PHOTO SERIES FOR QUANTIFYING FOREST RESIDUES IN THE:

SIERRA MIXED CONIFER TYPE
SIERRA TRUE FIR TYPE

WAYNE G. MAXWELL
FRANKLIN R. WARD

COSPONSORED BY: PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION
AND PACIFIC SOUTHWEST FOREST AND RANGE EXPERIMENT STATION

PUBLISHED BY: PACIFIC NORTHWEST FOREST AND RANGE EXPERIEMENT STATION

U.S. DEPARTMENT OF AGRICULTURE

FOREST SERVICE

ABSTRACT

Five series of photographs display different forest residue loading levels, by size classes, for areas of like timber type (Sierra mixed conifer and Sierra true fir) and cutting objective.

Information with each photo includes measured weights, volumes and other residue data, information about the timber stand and harvest actions, and assessment of fire behavior and suppression difficulty.

These photo series provide a fast and easy-to-use means for quantifying and describing existing and expected residues.

KEYWORDS: Residues, residue management, fuel hazard rating, fire behavior (forest), slash (Sierra mixed conifer), slash (Sierra true fir), residue measurements, residue surveys.

ACKNOWLEDGMENT OF COOPERATION

CONTENTS

LIST OF PLANT SPECIES CITED

California black oak .... *Quercus kelloggii* Newb.
Douglas-fir .... *Pseudotsuga menzeisii* (Mirb.) Franco
grand fir .... *Abies grandis* (Dougl.) Lindl.
incense-cedar .... *Libocedrus decurrens* Torr.
Jeffrey pine .... *Pinus jeffreyi* Grev. & Balf.
ponderosa pine .... *Pinus ponderosa* Laws.
red fir .... *Abies* spp.
sugar pine .... *Pinus lambertiana* Dougl.
western white pine .... *Pinus monticola* Dougl.
white fir .... *Abies concolor* (Gord. & Glend.) Lindl.

METRIC CONVERSIONS

1 acre	=	0.404 7 hectare
2.471 acres	=	1 hectare
1 cubic foot	=	0.283 2 cubic meter
35.31 cubic feet	=	1 cubic meter
1 foot	=	0. 304 8 meter
3.281 feet	=	1 meter
1 inch	=	2.54 centimeter
0.3937 inch	=	1 centimeter
1 ton (short)	=	0.907 ton (metric)
1.102 tons (short)	=	1 ton (metric)

WHAT ARE THESE PHOTO SERIES?

These photo series are arrays of photos; each array shows different residue loading levels generated from like timber types and cutting practices. Each photo is supplemented with information which includes:

- Measured quantities by size classes, average depth, ground area covered, and other residue data.

- Harvest information.

- Assessment of fire behavior and suppression difficulty.

Thus, the series provide a basis for quantifying and describing existing and expected residue loadings on other areas and serve as a communication link among users.

WHY ARE THEY NEEDED?

Timber harvesting, silvicultural practices, and land clearing operations annually generate forest residues on thousands of acres in the Sierra Nevada.

Although some residues are beneficial for nutrient cycling, soil protection, wildlife cover, and the microclimate, excessive residues adversely affect the forest environment in many ways. Much of the forest contains residues in undetermined quantities, which are

excessive from the standpoints of resource use, protection, and management. So that residues may be reduced to a level considered desirable, estimates are needed on quantities that now exist or will be created by some activity.

Inventory techniques, such as the planar intersect method, are useful when a high degree of accuracy is needed but are time consuming and costly to apply extensively. Photo series can be used to make fast, easy, and inexpensive quantifications of residue, adequate for most management needs.

There has been no way for all resource disciplines to become readily familiar with volumes and descriptions of residue so that they can make quantitative inputs to residue management. Likewise, because fuel rating systems axe specialized and subjective, they too are not readily adapted to other environmental components. These deficiencies can be overcome with the photo series.

HOW CAN THEY BE USED?

Inventory of Down Residue

Loadings in various residue size classes, average residue depth, and ground area covered are characteristics that are visible in the photographs; hence, users can estimate any of these characteristics on an area being inventoried by comparing them with the photos as follows:

1. Observe each characteristic of the residue on the ground (e.g., 3.1- to 9-inch loading).

2. Select a photo that nearly matches, or photos that bracket, the observed characteristic.

3. Obtain the quantitative value for the characteristic being estimated from the data sheet accompanying the selected photo (or interpolate a value between photos).

These steps are repeated for each characteristic desired. If the general area being inventoried has zones of obvious differences in residue loading, the user should consider making separate determinations for each zone; these can then be weighted and cumulated for the whole area.

Residue characteristics not distinguishable in the photographs are duff and litter depth, proportion of sound residue by species, and proportion rotted. If values for these characteristics are desired in an inventory, they must be derived from independent sampling or observations.

Inventory information can be used by land managers to (1) evaluate impacts residues have on various aspects of forest management, (2) identify areas of unacceptable residue loading, (3) identify priority areas for treatment, (4) estimate amount of utilizable material, and (5) predict characteristics of fire behavior and resistance to suppression.

Determination of Desired Residue Level

Land management objectives can be more nearly achieved if a team of appropriate specialists can participate in specifying residues that should remain onsite after completion of a cutting activity. Individuals helping with these determinations can study the photo series to recognize the appearance of various quantities and distributions of residue. With this knowledge, each individual can describe in quantitative terms the residue thought necessary to meet environmental concerns and goals of a particular specialty. The team can then use the photo series as a communication tool to resolve differences in arriving at a desired level of residue.

After treatment, the degree to which objectives were achieved can be judged by comparing observed posttreatment loading with the desired level description.

Prediction of Residues From Planned Cutting and
Residue Changes From Treatments

Photo series are a rudimentary aid for predicting amounts of residue from cutting and changes in residue from treatments. Many factors, such as condition of timber stand, topography, logging method, and intensity of utilization, affect the volume of resulting residues. Therefore, users should bear in mind that these series depict only a few of the possible combinations.

To predict residue volumes from planned cutting, the user compares timber volume and size information from cutting plans with this kind of information in the photo series. Selecting a photo series level or levels with similar stand characteristics, the user refers to data sheet loadings, considers factors that differ from the photo series situations, and quantifies the loading expected.

Predicted loadings can be used to support changes in cutting and removal actions and to plan appropriate treatments.

To predict residue changes from treatments, the user studies the treated and untreated levels in the photo series to gain knowledge of relative changes or reductions affected by sample treatments. Then, comparing residue inventory or preharvest prediction information with levels in the series, the user predicts the change a specific treatment may produce.

Predicted change in residue from treatments can aid in (1) identifying treatments that will reduce residues to the desired level, (2) selecting the most cost-effective treatments, and (3) estimating tons that will be consumed by fire or removed in other ways. Improved accuracy in estimating tons consumed by fire will increase the reliability of calculations of emissions from particulates and chemical compounds.

HOW WERE THEY DEVELOPED?

Area Selection and Data Collection

Areas photographed for these series were selected to show typical residue loading variations resulting from commonly applied harvest and cultural practices in selected major vegetative types of the Sierra Nevada. Photos were taken and collected as follows:

1. Areas were photographed and the material in the photo area sampled in accordance with USDA Forest Service national guidelines.[1]

2. Measurements were made in accordance with the "Handbook for Inventorying Downed Woody Material."[2] Specific gravities used for calculating loadings are based on ovendry weights and air-dry volumes.

3. Information about timber stands, logging practices, and residue treatments were obtained from timber sale records in field offices or estimated on the site if such records were not available.

---

[1]U. S. Department of Agriculture, Forest Service. 1975. National fuel classification and inventory system, preliminary draft. 61 p. , illus. Wash. Off., Washington, D. C.

[2]Brown, James K. 1974. Handbook for inventorying downed woody material. USDA For. Serv.Gen. Tech. Rep. INT-16, 24 p., illus. Intermt. For. and Range Exp. Stn., Ogden, Utah.

Assessment of Fire Behavior and Suppression Difficulty

Quantities of dead and down fuel in each photo example were assessed for wildfire spread rate, flame length, and resistance to suppression, based on assumed conditions of 0- to 15-percent slope, 4-percent fine fuel moisture, and 10-miles-per-hour windspeed at 20 feet; procedures used were determined from fuel model scaling tables developed by Dr. David V. Sandberg, and a resistance to suppression matrix developed by Wayne G. Maxwell.[3]

HOW CAN THEY BE SUPPLEMENTED?

If users in the Pacific Southwest find they have important local residue loadings not adequately represented, they can supplement these series or develop additional series by following procedures described in the referenced documents. The series in this publication may be usable, in total or in part, in appropriate vegetative types in other regions.

These series do not show residue loadings in stands undisturbed by cutting activities. Natural residue photo series are being developed for inventorying such areas.

---

[3]Unpublished data on file at Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.

HOW ARE LEVELS IN THESE SERIES CODED?

The data for each level are presented on the page facing the photo. Facing picture and data pages have the same code for the residue situation shown. The code shows:

a.   Order of rank from lightest loading to heavist loading shown in the series of photographs.

b.   Forest type; e.g., MC = mixed conifer, TF = true fir.

c.   Forest size class, where:

   1 = < 5-inch d. b. h.   3 = 12- to 20-inch d. b. h.

   2 = 5- to 11-inch d. b. h.   4 = > 20-inch d. b. h.

d.   Cutting practice, where:

RC = regeneration cut (clearcut, seed tree, shelterwood).

PC = partial cut (tree selection, group selection, overstory removal, understory re-moval, sanitation).

EXAMPLE: 1-MC-4-RC is the first photo in the series for mixed conifer, > 20-inch diameter trees, after harvest by regeneration cutting.

      This report augments published photo series for residue levels in western forest vegetative types.[4]

---

[4]Maxwell, Wayne G., and Franklin R. Ward. 1976. Photo series for quantifying forest residues in the: Coastal Douglas-fir--hemlock type, coastal Douglas-fir--hardwood type. USDA For. Serv. Gen. Tech. Rep. PNW-51, 103 p., illus. Pac. Northwest For. and Range Exp. Stn., Portland, Oreg.

    Maxwell, Wayne G., and Franklin R. Ward. 1976. Photo series for quantifying forest residues in the: Ponderosa pine type, ponderosa pine and associated species type, lodgepole pine type. USDA For. Serv. Gen. Tech. Rep. PNW-52, 73 p., illus. Pac. Northwest For. and Range Exp. Stn., Portland, Oreg.

MIXED CONIFER
SIZE CLASS 4
REGENERATION CUT

A SERIES OF 3 LEVELS

REMINDERS TO USERS:

1. The marker in these photos is 1 foot square, and the pole is painted in contrasting colors at 1-foot intervals to provide perspective.

2. Stumps are not included in residue quantities.

3. Rotted residue is that which would come apart or splinter when kicked.

1-MC-4-RC

DATA SHEET   Residue descriptive code   1-MC-4-RC

LOADING			OTHER MEASUREMENT			
Size class	Weight	Volume	Average residue depth		(feet)	0.1
(inches)	(tons/acre)	Ft^3/acre	Ground area covered by residue ¼-inch diamter and larger		(percent)	61
0.0 – 0.25	0.2	13	Average duff and litter depth		(inches)	0.3
0.26 – 1.0	2.6	174	Sound residue 3.1-inch diameter and larger	Jeffrey pine	(percent)	64
1.1 – 3.0	4.8	385		white fir	(percent)	27
3.1 – 9.0	4.3	360			(percent)	
9.1 – 20.0	2.8	225	Rotted residue 3.1-inch diameter and larger		(percent)	9
20.1+	0	0				
Total	14.7	1,157				

HARVEST INFORMATION			HARVEST INFORMATION SOURCE		ASSESSMENT OF THE FIRE BEHAVIOR AND SUPRESSION DIFFICULTY		
			Sale Records	Onsite estimation			
Gross volume	(M fbm/acre)	18	X		Spread rate	(chains/hour)	0
Net volume	(M fbm/acre)	12	X		Flame length	(Feet)	0
Average stems/acre cut		10		X	Resistance to		
Average d.b.h. of stems cut	(inches)	34		X	Suppression	(chains/man-hour)	3.0
Stand age	(years)	300		X	REMARKS		
Cutting prescription	Shelterwood		X		First entry in old-growth stand.		
Yarding method	Tractor		X				
Slash treatment	Tractor pile & burn		X				
Period since cut or treatment	(months)	22	X				

13

2-MC-4-RC

DATA SHEET Residue descriptive code 2-MC-4-RC

LOADING			OTHER MEASUREMENT			
Size class	Weight	Volume	Average residue depth		(feet)	0.5
(inches)	(tons/acre)	Ft^3/acre	Ground area covered by residue ¼-inch diamter and larger		(percent)	91
0.0 – 0.25	0.4	27	Average duff and litter depth		(inches)	1.4
0.26 – 1.0	5.7	381	Sound residue 3.1-inch diameter and larger	Jeffrey pine	(percent)	75
1.1 – 3.0	11.8	945		white fir	(percent)	21
3.1 – 9.0	8.9	726		other	(percent)	4
9.1 – 20.0	2.7	216	Rotted residue 3.1-inch diameter and larger		(percent)	0
20.1+	6.9	553				
Total	36.4	2,848				

HARVEST INFORMATION			HARVEST INFORMATION SOURCE		ASSESSMENT OF THE FIRE BEHAVIOR AND SUPRESSION DIFFICULTY	
			Sale Records	Onsite estimation		
Gross volume	(M fbm/acre)	22	X		Spread rate (chains/hour)	9
Net volume	(M fbm/acre)	20	X		Flame length (Feet)	6
Average stems/acre cut		54	X		Resistance to	
Average d.b.h. of stems cut	(inches)	24	X		Suppression (chains/man-hour)	1.1
Stand age	(years)	250		X	REMARKS	
Cutting prescription	Clearcut		X		First entry in old-growth stand.	
Yarding method	High-lead		X			
Slash treatment	None		X			
Period since cut or treatment	(months)	7	X			

3-MC-4-RC

DATA SHEET   Residue descriptive code   3-MC-4-RC

LOADING			OTHER MEASUREMENT			
Size class	Weight	Volume	Average residue depth		(feet)	0.9
(inches)	(tons/acre)	Ft^3/acre	Ground area covered by residue ¼-inch diamter and larger		(percent)	87
0.0 – 0.25	0.7	47	Average duff and litter depth		(inches)	2.1
0.26 – 1.0	9.6	641	Sound residue 3.1-inch diameter and larger	white fir	(percent)	38
1.1 – 3.0	21.6	1,731		sugar pine	(percent)	24
3.1 – 9.0	13.7	1,152		other	(percent)	38
9.1 – 20.0	52.4	4,340	Rotted residue 3.1-inch diameter and larger		(percent)	0
20.1+	27.9	2,351				
Total	125.9	10,262				

HARVEST INFORMATION			HARVEST INFORMATION SOURCE		ASSESSMENT OF THE FIRE BEHAVIOR AND SUPRESSION DIFFICULTY	
			Sale Records	Onsite estimation		
Gross volume	(M fbm/acre)	11.4	X	_____	Spread rate (chains/hour)	12
Net volume	(M fbm/acre)	10.1	X	_____	Flame length (Feet)	8
Average stems/acre cut		12	X	_____	Resistance to	
Average d.b.h. of stems cut	(inches)	23	X	_____	Suppression (chains/man-hour)	0.4
Stand age	(years)	150	X	_____	REMARKS	
Cutting prescription	Clearcut		X	_____	Old slash from partial cut prior to this clearcut entry was in evidence.	
Yarding method	Tractor		X	_____		
Slash treatment	None		X	_____		
Period since cut or treatment	(months)	6	X	_____		

17

MIXED CONIFER
SIZE CLASS 4
PARTIAL CUT

A SERIES OF 8 LEVELS

REMINDERS TO USERS:

1. The marker in these photos is 1 foot square, and the pole is painted in contrasting colors at 1-foot intervals to provide perspective.

2. Stumps are not included in residue quantities.

3. Rotted residue is that which would come apart or splinter when kicked.

1-MC-4-PC

DATA SHEET Residue descriptive code 1-MC-4-PC

LOADING			OTHER MEASUREMENT			
Size class	Weight	Volume	Average residue depth		(feet)	0.01
(inches)	(tons/acre)	Ft^3/acre	Ground area covered by residue ¼-inch diamter and larger		(percent)	89
0.0 – 0.25	0.2	13	Average duff and litter depth		(inches)	0.1
0.26 – 1.0	2.0	134	Sound residue 3.1-inch diameter and larger	white fir	(percent)	60
1.1 – 3.0	3.8	304		incense-cedar	(percent)	40
3.1 – 9.0	0.5	42			(percent)	
9.1 – 20.0	0	0	Rotted residue 3.1-inch diameter and larger		(percent)	0
20.1+	0	0				
Total	6.5	493				

HARVEST INFORMATION			HARVEST INFORMATION SOURCE		ASSESSMENT OF THE FIRE BEHAVIOR AND SUPRESSION DIFFICULTY		
			Sale Records	Onsite estimation			
Gross volume	(M fbm/acre)	4.6	X		Spread rate	(chains/hour)	3
Net volume	(M fbm/acre)	4.6	X		Flame length	(Feet)	2
Average stems/acre cut		15	X		Resistance to		
Average d.b.h. of stems cut	(inches)	22	X		Suppression	(chains/man-hour)	6.0
Stand age	(years)	150		X	REMARKS		
Cutting prescription	Tree selection		X				
Yarding method	Tractor		X				
Slash treatment	Machine pile & burn			X			
Period since cut or treatment	(months)	8		X			

2-MC-4-PC

DATA SHEET   Residue descriptive code   2-MC-4-PC

LOADING			OTHER MEASUREMENT			
Size class (inches)	Weight (tons/acre)	Volume Ft^3/acre	Average residue depth		(feet)	0.4
			Ground area covered by residue ¼-inch diamter and larger		(percent)	100
0.0 – 0.25	1.0	67	Average duff and litter depth		(inches)	1.8
0.26 – 1.0	4.1	274	Sound residue 3.1-inch diameter and larger	Douglas-fir	(percent)	43
1.1 – 3.0	8.0	641		incense-cedar	(percent)	34
3.1 – 9.0	9.6	751		other	(percent)	19
9.1 – 20.0	3.9	284	Rotted residue 3.1-inch diameter and larger		(percent)	4
20.1+	0	0				
Total	26.6	2,017				

HARVEST INFORMATION			HARVEST INFORMATION SOURCE		ASSESSMENT OF THE FIRE BEHAVIOR AND SUPRESSION DIFFICULTY		
			Sale Records	Onsite estimation			
Gross volume	(M fbm/acre)	5.8	X		Spread rate	(chains/hour)	3
Net volume	(M fbm/acre)	5.3	X		Flame length	(Feet)	3
Average stems/acre cut		23	X		Resistance to		
Average d.b.h. of stems cut	(inches)	20	X		Suppression	(chains/man-hour)	1.0
Stand age	(years)	150	X		REMARKS		
Cutting prescription	Overstory removal		X		Treated with Hydro-ax machine.		
Yarding method	Rubber tire skidder		X				
Slash treatment	Machine treat[1]		X				
Period since cut or treatment	(months)	8	X				

[1] see remarks.

3-MC-4-PC

DATA SHEET   Residue descriptive code   3-MC-4-PC

LOADING			OTHER MEASUREMENT			
Size class	Weight	Volume	Average residue depth		(feet)	0.2
(inches)	(tons/acre)	Ft^3/acre	Ground area covered by residue ¼-inch diamter and larger		(percent)	36
0.0 – 0.25	0	0	Average duff and litter depth		(inches)	0.6
0.26 – 1.0	0.4	27	Sound residue 3.1-inch diameter and larger	incense-cedar	(percent)	25
1.1 – 3.0	3.1	248		sugar pine	(percent)	16
3.1 – 9.0	8.9	766		other	(percent)	19
9.1 – 20.0	12.2	1,140	Rotted residue 3.1-inch diameter and larger		(percent)	40
20.1+	4.0	427				
Total	28.6	2,608				

HARVEST INFORMATION			HARVEST INFORMATION SOURCE		ASSESSMENT OF THE FIRE BEHAVIOR AND SUPRESSION DIFFICULTY	
			Sale Records	Onsite estimation		
Gross volume	(M fbm/acre)	35	x		Spread rate (chains/hour)	0
Net volume	(M fbm/acre)	33.5	x		Flame length (Feet)	0
Average stems/acre cut		32	x		Resistance to	
Average d.b.h. of stems cut	(inches)	22	x		Suppression (chains/man-hour)	2.4
Stand age	(years)	250		x	REMARKS	
Cutting prescription	Group selection		x		First entry in old-growth stand.	
Yarding method	Skyline		x			
Slash treatment	YUM[1] & underburn		x			
Period since cut or treatment	(months)	<1	x			

[1] Required yarding unmerchantable material (YUM) down to 8-inch diameter, small end, and 10-foot length.

4-MC-4-PC

DATA SHEET   Residue descriptive code   4-MC-4-PC

LOADING			OTHER MEASUREMENT			
Size class	Weight	Volume	Average residue depth		(feet)	1.1
(inches)	(tons/acre)	Ft³/acre	Ground area covered by residue ¼-inch diamter and larger		(percent)	91
0.0 – 0.25	0.8	53	Average duff and litter depth		(inches)	1.7
0.26 – 1.0	4.0	267	Sound residue 3.1-inch diameter and larger	white fir	(percent)	38
1.1 – 3.0	6.2	497		Douglas-fir	(percent)	18
3.1 – 9.0	14.7	1,071		other	(percent)	36
9.1 – 20.0	8.9	724	Rotted residue 3.1-inch diameter and larger		(percent)	8
20.1+	3.6	296				
Total	38.2	2,908				

HARVEST INFORMATION			HARVEST INFORMATION SOURCE		ASSESSMENT OF THE FIRE BEHAVIOR AND SUPRESSION DIFFICULTY		
			Sale Records	Onsite estimation			
Gross volume	(M fbm/acre)	24	x		Spread rate	(chains/hour)	7
Net volume	(M fbm/acre)	22	x		Flame length	(Feet)	4
Average stems/acre cut		15	x		Resistance to		
Average d.b.h. of stems cut	(inches)	24	x		Suppression	(chains/man-hour)	1.2
Stand age	(years)	200+	x		REMARKS		
Cutting prescription	Overstory removal		x		Much old, treated slash on ground from prior sales.		
Yarding method	Tractor		x				
Slash treatment	None		x				
Period since cut or treatment	(months)	12	x				

27

5-MC-4-PC

DATA SHEET   Residue descriptive code   5-MC-4-PC

LOADING			OTHER MEASUREMENT			
Size class	Weight	Volume	Average residue depth		(feet)	0.1
(inches)	(tons/acre)	Ft^3/acre	Ground area covered by residue ¼-inch diamter and larger		(percent)	69
0.0 – 0.25	0.5	33	Average duff and litter depth		(inches)	0.3
0.26 – 1.0	5.3	354	Sound residue 3.1-inch diameter and larger	incense-cedar	(percent)	85
1.1 – 3.0	12.0	962		ponderosa pine	(percent)	15
3.1 – 9.0	12.9	1,113			(percent)	
9.1 – 20.0	10.8	915	Rotted residue 3.1-inch diameter and larger		(percent)	0
20.1+	0	0				
Total	41.5	3,377				

HARVEST INFORMATION			HARVEST INFORMATION SOURCE		ASSESSMENT OF THE FIRE BEHAVIOR AND SUPRESSION DIFFICULTY		
			Sale Records	Onsite estimation			
Gross volume	(M fbm/acre)	5.8	x		Spread rate	(chains/hour)	9
Net volume	(M fbm/acre)	5.8	x		Flame length	(Feet)	6
Average stems/acre cut		7	x		Resistance to		
Average d.b.h. of stems cut	(inches)	26	x		Suppression	(chains/man-hour)	0.9
Stand age	(years)	100		x	REMARKS		
Cutting prescription	Tree selection		x				
Yarding method	Tractor		x				
Slash treatment	None		x				
Period since cut or treatment	(months)	8		x			

6-MC-4-PC

DATA SHEET   Residue descriptive code   6-MC-4-PC

LOADING			OTHER MEASUREMENT		
Size class	Weight	Volume	Average residue depth	(feet)	0.4
(inches)	(tons/acre)	Ft^3/acre	Ground area covered by residue ¼-inch diamter and larger	(percent)	97
0.0 – 0.25	1.6	107	Average duff and litter depth	(inches)	0.4
0.26 – 1.0	8.7	581	Sound residue 3.1-inch diameter and larger white fir	(percent)	54
1.1 – 3.0	6.1	489	incense-cedar	(percent)	24
3.1 – 9.0	20.5	1,772		(percent)	
9.1 – 20.0	6.9	632	Rotted residue 3.1-inch diameter and larger	(percent)	22
20.1+	0	0			
Total	43.8	3,581			

HARVEST INFORMATION			HARVEST INFORMATION SOURCE		ASSESSMENT OF THE FIRE BEHAVIOR AND SUPRESSION DIFFICULTY		
			Sale Records	Onsite estimation			
Gross volume	(M fbm/acre)	23	x		Spread rate	(chains/hour)	10
Net volume	(M fbm/acre)	20.5	x		Flame length	(Feet)	6
Average stems/acre cut		34	x		Resistance to		
Average d.b.h. of stems cut	(inches)	26	x		Suppression	(chains/man-hour)	0.7
Stand age	(years)	100		x	REMARKS		
Cutting prescription	Tree selection		x		Some old, untreated slash on ground from cutting prior to recent sale.		
Yarding method	Tractor		x				
Slash treatment	None		x				
Period since cut or treatment	(months)	36	x				

31

7-MC-4-PC

DATA SHEET   Residue descriptive code   7-MC-4-PC

LOADING			OTHER MEASUREMENT			
Size class	Weight	Volume	Average residue depth		(feet)	0.3
(inches)	(tons/acre)	Ft^3/acre	Ground area covered by residue ¼-inch diamter and larger		(percent)	67
0.0 – 0.25	0.6	40	Average duff and litter depth		(inches)	2.4
0.26 – 1.0	6.7	447	Sound residue 3.1-inch diameter and larger	incense-cedar	(percent)	52
1.1 – 3.0	10.8	865		white fir	(percent)	45
3.1 – 9.0	3.7	254		other	(percent)	3
9.1 – 20.0	8.0	693	Rotted residue 3.1-inch diameter and larger		(percent)	0
20.1+	21.2	1,774				
Total	51.0	4,073				

HARVEST INFORMATION			HARVEST INFORMATION SOURCE		ASSESSMENT OF THE FIRE BEHAVIOR AND SUPRESSION DIFFICULTY		
			Sale Records	Onsite estimation			
Gross volume	(M fbm/acre)	27		x	Spread rate	(chains/hour)	9
Net volume	(M fbm/acre)	23		x	Flame length	(Feet)	6
Average stems/acre cut		30		x	Resistance to		
Average d.b.h. of stems cut	(inches)	28		x	Suppression	(chains/man-hour)	0.6
Stand age	(years)	250		x	REMARKS		
Cutting prescription	Tree selection			x			
Yarding method	Tractor			x			
Slash treatment	None			x			
Period since cut or treatment	(months)	12		x			

8-MC-4-PC

DATA SHEET   Residue descriptive code   8-MC-4-PC

LOADING			OTHER MEASUREMENT			
Size class	Weight	Volume	Average residue depth		(feet)	1.0
(inches)	(tons/acre)	Ft^3/acre	Ground area covered by residue ¼-inch diamter and larger		(percent)	95
0.0 – 0.25	1.0	67	Average duff and litter depth		(inches)	1.0
0.26 – 1.0	5.9	394	Sound residue 3.1-inch diameter and larger	Douglas-fir	(percent)	68
1.1 – 3.0	7.9	633		ponderosa pine	(percent)	4
3.1 – 9.0	22.9	1,741		other	(percent)	1
9.1 – 20.0	7.3	647	Rotted residue 3.1-inch diameter and larger		(percent)	27
20.1+	16.5	1,102				
Total	61.5	4,584				

HARVEST INFORMATION			HARVEST INFORMATION SOURCE		ASSESSMENT OF THE FIRE BEHAVIOR AND SUPRESSION DIFFICULTY		
			Sale Records	Onsite estimation			
Gross volume	(M fbm/acre)	5.5		x	Spread rate	(chains/hour)	9
Net volume	(M fbm/acre)	4.8		x	Flame length	(Feet)	5
Average stems/acre cut		24	x		Resistance to		
Average d.b.h. of stems cut	(inches)	17	x		Suppression	(chains/man-hour)	0.7
Stand age	(years)	80	x		REMARKS		
Cutting prescription	Tree selection		x		Some old, large residue from early cutting existed on this site prior to recent cutting.		
Yarding method	Tractor		x				
Slash treatment	None		x				
Period since cut or treatment	(months)	12	x				

35

MIXED CONIFER
SIZE CLASS 3
PARTIAL CUT

A SERIES OF 8 LEVELS

REMINDERS TO USERS:

1. The marker in these photos is 1 foot square, and the pole is painted in contrasting colors at 1-foot intervals to provide perspective.

2. Stumps are not included in residue quantities.

3. Rotted residue is that which would come apart or splinter when kicked.

1-MC-3-PC

DATA SHEET   Residue descriptive code   1-MC-3-PC

LOADING			OTHER MEASUREMENT		
Size class	Weight	Volume	Average residue depth	(feet)	0.1
(inches)	(tons/acre)	Ft³/acre	Ground area covered by residue ¼-inch diamter and larger	(percent)	88
0.0 – 0.25	0.2	13	Average duff and litter depth	(inches)	0.8
0.26 – 1.0	1.9	127	Sound residue 3.1-inch diameter and larger incense-cedar	(percent)	100
1.1 – 3.0	0.8	64		(percent)	
3.1 – 9.0	0.4	35		(percent)	
9.1 – 20.0	1.1	95	Rotted residue 3.1-inch diameter and larger	(percent)	0
20.1+	0	0			
Total	4.4	334			

HARVEST INFORMATION			HARVEST INFORMATION SOURCE		ASSESSMENT OF THE FIRE BEHAVIOR AND SUPRESSION DIFFICULTY		
			Sale Records	Onsite estimation			
Gross volume	(M fbm/acre)	3.9		x	Spread rate	(chains/hour)	4
Net volume	(M fbm/acre)	3.8		x	Flame length	(Feet)	2
Average stems/acre cut		30		x	Resistance to		
Average d.b.h. of stems cut	(inches)	15		x	Suppression	(chains/man-hour)	6.0
Stand age	(years)	80		x	REMARKS		
Cutting prescription	Tree selection			x	General marking on this sale was to cut all stems over 10-inch d.b.h.		
Yarding method	Tractor			x			
Slash treatment	Hand piled & burned			x			
Period since cut or treatment	(months)	30		x			

2-MC-3-PC

DATA SHEET   Residue descriptive code   2-MC-3-PC

LOADING			OTHER MEASUREMENT			
Size class	Weight	Volume	Average residue depth		(feet)	0.4
(inches)	(tons/acre)	Ft^3/acre	Ground area covered by residue ¼-inch diamter and larger		(percent)	85
0.0 – 0.25	0.2	13	Average duff and litter depth		(inches)	1.1
0.26 – 1.0	2.8	187	Sound residue 3.1-inch diameter and larger	ponderosa pine	(percent)	43
1.1 – 3.0	3.1	248		Jeffrey pine	(percent)	39
3.1 – 9.0	4.9	413		incense-cedar	(percent)	3
9.1 – 20.0	1.2	96	Rotted residue 3.1-inch diameter and larger		(percent)	15
20.1+	0	0				
Total	12.2	957				

HARVEST INFORMATION			HARVEST INFORMATION SOURCE		ASSESSMENT OF THE FIRE BEHAVIOR AND SUPRESSION DIFFICULTY	
			Sale Records	Onsite estimation		
Gross volume	(M fbm/acre)	6.5		x	Spread rate (chains/hour)	12
Net volume	(M fbm/acre)	6.3		x	Flame length (Feet)	6
Average stems/acre cut		50		x	Resistance to	2.0
Average d.b.h. of stems cut	(inches)	15		x	Suppression (chains/man-hour)	
Stand age	(years)	80		x	REMARKS	
Cutting prescription	Tree selection			x	General marking rule on this sale was to cut all stems over 10-inch d.b.h.	
Yarding method	Tractor			x		
Slash treatment	None			x		
Period since cut or treatment	(months)	24	x			

3-MC-3-PC

DATA SHEET   Residue descriptive code   3-MC-3-PC

LOADING			OTHER MEASUREMENT			
Size class	Weight	Volume	Average residue depth		(feet)	0.2
(inches)	(tons/acre)	Ft^3/acre	Ground area covered by residue ¼-inch diamter and larger		(percent)	69
0.0 – 0.25	0.4	27	Average duff and litter depth		(inches)	0.8
0.26 – 1.0	2.6	174	Sound residue 3.1-inch diameter and larger	black oak	(percent)	65
1.1 – 3.0	5.1	409		incense-cedar	(percent)	25
3.1 – 9.0	6.9	417		ponderosa pine	(percent)	10
9.1 – 20.0	0	0	Rotted residue 3.1-inch diameter and larger		(percent)	0
20.1+	0	0				
Total	15.0	1,027				

HARVEST INFORMATION			HARVEST INFORMATION SOURCE		ASSESSMENT OF THE FIRE BEHAVIOR AND SUPRESSION DIFFICULTY		
			Sale Records	Onsite estimation			
Gross volume	(M fbm/acre)	6.7		x	Spread rate	(chains/hour)	5
Net volume	(M fbm/acre)	6.5	x		Flame length	(Feet)	3
Average stems/acre cut		19	x		Resistance to		
Average d.b.h. of stems cut	(inches)	20	x		Suppression	(chains/man-hour)	2.4
Stand age	(years)	90	x		REMARKS		
Cutting prescription	Tree selection		x				
Yarding method	Tractor		x				
Slash treatment	Lop & scatter; spot burn		x				
Period since cut or treatment	(months)	10	x				

4-MC-3-PC

DATA SHEET   Residue descriptive code   4-MC-3-PC

LOADING			OTHER MEASUREMENT		
Size class	Weight	Volume	Average residue depth	(feet)	0.3
(inches)	(tons/acre)	Ft³/acre	Ground area covered by residue ¼-inch diamter and larger	(percent)	91
0.0 – 0.25	0.5	33	Average duff and litter depth	(inches)	1.2
0.26 – 1.0	4.4	294	Sound residue 3.1-inch diameter and larger ponderosa pine	(percent)	67
1.1 – 3.0	4.0	321	Douglas-fir	(percent)	12
3.1 – 9.0	6.1	498		(percent)	
9.1 – 20.0	1.4	120	Rotted residue 3.1-inch diameter and larger	(percent)	21
20.1+	0	0			
Total	16.4	1,266			

HARVEST INFORMATION			HARVEST INFORMATION SOURCE		ASSESSMENT OF THE FIRE BEHAVIOR AND SUPRESSION DIFFICULTY		
			Sale Records	Onsite estimation			
Gross volume	(M fbm/acre)	12.5	x		Spread rate	(chains/hour)	7
Net volume	(M fbm/acre)	12.5	x		Flame length	(Feet)	4
Average stems/acre cut		28	x		Resistance to		
Average d.b.h. of stems cut	(inches)	19	x		Suppression	(chains/man-hour)	2.0
Stand age	(years)	60	x		REMARKS		
Cutting prescription	Tree selection		x				
Yarding method	Tractor		x				
Slash treatment	Lop & scatter		x				
Period since cut or treatment	(months)	12	x				

5-MC-3-PC

DATA SHEET   Residue descriptive code   5-MC-3-PC

LOADING			OTHER MEASUREMENT			
Size class	Weight	Volume	Average residue depth		(feet)	0.6
(inches)	(tons/acre)	Ft^3/acre	Ground area covered by residue ¼-inch diamter and larger		(percent)	87
0.0 – 0.25	0.3	20	Average duff and litter depth		(inches)	1.1
0.26 – 1.0	2.6	174	Sound residue 3.1-inch diameter and larger	Jeffrey pine	(percent)	89
1.1 – 3.0	4.4	353		white fir	(percent)	7
3.1 – 9.0	7.0	566		incense-cedar	(percent)	4
9.1 – 20.0	5.6	449	Rotted residue 3.1-inch diameter and larger		(percent)	0
20.1+	0	0				
Total	19.9	1,562				

HARVEST INFORMATION			HARVEST INFORMATION SOURCE		ASSESSMENT OF THE FIRE BEHAVIOR AND SUPRESSION DIFFICULTY		
			Sale Records	Onsite estimation			
Gross volume	(M fbm/acre)	8.6		x	Spread rate	(chains/hour)	13
Net volume	(M fbm/acre)	8.4		x	Flame length	(Feet)	6
Average stems/acre cut		60		x	Resistance to		
Average d.b.h. of stems cut	(inches)	15		x	Suppression	(chains/man-hour)	1.7
Stand age	(years)	80		x	REMARKS		
Cutting prescription	Tree selection			x	General marking rule on this sale was to cut all stems over 10-inch d.b.h.		
Yarding method	Tractor			x			
Slash treatment	None			x			
Period since cut or treatment	(months)	30	x				

47

6-MC-3-PC

DATA SHEET Residue descriptive code 6-MC-3-PC

	LOADING		OTHER MEASUREMENT		
Size class	Weight	Volume	Average residue depth	(feet)	0.6
(inches)	(tons/acre)	Ft³/acre	Ground area covered by residue ¼-inch diamter and larger	(percent)	100
0.0 – 0.25	0.1	7	Average duff and litter depth	(inches)	3.4
0.26 – 1.0	2.3	154	Sound residue 3.1-inch diameter and larger ponderosa pine	(percent)	45
1.1 – 3.0	3.0	240		(percent)	
3.1 – 9.0	10.9	978		(percent)	
9.1 – 20.0	2.0	192	Rotted residue 3.1-inch diameter and larger	(percent)	55
20.1+	2.1	224			
Total	20.4	1,795			

HARVEST INFORMATION			HARVEST INFORMATION SOURCE		ASSESSMENT OF THE FIRE BEHAVIOR AND SUPRESSION DIFFICULTY	
			Sale Records	Onsite estimation		
Gross volume	(M fbm/acre)	*			Spread rate (chains/hour)	5
Net volume	(M fbm/acre)	*			Flame length (Feet)	3
Average stems/acre cut		100		x	Resistance to	
Average d.b.h. of stems cut	(inches)	6		x	Suppression (chains/man-hour)	1.3
Stand age	(years)	90		x	REMARKS	
Cutting prescription	Understory removal[1]			x	Understory removed by precommercial thinning.	
Yarding method				x		
Slash treatment	Broadcast burn			x		
Period since cut or treatment	(months)	60		x		

[1]See remarks

49

7-MC-3-PC

DATA SHEET   Residue descriptive code   7-MC-3-PC

LOADING			OTHER MEASUREMENT			
Size class	Weight	Volume	Average residue depth		(feet)	0.6
(inches)	(tons/acre)	Ft^3/acre	Ground area covered by residue ¼-inch diamter and larger		(percent)	83
0.0 – 0.25	0.8	53	Average duff and litter depth		(inches)	0.8
0.26 – 1.0	7.2	481	Sound residue 3.1-inch diameter and larger	ponderosa pine	(percent)	36
1.1 – 3.0	7.5	601		black oak	(percent)	17
3.1 – 9.0	6.9	491			(percent)	
9.1 – 20.0	3.2	342	Rotted residue 3.1-inch diameter and larger		(percent)	47
20.1+	0	0				
Total	25.6	1,968				

HARVEST INFORMATION			HARVEST INFORMATION SOURCE		ASSESSMENT OF THE FIRE BEHAVIOR AND SUPRESSION DIFFICULTY		
			Sale Records	Onsite estimation			
Gross volume	(M fbm/acre)	12.5	x	———	Spread rate	(chains/hour)	9
Net volume	(M fbm/acre)	12.5	x	———	Flame length	(Feet)	6
Average stems/acre cut		28	x	———	Resistance to		
Average d.b.h. of stems cut	(inches)	19	x	———	Suppression	(chains/man-hour)	0.9
Stand age	(years)	60	x	———	REMARKS		
Cutting prescription	Tree selection		x	———			
Yarding method	Tractor		x	———			
Slash treatment	None		x	———			
Period since cut or treatment	(months)	12	x	———			

8-MC-3-PC

DATA SHEET   Residue descriptive code   8-MC-3-PC

LOADING			OTHER MEASUREMENT			
Size class	Weight	Volume	Average residue depth		(feet)	0.3
(inches)	(tons/acre)	Ft^3/acre	Ground area covered by residue ¼-inch diamter and larger		(percent)	57
0.0 – 0.25	0.2	13	Average duff and litter depth		(inches)	0.4
0.26 – 1.0	1.8	120	Sound residue 3.1-inch diameter and larger	ponderosa pine	(percent)	58
1.1 – 3.0	3.7	296		incense-cedar	(percent)	16
3.1 – 9.0	13.3	1,127		white fir	(percent)	5
9.1 – 20.0	20.7	1,761	Rotted residue 3.1-inch diameter and larger		(percent)	21
20.1+	13.6	1,202				
Total	53.3	4,519				

HARVEST INFORMATION			HARVEST INFORMATION SOURCE		ASSESSMENT OF THE FIRE BEHAVIOR AND SUPRESSION DIFFICULTY		
			Sale Records	Onsite estimation			
Gross volume	(M fbm/acre)	7.5		x	Spread rate	(chains/hour)	0
Net volume	(M fbm/acre)	6.5	x		Flame length	(Feet)	0
Average stems/acre cut		19	x		Resistance to		
Average d.b.h. of stems cut	(inches)	20	x		Suppression	(chains/man-hour)	1.5
Stand age	(years)	90	x		REMARKS		
Cutting prescription	Tree selection		x				
Yarding method	Tractor		x				
Slash treatment	Broadcast burn		x				
Period since cut or treatment	(months)	2	x				

53

TRUE FIR
SIZE CLASS 4
REGENERATION CUT

A SERIES OF 6 LEVELS

REMINDERS TO USERS:

1. The marker in these photos is 1 foot square, and the pole is painted in contrasting colors at 1-foot intervals to provide perspective.

2. Stumps are not included in residue quantities.

3. Rotted residue is that which would come apart or splinter when kicked.

1-TF-4-RC

DATA SHEET   Residue descriptive code   1-TF-4-RC

LOADING			OTHER MEASUREMENT		
Size class	Weight	Volume	Average residue depth	(feet)	0.1
(inches)	(tons/acre)	Ft^3/acre	Ground area covered by residue ¼-inch diamter and larger	(percent)	68
0.0 – 0.25	0.2	13	Average duff and litter depth	(inches)	0.2
0.26 – 1.0	1.1	73	Sound residue 3.1-inch diameter and larger red fir	(percent)	100
1.1 – 3.0	2.9	232		(percent)	
3.1 – 9.0	0.4	34		(percent)	
9.1 – 20.0	0	0	Rotted residue 3.1-inch diameter and larger	(percent)	0
20.1+	0	0			
Total	4.6	352			

HARVEST INFORMATION			HARVEST INFORMATION SOURCE		ASSESSMENT OF THE FIRE BEHAVIOR AND SUPRESSION DIFFICULTY		
			Sale Records	Onsite estimation			
Gross volume	(M fbm/acre)	30		x	Spread rate	(chains/hour)	0
Net volume	(M fbm/acre)	28		x	Flame length	(Feet)	0
Average stems/acre cut		32		x	Resistance to		
Average d.b.h. of stems cut	(inches)	25	x		Suppression	(chains/man-hour)	12
Stand age	(years)	150	x		REMARKS		
Cutting prescription	Shelterwood		x				
Yarding method	Tractor		x				
Slash treatment	Broadcast burn		x				
Period since cut or treatment	(months)	24	x				

57

2-TF-4-RC

DATA SHEET   Residue descriptive code   2-TF-4-RC

LOADING			OTHER MEASUREMENT		
Size class	Weight	Volume	Average residue depth	(feet)	0.1
(inches)	(tons/acre)	Ft³/acre	Ground area covered by residue ¼-inch diamter and larger	(percent)	93
0.0 – 0.25	0.3	20	Average duff and litter depth	(inches)	0.6
0.26 – 1.0	1.4	93	Sound residue 3.1-inch diameter and larger grand fir	(percent)	100
1.1 – 3.0	3.8	304		(percent)	
3.1 – 9.0	1.4	121		(percent)	
9.1 – 20.0	0	0	Rotted residue 3.1-inch diameter and larger	(percent)	0
20.1+	0	0			
Total	6.9	538			

HARVEST INFORMATION			HARVEST INFORMATION SOURCE		ASSESSMENT OF THE FIRE BEHAVIOR AND SUPRESSION DIFFICULTY		
			Sale Records	Onsite estimation			
Gross volume	(M fbm/acre)	14		x	Spread rate	(chains/hour)	0
Net volume	(M fbm/acre)	13		x	Flame length	(Feet)	0
Average stems/acre cut		15		x	Resistance to		
Average d.b.h. of stems cut	(inches)	25	x		Suppression	(chains/man-hour)	6.0
Stand age	(years)	150	x		REMARKS		
Cutting prescription	Shelterwood		x		Complete history of this site not known, but it appeared that at least two entries had been made prior to the shelterwood cut.		
Yarding method	Tractor		x				
Slash treatment	Machine pile & burn		x				
Period since cut or treatment	(months)	24	x				

59

3-TF-4-RC

DATA SHEET   Residue descriptive code   3-TF-4-RC

LOADING			OTHER MEASUREMENT		
Size class	Weight	Volume	Average residue depth	(feet)	0.4
(inches)	(tons/acre)	Ft^3/acre	Ground area covered by residue ¼-inch diamter and larger	(percent)	100
0.0 – 0.25	0.3	20	Average duff and litter depth	(inches)	0.7
0.26 – 1.0	3.6	240	Sound residue 3.1-inch diameter and larger red fir	(percent)	84
1.1 – 3.0	12.1	970		(percent)	
3.1 – 9.0	6.4	560		(percent)	
9.1 – 20.0	4.1	357	Rotted residue 3.1-inch diameter and larger	(percent)	16
20.1+	0	0			
Total	26.5	2,147			

HARVEST INFORMATION			HARVEST INFORMATION SOURCE		ASSESSMENT OF THE FIRE BEHAVIOR AND SUPRESSION DIFFICULTY	
			Sale Records	Onsite estimation		
Gross volume	(M fbm/acre)	40		x	Spread rate (chains/hour)	2
Net volume	(M fbm/acre)	38		x	Flame length (Feet)	3
Average stems/acre cut		36		x	Resistance to	
Average d.b.h. of stems cut	(inches)	25	x		Suppression (chains/man-hour)	1.3
Stand age	(years)	150	x		REMARKS	
Cutting prescription	Shelterwood		x		Treated with Trackmac machine	
Yarding method	Tractor		x			
Slash treatment	YUM[1] & machine treat[2]		x			
Period since cut or treatment	(months)		x			

[1]Required yarding unmerchantable material (YUM) down to 10-inch diameter, small end, and 10-foot length.
[2]See remarks

61

4-TF-4-RC

DATA SHEET   Residue descriptive code   4-TF-4-RC

LOADING			OTHER MEASUREMENT			
Size class (inches)	Weight (tons/acre)	Volume Ft^3/acre	Average residue depth		(feet)	0.3
			Ground area covered by residue ¼-inch diamter and larger		(percent)	88
0.0 – 0.25	0.9	60	Average duff and litter depth		(inches)	0.4
0.26 – 1.0	5.3	354	Sound residue 3.1-inch diameter and larger	white fir	(percent)	83
1.1 – 3.0	4.6	369			(percent)	
3.1 – 9.0	15.8	1,338			(percent)	
9.1 – 20.0	2.1	195	Rotted residue 3.1-inch diameter and larger		(percent)	17
20.1+	0	0				
Total	28.7	2,316				

HARVEST INFORMATION			HARVEST INFORMATION SOURCE		ASSESSMENT OF THE FIRE BEHAVIOR AND SUPRESSION DIFFICULTY	
			Sale Records	Onsite estimation		
Gross volume	(M fbm/acre)	36		x	Spread rate (chains/hour)	5
Net volume	(M fbm/acre)	33		x	Flame length (Feet)	4
Average stems/acre cut		34	x		Resistance to	
Average d.b.h. of stems cut	(inches)	26	x		Suppression (chains/man-hour)	1.1
Stand age	(years)	200		x	REMARKS	
Cutting prescription	Tree selection		x			
Yarding method	Tractor		x			
Slash treatment	Burned concentrations			x		
Period since cut or treatment	(months)	18		x		

63

5-TF-4-RC

DATA SHEET   Residue descriptive code   5-TF-4-RC

LOADING			OTHER MEASUREMENT			
Size class	Weight	Volume	Average residue depth		(feet)	0.2
(inches)	(tons/acre)	Ft^3/acre	Ground area covered by residue ¼-inch diamter and larger		(percent)	95
0.0 – 0.25	0.2	13	Average duff and litter depth		(inches)	0.7
0.26 – 1.0	2.0	134	Sound residue 3.1-inch diameter and larger	red fir	(percent)	86
1.1 – 3.0	4.8	385		western white pine	(percent)	2
3.1 – 9.0	11.0	945			(percent)	
9.1 – 20.0	10.4	911	Rotted residue 3.1-inch diameter and larger		(percent)	12
20.1+	3.1	261				
Total	31.5	2,649				

HARVEST INFORMATION			HARVEST INFORMATION SOURCE		ASSESSMENT OF THE FIRE BEHAVIOR AND SUPRESSION DIFFICULTY		
			Sale Records	Onsite estimation			
Gross volume	(M fbm/acre)	12		x	Spread rate	(chains/hour)	5
Net volume	(M fbm/acre)	11		x	Flame length	(Feet)	3
Average stems/acre cut		10		x	Resistance to		
Average d.b.h. of stems cut	(inches)	25	x		Suppression	(chains/man-hour)	2.0
Stand age	(years)	200		x	REMARKS		
Cutting prescription	Shlterwood		x		Entry prior to this cut had left much large, untreated residue.		
Yarding method	Tractor		x				
Slash treatment	Lop to 25-inch height		x				
Period since cut or treatment	(months)	24	x				

6-TF-4-RC

DATA SHEET   Residue descriptive code 6-TF-4-RC

LOADING			OTHER MEASUREMENT			
Size class	Weight	Volume	Average residue depth		(feet)	0.7
(inches)	(tons/acre)	Ft^3/acre	Ground area covered by residue ¼-inch diamter and larger		(percent)	92
0.0 – 0.25	1.6	107	Average duff and litter depth		(inches)	0.2
0.26 – 1.0	6.3	421	Sound residue 3.1-inch diameter and larger	white fir	(percent)	48
1.1 – 3.0	6.2	497		incense-cedar	(percent)	4
3.1 – 9.0	16.2	1,372			(percent)	
9.1 – 20.0	28.1	2,499	Rotted residue 3.1-inch diameter and larger		(percent)	48
20.1+	25.6	2,604				
Total	84.0	7,500				

HARVEST INFORMATION			HARVEST INFORMATION SOURCE		ASSESSMENT OF THE FIRE BEHAVIOR AND SUPRESSION DIFFICULTY		
			Sale Records	Onsite estimation			
Gross volume	(M fbm/acre)	40		x	Spread rate	(chains/hour)	8
Net volume	(M fbm/acre)	35		x	Flame length	(Feet)	5
Average stems/acre cut		43	x		Resistance to		
Average d.b.h. of stems cut	(inches)	24	x		Suppression	(chains/man-hour)	0.7
Stand age	(years)	150		x	REMARKS		
Cutting prescription	Clearcut		x				
Yarding method	Tractor		x				
Slash treatment	None		x				
Period since cut or treatment	(months)	15	x				

TRUE FIR
SIZE CLASS 4
PARTIAL CUT

A SERIES OF 5 LEVELS

REMINDERS TO USERS:

1. The marker in these photos is 1 foot square, and the pole is painted in contrasting colors at 1-foot intervals to provide perspective.

2. Stumps are not included in residue quantities.

3. Rotted residue is that which would come apart or splinter when kicked.

1-TF-4-PC

DATA SHEET   Residue descriptive code   1-TF-4-PC

LOADING			OTHER MEASUREMENT		
Size class	Weight	Volume	Average residue depth	(feet)	0.4
(inches)	(tons/acre)	Ft^3/acre	Ground area covered by residue ¼-inch diamter and larger	(percent)	95
0.0 – 0.25	0.5	33	Average duff and litter depth	(inches)	0.5
0.26 – 1.0	2.2	147	Sound residue 3.1-inch diameter and larger red fir	(percent)	93
1.1 – 3.0	6.3	505		(percent)	
3.1 – 9.0	7.3	627		(percent)	
9.1 – 20.0	1.3	110	Rotted residue 3.1-inch diameter and larger	(percent)	7
20.1+	0	0			
Total	17.6	1,422			

HARVEST INFORMATION			HARVEST INFORMATION SOURCE		ASSESSMENT OF THE FIRE BEHAVIOR AND SUPRESSION DIFFICULTY		
			Sale Records	Onsite estimation			
Gross volume	(M fbm/acre)	30		x	Spread rate	(chains/hour)	3
Net volume	(M fbm/acre)	29		x	Flame length	(Feet)	2
Average stems/acre cut		32		x	Resistance to		
Average d.b.h. of stems cut	(inches)	25	x		Suppression	(chains/man-hour)	3.0
Stand age	(years)	150		x	REMARKS		
Cutting prescription	Group selection			x			
Yarding method	Tractor		x				
Slash treatment	Lop to 25-inch height		x				
Period since cut or treatment	(months)	24	x				

71

2-TF-4-PC

DATA SHEET   Residue descriptive code   2-TF-4-PC

LOADING			OTHER MEASUREMENT			
Size class	Weight	Volume	Average residue depth		(feet)	0.3
(inches)	(tons/acre)	Ft^3/acre	Ground area covered by residue ¼-inch diamter and larger		(percent)	97
0.0 – 0.25	0.3	20	Average duff and litter depth		(inches)	2.0
0.26 – 1.0	2.1	140	Sound residue 3.1-inch diameter and larger	white fir	(percent)	27
1.1 – 3.0	3.5	280		ponderosa pine	(percent)	33
3.1 – 9.0	8.9	765		other	(percent)	12
9.1 – 20.0	3.9	403	Rotted residue 3.1-inch diameter and larger		(percent)	28
20.1+	6.0	481				
Total	24.7	2,089				

HARVEST INFORMATION			HARVEST INFORMATION SOURCE		ASSESSMENT OF THE FIRE BEHAVIOR AND SUPRESSION DIFFICULTY		
			Sale Records	Onsite estimation			
Gross volume	(M fbm/acre)	4.5		x	Spread rate	(chains/hour)	5
Net volume	(M fbm/acre)	4.0		x	Flame length	(Feet)	3
Average stems/acre cut		2	x		Resistance to		
Average d.b.h. of stems cut	(inches)	44	x		Suppression	(chains/man-hour)	1.7
Stand age	(years)	250	x		REMARKS		
Cutting prescription	Tree selection		x				
Yarding method	Tractor		x				
Slash treatment	YUM[1]			x			
Period since cut or treatment	(months)	14	x				

[1]Required yarding unmerchantable material (YUM) down to 10-inch diameter, small end, and 10-foot length.

3-TF-4-PC

DATA SHEET   Residue descriptive code   3-TF-4-PC

LOADING			OTHER MEASUREMENT		
Size class	Weight	Volume	Average residue depth	(feet)	0.4
(inches)	(tons/acre)	Ft³/acre	Ground area covered by residue ¼-inch diamter and larger	(percent)	100
0.0 – 0.25	1.2	80	Average duff and litter depth	(inches)	1.8
0.26 – 1.0	4.1	274	Sound residue 3.1-inch diameter and larger red fir	(percent)	57
1.1 – 3.0	6.6	529	white fir	(percent)	26
3.1 – 9.0	10.6	909	ponderosa pine	(percent)	2
9.1 – 20.0	12.7	1,113	Rotted residue 3.1-inch diameter and larger	(percent)	15
20.1+	3.8	321			
Total	39.0	3,226			

HARVEST INFORMATION			HARVEST INFORMATION SOURCE		ASSESSMENT OF THE FIRE BEHAVIOR AND SUPRESSION DIFFICULTY		
			Sale Records	Onsite estimation			
Gross volume	(M fbm/acre)	22		x	Spread rate	(chains/hour)	7
Net volume	(M fbm/acre)	18		x	Flame length	(Feet)	4
Average stems/acre cut		11	x		Resistance to		
Average d.b.h. of stems cut	(inches)	30	x		Suppression	(chains/man-hour)	1.5
Stand age	(years)	250	x		REMARKS		
Cutting prescription	Group selection		x				
Yarding method	Tractor		x				
Slash treatment	Lop & scatter		x				
Period since cut or treatment	(months)	48	x				

4-TF-4-PC

DATA SHEET　　　　　　　　Residue descriptive code　4-TF-4-PC

LOADING			OTHER MEASUREMENT			
Size class	Weight	Volume	Average residue depth		(feet)	0.6
(inches)	(tons/acre)	Ft^3/acre	Ground area covered by residue ¼-inch diamter and larger		(percent)	99
0.0 – 0.25	1.3	87	Average duff and litter depth		(inches)	3.3
0.26 – 1.0	5.8	387	Sound residue 3.1-inch diameter and larger	white fir	(percent)	93
1.1 – 3.0	7.8	625		incense-cedar	(percent)	3
3.1 – 9.0	19.1	1,586		sugar pine	(percent)	2
9.1 – 20.0	8.6	710	Rotted residue 3.1-inch diameter and larger		(percent)	2
20.1+	6.4	526				
Total	49.0	3,921				

HARVEST INFORMATION			HARVEST INFORMATION SOURCE		ASSESSMENT OF THE FIRE BEHAVIOR AND SUPRESSION DIFFICULTY		
			Sale Records	Onsite estimation			
Gross volume	(M fbm/acre)	8.0		x	Spread rate	(chains/hour)	8
Net volume	(M fbm/acre)	7.5		x	Flame length	(Feet)	5
Average stems/acre cut		30		x	Resistance to		
Average d.b.h. of stems cut	(inches)	18		x	Suppression	(chains/man-hour)	0.7
Stand age	(years)	120		x	REMARKS		
Cutting prescription	Tree selection			x			
Yarding method	Tractor			x			
Slash treatment	None			x			
Period since cut or treatment	(months)	30		x			

5-TF-4-PC

DATA SHEET   Residue descriptive code   5-TF-4-PC

LOADING			OTHER MEASUREMENT		
Size class	Weight	Volume	Average residue depth	(feet)	0.6
(inches)	(tons/acre)	Ft^3/acre	Ground area covered by residue ¼-inch diamter and larger	(percent)	92
0.0 – 0.25	0.5	33	Average duff and litter depth	(inches)	5.0
0.26 – 1.0	4.7	314	Sound residue 3.1-inch diameter and larger white fir	(percent)	71
1.1 – 3.0	6.2	497		(percent)	
3.1 – 9.0	20.0	1,769		(percent)	
9.1 – 20.0	45.0	3,767	Rotted residue 3.1-inch diameter and larger	(percent)	29
20.1+	29.9	2,817			
Total	106.3	9,197			

HARVEST INFORMATION			HARVEST INFORMATION SOURCE		ASSESSMENT OF THE FIRE BEHAVIOR AND SUPRESSION DIFFICULTY	
			Sale Records	Onsite estimation		
Gross volume	(M fbm/acre)	* [1]			Spread rate (chains/hour)	7
Net volume	(M fbm/acre)	* [1]			Flame length (Feet)	5
Average stems/acre cut		40		x	Resistance to	
Average d.b.h. of stems cut	(inches)	20		x	Suppression (chains/man-hour)	0.5
Stand age	(years)	300		x	REMARKS	
Cutting prescription	Sanitation cut			x	No volume removed from cutting; trees were felled to remove diseased trees from stand.	
Yarding method	None			x		
Slash treatment	None			x		
Period since cut or treatment	(months)	96		x		

[1]see remarks

79

The mission of the PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION is to provide the knowledge, technology, and alternatives for present and future protection, management, and use of forest, range, and related environments.

Within this overall mission, the Station conducts and stimulates research to facilitate and to accelerate progress toward the following goals:

1. Providing safe and efficient technology for inventory, protection, and use of resources.

2. Developing and evaluating alternative methods and levels of resource management.

3. Achieving optimum sustained resource productivity consistent with maintaining a high quality forest environment.

The area of research encompasses Oregon, Washington, Alaska, and, in some cases, California, Hawaii, the Western States, and the Nation. Results of the research are made available promptly. Project headquarters are at:

Anchorage, Alaska	La Grande, Oregon
Fairbanks, Alaska	Portland, Oregon
Juneau, Alaska	Olympia, Washington
Bend, Oregon	Seattle, Washington
Corvallis, Oregon	Wenatchee, Washington

Mailing address: *Pacific Northwest Forest and Range Experiment Station*
809 N.E. 6th Ave.
Portland, Oregon 97232