
321w1u11LU	ABCO	35	17	130	0.61	6.70	6.09	41	58	72	19
321e5u1	ABCO	70	17	91	1.01	6.70	5.69	47	64	27	27
321e33u6LU	PSME	40	8	80	0.38	3.60	3.22	27	35	45	15
321w1u6	ABCO	38	17	70	3.40	6.70	3.30	9	26	44	17
321e3u3	PSME	43	8	58	0.77	3.60	2.83	14	22	36	16
321e29u6	PSME	82	8	52	1.34	3.60	2.26	18	26	26	48
321e29u5	PSME	88	8	62	1.19	3.60	2.41	19	27	35	52
321e29u7	PSME	76	8	79	0.96	3.60	2.64	14	22	57	49
Total		**2036**									**820**

* DecAID Snag Density: Southwest Oregon Mixed Conifer-Hardwood Forest, Larger Trees
**DecAID % Cover: Table 1 Conifer-Harwood Forest SMall/Medium and Larger Trees
***DeAID Target % Cover: Southwest Oregon Mixed Conifer-Hardwood Forest, Larger Trees

What Is the DecAID Advisor?

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DecAID -- Work in Progress on a Decayed Wood Advisor for Washington and Oregon
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Introduction

Decayed wood elements -- snags, down wood, and live decaying trees -- are habitat for many organisms that live in terrestrial ecosystems, and contribute to other aspects of ecosystem productivity and diversity. Maintaining an adequate level and mixture of these habitat elements can be a challenging task for any forest land manager. An advisory system called “DecAID” is being developed from a new synthesis of data and research results pertaining to forests in Oregon and Washington. The DecAID Advisor is a planning tool intended to help advise and guide managers as they conserve and manage snags, partially dead trees, and down wood for biodiversity.

DecAID is an advisory tool to help managers evaluate effects, of forest conditions and existing or proposed management activities on organisms that use snags and down wood. DecAID also can help managers decide on snag and down wood sizes and levels needed to help meet wildlife management objectives. It can help managers articulate those objectives in specific, quantitative terms that could be tested in the field. In this way, the name “DecAID” can be read as decayed wood advisor and management aid (“decay-aid” or “decision-aid”). The DecAID Advisor can help long-term planning, as over “decades” of time.

Background

Wildlife species models and advisory tools related to managing decayed wood elements (principally, snags and down wood) on federal lands in the Pacific Northwest were first developed in the 1970s and 1980s (Thomas and others 1979, Neitro and others 1985, Marcot 1992, Raphael 1983), including some snag dynamics models (e.g., Morrison and Raphael 1993, Marcot 1992). Although these tools were based on sound empirical information and expert knowledge available at the time, the data and model structures have become outdated. A considerable amount of new information about the ecology, dynamics, and management of decayed wood has become available since the 1980s. There has been an evolution in thinking of snags and down wood just as habitat structures for terrestrial vertebrates, to thinking of decaying wood in the broadest sense as an integral part of complex ecosystems and ecological processes.

Several key themes prevalent in recent literature include:

- decayed wood elements consist of more than just snags and down wood, such as live trees with dead tops or stem decay
- decayed wood provides habitat and resources for a wider array of organisms and their ecological functions than previously thought
- “wood decay” is an ecological process important to far more organisms than just terrestrial vertebrates (“wildlife” in the traditional sense). Also, more recent field studies, particularly in eastern Oregon (e.g., Bull and others 1997),

suggest that the amounts and sizes of snags selected by wildlife are far greater than those depicted by existing models.

Because of the extensive amount of new information and ideas published over the past twenty years, it was apparent that the empirical foundation of existing models needed to be updated and revised (e.g., see synthesis in Rose and others 2001). The DecAID Advisor is being developed to fill this need.

What is DecAID?

The DecAID Advisor arose from the recognition by Pacific Northwest Region, USDA Forest Service, of the growing need to update guidelines for managing snags and down wood. It was described in the wildlife Species Habitat Project of Washington and Oregon (Rose and others 2001, Johnson and O'Neil 2001). DecAID developed into a major data synthesis project under USDA Forest Service, Pacific Northwest Region, and Pacific Northwest Research Station, Portland, Oregon, with contributions of expertise from USDI Fish and Wildlife Service, and other agencies and institutions.

Modeling biological potential of wildlife species (particularly only of primary cavity excavator birds) has been used in the past, and we developed the DecAID Advisor to avoid some pitfalls associated with that approach. There is no direct relationship between the statistical summaries presented in DecAID and past calculations or models of biological potential. Field studies have suggested that predictions of biological potential (relative or absolute population sizes of snag-associated wildlife species) do not match research findings.

DecAID is organized around "vegetation conditions" that combine wildlife habitat type, vegetation alliance, structural condition (average tree size and canopy closure), and geographic location (subregion). Wildlife habitat types and structural conditions as used in DecAID were derived from the wildlife habitats and structural conditions defined in the Species Habitat Project (Chappell and others 2001).

DecAID provides interpretation and advice on the roles of insects and pathogens in the creation and dynamics of dead wood, and the implications of snag and down wood management on ecosystem health, and offers mitigation considerations. It includes information and advice on relationships between forest insects and pathogens and snag and down wood management, and summarizes the occurrences of specific pathogens within various vegetation conditions.

DecAID also provides a summary of forest inventory data representing the range of "natural" (unharvested) and current conditions of snags and down wood in forests of all ownerships and disturbance histories. The DecAID Advisor presents information from research studies and inventories about range of natural conditions where available, and can be used to help identify knowledge gaps and areas of needed research. DecAID describes fungi associated with decayed wood in Oregon and Washington, including a summary of their ecological roles, the importance of dead wood to fungi, and considerations for maintenance of fungal biodiversity. At present, DecAID does not specifically address effects of fire.

Because forest management has evolved to address forests as ecological communities and dynamic ecosystems, DecAID addresses far more than just wildlife (terrestrial vertebrate) use of snags and down wood. Ecosystem management acknowledges how organisms link to their environments and how human activities influence more than just individual species. In this spirit, DecAID provides information on the array of key ecological functions and functional groups of wildlife that use snags and down wood, and can be used to describe the impact of changing snag and down wood levels on those functions and functional groups.

On What is DecAID Based?

DecAID is a summary, synthesis, and integration of published scientific literature, research data, wildlife databases, forest inventory databases, and expert judgment and experience. The information presented on wildlife species use of snags and down wood is based entirely on scientific field research and does not rely on modeling the biological potential of wildlife populations.

The information presented on ranges of snag and down wood amounts under natural and current conditions is based on forest inventories, research studies, and other sources. Forest inventories include: the Current Vegetation Survey (CVS), conducted by USDA Forest Service, Pacific Northwest Region, on National Forest lands; the Forest Inventory and Analysis (FIA), conducted by USDA Forest Service, Pacific Northwest Research Station, on nonfederal lands; and the Natural Resource Inventory (NRI), conducted by USDI Bureau of Land Management (BLM) on BLM lands in western Oregon. Inventory plot data are unavailable for reserved areas outside BLM lands and National Forests, such as on National and State Parks.

The information on insects and pathogens is based on empirical studies, CVS, NRI, and FIA inventory data, and expert understanding of potential effects.

For the current version of the DecAID Advisor, December 2000 was the cutoff date for incorporating papers and data sources, with a few additional sources added after that date if the data were readily available and served to fill critical data gaps. To select the studies to include in DecAID, we relied primarily on published literature and theses that had empirical data on wildlife use of size and amount of dead wood. Data used in the wildlife cumulative species curves were those on mean, variance, and sample size. For use in the down wood cumulative curves, the data needed to be reported in units that we could convert to percent cover, such as down wood volume. Data on down wood reported as pieces of down wood per unit area were not able to be converted to percent cover of down wood.

Studies since December 2000 that we selected to also include were those for which we had already used in the form of theses or progress reports, and that had been subsequently formally published in peer-reviewed literature as of August 2002 (the date of our formal peer review of the DecAID Advisor). We did not solicit unpublished data to include, but we accepted it when it was volunteered through the peer review process.

Components of DecAID

DecAID contains an extensive amount of information. However, it is not all-encompassing and it is important to clarify what it can and can not do.

DecAID is:

- a thorough review of published literature and other available data on wildlife use of decayed wood elements, primarily in Oregon and Washington
- a statistical synthesis of data showing levels of use by individual wildlife species of decayed wood elements
- a summary of the patterns of use of decayed wood elements by wildlife speciesin Oregon and Washington (number of species using specific snag or down wood sizes or amounts
- statistical summaries of forest inventory data on snags and down wood in unharvested forests and entire landscapes across Oregon and Washington
- a helpful tool for making informed decisions

DecAID is NOT:

- a forest stand growth simulator
- a snag and down wood decay simulator or recruitment model
- a wildlife population simulator or analysis of wildlife population viability
- a substitute for making professional decisions based on experience

Also, DecAID does not address decayed wood elements in aquatic or riparian environments, although we recognize the high value of such elements in providing habitat for associated fish, wildlife, invertebrate, and other species.

Who Could Use DecAID?

DecAID is being developed with the intent for use across all land ownerships in Washington and Oregon. The DecAID Advisor will be useful to a wide array of private, commercial, city, county, state, and federal land managers, as well as planners, policymakers, and researchers. Our DecAID science team (see authors) consists of wildlife biologists, research ecologists, forest inventory specialists, forest entomologists, and mycologists. The team also consulted with professionals from diverse specialties including wildlife research, fire ecology, timber management, plant pathology, silviculture, and land use planning.

We intend DecAID to be used broadly by land planners, timber consultants, and forest managers. We hope the DecAID Advisor serves as a template for use in other geographic areas, given similar literature reviews, research data, and summaries of expert judgments.

How Can DecAID Be Used?

DecAID presents information on wildlife use of snag diameter, snag density, down wood diameter, and down wood percent cover, and on the range of natural (unharvested) and current (all) conditions of snag density and down wood percent cover by diameter classes. The information is presented at three statistical tolerance levels which may be interpreted as three levels of "assurance:" low (30% tolerance level), moderate (50% tolerance level), and high (80% tolerance level). Minimum and maximum values are also presented. Additional available data on dead wood species, decay condition, etc. are summarized but not analyzed statistically.

DecAID allows the user to specify a vegetation condition, and to:

- view a synthesis of empirical data on wildlife use of wood decay elements in Washington and Oregon;
- determine which selected wildlife species would be associated with specific sizes or amounts of snags or down wood at various statistical levels;
- determine the sizes or amounts of snags or down wood to meet specified wildlife species objectives;
- view a narrative interpretation of these data along with the literature sources;
- view summaries of the range of snag and down wood levels in unharvested forest, representing ranges of natural conditions, and across all current forest conditions;
- determine effects of present or expected stand conditions on wildlife using
- wood decay elements;
- determine implications of insect and pathogen activity on the creation and management of snags and down wood for wildlife habitat;
- view advice on the roles of insects and pathogens in creation and dynamics of snags and down wood; and
- determine implications of snag and down wood levels on managing for overall forest ecosystem health.

Paying Attention to Scales of Space and Time

A critical consideration in use of DecAID is that of scales of space and time. DecAID will be best applied at scales of subwatersheds, watersheds, subbasins, physiographic provinces, or large administrative units such as Ranger Districts, National Forests, or BLM Districts.

DecAID is not intended to predict occurrence of wildlife species at the scale of individual forest stands or specific locations – there are far too many other factors influencing the presence or absence of organisms at that scale than could be reasonably depicted here. DecAID is not intended to predict the specific species composition in a given geographic area. Instead, it is intended to be used to help advise on broad, cumulative patterns of species occurrence and distributions in generally-described habitat types and structural conditions. Validation of other wildlife-habitat relationships databases (for example, Dedon and others 1986, Fielding and Haworth 1995, Raphael and Marcot 1986) suggests that any information of this type would likely err on the side of commission, that is, including species that may not really occur on any one site, particularly with smaller geographic areas such as an individual forest stand. DecAID is intended to be a broader planning aid than a species- or stand-specific prediction tool.

Because DecAID is not a time-dynamic simulator (such as Marcot 1992 for snags; Mellen and Ager 2002 for snags and down wood; and Bragg 2000, for down wood in riparian systems), it does not account for potential temporal changes in vegetation and other environmental conditions, species functional and numerical responses, population dynamics and demographics, fire likelihoods, and ecosystem health. DecAID could be consulted to review potential conditions at specific time intervals and for a specific set of conditions, but dynamic changes in forest and landscape conditions would have to be modeled or evaluated outside the confines of the DecAID Advisor.

Regarding the use of inventory data to represent ranges of natural and current conditions, the dead wood estimates must be interpreted in light of the inherent scale imposed by the inventory designs. Each observation that entered our summaries was an individual field plot. Each plot encompassed about a one- or two-hectare area, within which snags were sampled on fixed- or variable-radius subplots and down wood was sampled on line transects. Plot area, subplot sizes, and transect lengths varied somewhat within and among the data sets. Within-plot variability is not represented in this study. Also, because the plots sampled an area that is smaller than a typical forest stand, the plot-level observations should not be thought of as representing

stand-level conditions. Rather, our summaries describe the aggregate properties of the variability of dead wood on multiple plots that sample a given wildlife habitat. We believe it is reasonable to apply distributional information about dead wood that is based on many inventory plots in a given vegetation condition to a management "unit" at the scale of a landscape or sub-watershed.

Also, the distribution and estimated variation of dead wood within each wildlife habitat is the result of the interaction between plot size and the spatial pattern of dead wood. Smaller plot sizes would result in greater variability, since smaller plots are more likely to sample dense clumps of dead wood or fall in gaps where no dead wood exists.

Although the estimates of amounts of dead wood are from plots measured at a single point in time, the current conditions express events that have occurred over the past decades to centuries.

Availability, Progress, and Related References

As of this writing, the DecAID project is an ongoing, dynamic process. The DecAID Advisor will be available as a Web site operating as an interactive program. Current plans include training sessions to help users understand how to run the program and use and interpret results.

We have presented work to date in other publications. An overview of DecAID was provided in Mellen and others (2002). The wildlife component of DecAID was described in Marcot and others (2002) and the ecological functions of wildlife pertaining to decayed wood were presented by Marcot (2002) and Marcot and Vander Heyden (2001). The forest inventory summaries were described in Ohmann and Waddell (2002). The ecosystem productivity implications of decayed wood were presented in Rose and others (2001).

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Printed from DecAID web site: http://www.fs.fed.us/wildecology/decaid/decaid_background/decaid_whatis.htm

Table D-4. Alternative E Snag and CWD Levels by Unit

AUNIT	Burn Severity	Acres	Snags	CWD Level
321e15u10g	low/very low burn	2	4/acre	120 Linear ft.
321e15u11g	low/very low burn	41	4/acre	120 Linear ft.
321e15u9g	low/very low burn	2	4/acre	120 Linear ft.
321e17u13g	low/very low burn	2	4/acre	120 Linear ft.
321e19u11g	low/very low burn	29	4/acre	120 Linear ft.
321e19u12g	low/very low burn	9	4/acre	120 Linear ft.
321e19u13g	low/very low burn	9	4/acre	120 Linear ft.
321e19u14g	low/very low burn	49	4/acre	120 Linear ft.
321e19u15g	low/very low burn	5	4/acre	120 Linear ft.
321e19u16g	low/very low burn	3	4/acre	120 Linear ft.
321e19u17g	low/very low burn	2	4/acre	120 Linear ft.
321e21u4g	low/very low burn	5	4/acre	120 Linear ft.
321e29u11g	low/very low burn	8	4/acre	120 Linear ft.
321e29u12g	low/very low burn	5	4/acre	120 Linear ft.
321e31u4g	low/very low burn	2	4/acre	120 Linear ft.
321e31u5g	low/very low burn	3	4/acre	120 Linear ft.
321e3u10g	low/very low burn	10	4/acre	120 Linear ft.
321e3u6g	low/very low burn	2	4/acre	120 Linear ft.
321e3u7g	low/very low burn	6	4/acre	120 Linear ft.
321e3u9g	low/very low burn	2	4/acre	120 Linear ft.
321e4u6g	low/very low burn	2	4/acre	120 Linear ft.
321e4u7g	low/very low burn	32	4/acre	120 Linear ft.
321e5u16g	low/very low burn	69	4/acre	120 Linear ft.
321e5u17g	low/very low burn	2	4/acre	120 Linear ft.
321e5u18g	low/very low burn	2	4/acre	120 Linear ft.
321e5u19g	low/very low burn	36	4/acre	120 Linear ft.
321e5u20g	low/very low burn	3	4/acre	120 Linear ft.
321e5u21g	low/very low burn	11	4/acre	120 Linear ft.
321e5u22g	low/very low burn	2	4/acre	120 Linear ft.
321e5u23g	low/very low burn	6	4/acre	120 Linear ft.
321e5u24g	low/very low burn	4	4/acre	120 Linear ft.
321e7u18g	low/very low burn	5	4/acre	120 Linear ft.
321e7u19g	low/very low burn	47	4/acre	120 Linear ft.
321e7u20g	low/very low burn	13	4/acre	120 Linear ft.
321e7u21g	low/very low burn	33	4/acre	120 Linear ft.
321e7u22g	low/very low burn	11	4/acre	120 Linear ft.
321e7u23g	low/very low burn	2	4/acre	120 Linear ft.
321e7u24g	low/very low burn	2	4/acre	120 Linear ft.
321e7u25g	low/very low burn	4	4/acre	120 Linear ft.
321e7u26g	low/very low burn	8	4/acre	120 Linear ft.
321e8u10g	low/very low burn	3	4/acre	120 Linear ft.
321e8u11g	low/very low burn	6	4/acre	120 Linear ft.
321e8u12g	low/very low burn	5	4/acre	120 Linear ft.
321e8u13g	low/very low burn	4	4/acre	120 Linear ft.
321e8u8g	low/very low burn	7	4/acre	120 Linear ft.

Table D-4. Alternative E Snag and CWD Levels by Unit

AUNIT	Burn Severity	Acres	Snags	CWD Level
321e8u9g	low/very low burn	50	4/acre	120 Linear ft.
321e9u7g	low/very low burn	7	4/acre	120 Linear ft.
321w11u10g	low/very low burn	14	4/acre	120 Linear ft.
321w11u11g	low/very low burn	2	4/acre	120 Linear ft.
321w11u12g	low/very low burn	4	4/acre	120 Linear ft.
321w11u6g	low/very low burn	6	4/acre	120 Linear ft.
321w11u7g	low/very low burn	10	4/acre	120 Linear ft.
321w11u8g	low/very low burn	2	4/acre	120 Linear ft.
321w11u9g	low/very low burn	15	4/acre	120 Linear ft.
321w12u4g	low/very low burn	4	4/acre	120 Linear ft.
321w12u5g	low/very low burn	26	4/acre	120 Linear ft.
321w12u6g	low/very low burn	16	4/acre	120 Linear ft.
321w12u7g	low/very low burn	74	4/acre	120 Linear ft.
321w12u8g	low/very low burn	10	4/acre	120 Linear ft.
321w13u10g	low/very low burn	7	4/acre	120 Linear ft.
321w13u11g	low/very low burn	2	4/acre	120 Linear ft.
321w13u12g	low/very low burn	19	4/acre	120 Linear ft.
321w13u13g	low/very low burn	10	4/acre	120 Linear ft.
321w13u14g	low/very low burn	6	4/acre	120 Linear ft.
321w13u15g	low/very low burn	2	4/acre	120 Linear ft.
321w13u16g	low/very low burn	2	4/acre	120 Linear ft.
321w13u17g	low/very low burn	12	4/acre	120 Linear ft.
321w13u18g	low/very low burn	23	4/acre	120 Linear ft.
321w13u19g	low/very low burn	3	4/acre	120 Linear ft.
321w13u20g	low/very low burn	3	4/acre	120 Linear ft.
321w13u21g	low/very low burn	23	4/acre	120 Linear ft.
321w14u4g	low/very low burn	2	4/acre	120 Linear ft.
321w14u5g	low/very low burn	7	4/acre	120 Linear ft.
321w14u6g	low/very low burn	14	4/acre	120 Linear ft.
321w14u7g	low/very low burn	22	4/acre	120 Linear ft.
321w14u8g	low/very low burn	2	4/acre	120 Linear ft.
321w14u9g	low/very low burn	9	4/acre	120 Linear ft.
321w1u25g	low/very low burn	17	4/acre	120 Linear ft.
321w1u27g	low/very low burn	6	4/acre	120 Linear ft.
321w1u28g	low/very low burn	4	4/acre	120 Linear ft.
321w1u29g	low/very low burn	3	4/acre	120 Linear ft.
321w1u30g	low/very low burn	11	4/acre	120 Linear ft.
321w1u31g	low/very low burn	7	4/acre	120 Linear ft.
321w1u32g	low/very low burn	59	4/acre	120 Linear ft.
321w1u33g	low/very low burn	5	4/acre	120 Linear ft.
321w1u34g	low/very low burn	3	4/acre	120 Linear ft.
321w1u35g	low/very low burn	8	4/acre	120 Linear ft.
321w1u36g	low/very low burn	2	4/acre	120 Linear ft.
321w1u37g	low/very low burn	2	4/acre	120 Linear ft.
321w1u38g	low/very low burn	3	4/acre	120 Linear ft.

Table D-4. Alternative E Snag and CWD Levels by Unit

AUNIT	Burn Severity	Acres	Snags	CWD Level
321w23u2g	low/very low burn	18	4/acre	120 Linear ft.
321w23u3g	low/very low burn	11	4/acre	120 Linear ft.
321w24u4g	low/very low burn	7	4/acre	120 Linear ft.
321w24u5g	low/very low burn	13	4/acre	120 Linear ft.
321w24u6g	low/very low burn	5	4/acre	120 Linear ft.
321w25u10g	low/very low burn	18	4/acre	120 Linear ft.
321w25u11g	low/very low burn	45	4/acre	120 Linear ft.
321w25u12g	low/very low burn	16	4/acre	120 Linear ft.
321w25u13g	low/very low burn	22	4/acre	120 Linear ft.
321w25u14g	low/very low burn	2	4/acre	120 Linear ft.
321w25u7g	low/very low burn	102	4/acre	120 Linear ft.
321w25u8g	low/very low burn	27	4/acre	120 Linear ft.
321w25u9g	low/very low burn	23	4/acre	120 Linear ft.
Total Acres Low/Very Low		**1,362**		
321e10u1	high/moderate burn	11	6 - 14/acre	120 Linear ft.
321e10u2	high/moderate burn	2	6 - 14/acre	120 Linear ft.
321e10u3	high/moderate burn	18	6 - 14/acre	120 Linear ft.
321e10u4	high/moderate burn	1	6 - 14/acre	120 Linear ft.
321e11u1	high/moderate burn	3	6 - 14/acre	120 Linear ft.
321e11u2	high/moderate burn	8	6 - 14/acre	120 Linear ft.
321e11u3	high/moderate burn	19	6 - 14/acre	120 Linear ft.
321e11u4	high/moderate burn	53	6 - 14/acre	120 Linear ft.
321e15u1	high/moderate burn	21	6 - 14/acre	120 Linear ft.
321e15u10	high/moderate burn	3	6 - 14/acre	120 Linear ft.
321e15u11	high/moderate burn	1	6 - 14/acre	120 Linear ft.
321e15u2	high/moderate burn	6	6 - 14/acre	120 Linear ft.
321e15u3	high/moderate burn	4	6 - 14/acre	120 Linear ft.
321e15u4	high/moderate burn	4	6 - 14/acre	120 Linear ft.
321e15u5	high/moderate burn	10	6 - 14/acre	120 Linear ft.
321e15u6	high/moderate burn	19	6 - 14/acre	120 Linear ft.
321e15u7	high/moderate burn	9	6 - 14/acre	120 Linear ft.
321e15u8	high/moderate burn	1	6 - 14/acre	120 Linear ft.
321e15u9	high/moderate burn	1	6 - 14/acre	120 Linear ft.
321e17u1	high/moderate burn	14	6 - 14/acre	120 Linear ft.
321e17u10	high/moderate burn	2	6 - 14/acre	120 Linear ft.
321e17u11	high/moderate burn	1	6 - 14/acre	120 Linear ft.
321e17u12	high/moderate burn	2	6 - 14/acre	120 Linear ft.
321e17u2	high/moderate burn	7	6 - 14/acre	120 Linear ft.
321e17u3	high/moderate burn	35	6 - 14/acre	120 Linear ft.
321e17u4	high/moderate burn	11	6 - 14/acre	120 Linear ft.
321e17u5	high/moderate burn	8	6 - 14/acre	120 Linear ft.
321e17u6	high/moderate burn	2	6 - 14/acre	120 Linear ft.
321e17u7	high/moderate burn	10	6 - 14/acre	120 Linear ft.
321e17u8	high/moderate burn	2	6 - 14/acre	120 Linear ft.
321e17u9	high/moderate burn	3	6 - 14/acre	120 Linear ft.

Table D-4. Alternative E Snag and CWD Levels by Unit

AUNIT	Burn Severity	Acres	Snags	CWD Level
321e19u1	high/moderate burn	2	6 - 14/acre	120 Linear ft.
321e19u10	high/moderate burn	3	6 - 14/acre	120 Linear ft.
321e19u2	high/moderate burn	2	6 - 14/acre	120 Linear ft.
321e19u3	high/moderate burn	9	6 - 14/acre	120 Linear ft.
321e19u4	high/moderate burn	24	6 - 14/acre	120 Linear ft.
321e19u5	high/moderate burn	16	6 - 14/acre	120 Linear ft.
321e19u6	high/moderate burn	20	6 - 14/acre	120 Linear ft.
321e19u7	high/moderate burn	18	6 - 14/acre	120 Linear ft.
321e19u8	high/moderate burn	2	6 - 14/acre	120 Linear ft.
321e19u9	high/moderate burn	3	6 - 14/acre	120 Linear ft.
321e21u1	high/moderate burn	15	6 - 14/acre	120 Linear ft.
321e21u2	high/moderate burn	23	6 - 14/acre	120 Linear ft.
321e21u3	high/moderate burn	3	6 - 14/acre	120 Linear ft.
321e27u1	high/moderate burn	2	6 - 14/acre	120 Linear ft.
321e29u1	high/moderate burn	6	6 - 14/acre	120 Linear ft.
321e29u10	high/moderate burn	6	6 - 14/acre	120 Linear ft.
321e29u2	high/moderate burn	28	6 - 14/acre	120 Linear ft.
321e29u3	high/moderate burn	11	6 - 14/acre	120 Linear ft.
321e29u4	high/moderate burn	23	6 - 14/acre	120 Linear ft.
321e29u5	high/moderate burn	81	6 - 14/acre	120 Linear ft.
321e29u6	high/moderate burn	30	6 - 14/acre	120 Linear ft.
321e29u7	high/moderate burn	50	6 - 14/acre	120 Linear ft.
321e29u8	high/moderate burn	19	6 - 14/acre	120 Linear ft.
321e29u9	high/moderate burn	2	6 - 14/acre	120 Linear ft.
321e30u2	high/moderate burn	19	6 - 14/acre	120 Linear ft.
321e31u1	high/moderate burn	3	6 - 14/acre	120 Linear ft.
321e31u2	high/moderate burn	5	6 - 14/acre	120 Linear ft.
321e31u3	high/moderate burn	2	6 - 14/acre	120 Linear ft.
321e33u1	high/moderate burn	18	6 - 14/acre	120 Linear ft.
321e33u2	high/moderate burn	42	6 - 14/acre	120 Linear ft.
321e33u4	high/moderate burn	6	6 - 14/acre	120 Linear ft.
321e3u1	high/moderate burn	3	6 - 14/acre	120 Linear ft.
321e3u10	high/moderate burn	4	6 - 14/acre	120 Linear ft.
321e3u11	high/moderate burn	1	6 - 14/acre	120 Linear ft.
321e3u12	high/moderate burn	3	6 - 14/acre	120 Linear ft.
321e3u13	high/moderate burn	4	6 - 14/acre	120 Linear ft.
321e3u14	high/moderate burn	1	6 - 14/acre	120 Linear ft.
321e3u15	high/moderate burn	7	6 - 14/acre	120 Linear ft.
321e3u16	high/moderate burn	1	6 - 14/acre	120 Linear ft.
321e3u17	high/moderate burn	1	6 - 14/acre	120 Linear ft.
321e3u18	high/moderate burn	4	6 - 14/acre	120 Linear ft.
321e3u2	high/moderate burn	4	6 - 14/acre	120 Linear ft.
321e3u3	high/moderate burn	12	6 - 14/acre	120 Linear ft.
321e3u4	high/moderate burn	12	6 - 14/acre	120 Linear ft.
321e3u5	high/moderate burn	1	6 - 14/acre	120 Linear ft.

Table D-4. Alternative E Snag and CWD Levels by Unit

AUNIT	Burn Severity	Acres	Snags	CWD Level
321e3u6	high/moderate burn	1	6 - 14/acre	120 Linear ft.
321e3u7	high/moderate burn	3	6 - 14/acre	120 Linear ft.
321e3u8	high/moderate burn	4	6 - 14/acre	120 Linear ft.
321e3u9	high/moderate burn	3	6 - 14/acre	120 Linear ft.
321e4u1	high/moderate burn	9	6 - 14/acre	120 Linear ft.
321e4u2	high/moderate burn	11	6 - 14/acre	120 Linear ft.
321e4u3	high/moderate burn	2	6 - 14/acre	120 Linear ft.
321e4u4	high/moderate burn	1	6 - 14/acre	120 Linear ft.
321e4u5	high/moderate burn	2	6 - 14/acre	120 Linear ft.
321e5u1	high/moderate burn	5	6 - 14/acre	120 Linear ft.
321e5u10	high/moderate burn	2	6 - 14/acre	120 Linear ft.
321e5u11	high/moderate burn	1	6 - 14/acre	120 Linear ft.
321e5u12	high/moderate burn	3	6 - 14/acre	120 Linear ft.
321e5u13	high/moderate burn	2	6 - 14/acre	120 Linear ft.
321e5u14	high/moderate burn	1	6 - 14/acre	120 Linear ft.
321e5u15	high/moderate burn	2	6 - 14/acre	120 Linear ft.
321e5u2	high/moderate burn	8	6 - 14/acre	120 Linear ft.
321e5u3	high/moderate burn	6	6 - 14/acre	120 Linear ft.
321e5u4	high/moderate burn	1	6 - 14/acre	120 Linear ft.
321e5u5	high/moderate burn	5	6 - 14/acre	120 Linear ft.
321e5u6	high/moderate burn	2	6 - 14/acre	120 Linear ft.
321e5u7	high/moderate burn	2	6 - 14/acre	120 Linear ft.
321e5u8	high/moderate burn	2	6 - 14/acre	120 Linear ft.
321e5u9	high/moderate burn	31	6 - 14/acre	120 Linear ft.
321e7u1	high/moderate burn	3	6 - 14/acre	120 Linear ft.
321e7u10	high/moderate burn	2	6 - 14/acre	120 Linear ft.
321e7u11	high/moderate burn	7	6 - 14/acre	120 Linear ft.
321e7u12	high/moderate burn	6	6 - 14/acre	120 Linear ft.
321e7u13	high/moderate burn	25	6 - 14/acre	120 Linear ft.
321e7u14	high/moderate burn	5	6 - 14/acre	120 Linear ft.
321e7u15	high/moderate burn	1	6 - 14/acre	120 Linear ft.
321e7u16	high/moderate burn	2	6 - 14/acre	120 Linear ft.
321e7u17	high/moderate burn	1	6 - 14/acre	120 Linear ft.
321e7u2	high/moderate burn	5	6 - 14/acre	120 Linear ft.
321e7u3	high/moderate burn	5	6 - 14/acre	120 Linear ft.
321e7u4	high/moderate burn	2	6 - 14/acre	120 Linear ft.
321e7u5	high/moderate burn	4	6 - 14/acre	120 Linear ft.
321e7u6	high/moderate burn	4	6 - 14/acre	120 Linear ft.
321e7u7	high/moderate burn	25	6 - 14/acre	120 Linear ft.
321e7u8	high/moderate burn	3	6 - 14/acre	120 Linear ft.
321e7u9	high/moderate burn	3	6 - 14/acre	120 Linear ft.
321e8u1	high/moderate burn	1	6 - 14/acre	120 Linear ft.
321e8u2	high/moderate burn	3	6 - 14/acre	120 Linear ft.
321e8u3	high/moderate burn	10	6 - 14/acre	120 Linear ft.
321e8u4	high/moderate burn	3	6 - 14/acre	120 Linear ft.

Table D-4. Alternative E Snag and CWD Levels by Unit

AUNIT	Burn Severity	Acres	Snags	CWD Level
321e8u5	high/moderate burn	2	6 - 14/acre	120 Linear ft.
321e8u6	high/moderate burn	2	6 - 14/acre	120 Linear ft.
321e8u7	high/moderate burn	4	6 - 14/acre	120 Linear ft.
321e9u1	high/moderate burn	1	6 - 14/acre	120 Linear ft.
321e9u2	high/moderate burn	19	6 - 14/acre	120 Linear ft.
321e9u3	high/moderate burn	11	6 - 14/acre	120 Linear ft.
321e9u4	high/moderate burn	4	6 - 14/acre	120 Linear ft.
321e9u5	high/moderate burn	13	6 - 14/acre	120 Linear ft.
321e9u6	high/moderate burn	1	6 - 14/acre	120 Linear ft.
321e9u7	high/moderate burn	1	6 - 14/acre	120 Linear ft.
321e9u8	high/moderate burn	1	6 - 14/acre	120 Linear ft.
321e9u9	high/moderate burn	3	6 - 14/acre	120 Linear ft.
321w11u1	high/moderate burn	5	6 - 14/acre	120 Linear ft.
321w11u2	high/moderate burn	21	6 - 14/acre	120 Linear ft.
321w11u3	high/moderate burn	13	6 - 14/acre	120 Linear ft.
321w11u4	high/moderate burn	2	6 - 14/acre	120 Linear ft.
321w11u5	high/moderate burn	2	6 - 14/acre	120 Linear ft.
321w12u1	high/moderate burn	13	6 - 14/acre	120 Linear ft.
321w12u2	high/moderate burn	2	6 - 14/acre	120 Linear ft.
321w12u3	high/moderate burn	3	6 - 14/acre	120 Linear ft.
321w13u1	high/moderate burn	17	6 - 14/acre	120 Linear ft.
321w13u2	high/moderate burn	7	6 - 14/acre	120 Linear ft.
321w13u3	high/moderate burn	21	6 - 14/acre	120 Linear ft.
321w13u4	high/moderate burn	14	6 - 14/acre	120 Linear ft.
321w13u5	high/moderate burn	5	6 - 14/acre	120 Linear ft.
321w13u6	high/moderate burn	1	6 - 14/acre	120 Linear ft.
321w13u7	high/moderate burn	4	6 - 14/acre	120 Linear ft.
321w13u8	high/moderate burn	3	6 - 14/acre	120 Linear ft.
321w13u9	high/moderate burn	1	6 - 14/acre	120 Linear ft.
321w14u1	high/moderate burn	8	6 - 14/acre	120 Linear ft.
321w14u2	high/moderate burn	8	6 - 14/acre	120 Linear ft.
321w14u3	high/moderate burn	2	6 - 14/acre	120 Linear ft.
321w1u1	high/moderate burn	7	6 - 14/acre	120 Linear ft.
321w1u10	high/moderate burn	3	6 - 14/acre	120 Linear ft.
321w1u11	high/moderate burn	31	6 - 14/acre	120 Linear ft.
321w1u12	high/moderate burn	3	6 - 14/acre	120 Linear ft.
321w1u13	high/moderate burn	12	6 - 14/acre	120 Linear ft.
321w1u14	high/moderate burn	3	6 - 14/acre	120 Linear ft.
321w1u15	high/moderate burn	2	6 - 14/acre	120 Linear ft.
321w1u16	high/moderate burn	1	6 - 14/acre	120 Linear ft.
321w1u17	high/moderate burn	2	6 - 14/acre	120 Linear ft.
321w1u18	high/moderate burn	5	6 - 14/acre	120 Linear ft.
321w1u19	high/moderate burn	4	6 - 14/acre	120 Linear ft.
321w1u2	high/moderate burn	17	6 - 14/acre	120 Linear ft.
321w1u20	high/moderate burn	2	6 - 14/acre	120 Linear ft.

Table D-4. Alternative E Snag and CWD Levels by Unit

AUNIT	Burn Severity	Acres	Snags	CWD Level
321w1u21	high/moderate burn	4	6 - 14/acre	120 Linear ft.
321w1u22	high/moderate burn	3	6 - 14/acre	120 Linear ft.
321w1u23	high/moderate burn	3	6 - 14/acre	120 Linear ft.
321w1u24	high/moderate burn	2	6 - 14/acre	120 Linear ft.
321w1u3	high/moderate burn	26	6 - 14/acre	120 Linear ft.
321w1u4	high/moderate burn	41	6 - 14/acre	120 Linear ft.
321w1u5	high/moderate burn	28	6 - 14/acre	120 Linear ft.
321w1u6	high/moderate burn	57	6 - 14/acre	120 Linear ft.
321w1u7	high/moderate burn	2	6 - 14/acre	120 Linear ft.
321w1u8	high/moderate burn	1	6 - 14/acre	120 Linear ft.
321w1u9	high/moderate burn	2	6 - 14/acre	120 Linear ft.
321w23u1	high/moderate burn	18	6 - 14/acre	120 Linear ft.
321w24u1	high/moderate burn	6	6 - 14/acre	120 Linear ft.
321w24u2	high/moderate burn	27	6 - 14/acre	120 Linear ft.
321w24u3	high/moderate burn	2	6 - 14/acre	120 Linear ft.
321w25u1	high/moderate burn	16	6 - 14/acre	120 Linear ft.
321w25u2	high/moderate burn	5	6 - 14/acre	120 Linear ft.
321w25u3	high/moderate burn	14	6 - 14/acre	120 Linear ft.
321w25u4	high/moderate burn	26	6 - 14/acre	120 Linear ft.
321w25u5	high/moderate burn	2	6 - 14/acre	120 Linear ft.
321w25u6	high/moderate burn	9	6 - 14/acre	120 Linear ft.
331e10u1	high/moderate burn	3	6 - 14/acre	120 Linear ft.
331e10u2	high/moderate burn	20	6 - 14/acre	120 Linear ft.
331e10u3	high/moderate burn	2	6 - 14/acre	120 Linear ft.
331e10u4	high/moderate burn	2	6 - 14/acre	120 Linear ft.
331e15u	high/moderate burn	2	6 - 14/acre	120 Linear ft.
331e15u1	high/moderate burn	4	6 - 14/acre	120 Linear ft.
331e15u2	high/moderate burn	3	6 - 14/acre	120 Linear ft.
331e17u1	high/moderate burn	4	6 - 14/acre	120 Linear ft.
331e17u2	high/moderate burn	5	6 - 14/acre	120 Linear ft.
331e3u	high/moderate burn	2	6 - 14/acre	120 Linear ft.
331e3u1	high/moderate burn	6	6 - 14/acre	120 Linear ft.
331e3u2	high/moderate burn	2	6 - 14/acre	120 Linear ft.
331e3u3	high/moderate burn	4	6 - 14/acre	120 Linear ft.
331e3u4	high/moderate burn	3	6 - 14/acre	120 Linear ft.
331e3u5	high/moderate burn	3	6 - 14/acre	120 Linear ft.
331e3u6	high/moderate burn	7	6 - 14/acre	120 Linear ft.
331e3u7	high/moderate burn	4	6 - 14/acre	120 Linear ft.
331e3u8	high/moderate burn	5	6 - 14/acre	120 Linear ft.
331e3u9	high/moderate burn	2	6 - 14/acre	120 Linear ft.
331e5u1	high/moderate burn	13	6 - 14/acre	120 Linear ft.
331e5u2	high/moderate burn	6	6 - 14/acre	120 Linear ft.
331e5u3	high/moderate burn	1	6 - 14/acre	120 Linear ft.
331e5u3	high/moderate burn	3	6 - 14/acre	120 Linear ft.
331e5u3	high/moderate burn	5	6 - 14/acre	120 Linear ft.

Table D-4. Alternative E Snag and CWD Levels by Unit

AUNIT	Burn Severity	Acres	Snags	CWD Level
331e5u4	high/moderate burn	2	6 - 14/acre	120 Linear ft.
331e6u1	high/moderate burn	2	6 - 14/acre	120 Linear ft.
331e7u1	high/moderate burn	1	6 - 14/acre	120 Linear ft.
331e7u2	high/moderate burn	32	6 - 14/acre	120 Linear ft.
331e7u3	high/moderate burn	2	6 - 14/acre	120 Linear ft.
331e7u4	high/moderate burn	11	6 - 14/acre	120 Linear ft.
331e7u5	high/moderate burn	4	6 - 14/acre	120 Linear ft.
331e7u6	high/moderate burn	45	6 - 14/acre	120 Linear ft.
331e7u7	high/moderate burn	7	6 - 14/acre	120 Linear ft.
331e7u8	high/moderate burn	1	6 - 14/acre	120 Linear ft.
331e8u1	high/moderate burn	17	6 - 14/acre	120 Linear ft.
331w1u1	high/moderate burn	6	6 - 14/acre	120 Linear ft.
331w1u10	high/moderate burn	1	6 - 14/acre	120 Linear ft.
331w1u11	high/moderate burn	4	6 - 14/acre	120 Linear ft.
331w1u12	high/moderate burn	2	6 - 14/acre	120 Linear ft.
331w1u2	high/moderate burn	12	6 - 14/acre	120 Linear ft.
331w1u3	high/moderate burn	2	6 - 14/acre	120 Linear ft.
331w1u4	high/moderate burn	1	6 - 14/acre	120 Linear ft.
331w1u5	high/moderate burn	2	6 - 14/acre	120 Linear ft.
331w1u6	high/moderate burn	9	6 - 14/acre	120 Linear ft.
331w1u7	high/moderate burn	3	6 - 14/acre	120 Linear ft.
331w1u8	high/moderate burn	2	6 - 14/acre	120 Linear ft.
331w1u9	high/moderate burn	4	6 - 14/acre	120 Linear ft.
Total Acres High/Moderate		**1,954**		

Table D-5. Alternative F Snag and CWD Levels per Unit

AUNIT	Stand Acres	Potential Salvage Acres	Available Salvage Acres
321e10u2	3	1	1
321e11u3	4	2	2
321e15u1	9	7	7
321e15u10	6	4	3
321e15u2	8	6	6
321e15u4	8	6	5
321e15u6	8	6	3
321e17u2	9	7	7
321e17u7	7	5	5
321e17u8	3	1	1
321e17u9	3	1	1
321e19u1	4	2	2
321e19u10	3	1	1
321e19u8	3	1	1
321e19u9	3	1	1
321e21u3	6	4	4
321e29u10	6	4	4
321e29u3	9	7	7
321e31u1	3	1	1
321e31u2	5	3	3
321e3u1	3	1	1
321e3u10	4	2	2
321e3u11	4	2	1
321e3u12	3	1	1
321e3u2	4	2	2
321e3u6	5	3	1
321e5u14	3	1	1
321e5u4	3	1	1
321e5u5	10	8	5
321e7u1	3	1	1
321e7u10	10	8	2
321e7u11	8	6	6
321e7u12	6	4	4
321e7u13LU	3	1	1
321e7u14	7	5	5
321e7u3	5	3	3
321e7u8	4	2	2
321e8u3	10	8	8
321e8u4	3	1	1
321e8u7	4	2	2
321e9u4	4	2	2
321w11u1	5	3	3
321w11u4	3	1	1
321w12u3	3	1	1

Table D-5. Alternative F Snag and CWD Levels per Unit

AUNIT	Stand Acres	Potential Salvage Acres	Available Salvage Acres
321w13u2	8	6	6
321w13u7	6	4	4
321w13u8	4	2	2
321w14u1	8	6	5
321w14u2	10	8	8
321w1u12	3	1	1
321w1u14	4	2	2
321w1u16	4	2	1
321w1u18	5	3	3
321w1u19	4	2	2
321w1u21	5	3	3
321w1u22	4	2	2
321w1u23	3	1	1
321w1u8	3	1	1
321w24u1	6	4	4
321w25u2	5	3	3
321w25u6	9	7	7
331e10u1	3	1	1
331e15u3	7	5	4
331e15u2	3	1	1
331e17u1	7	5	4
331e3u3	4	2	2
331e3u4	3	1	1
331e5u2	9	7	6
331e5u3	6	4	4
331e7u3	3	1	1
331e7u5	4	2	2
331e7u8	3	1	1
331w1u1	7	5	5
331w1u3	10	8	2
331w1u7	9	7	3
Total Acres			214

NOTE: Potential Salvage Acres equal (Stand acres minus 2 acres for snags)
Available Salvage Acres equal (Potential salvage acres minus additional riparian acres within stand)

Alternative G Snag and CWD Levels

In determining the recommended levels of snags and CWD in Alternative G, outside of the research units, a number of references were considered. A review of these references shows that recommendations for snags and CWD were very similar. Recommended snag levels from the following references were considered:

Guidelines for Snag and Down Wood Prescriptions in Southwestern Oregon (Diane White 2001)
Effects of Stand Replacement Fire and Salvage Logging on a Cavity Nesting Bird Community in Eastern Cascades,Washington (Haggard and Gaines 2001)
Jenny Creek Late-Successional Reserve Assessment (LSRA) (2000)
DecAID Wood Advisor (Mellen, et al.)

These references were related either to recommendations for cavity nesting species (i.e. Haggard and Gaines) or were specific recommendations for southwest Oregon (i.e. White paper, Jenny Creek LSRA, DecAID). The Haggard and Gaines recommendations were included because they provided a range of snag levels which would provide the "highest abundance, species richness, and nesting population of cavity nesters" (Haggard and Gaines, 2001). It is acknowledged that this study was completed in Eastern Cascades of Washington but it was felt conditions were similar to those in southwest Oregon and the recommendations should be considered. The three other references included make specific recommendations for southwest Oregon.

Table D-5 contains a comparison of these references and the recommended snag and CWD levels.

Table D-6. Comparison of Recommended Snag and CWD Levels by Reference

	Diane White Paper		Haggard & Gaines		Jenny Creek LSRA		DecAID Advisor	
	Snags	CWD	Snags	CWD	Snags	CWD	Snags	CWD
White Fir Plant Series	>10", 6 tpa	13 pieces/acre or 9.8 tons/ acre or 2.5 % cover	> 10", 6-14 tpa	No CWD level recommended	> 8", 15 tpa; > 16", 7-14 tpa	Range 5-7 pieces/acre (16" x 16") or 0.84% ground cover	50-80% range, 8-17 tpa	50-80% range, 3.6-6.7% ground cover
Douglas-fir Plant Series	>10", 6 tpa	8 pieces/acre or 5.3 tons/ acre or 1.1% cover					30-50% range, 5-8 tpa	30-50% range, 2.0-3.6% ground cover

A landscape approach was used in determining the snags and CWD levels in Alternative G, outside of the research units. Snag and CWD levels would be applied across all stand-replacement units on BLM-administered land. It does not consider or make up for snag levels on private land. Based on these recommendations, the following snag and CWD target levels were proposed for Alternative G.

Table D-7. Recommended Snag and CWD Levels for Alternative G

	Snags > 16"	CWD
White Fir Plant Series	12	3.6 % ground cover
Douglas-fir Plant Series	8	2.0 % ground cover

Alternative G

Determination on the number of snags needed to meet the 30% and 50% DecAID levels for nonresearch salvage units in Alternative G using the DecAID Wood Advisor follows. This was considered a minimum level for this alternative. Snag and CWD levels were determined based on a landscape approach.

Determination of salvage acres within White Fir Plant Series

50% DecAID Tolerance Level
Total Acres of stand-replacement acres within White Fir Plant Series = 1,138 acres
Acres available for salvage within 10-acre stand-replacement units = 872 acres
DecAID Target Wildlife Snags (10" DBH and greater) = 8 tpa
DecAID Target % ground cover = 3.6%
Existing average snag size = 16.5" DBH and 60'
% ground cover of the average snag = 0.129% cover
Average existing % ground cover = 1.55% cover
Average needed to meet Target ground cover = (Target - Existing) = 3.6% - 1.55% = 2.05%
Additional snags needed/acre to meet Target = average needed/existing average snag % ground cover = 2.05/0.129 = 17 tpa
Total Trees within available salvage acres in White Fir Plant Series > 10" = 76,417 snags
Average tpa = 67 tpa

Wildlife snags - 8 snag/acre x 1,138 acres =	9,104 snags
Additional snags to meet ground cover = 17 snags/acre x 1138 acres =	19,346 snags
Total snags needed to meet DecAID 50% Tolerance Level =	28,450 snags
Total trees within unavailable salvage acres (<10 acre units) >10" =	17,822 snags
Additional snags needed within salvage acres to meet target = (28450 – 17,822)	10,628 snags
Number of snags/acre needed on Salvage units = 10,628/872 =	12 snags/acre

Determination of salvage acres within Douglas-fir Plant Series

30% DecAID Tolerance Level
Total Acres of stand-replacement acres within Douglas-fir Plant Series = 1,448 acres
Acres available for salvage within 10-acre stand-replacement units = 1,112 acres
DecAID Target Wildlife Snags (10" DBH and greater) = 5 tpa
DecAID Target % ground cover = 2.0%
Existing average snag size = 13.5" DBH and 53'
% ground cover of the average snag = 0.099% cover
Average existing % ground cover = 0.69% cover
Average needed to meet Target ground cover = (Target - Existing) = 2.0% - 0.69% = 1.31%
Additional snags needed/acre to meet Target = average needed/existing average snag % ground cover = 1.31/0.099 = 13 tpa
Total Trees w/in available salvage acres in WF Plant Series > 10" = 82,786 snags
Average tpa = 57 tpa

Wildlife snags - 5 snag/acre x 1448 acres =	7,240 snags
Additional snags to meet ground cover = 13 snags/acre x 1448 acres =	18,824 snags
Total snags needed to meet DecAID 30% Tolerance Level =	26,064 snags
Total trees w/in unavailable salvage acres (<10-acre units) > 10" =	19,152 snags
Additional snags needed w/in salvage acres to meet target =	6,912 snags
Number of snags/acre needed on Salvage units = 6,912/1112 =	6 snags/acre

It is anticipated additional snags and CWD would be provided for in the salvaged units because many trees in the 10" to 16" DBH range would not be merchantable due to the delay in implementation of the salvage activities. These were not considered in meeting the target levels but it is assumed they would provide additional levels. It is estimated 80% of the trees from 10-16" DBH within the salvaged units would not be salvaged. This would provide an average of 15 snags/acre and 3.6% cover in the White Fir plant series and 2.8% cover in the Douglas-fir plant series across the landscape.

Table D-8. Alternative G Harvest Units and Systems

Original Unit	Original Unit Acres	Series	Salvageable Unit	Harvest Acres	Harvest System	Comment
321e10u3	34	ABCO	321e10u3	25	cable	
321e11u4	53	PSME	321e11u4	37	helicopter	research
321e15u1	23	PSME	321e15u1t	9	tractor	
			321e15u1tc	10	cable	
321e15u3	4	ABCO	321e15u3	2	bull line	
321e15u4	7	ABCO	321e15u4	3	bull line	
321e15u5	13	ABCO	321e15u5	6	cable	
321e15u6	19	PSME	321e15u6c	9	cable	
			321e15u6t	6	tractor	
321e15u7	9	ABCO	321e15u7	5	bull line	
321e17u4c	13	PSME	321e17u4c	11	helicopter	
321e17u4	23	PSME	321e17u4h	5	helicopter	
	0	PSME	321e17u4t	10	tractor	
321e17u5	8	ABCO	321e17u5	4	cable	
321e17u7	10	PSME	321e17u7	8	cable	
321e19u4	32	ABCO	321e19u4	32	cable	research
321e19u5	16	PSME	321e19u5c	3	cable	
			321e19u5t	10	tractor	
321e19u6	21	ABCO	321e19u6	14	cable	
321e19u7	17	ABCO	321e19u7	11	cable	
321e21u1c	15	PSME	321e21u1c	10	cable	
321e21u2	27	PSME	321e21u2	14	helicopter	
			321e21u2a	5	tractor	
321e29u1	20	ABCO	321e29u1	14	cable	
321e29u4	35	ABCO	321e29u4	23	cable	
321e29u5c	43	PSME	321e29u5c	43	cable	research
321e29u5t	10	PSME	321e29u5t	7	tractor	
321e29u6	38	PSME	321e29u6	15	cable	research
			321e29u6a	7	tractor	research
			321e29u6b	16	helicopter	research
321e29u7	57	PSME	321e29u7A	35	cable	research
			321e29u7A	5	helicopter	research
321e30u2c	19	ABCO	321e30u2c	8	cable	
			321e30u2h	8	tractor	
321e33u1	13	ABCO	321e33u1	9	cable	
321e33u4	7	ABCO	321e33u4	4	bull line	
321e3u13	4	PSME	321e3u13	4	helicopter	
321e3u18	4	PSME	321e3u18	3	helicopter	
321e3u3	15	PSME	321e3u3	8	bull line	
			321e3u3a	5	cable	
321e3u8	4	PSME	321e3u8	3	cable	
321e3u9	3	PSME	321e3u9	2	bull line	

Table D-8. Alternative G Harvest Units and Systems

Original Unit	Original Unit Acres	Series	Salvageable Unit	Harvest Acres	Harvest System	Comment
321e4u1	12	ABCO	321e4u1	9	helicopter	
321e4u2	43	ABCO	321e4u2	14	helicopter	
321e5u13	2	ABCO	321e5u13	1	helicopter	
321e5u1E	34	ABCO	321e5u1E	11	cable	research
			321e5u1E	23	helicopter	research
321e5u2	8	ABCO	321e5u2	6	cable	
321e5u3	6	ABCO	321e5u3	3	helicopter	
321e5u5	5	ABCO	321e5u5	3	helicopter	
321e7u13	25	ABCO	321e7u13	12	cable	
321e7u14	20	ABCO	321e7u14	7	bull line	
321e7u5	11	ABCO	321e7u5	9	cable	
321e7u6	3	ABCO	321e7u6	1	bull line	
321e7u7	24	PSME	321e7u7	15	cable	
321e7u8	2	ABCO	321e7u8	2	cable	
321e8u3	10	ABCO	321e8u3	5	cable	
321e8u6	5	ABCO	321e8u6	4	cable	
321e9u2	23	PSME	321e9u2c	9	cable	
			321e9u2h	7	helicopter	
321e9u5	3	PSME	321e9u5	2	cable	
321w11u2	21	ABCO	321w11u2c	1	cable	
			321w11u2h	12	helicopter	
321w11u3	13	ABCO	321w11u3	10	helicopter	
321w12u1	6	ABCO	321w12u1	5	helicopter	
321w12u1a	8	ABCO	321w12u1a	6	cable	
321w13u1	17	ABCO	321w13u1	12	helicopter	
321w13u3	21	ABCO	321w13u3	3	cable	
			321w13u3a	5	helicopter	
321w13u4	14	ABCO	321w13u4	8	cable	
321w13u5	5	ABCO	321w13u5	4	helicopter	
321w14u1	13	ABCO	321w14u1	9	helicopter	
321w1u1	7	ABCO	321w1u1	5	helicopter	
321w1u13	12	ABCO	321w1u13	8	helicopter	
321w1u18	21	ABCO	321w1u18	11	helicopter	adjusted tpa for openings
321w1u2	45	ABCO	321w1u2	32	helicopter	research
321w1u2A	17	ABCO	321w1u2A	13	helicopter	
321w1u5	28	ABCO	321w1u5	20	helicopter	
321w1u6	8	ABCO	321w1u6	8	helicopter	FMZ: leave 6 tpa
321w24u1	10	ABCO	321w24u1	4	helicopter	
321w24u2	37	ABCO	321w24u2	26	helicopter	research
321w25u1	11	ABCO	321w25u1	6	cable	
321w25u3c	14	ABCO	321w25u3c	6	cable	
			321w25u3tb	3	bull line	

Table D-8. Alternative G Harvest Units and Systems

Original Unit	Original Unit Acres	Series	Salvageable Unit	Harvest Acres	Harvest System	Comment
321w25u4	26	ABCO	321w25u4	12	helicopter	
			321w25u4t	7	tractor	
321w25u6	9	ABCO	321w25u6	6	tractor	
331e5u1	13	PSME	331e5u1	11	tractor	
331e5u2	6	PSME	331e5u2	5	helicopter	
331e7u2	32	PSME	331e7u2	16	tractor	
			331e7u2a	10	cable	
331e7u4	11	PSME	331e7u4	10	helicopter	
331e7u7A	7	PSME	331e7u7A	6	helicopter	
331e7u7h	32	PSME	331e7u7h	13	helicopter	
			331e7u7t	12	tractor	
331e8u1	17	PSME	331e8u1	13	helicopter	
331w1u11	4	PSME	331w1u11	4	helicopter	
331w1u6	9	PSME	331w1u6	7	helicopter	
331w1u9	4	PSME	331w1u9	4	helicopter	
Total	**1349**			**961**		

Reserve tree selection guidelines

Reserve tree types and hazard areas

1995

Fig. 3. — Reserve tree Type 1.

Reserve tree types — conifer only

Recognizing reserve tree types is the first step in identifying potential hazard areas. These definitions are based upon conditions that affect the tree's stability that are visible to an observer on the ground.

They are divided into four classifications, ranging from the safest to the most dangerous.

For example, Type 1 reserve trees have low-hazard and low-failure probability, while Type 4 reserve trees have extreme-hazard and extreme-failure probability. Non-defective, healthy green trees are not classified. All reserve trees fit one of these types.

Specific defects which could cause failure must be evaluated for each reserve tree.

When a reserve tree type is questionable, it should be assigned the next higher type.

Type 1 reserve trees are live-green trees that are defective or deformed with sound tops, trunks, and roots (Fig. 3).

They may have part of the top broken out or have evidence of other defects that include "cat face," animal chewing, old logging wound, weather injury, insect attack, or lightning strike.

Because these trees are stable, they pose the least hazard to workers.

Type 1 trees may be retained wherever live-green trees can be retained safely.

Reserve tree selection guidelines

Reserve tree types and hazard areas

1995

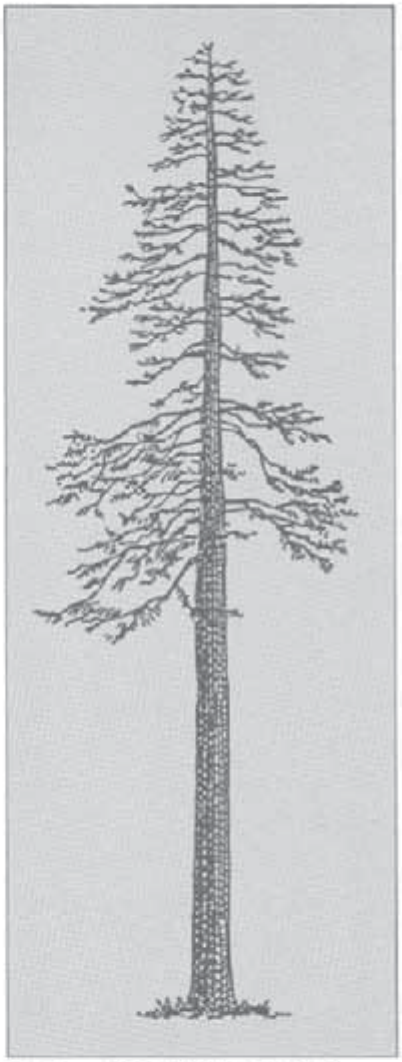


Fig. 4. — Reserve tree Type 2.

A **Type 2** reserve tree is a dead tree with sound top, trunk, and roots (Fig. 4).

Identifying Type 2 reserve trees requires careful observation. Mortality may have been caused by canker, diseases, insects, fire, adverse weather or lightning. Needle and small twig retention is evidence of recent death, which may be an indicator of stability.

Fire-scorched trees may remain stable for many years if the trunk and root systems are not badly burned. However, not all fire-scarred trees may be safe. Preexisting defects may be charred and difficult to detect, rendering a tree that was dangerous before the fire even more dangerous afterward.

A tree classified as Type 2 may move to a Type 4 as a result of natural decay and deformation or if its roots have been damaged by fire or weakened by root rot.

Because Type 2 reserve trees have stable tops, trunks, and roots, they may be retained wherever healthy, green trees could be retained safely.

Reserve tree selection guidelines

Reserve tree types and hazard areas

1995

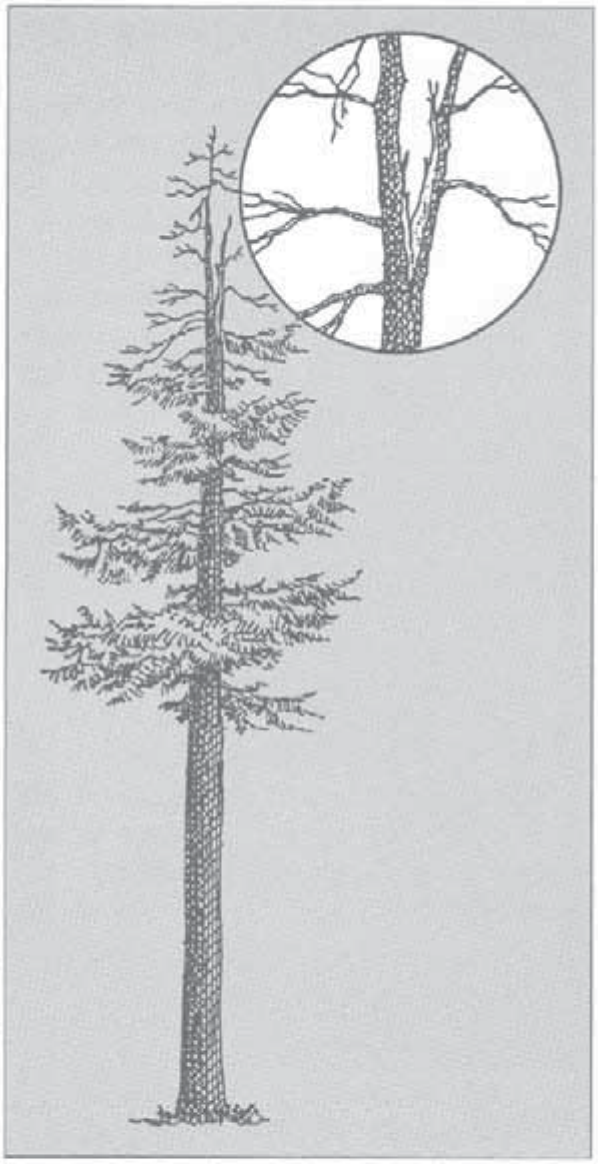


Fig. 5. — Reserve tree Type 3.

Type 3 trees are live or dead trees with unstable tops or upper portions (Fig. 5).

Although the roots and main portions of the trunk are sound, these reserve trees pose high hazard because of defect in live or dead wood higher up in the tree. Ground vibration from falling trees, wind, flying debris, heavy equipment or other industrial activity can dislodge slabs, chunks, limbs, or the entire upper portion of the tree.

Because these reserve trees do not collapse at the base, but somewhere above, testing the tree at breast height will not give an accurate indication of the tree's condition at a higher location where failures are likely to occur.

The area on the ground that could be reached by a dislodged top, slab or chunk is called the "hazard area" for a Type 3 reserve tree.

In determining the hazard area, evaluate the following criteria:

- Slope of the ground.
- Amount and direction of lean — must be easily observable.
- Length of the top portion that would dislodge.

Reserve tree selection guidelines

Reserve tree types and hazard areas

1995

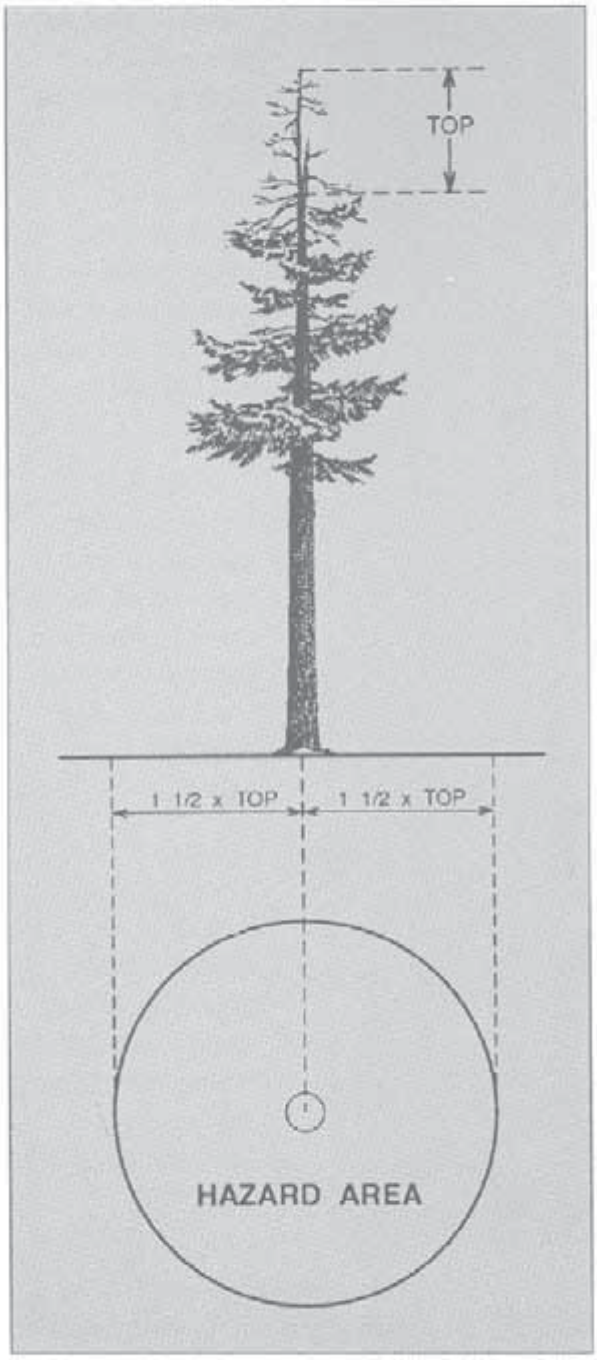


Fig. 6. — Hazard area for a Type 3 reserve tree with no discernible lean.

Level or sloped ground ... no discernible lean (Fig. 6).

Step 1. Determine the length of the top or portion that would dislodge and at least one half of its length.

Step 2. The hazard area forms a circle around the tree with a radius equal to at least 1 1/2 times the length of the dislodged portion.*

** On sloped ground where the dislodged section may roll down hill, the hazard area must be extended on the down-hill side for whatever distance is necessary to protect workers.*

Reserve tree selection guidelines

Reserve tree types and hazard areas

1995

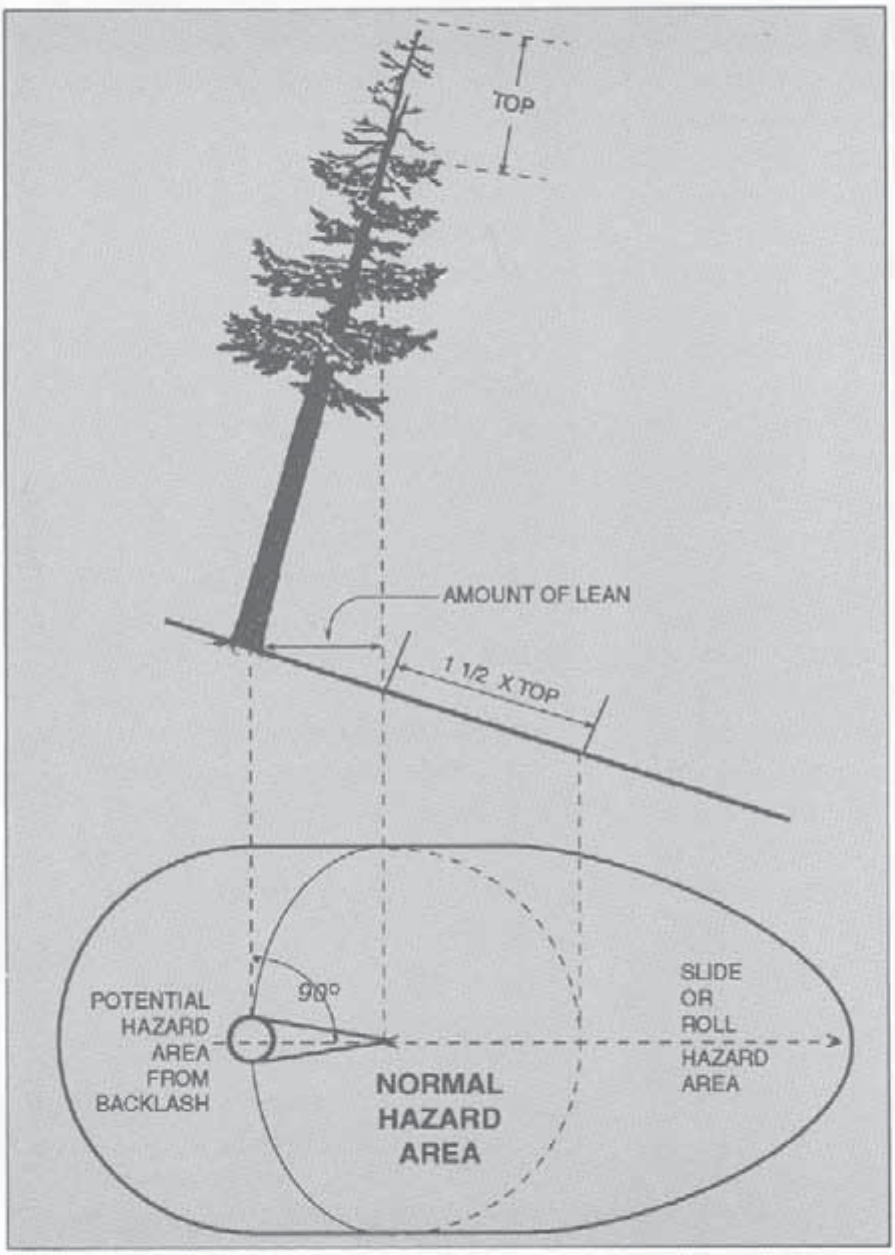


Fig. 7. — Hazard area for a Type 3 tree with lean.

Level or sloped ground ... lean in any direction (Fig. 7).

Step 1. Determine the length of the top or portion that would dislodge and add one half of its length.

Step 2. Determine the amount of lean (horizontal distance from where the top or portion would dislodge relative to the base).

Step 3. The hazard area would be the distance determined by adding steps 1 and 2 and 90 degrees on each side of the lean beginning at the base.*

The area behind the lean is not a hazard area unless equipment, yarding activity or falling timber contacts the reserve tree. Striking a Type 3 reserve tree could force a backlash opposite the lean, creating an additional hazard during the time of impact.

**On sloped ground where the dislodged section may roll downhill, the hazard area must be extended on the downhill side for whatever distance is necessary to protect workers.*

Reserve tree selection guidelines

Reserve tree types and hazard areas

1995

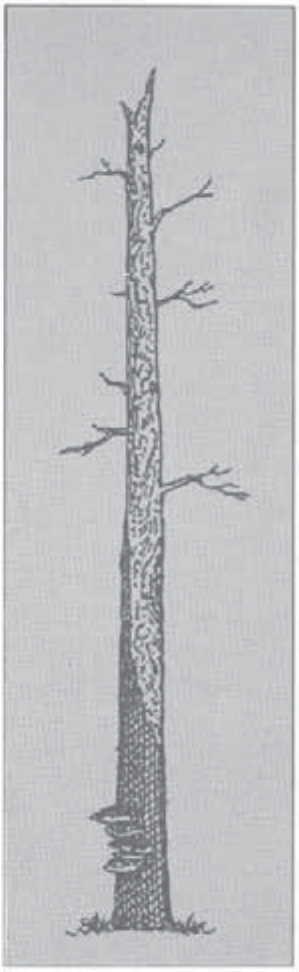


Fig. 8. — Reserve tree Type 4.

Type 4 reserve trees are live or dead with unstable trunk or roots, with or without bark. This includes "soft" snags as well as live trees with unstable roots caused by root rot or fire. They are considered the most dangerous type (Fig. 8).

Unexpected collapse could occur from any portion of the roots or trunk. Testing the snag at breast height will not give an accurate indication of the tree's condition higher up where failures can occur.

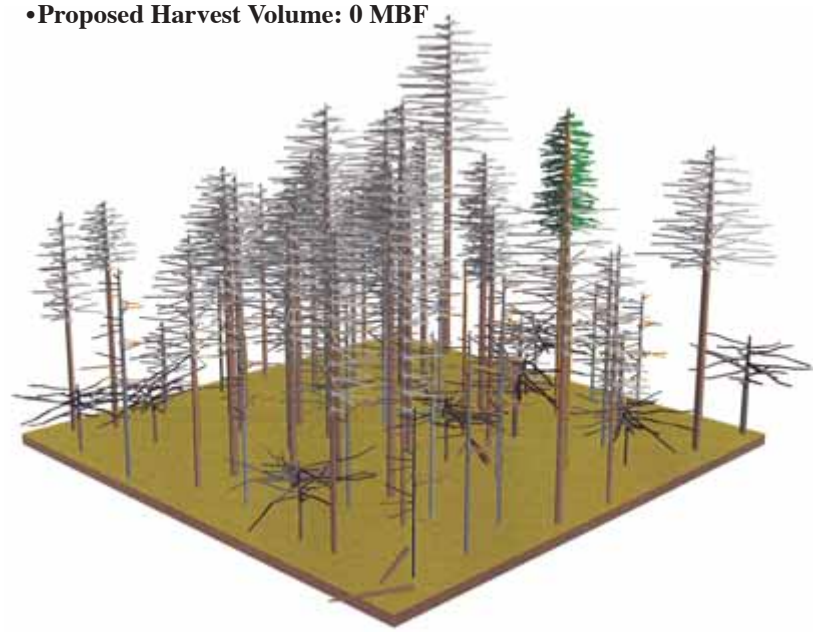
The hazard area for a Type 4 reserve tree is defined as the area on the ground that could be reached by any portion of the tree that may collapse.

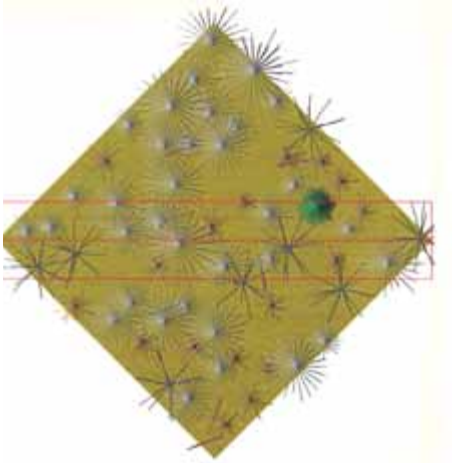
In determining the hazard area, the following criteria must be evaluated:

- Slope of the ground.
- Direction of lean.
- Height of the tree.

Figure D-2. Stand Visualization System (SVS) Representation of Proposed Salvage in Unit T32S, R1E, Section 29: Alternatives A, B, and F - No Salvage

Alternative A, B - No Salvage
Alternative F - No Salvage in Unit
- **Total Unit: 82 Acres**
- **Proposed Salvage: 0 Acres**
- **Total Unit Volume: 2,313 MBF**
- **Proposed Harvest Volume: 0 MBF**





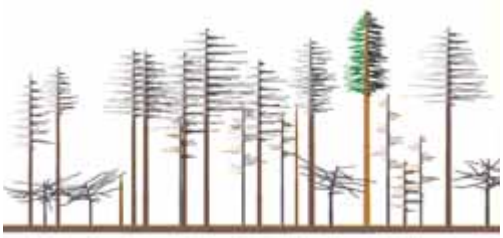
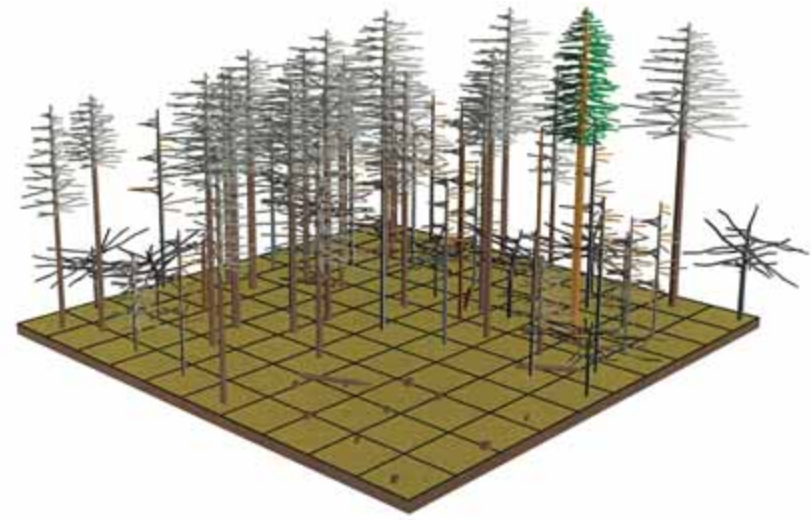
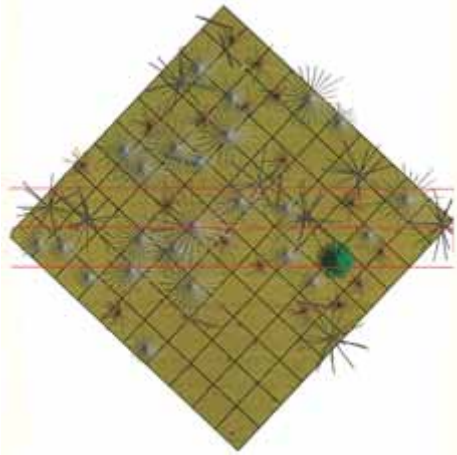


Figure D-3. SVS Representation of Proposed Salvage in Unit T32S, R1E, Section 29: Alternative C - South Cascades LSRA Criteria

- **Total Unit: 82 Acres**
- **Proposed Salvage: 16 Acres**
- **Total Unit Volume: 2,313 MBF**
- **Proposed Harvest Volume: 463 MBF**
- **Retains minimum 29 snags/acre concentrated in reserve acres**
- **Snags greater than 14" DBH**
- **Salvage limited to 20% of unit acres**





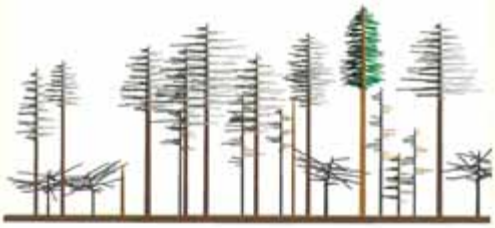
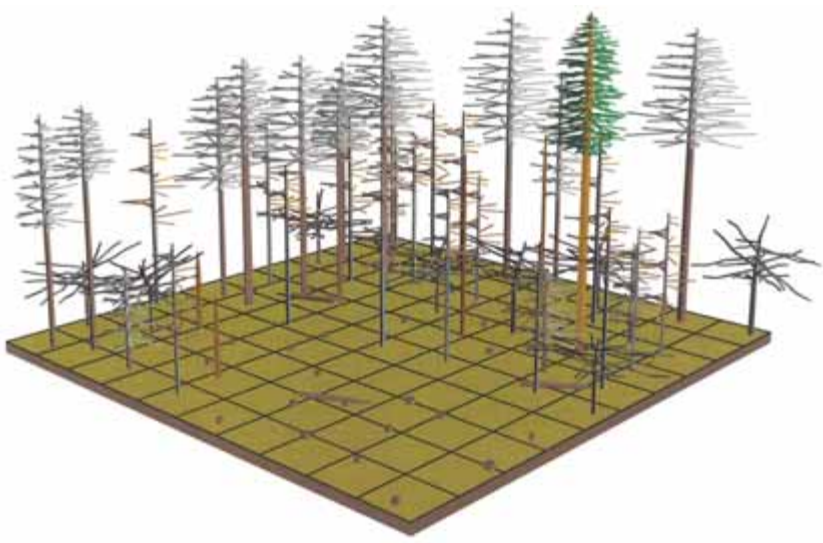
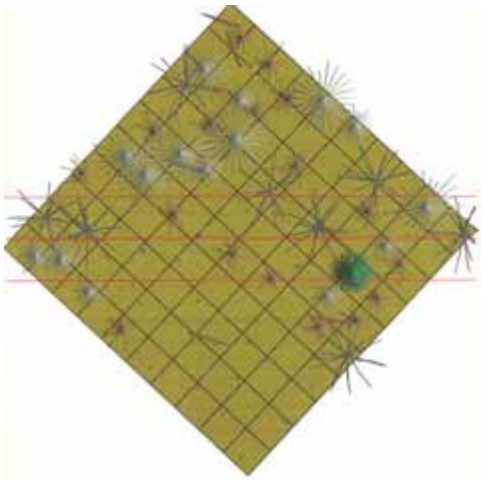


Figure D-4. SVS Representation of Proposed Salvage in Unit T32S, R1E, Section 29: Alternative D - LSR Salvage using DecAID

- **Total Unit: 82 Acres**
- **Proposed Salvage: 48 Acres**
- **Total Unit Volume: 2,313 MBF**
- **Proposed Harvest Volume: 1,388 MBF**
- **Retains minimum 26 snags/acre concentrated in reserve acres**
- **Snags greater than 10" DBH**





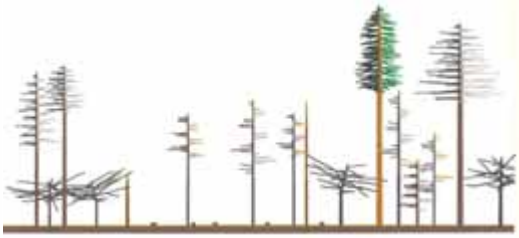
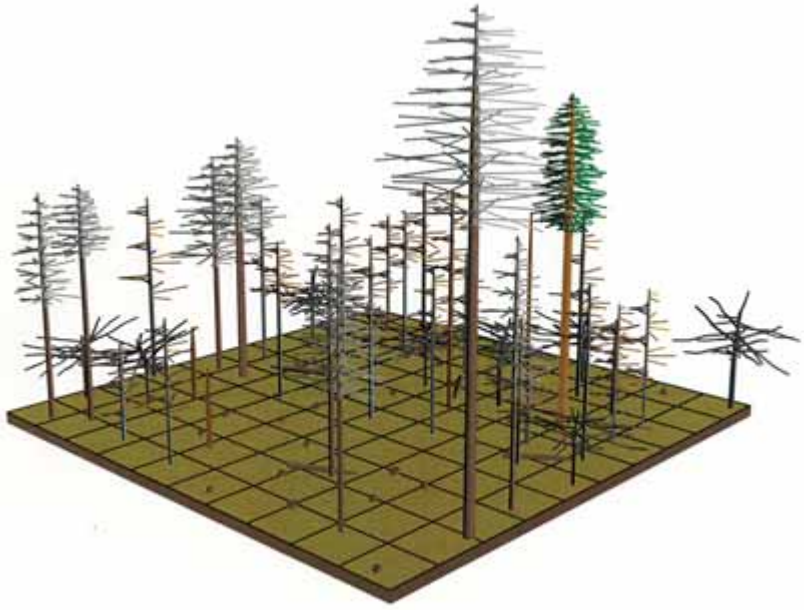


Figure D-5. SVS Representation of Proposed Salvage in Unit T32S, R1E, Section 29: Alternative E - High Level of Salvage

- **Total Unit: 82 Acres**
- **Proposed Salvage: 48 Acres**
- **Total Unit Volume: 2,313 MBF**
- **Proposed Harvest Volume: 1,176 MBF**
- **Leave 8 tpa greater than 14" DBH**



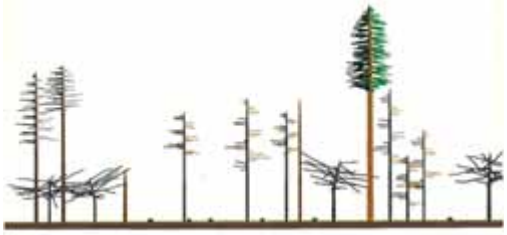


Figure D-6. SVS Representation of Proposed Salvage in Unit T32S, R1E, Section 29: Alternative G - Intensive Salvage Research Unit

- **Total Unit: 57 Acres**
- **Proposed Salvage: 57 Acres**
- **Total Unit Volume: 1,608 MBF**
- **Proposed Harvest Volume: 1,279 MBF**
- **Leave 6 tpa greater than 20" DBH**
- **100% salvaged**

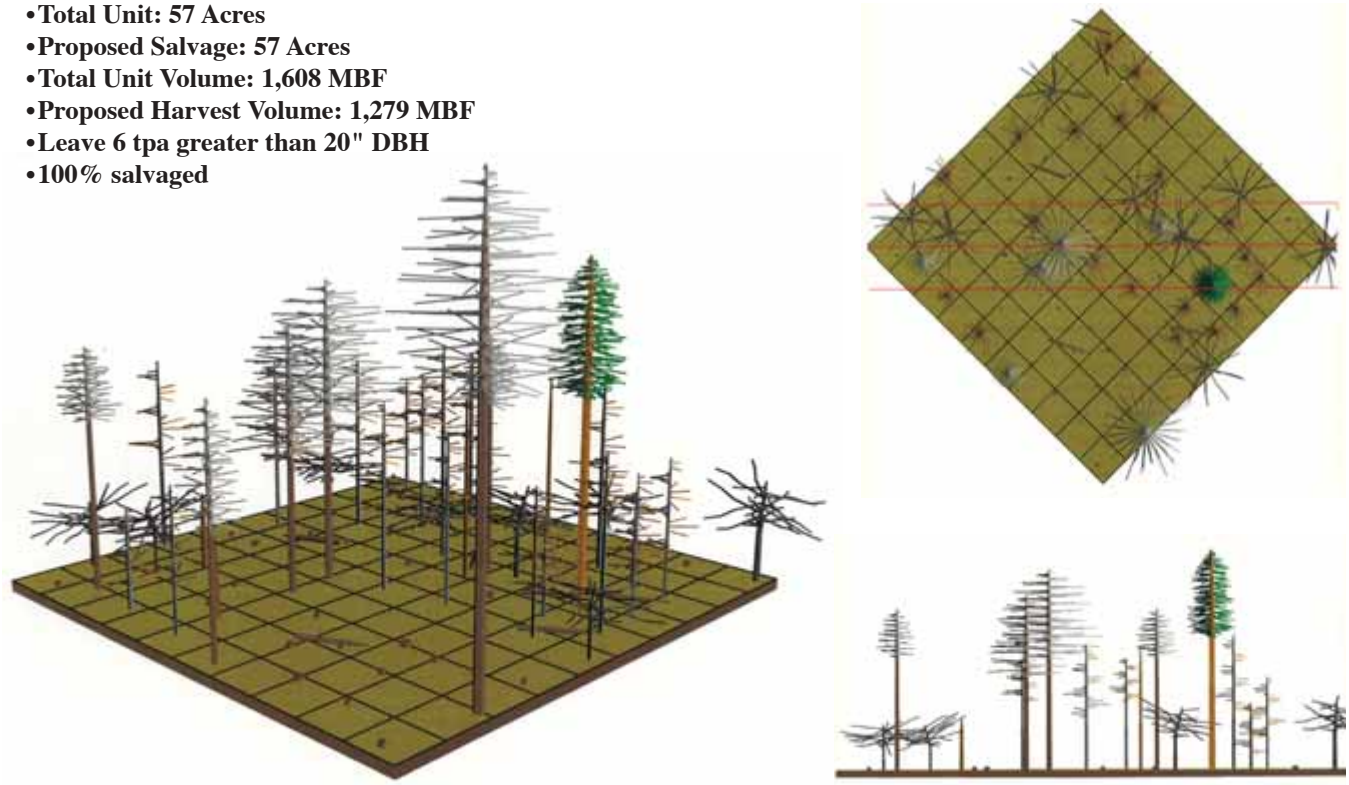


Figure D-7. SVS Representation of Proposed Salvage in Unit T32S, R1E, Section 29: Alternative G - Moderate Salvage Research Unit

- **Total Unit: 57 Acres**
- **Proposed Salvage: 40 Acres**
- **Total Unit Volume: 1,608 MBF**
- **Proposed Harvest Volume: 981 MBF**
- **Leave 6 tpa greater than 20" DBH**
- **30%unsalvaged; 70% salvaged**

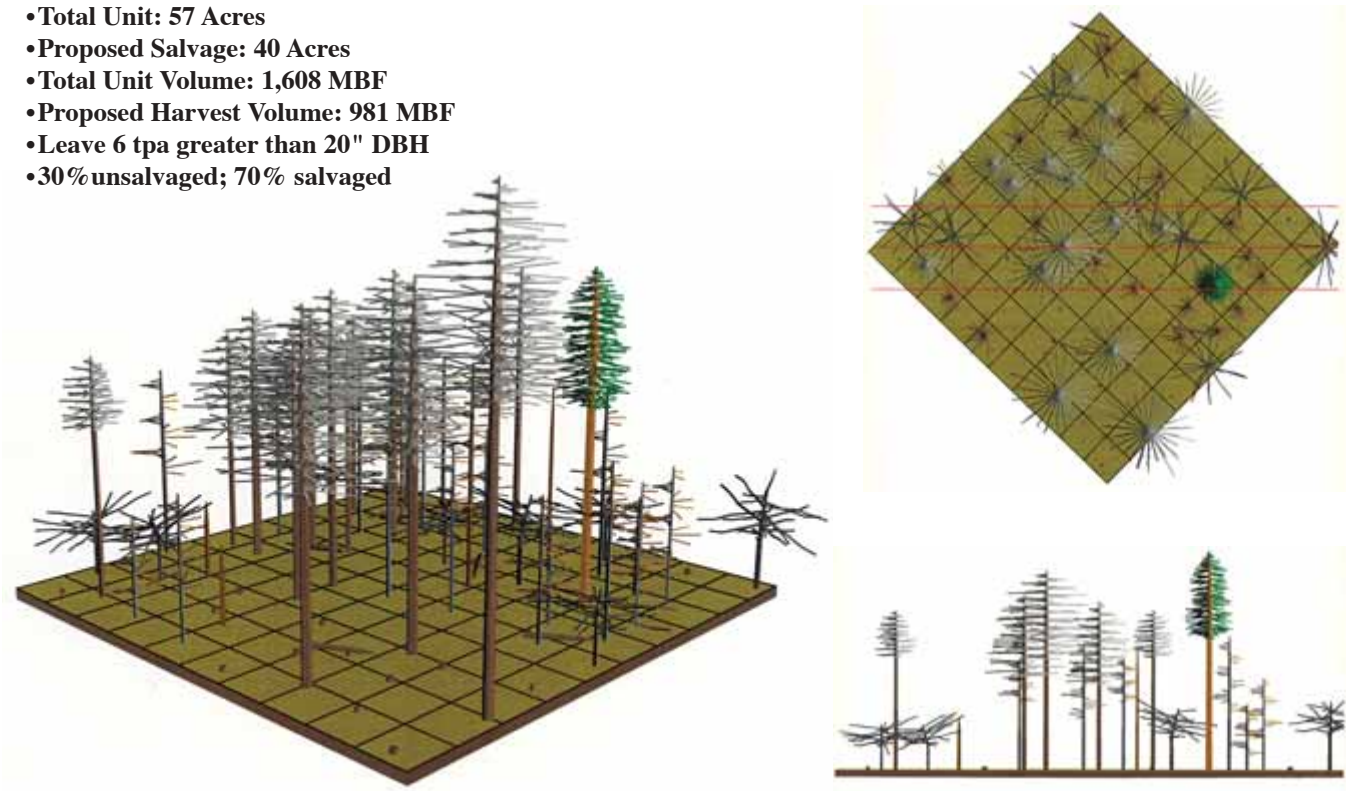
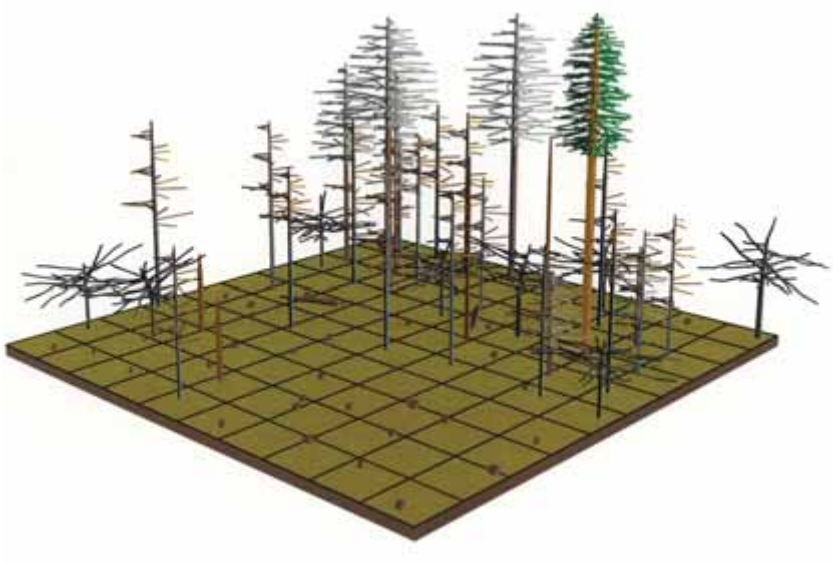
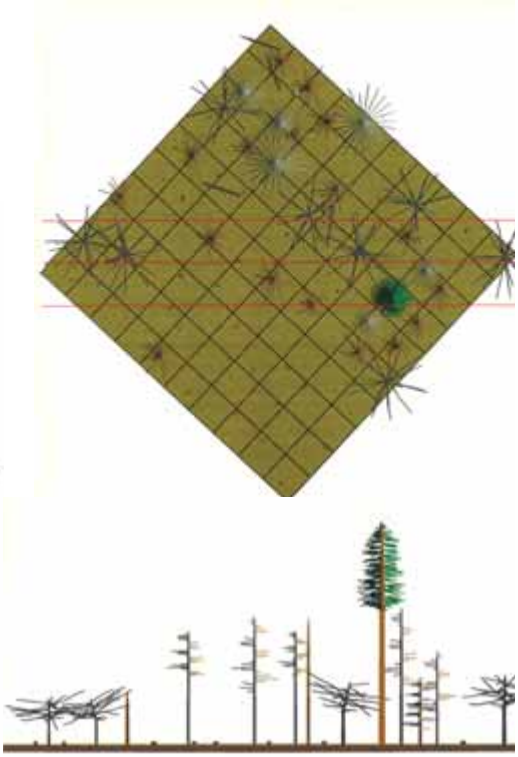


Figure D-8. SVS Representation of Proposed Salvage in Unit T32S, R1E, Section 29: Alternative G - Remaining Area Salvage

- **Total Unit: 57 Acres**
- **Proposed Salvage: 46 Acres**
- **Total Unit Volume: 1,607 MBF**
- **Proposed Harvest Volume: 1,297 MBF**
- **Snags greater than 16" DBH**
- **Retains minimum 8 snags/acre concentrated in reserve acres**