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Stereo Photo Series for Quantifying Forest Residues in Coastal Oregon Forests:

Second-Growth Douglas-Fir—Western Hemlock Type, Western Hemlock—Sitka Spruce Type, and Red Alder Type

Roger D. Ottmar and Colin C. Hardy

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A series of stereo photographs displays a range of residue loadings for cleancut units in three general forest types common to coastal Oregon forest lands: Douglas-fir-- western hemlock (second-growth), western hemlock--Sitka spruce, and red alder. Postburn residue levels are also represented for the Douglas-fir--western hemlock, and red alder types. Information with each photo includes measured quadratic means and weights for various size classes, woody fuel depth, and duff depth. The stereo photo series is designed to help forest managers appraise woody residue after both timber harvest and treatment with fire in forest types not previously represented by a photo series.

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Abstract

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A series of stereo photographs displays a range of residue loadings for clearcut units in three general forest types common to coastal Oregon forest lands: Douglas-fir—western hemlock (second-growth), western hemlock—Sitka spruce, and red alder. Postburn residue levels are also represented for the Douglas-fir—western hemlock, and red alder types. Information with each photo includes measured quadratic means and weights for various size classes, woody fuel depth, and duff depth. The stereo photo series is designed to help forest managers appraise woody residue after both timber harvest and treatment with fire in forest types not previously represented by a photo series.

Keywords: Residues, fuel loadings, slash, residue measurements.

Cooperators

This publication was developed by the Pacific Northwest Research Station, Fire and Air Resource Management Research Work Unit, in cooperation with the Siuslaw National Forest, to better serve the needs of forest land managers in the Pacific Northwest.

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What Is the Photo Series?

This photo series contains single and stereo photographs of 17 clearcut, harvested units before treatment with fire and 9 units after treatment with fire. Each photograph is supplemented with information on the measured forest residue. The series provides a basis for appraising and describing existing residue loadings on clearcut, logged units in the Douglas-fir—western hemlock, western hemlock—Sitka spruce, and red alder forest types common to coastal Oregon forested lands.[1]

Why Is the Photo Series Needed?

Timber-harvesting operations annually generate residue on thousands of timber-harvested acres in coastal Oregon forests. The appraisal based on this photo series can be used in planning fuel treatment and prescribed fire strategies to meet site preparation and fire hazard reduction objectives and to minimize any adverse effects on the site and adjacent resources. The photo series can also be used to estimate fuel loadings for smoke management reports.

Photo series have been a popular tool for appraising residue loadings for many years. The series developed by Maxwell and Ward (1976) was the model for this series.

The line-intersect method of inventorying is useful to determine residue loading when a high degree of accuracy is needed. But this method is time consuming and very expensive. Photo series can be used to make fast, easy, and inexpensive quantification of residues when less accurate estimates are acceptable.

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[1] Forest types are according to SAF (1980). Scientific names are given on page 5.

How Was the Photo Series Developed?

Areas photographed for these series were selected to show typical differences in residue loadings resulting from logging and from prescribed burning. Photographs were taken and residue loading data were collected as follows:

1. Sample plots were selected, laid out, and photographed in accordance with Maxwell and Ward (1980).

2. Measurement techniques used for inventorying dead and down woody material were patterned after procedures developed by Brown (1974) and described by Maxwell and Ward (1980).

Photographs

Stereopair photographs are included in this photo guide. The three-dimensional image obtained by viewing the photographs through a pocket stereoscope (or with a well-trained eye) will improve the manager's ability to appraise fuel loading by size class. A single but larger photograph has been included for additional comparison. The marker in these photographs is 1-foot square, and the pole is painted in contrasting colors at 1-foot intervals to provide scale. The residue loading values relate to quantities visible in the photograph and not the average for the entire unit. Because the fuel inventory was concentrated toward the immediate foreground near the center pole and the stereo photographs come into view best at the pole, we recommend that the fuels near the pole be the ones the estimate is based on.

Photograph Arrangement

The photographs and accompanying data sheets are presented in five series:

Series 1. Second-growth Douglas-fir—western hemlock type (DFWH), preburn (pre).

Series 2. Western hemlock—Sitka spruce type (WHSS), preburn (pre).
Series 3. Red alder type (RA), preburn (pre).
Series 4. Second-growth Douglas-fir—western hemlock type (DFWH), postburn (post).
Series 5. Red alder type (RA), postburn (post).

In each series, the photos are ranked from lightest loading to heaviest loading.

Loading Data

The fuel complex shown in each stereo photograph is described on an accompanying data sheet by the following characteristics:

1. Diameter size class (size class).
2. Quadratic mean diameter for sound and rotten fuels (mean diam.).
3. Fuel loading (load).
4. Percentage of residue by species based on the number of logs.
5. Average residue depth.
6. Average duff depth.

Using the Photo Series

Make a visual inventory of downed residue by viewing the field of observable fuel and comparing it with the photos as follows:

1. Observe each characteristic for a specific size class of residue on the ground (for example, 3.1- to 9-inch loading).
2. Select a photo or photos that nearly match or bracket the observed characteristics.

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 fuel size class or fuel characteristic needed. If the general area being inventoried has areas with obvious differences in residue loading, the user should make separate determinations for each area and then weight and cumulate the loading for the whole area.

The photo series has been developed to determine a quantitative value for a particular size class of fuel. A comparison of the preburn series and postburn series was not intended by the authors.

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

List of Plant Species Cited[2]

Common name	Scientific name
Bigleaf maple	*Acer macrophyllum* Pursh
Douglas-fir	*Pseudotsuga menziesii* (Mirb.) Franco
Red alder	*Alnus rubra* Bong.
Sitka spruce	*Picea sitchensis* (Bong.) Carr.
Vine maple	*Acer circinatum* Pursh
Western hemlock	*Tsuga heterophylla* (Raf.) Sarg.

[2] Scientific names are from Little 1979.

Metric Conversions

1 acre = 0.4047 hectare
1 inch = 2.54 centimeters
1 foot = 0.3048 meter
1 ton = 0.907 ton (metric)

Literature Cited

Brown, James K. 1974. Handbook for inventorying downed woody material. Gen. Tech. Rep. INT-16. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. 24 p.

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SERIES 1-DFWH-PRE

SECOND-GROWTH DOUGLAS-FIR—WESTERN HEMLOCK, PREBURN

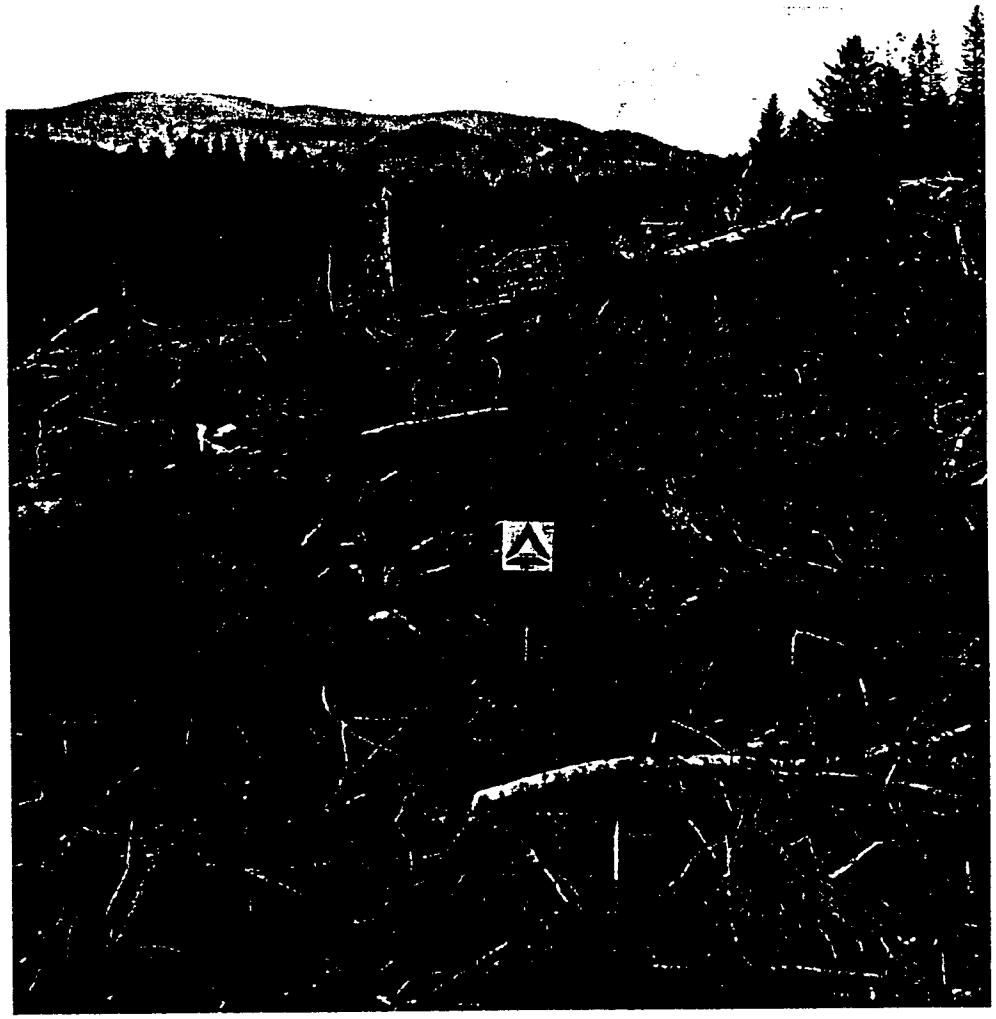
A SERIES OF 9 LEVELS

SERIES 1-DFWH-PRE-01

DOWN AND DEAD WOODY FUEL LOADING

Size class (inches)	Load (tons/acre)	Mean diam.[a] (inches)	
		sound	rot
0.0-0.25	0.9	0.1	
0.26-1.0	3.5	.5	
1.1-3.0	4.8	1.7	
Subtotal all 0-3 in	9.2		
3.1-9.0	5.1	4.9	
9.1-20.0	2.8	11.2	14.4
>20.0	2.7		24.3
Subtotal all >3 in	10.7	5.5	20.0
TOTAL	19.9		

[a] Mean diam.=quadratic mean.



Stereo Pair: 1-DFWH-PRE-01

ADDITIONAL FUEL INFORMATION

Sound residue >3-inch diameter:	Douglas-fir	62%	Average residue depth:	0.4 ft
	Red alder	26%	Average duff depth:	1.0 in
	Other	6%		
Rotted residue >3-inch diameter:		6%		

Percent residue >3-inch diameter is based on number of logs.

SERIES 1-DFWH-PRE-02

DOWN AND DEAD WOODY FUEL LOADING

Size class (inches)	Load (tons/acre)	Mean diam.[a] (inches)	
		sound	rot
0.0-0.25	1.6	0.1	
0.26-1.0	2.7	.5	
1.1-3.0	3.9	1.7	
Subtotal all 0-3 in	8.2		
3.1-9.0	11.0	5.5	4.3
9.1-20.0	0		
>20.0	3.4		27.2
Subtotal all >3 in	14.4	5.5	11.0
TOTAL	22.7		

[a] Mean diam.=quadratic mean.

Stereo Pair: 1-DFWH-PRE-02

ADDITIONAL FUEL INFORMATION

Sound residue >3-inch diameter:	Douglas-fir	87%	Average residue depth:	0.6 ft
	Other	none	Average duff depth:	0.9 in
Rotted residue >3-inch diameter:		13%		

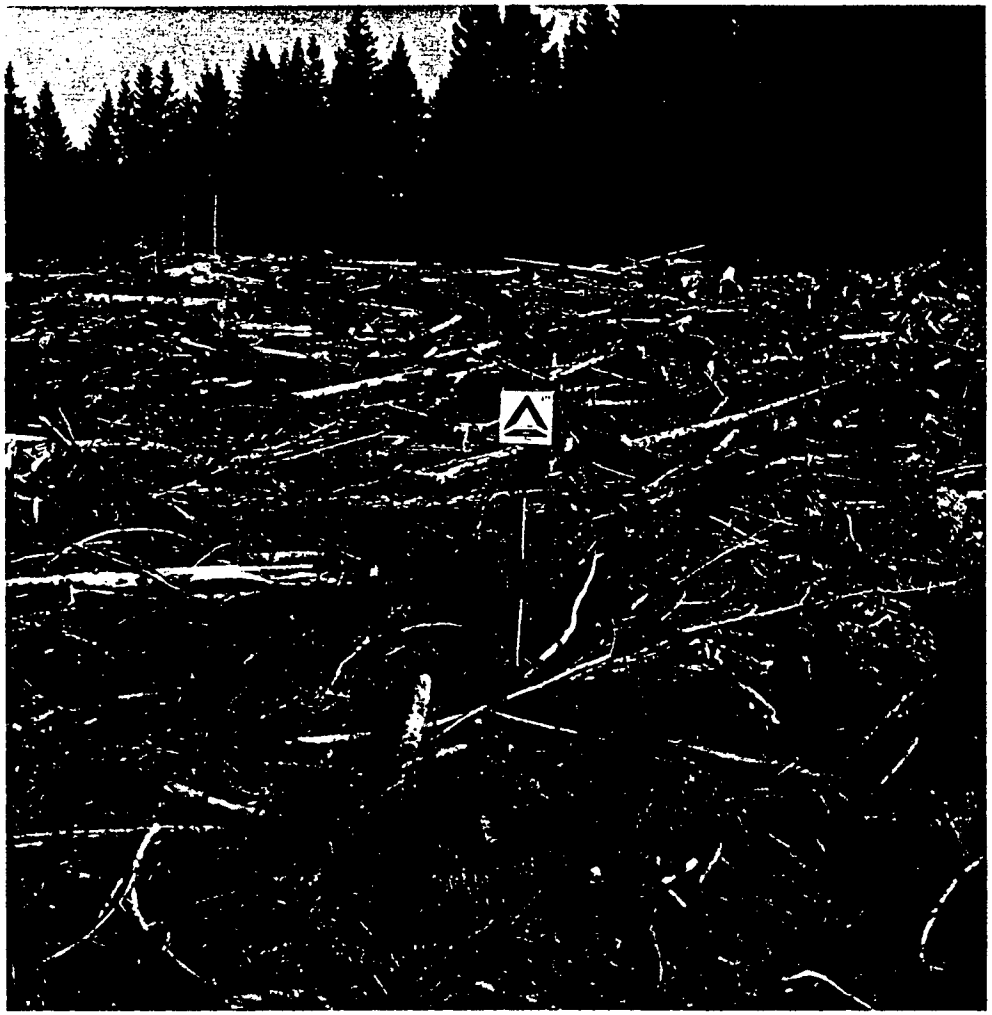
Percent residue >3-inch diameter is based on number of logs.

SERIES 1-DFWH-PRE-03

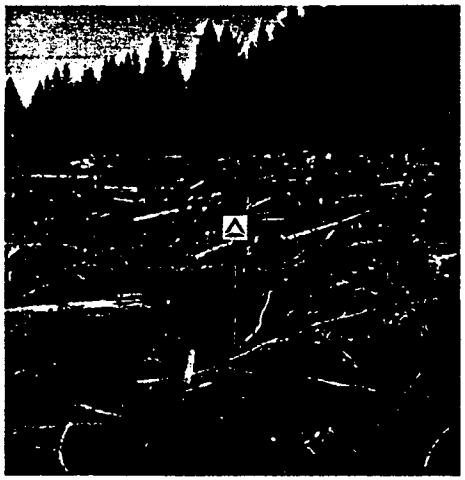
DOWN AND DEAD WOODY FUEL LOADING

Size class (inches)	Load (tons/acre)	Mean diam.[a] (inches)	
		sound	rot
0.0-0.25	1.2	0.1	
0.26-1.0	2.0	.5	
1.1-3.0	6.2	1.7	
Subtotal all 0-3 in	9.3		
3.1-9.0	8.8	5.2	5.3
9.1-20.0	5.1	15.4	13.3
>20.0	0		
Subtotal all >3 in	13.9	5.8	7.6
TOTAL	23.2		

[a] Mean diam.=quadratic mean.



Stereo Pair: 1-DFWH-PRE-03



ADDITIONAL FUEL INFORMATION

Sound residue >3-inch diameter:	Douglas-fir	44%	Average residue depth:	0.3 ft
	Red alder	11%	Average duff depth:	0.5 in
	Other	7%		
Rotted residue >3-inch diameter:		38%		

Percent residue >3-inch diameter is based on number of logs.

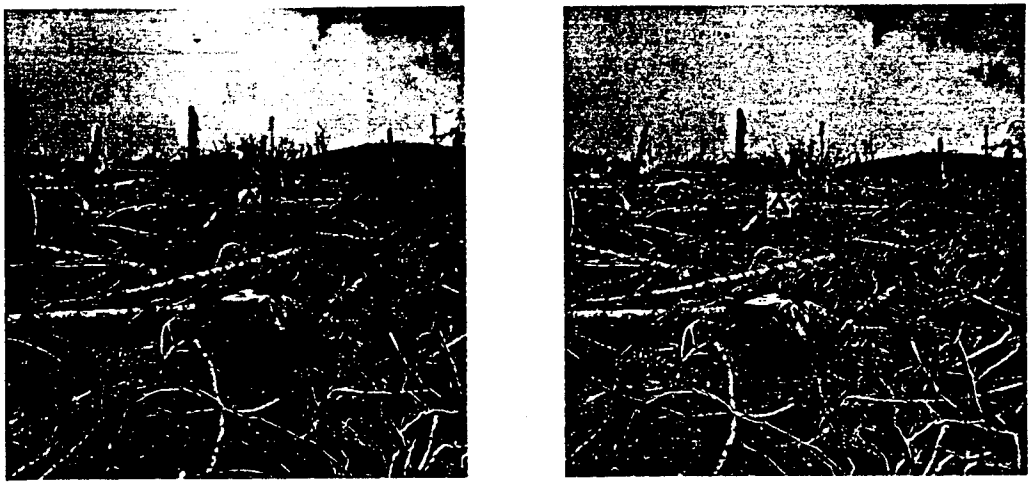
SERIES 1-DFWH-PRE-04

DOWN AND DEAD WOODY FUEL LOADING

Size class (inches)	Load (tons/acre)	Mean diam.[a] (inches)	
		sound	rot
0.0-0.25	2.8	0.1	
0.26-1.0	4.7	.5	
1.1-3.0	10.2	1.7	
Subtotal all 0-3 in	17.7		
3.1-9.0	5.8	5.4	5.0
9.1-20.0	0		
>20.0	0		
Subtotal all >3 in	5.8	5.4	5.0
TOTAL	23.5		

[a] Mean diam.=quadratic mean.

Stereo Pair: 1-DFWH-PRE-04



ADDITIONAL FUEL INFORMATION

Sound residue >3-inch diameter:	Douglas-fir	66%	Average residue depth:	0.4 ft
	Sitka spruce	17%	Average duff depth:	0.8 in
	other	none		
Rotted residue >3-inch diameter:		17%		

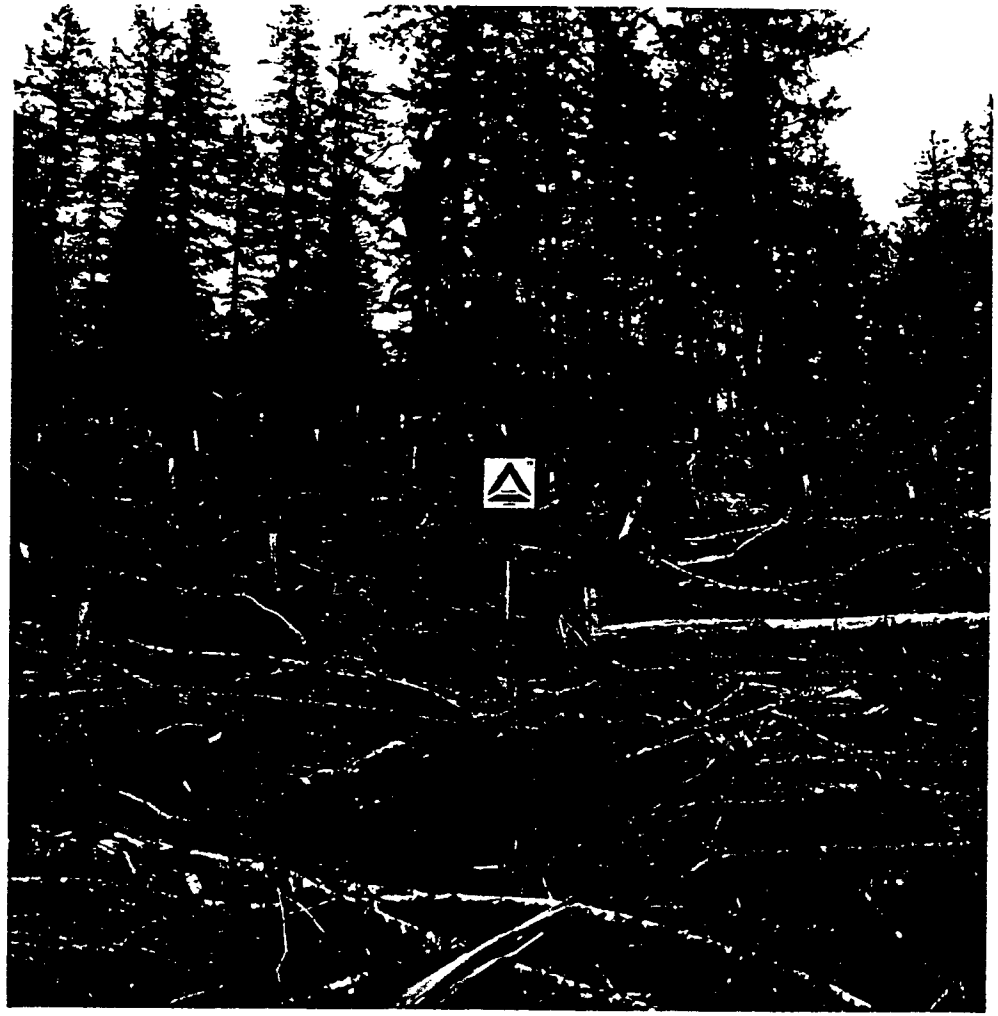
Percent residue >3-inch diameter is based on number of logs.

SERIES 1-DFWH-PRE-05

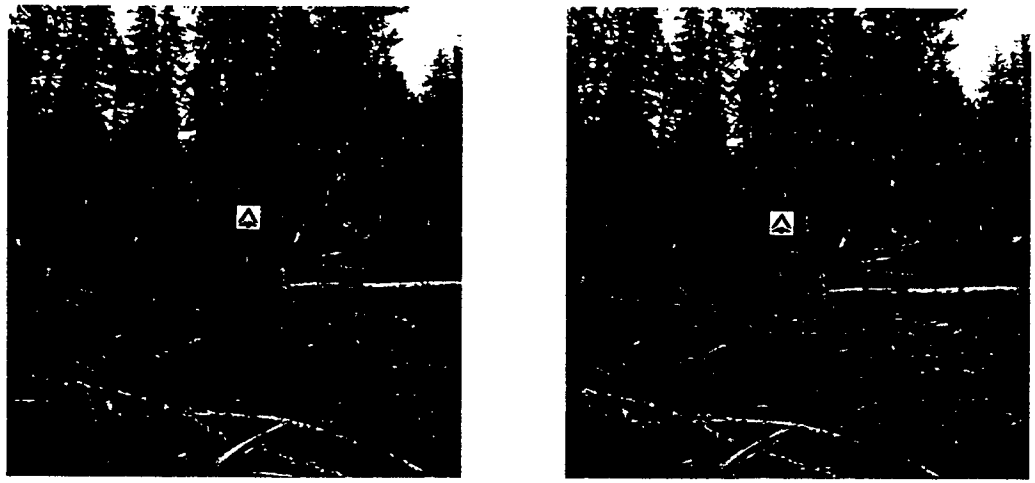
DOWN AND DEAD WOODY FUEL LOADING

Size class (inches)	Load (tons/acre)	Mean diam.[a] (inches)	
		sound	rot
0.0-0.25	2.5	0.1	
0.26-1.0	3.7	.5	
1.1-3.0	7.1	1.7	
Subtotal all 0-3 in	13.4		
3.1-9.0	8.0	4.8	6.1
9.1-20.0	3.6	10.8	14.8
>20.0	0		
Subtotal all >3 in	11.6	5.4	7.4
TOTAL	25.0		

[a] Mean diam.=quadratic mean.



Stereo Pair: 1-DFWH-PRE-05



ADDITIONAL FUEL INFORMATION

Sound residue >3-inch diameter:	W. hemlock	43%	Average residue depth:	0.5 ft
	Douglas-fir	26%	Average duff depth:	0.3 in
	Other	12%		
Rotted residue >3-inch diameter:		19%		

Percent residue >3-inch diameter is based on number of logs.

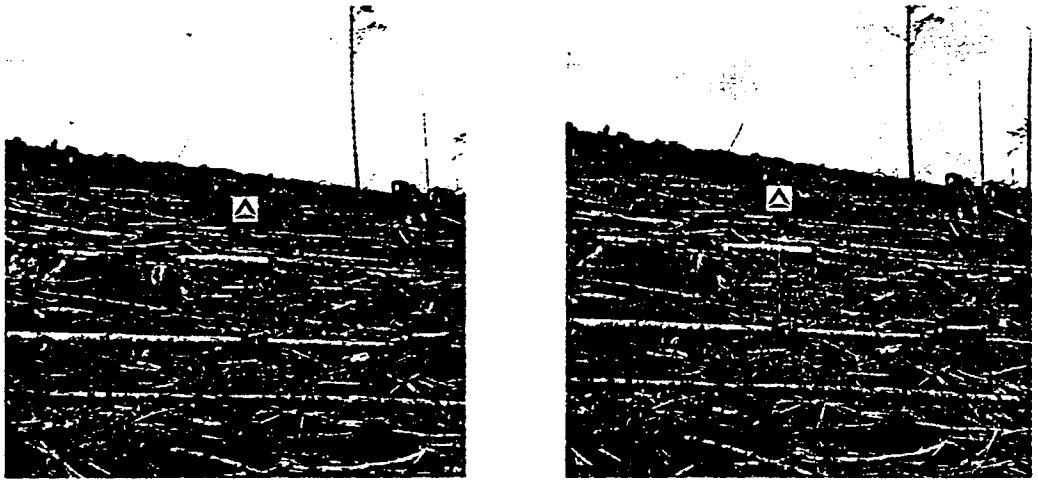
SERIES 1-DFWH-PRE-06

DOWN AND DEAD WOODY FUEL LOADING

Size class (inches)	Load (tons/acre)	Mean diam.[a] (inches)	
		sound	rot
0.0-0.25	0.6	0.1	
0.26-1.0	2.7	.5	
1.1-3.0	5.5	1.7	
Subtotal all 0-3 in	8.7		
3.1-9.0	22.4	4.8	4.5
9.1-20.0	5.9	13.5	
>20.0	0		
Subtotal all >3 in	28.3	4.8	6.5
TOTAL	37.0		

[a] Mean diam.=quadratic mean.

Stereo Pair: 1-DFWH-PRE-06



ADDITIONAL FUEL INFORMATION

Sound residue >3-inch diameter:	Douglas-fir	46%	Average residue depth:	0.3 ft
	Bigleaf maple	21%	Average duff depth:	0.9 in
	Other	none		
Rotted residue >3-inch diameter:		33%		

Percent residue >3-inch diameter is based on number of logs.

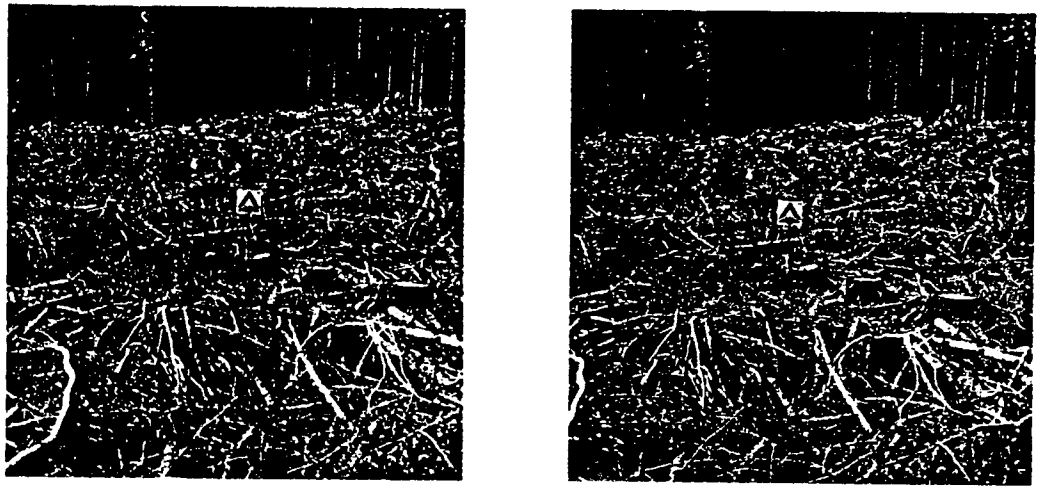
SERIES 1-DFWH-PRE-07

DOWN AND DEAD WOODY FUEL LOADING

Size class (inches)	Load (tons/acre)	Mean diam.[a] (inches)	
		sound	rot
0.0-0.25	4.0	0.1	
0.26-1.0	6.7	.5	
1.1-3.0	18.5	1.7	
Subtotal all 0-3 in	29.2		
3.1-9.0	8.2	5.5	4.3
9.1-20.0	2.6	10.8	
>20.0	0		
Subtotal all >3 in	10.8	6.1	4.3
TOTAL	40.0		

[a] Mean diam.=quadratic mean.

Stereo Pair: 1-DFWH-PRE-07



ADDITIONAL FUEL INFORMATION

Sound residue >3-inch diameter:	Douglas-fir	93%	Average residue depth:	0.8 ft
	Other	2%	Average duff depth:	0.1 in
Rotted residue >3-inch diameter:		5%		

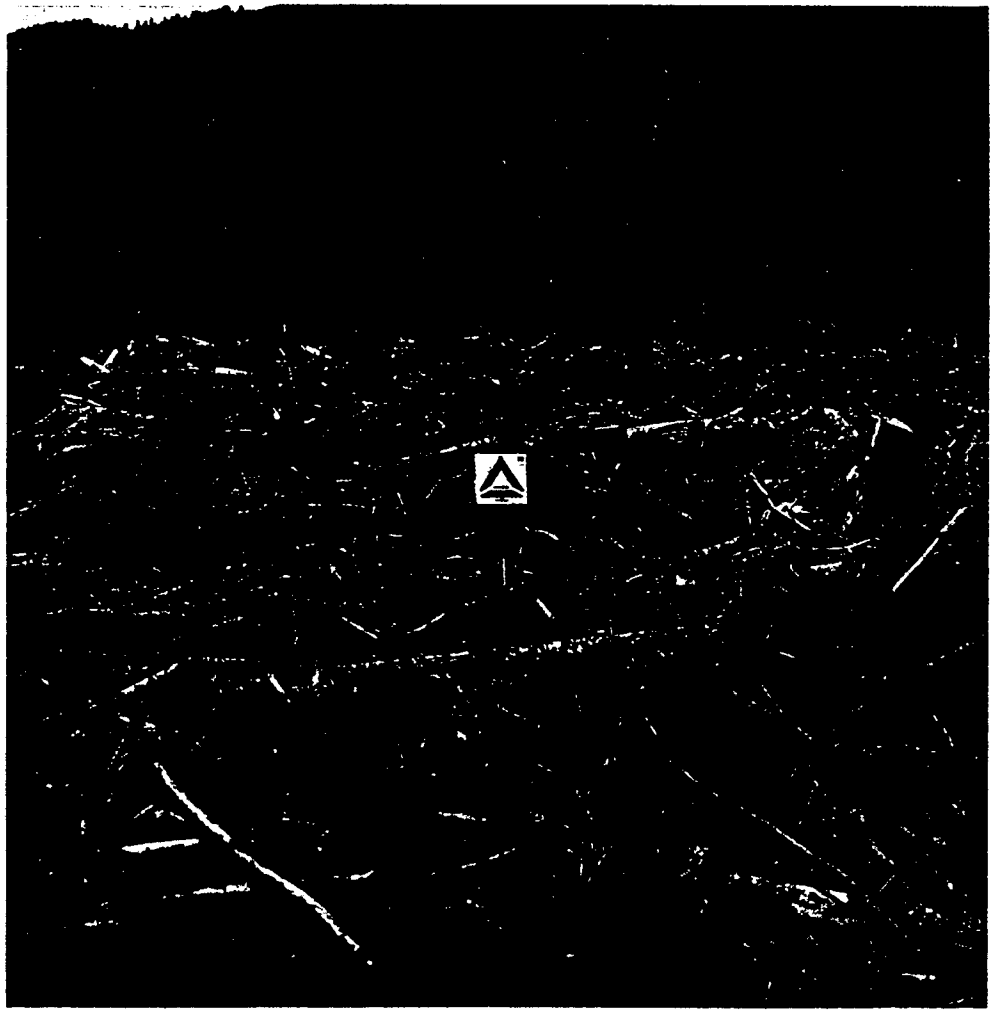
Percent residue >3-inch diameter is based on number of logs.

SERIES 1-DFWH-PRE-08

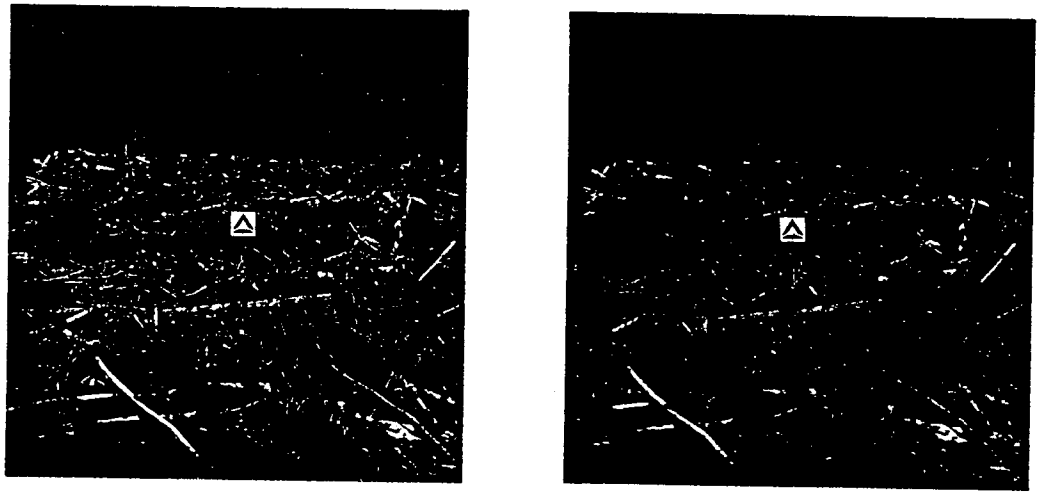
DOWN AND DEAD WOODY FUEL LOADING

Size class (inches)	Load (tons/acre)	Mean diam.[a] (inches)	
		sound	rot
0.0-0.25	3.1	0.1	
0.26-1.0	5.2	.5	
1.1-3.0	10.9	1.7	
Subtotal all 0-3 in	19.3		
3.1-9.0	15.5	5.5	4.1
9.1-20.0	42.0	14.4	17.3
>20.0	5.5		24.3
Subtotal all >3 in	63.0	8.9	16.1
TOTAL	82.3		

[a] Mean diam.=quadratic mean.



Stereo Pair: 1-DFWH-PRE-08



ADDITIONAL FUEL INFORMATION

Sound residue >3-inch diameter:	Douglas-fir	74%	Average residue depth:	0.7 ft
	W. hemlock	16%	Average duff depth:	1.8 in
	other	3%		
Rotted residue >3-inch diameter:		7%		

Percent residue >3-inch diameter is based on number of logs.

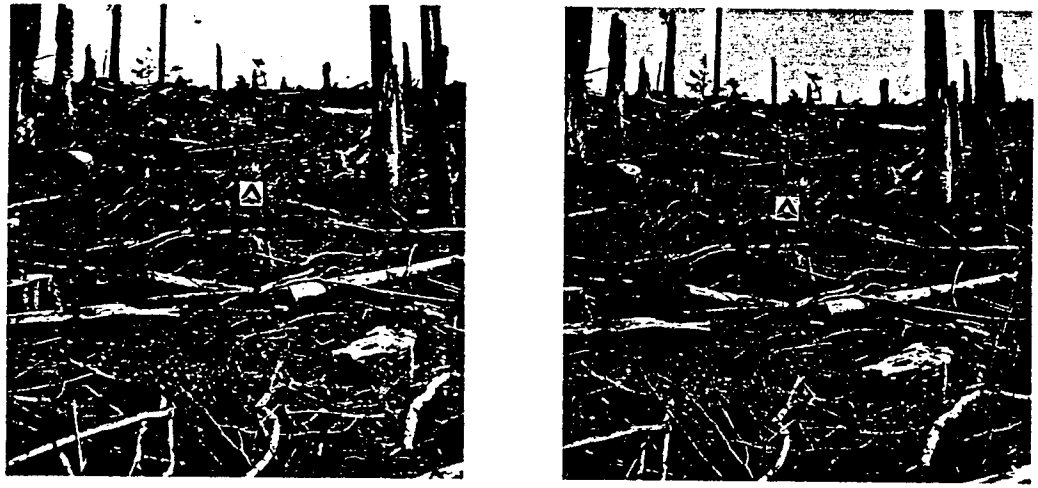
SERIES 1-DFWH-PRE-09

DOWN AND DEAD WOODY FUEL LOADING

Size class (inches)	Load (tons/acre)	Mean diam.[a] (inches)	
		sound	rot
0.0-0.25	2.0	0.1	
0.26-1.0	3.4	.5	
1.1-3.0	8.1	1.7	
Subtotal all 0-3 in	13.5		
3.1-9.0	14.8	5.2	6.0
9.1-20.0	14.8	12.8	12.2
>20.0	48.9	36.3	29.3
Subtotal all >3 in	78.5	10.3	13.4
TOTAL	92.0		

[a] Mean diam.=quadratic mean.

Stereo Pair: 1-DFWH-PRE-09



ADDITIONAL FUEL INFORMATION

Sound residue >3-inch diameter:	W. hemlock	44%	Average residue depth:	0.9 ft
	Douglas-fir	22%	Average duff depth:	2.0 in
	other	14%		
Rotted residue >3-inch diameter:		20%		

Percent residue >3-inch diameter is based on number of logs.

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SERIES 2—WHSS—PRE

WESTERN HEMLOCK—SITKA SPRUCE, PREBURN

1 LEVEL

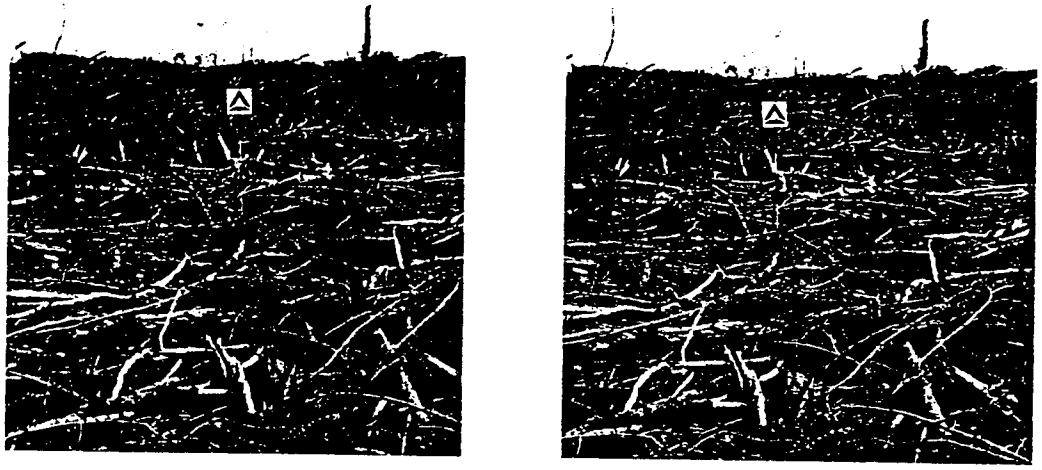
SERIES 2-WHSS-PRE-01

DOWN AND DEAD WOODY FUEL LOADING

Size class (inches)	Load (tons/acre)	Mean diam.[a] (inches)	
		sound	rot
0.0-0.25	3.8	0.1	
0.26-1.0	6.3	.5	
1.1-3.0	10.8	1.7	
Subtotal all 0-3 in	20.8		
3.1-9.0	12.0	4.2	3.7
9.1-20.0	3.1	13.5	
>20.0	0		
Subtotal all >3 in	15.1	4.7	3.7
TOTAL	35.9		

[a] Mean diam.=quadratic mean.

STEREO PAIR: 2-WHSS-PRE-01



ADDITIONAL FUEL INFORMATION

Sound residue >3-inch diameter:	Sitka spruce	76%	Average residue depth:	0.9 ft
	Vine maple	12%	Average duff depth:	0.1 in
	Other	2%		
Rotted residue >3-inch diameter:		10%		

Percent residue >3-inch diameter is based on number of logs.

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SERIES 3-RA-PRE

RED ALDER, PREBURN

A SERIES OF 7 LEVELS

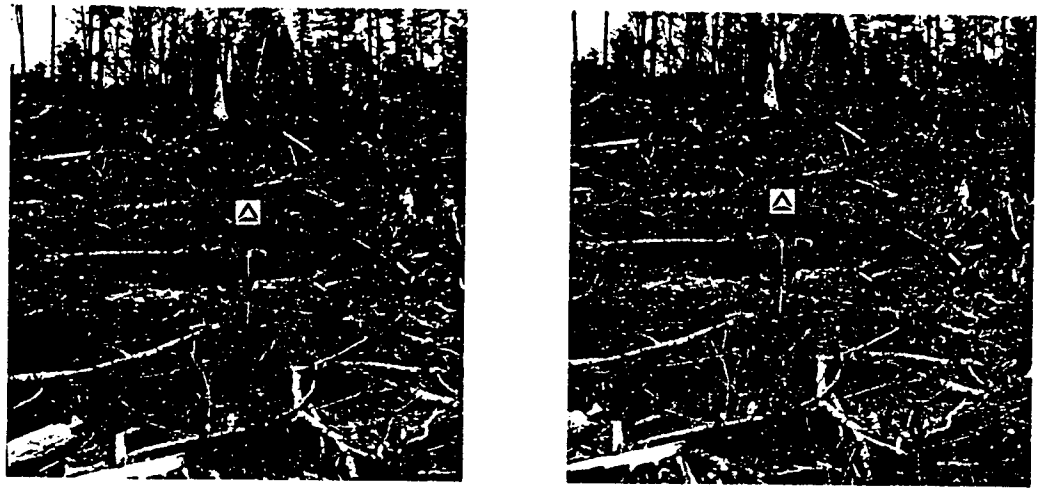
SERIES 3-RA-PRE-01

DOWN AND DEAD WOODY FUEL LOADING

Size class (inches)	Load (tons/acre)	Mean diam.[a] (inches)	
		sound	rot
0.0-0.25	0.6	0.1	
0.26-1.0	2.5	.5	
1.1-3.0	4.0	1.7	
Subtotal all 0-3 in	7.1		
3.1-9.0	5.8	4.5	5.4
9.1-20.0	4.5	13.6	14.4
20.0	0		
Subtotal all >3 in	10.3	5.4	8.6
TOTAL	17.3		

[a] Mean diam.=quadratic mean.

Stereo Pair: 3-RA-PRE-01



ADDITIONAL FUEL INFORMATION

Sound residue >3-inch diameter:	Red alder	77%	Average residue depth:	0.4 ft
	Douglas-fir	4%	Average duff depth:	1.9 in
	Other	2%		
Rotted residue >3-inch diameter:		17%		

Percent residue >3-inch diameter is based on number of logs.

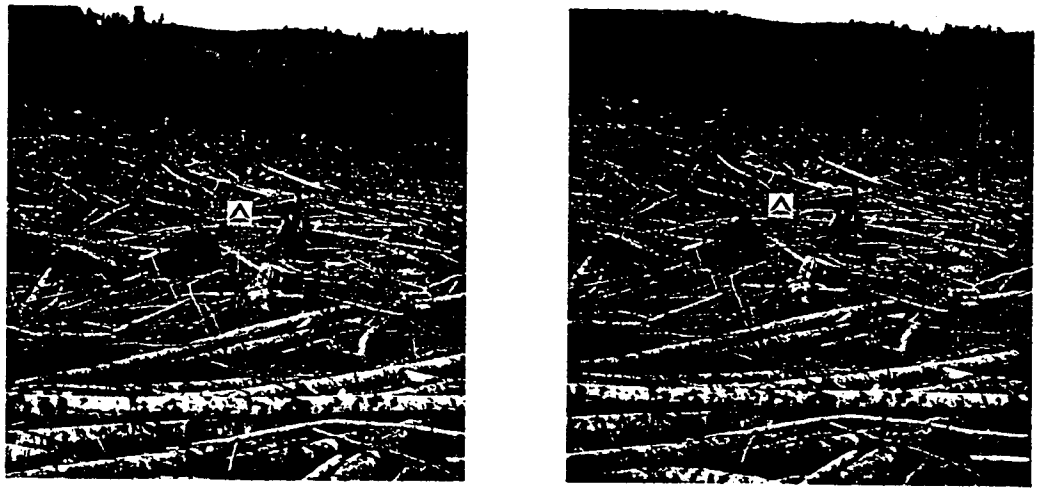
SERIES 3-RA-PRE-02

DOWN AND DEAD WOODY FUEL LOADING

Size class (inches)	Load (tons/acre)	Mean diam.[a] (inches)	
		sound	rot
0.0-0.25	0.6	0.1	
0.26-1.0	3.7	.5	
1.1-3.0	13.4	1.7	
Subtotal all 0-3 in	17.7		
3.1-9.0	16.2	4.3	5.1
9.1-20.0	.4		9.7
20.0	6.6	22.4	
Subtotal all >3 in	23.2	5.2	5.7
TOTAL	40.8		

[a] Mean diam.=quadratic mean.

Stereo Pair: 3-RA-PRE-02



ADDITIONAL FUEL INFORMATION

Sound residue >3-inch diameter:	Red alder	88%	Average residue depth:	0.6 ft
	Douglas-fir	2%	Average duff depth:	0.3 in
	Other	1%		
Rotted residue >3-inch diameter:		9%		

Percent residue >3-inch diameter is based on number of logs.

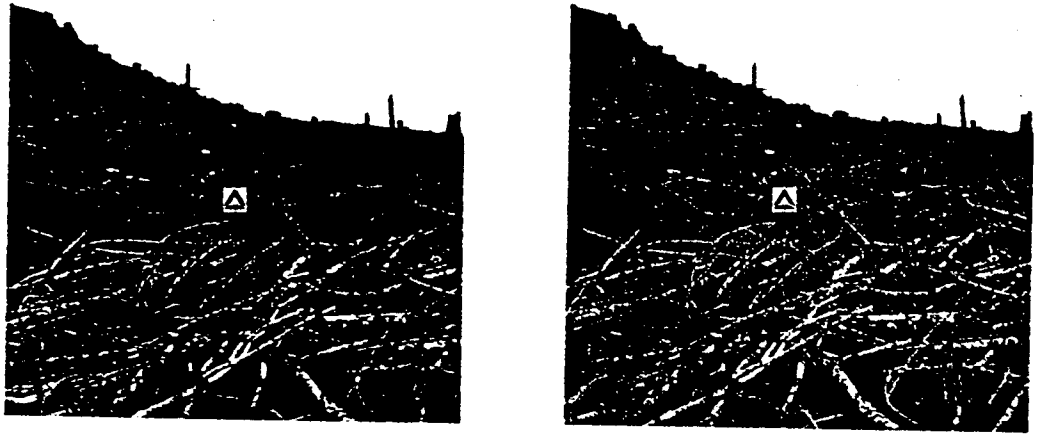
SERIES 3-RA-PRE-03

DOWN AND DEAD WOODY FUEL LOADING

Size class (inches)	Load (tons/acre)	Mean diam.[a] (inches)	
		sound	rot
0.0-0.25	1.3	0.1	
0.26-1.0	5.0	.5	
1.1-3.0	15.4	1.7	
Subtotal all 0-3 in	21.7		
3.1-9.0	15.1	4.4	3.5
9.1-20.0	3.0	11.6	16.9
20.0	2.8		24.7
Subtotal all >3 in	21.0	4.6	13.7
TOTAL	42.6		

[a] Mean diam.=quadratic mean.

Stereo Pair: 3-RA-PRE-03



ADDITIONAL FUEL INFORMATION

Sound residue >3-inch diameter:	Red alder	63%	Average residue depth:	1.8 ft
	Sitka spruce	23%	Average duff depth:	0.9 in
	Other	10%		
Rotted residue >3-inch diameter:		4%		

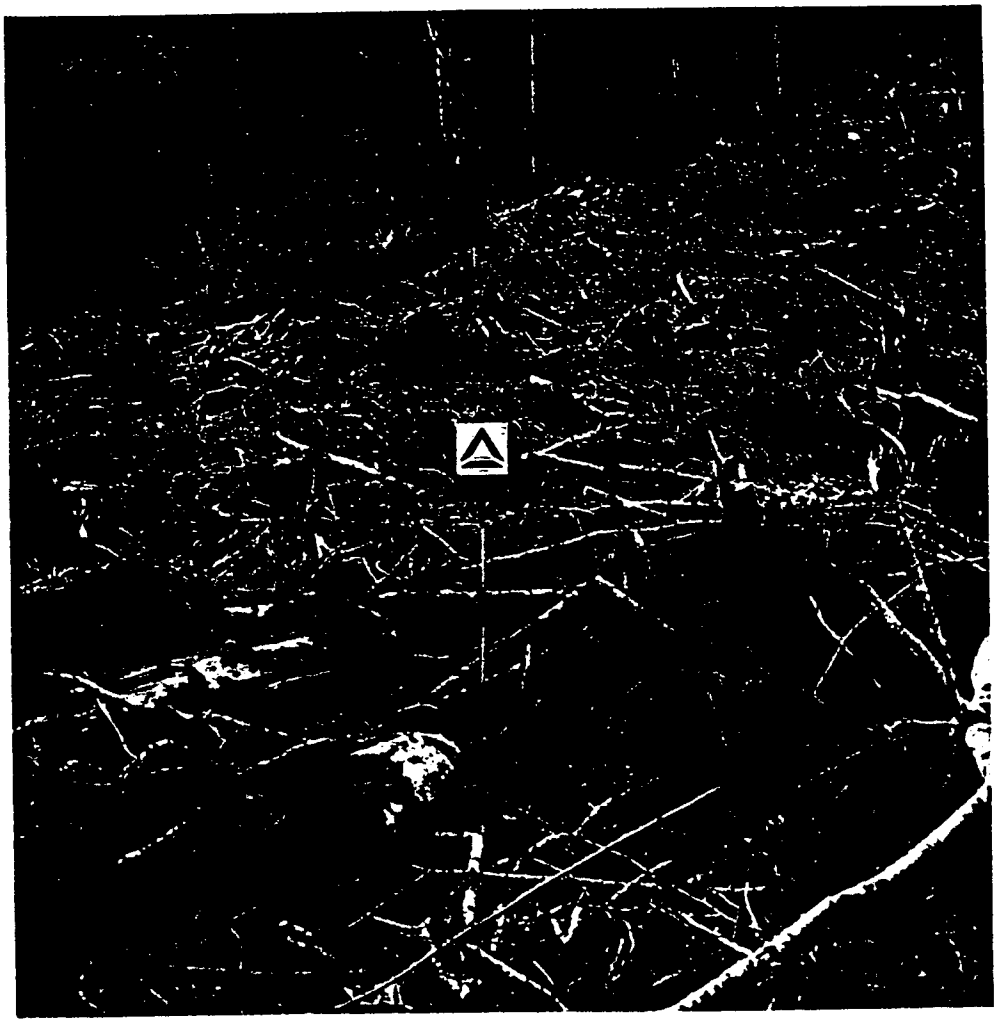
Percent residue >3-inch diameter is based on number of logs.

SERIES 3-RA-PRE-04

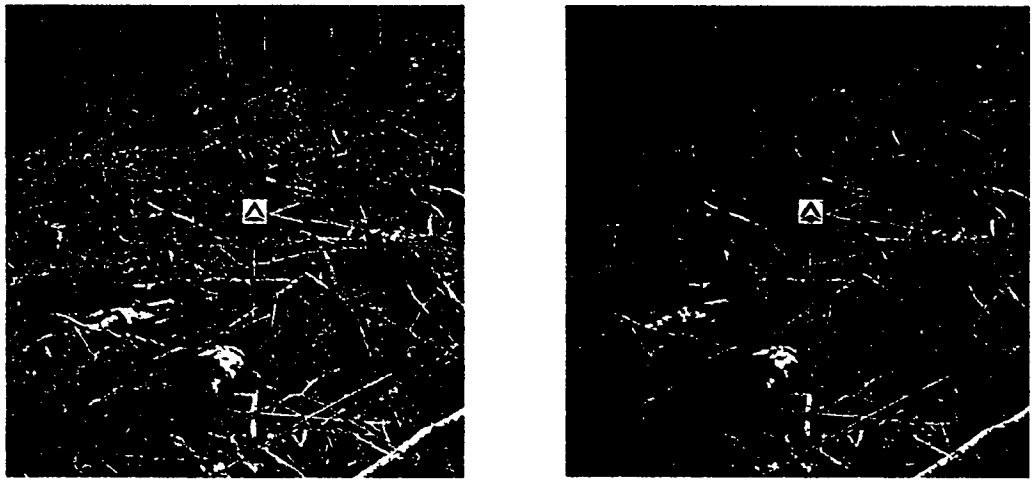
DOWN AND DEAD WOODY FUEL LOADING

Size class (inches)	Load (tons/acre)	Mean diam.[a] (inches)	
		sound	rot
0.0-0.25	1.1	0.1	
0.26-1.0	3.9	.5	
1.1-3.0	6.5	1.7	
Subtotal all 0-3 in	11.5		
3.1-9.0	12.0	4.4	5.9
9.1-20.0	7.3	10.0	13.7
20.0	12.0		25.4
Subtotal all >3 in	31.3	4.5	15.9
TOTAL	42.8		

[a] Mean diam.=quadratic mean.



Stereo Pair: 3-RA-PRE-04



ADDITIONAL FUEL INFORMATION

Sound residue >3-inch diameter:	Red alder	59%	Average residue depth:	1.3 ft
	Sitka spruce	26%	Average duff depth:	1.1 in
	Other	1%		
Rotted residue >3-inch diameter:		14%		

Percent residue >3-inch diameter is based on number of logs.

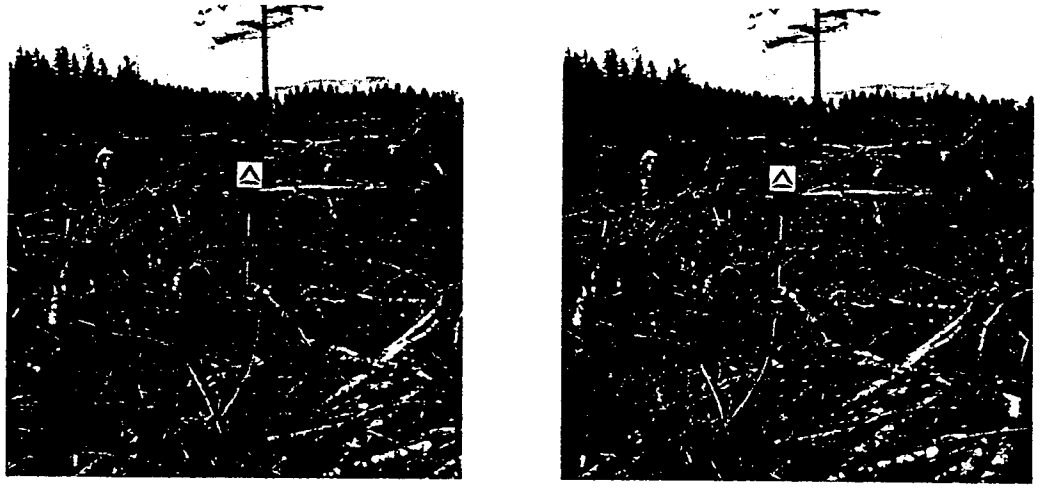
SERIES 3-RA-PRE-05

DOWN AND DEAD WOODY FUEL LOADING

Size class (inches)	Load (tons/acre)	Mean diam.[a] (inches)	
		sound	rot
0.0-0.25	1.7	0.1	
0.26-1.0	5.1	.5	
1.1-3.0	8.9	1.7	
Subtotal all 0-3 in	15.7		
3.1-9.0	12.8	4.8	4.5
9.1-20.0	10.2	13.0	17.0
20.0	15.3	30.3	24.3
Subtotal all >3 in	38.4	7.4	10.6
TOTAL	54.1		

[a] Mean diam.=quadratic mean.

Stereo Pair: 3-RA-PRE-05



ADDITIONAL FUEL INFORMATION

Sound residue >3-inch diameter:	Red alder	68%	Average residue depth:	1.0 ft
	Douglas-fir	12%	Average duff depth:	0.9 in
	Other	8%		
Rotted residue >3-inch diameter:		12%		

Percent residue >3-inch diameter is based on number of logs.

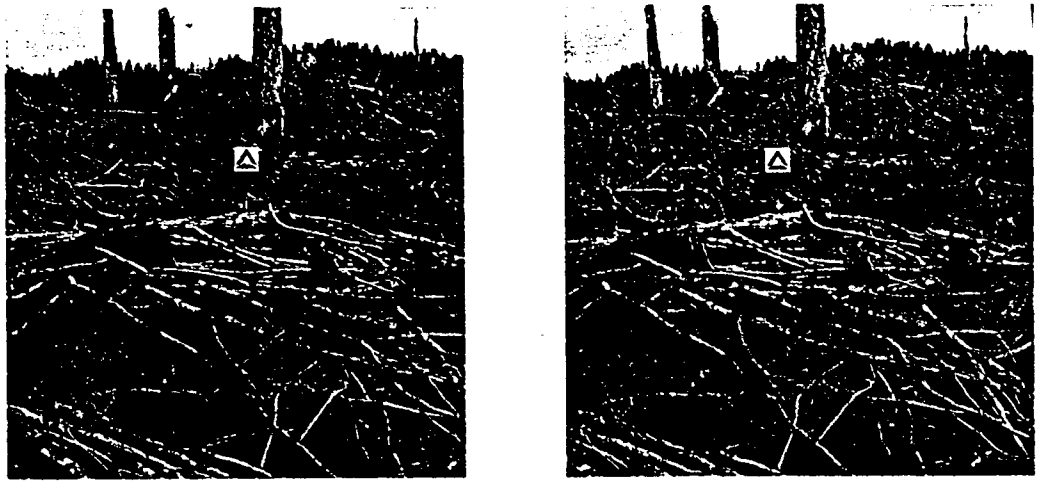
SERIES 3-RA-PRE-06

DOWN AND DEAD WOODY FUEL LOADING

Size class (inches)	Load (tons/acre)	Mean diam.[a] (inches)	
		sound	rot
0.0-0.25	1.3	0.1	
0.26-1.0	4.2	.5	
1.1-3.0	12.3	1.7	
Subtotal all 0-3 in	17.7		
3.1-9.0	6.6	4.9	4.3
9.1-20.0	3.5	10.6	11.5
20.0	27.7		25.7
Subtotal all >3 in	37.8	5.7	19.7
TOTAL	55.5		

[a] Mean diam.=quadratic mean.

Stereo Pair: 3-RA-PRE-06



ADDITIONAL FUEL INFORMATION

Sound residue >3-inch diameter:	Vine maple	28%	Average residue depth:	1.0 ft
	Red alder	21%	Average duff depth:	1.4 in
	Other	23%		
Rotted residue >3-inch diameter:		28%		

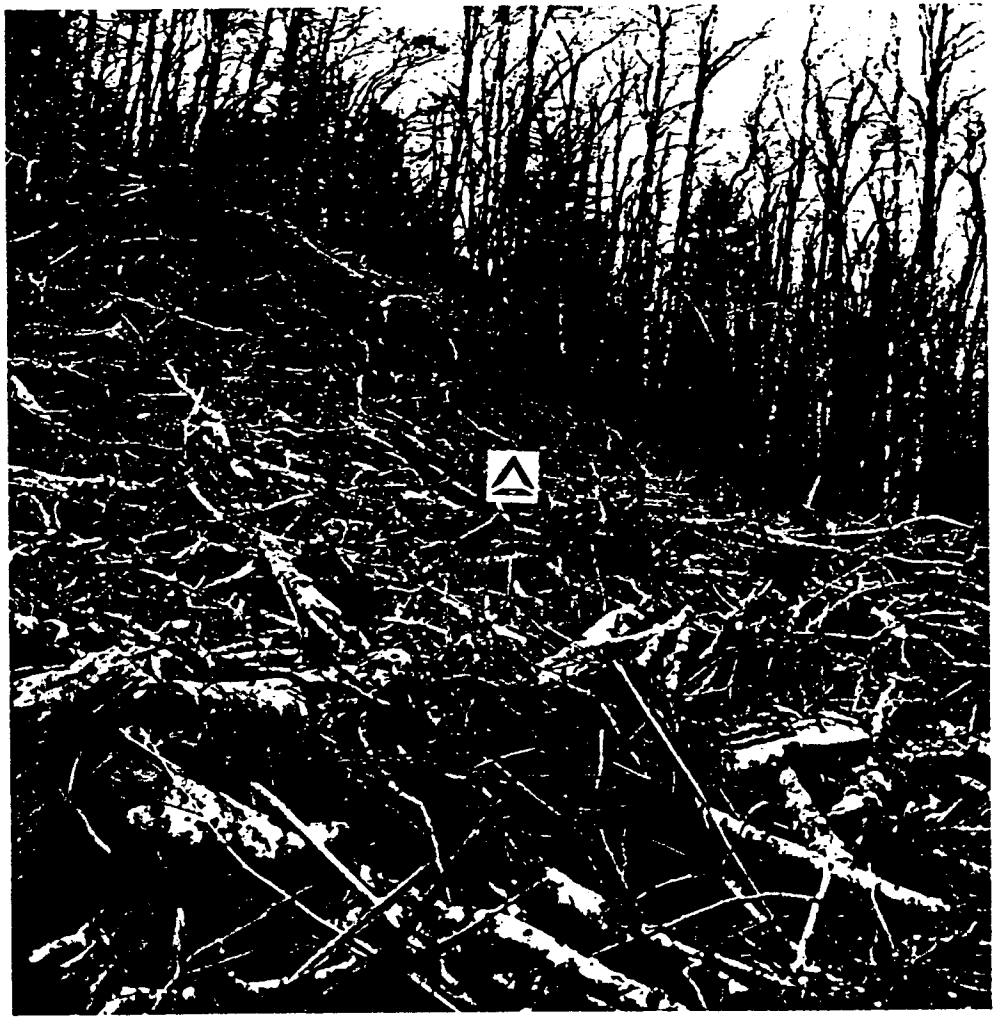
Percent residue >3-inch diameter is based on number of logs.

SERIES 3-RA-PRE-07

DOWN AND DEAD WOODY FUEL LOADING

Size class (inches)	Load (tons/acre)	Mean diam.[a] (inches)	
		sound	rot
0.0-0.25	0.8	0.1	
0.26-1.0	3.9	.5	
1.1-3.0	7.9	1.7	
Subtotal all 0-3 in	12.6		
3.1-9.0	20.0	4.6	5.1
9.1-20.0	5.8	10.8	
20.0	42.6	32.8	29.3
Subtotal all >3 in	68.4	7.2	17.4
TOTAL	81.0		

[a] Mean diam.=quadratic mean.



Stereo Pair: 3-RA-PRE-07

ADDITIONAL FUEL INFORMATION

Sound residue >3-inch diameter:	Red alder	84%	Average residue depth:	1.1 ft
	Sitka spruce	9%	Average duff depth:	0.6 in
	Other	none		
Rotted residue >3-inch diameter:		7%		

Percent residue >3-inch diameter is based on number of logs.

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SERIES 4-DFWH-POST

SECOND-GROWTH DOUGLAS-FIR—WESTERN HEMLOCK, POSTBURN

A SERIES OF 4 LEVELS

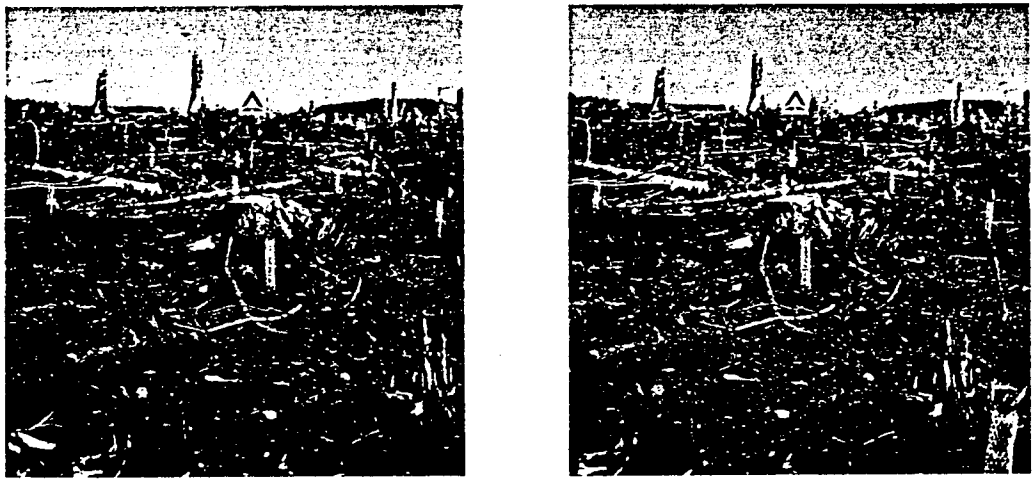
SERIES 4-DFWH-POST-01

DOWN AND DEAD WOODY FUEL LOADING

Size class (inches)	Load (tons/acre)	Mean diam.[a] (inches)	
		sound	rot
0.0-0.25	0.5	0.1	
0.26-1.0	.9	.5	
1.1-3.0	3.3	1.7	
Subtotal all 0-3 in	4.7		
3.1-9.0	6.2	5.3	8.3
9.1-20.0	2.8	11.2	14.2
>20.0	0		
Subtotal all >3 in	9.0	5.6	12.5
TOTAL	13.7		

[a] Mean diam.=quadratic mean.

Stereo Pair: 4-DFWH-POST-01



ADDITIONAL FUEL INFORMATION

Sound residue >3-inch diameter:	91%	Average residue depth:	0.1 ft
Rotted residue >3-inch diameter:	9%	Average duff depth:	1.1 in

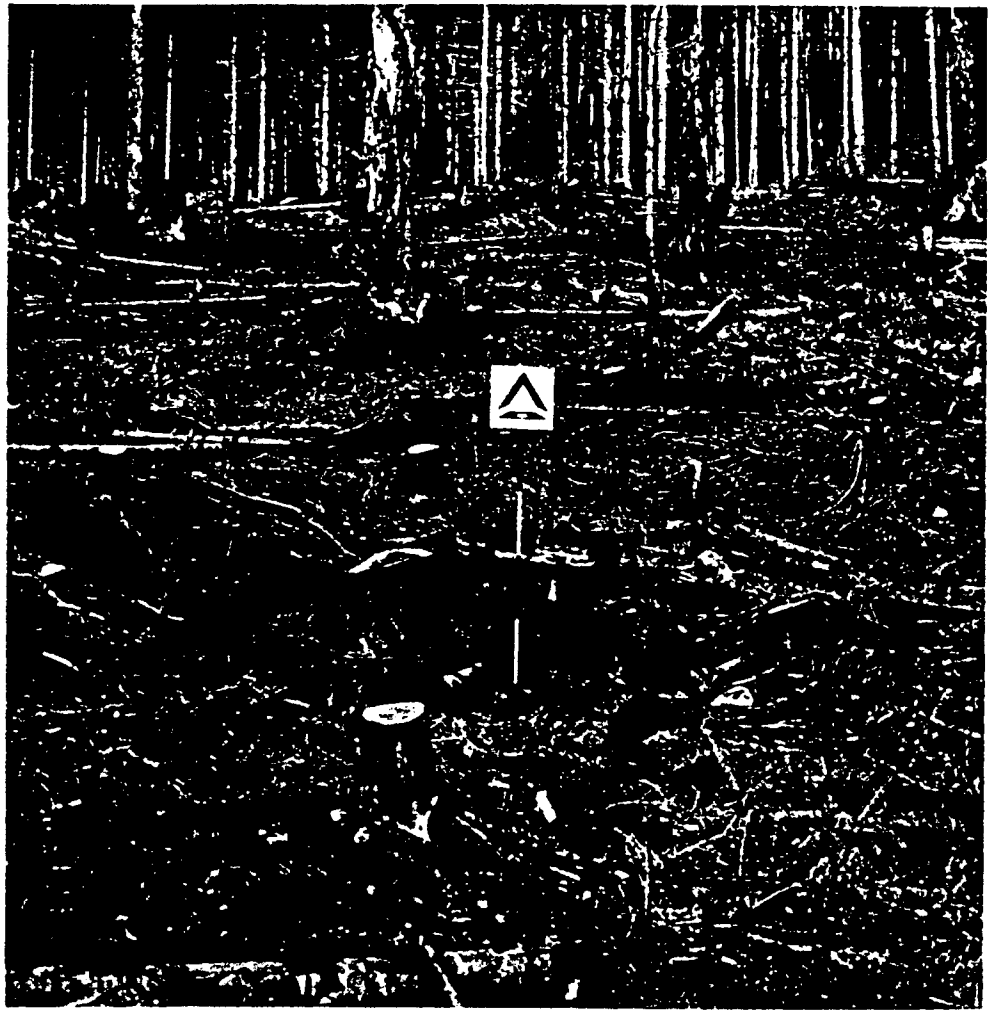
Percent residue >3-inch diameter is based on number of logs.

SERIES 4-DFWH-POST-02

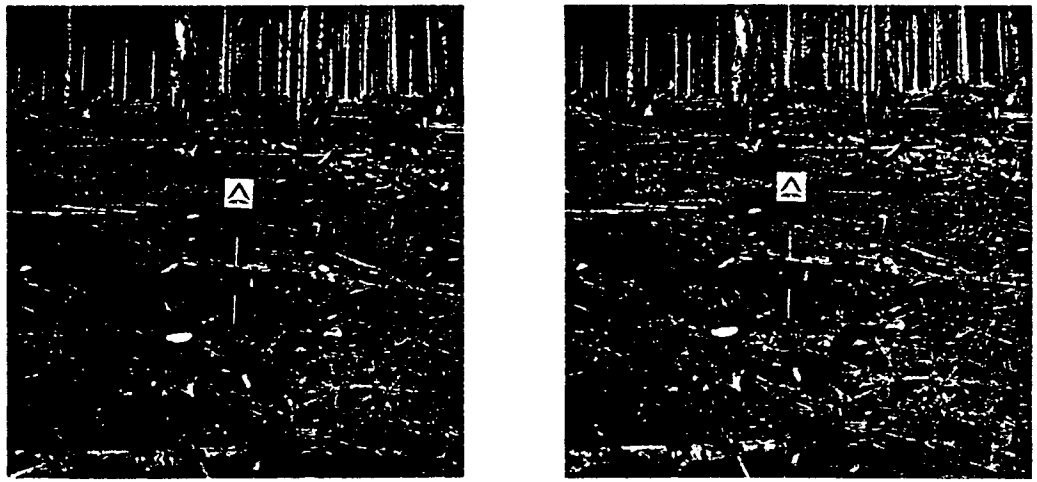
DOWN AND DEAD WOODY FUEL LOADING

Size class (inches)	Load (tons/acre)	Mean diam.[a] (inches)	
		sound	rot
0.0-0.25	0.4	0.1	
0.26-1.0	.6	.5	
1.1-3.0	2.2	1.7	
Subtotal all 0-3 in	3.2		
3.1-9.0	9.4	5.3	5.1
9.1-20.0	1.7		19.3
>20.0	4.5		22.0
Subtotal all >3 in	15.7	5.3	13.6
TOTAL	18.9		

[a] Mean diam.=quadratic mean.



Stereo Pair: 4-DFWH-POST-02



ADDITIONAL FUEL INFORMATION

Sound residue >3-inch diameter:	84%	Average residue depth:	0.1 ft
Rotted residue >3-inch diameter:	16%	Average duff depth:	0.5 in

Percent residue >3-inch diameter is based on number of logs.

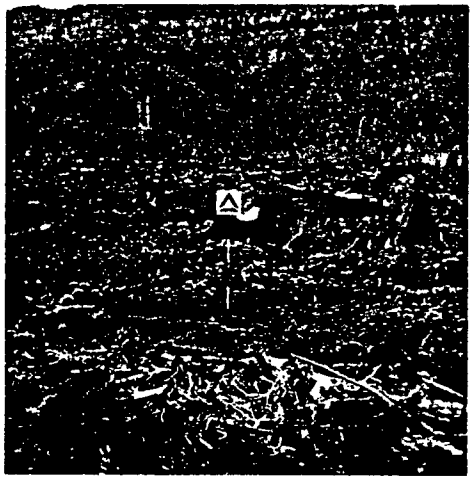
SERIES 4-DFWH-POST-03

DOWN AND DEAD WOODY FUEL LOADING

Size class (inches)	Load (tons/acre)	Mean diam.[a] (inches)	
		sound	rot
0.0-0.25	0.4	0.1	
0.26-1.0	.7	.5	
1.1-3.0	2.5	1.7	
Subtotal all 0-3 in	3.5		
3.1-9.0	7.5	5.1	5.1
9.1-20.0	39.7	14.6	15.4
>20.0	17.3	25.5	24.3
Subtotal all >3 in	64.5	11.1	12.9
TOTAL	68.1		

[a] Mean diam.=quadratic mean.

Stereo Pair: 4-DFWH-POST-03



ADDITIONAL FUEL INFORMATION

Sound residue >3-inch diameter:	82%	Average residue depth:	0.3 ft
Rotted residue >3-inch diameter:	18%	Average duff depth:	0.8 in

Percent residue >3-inch diameter is based on number of logs.

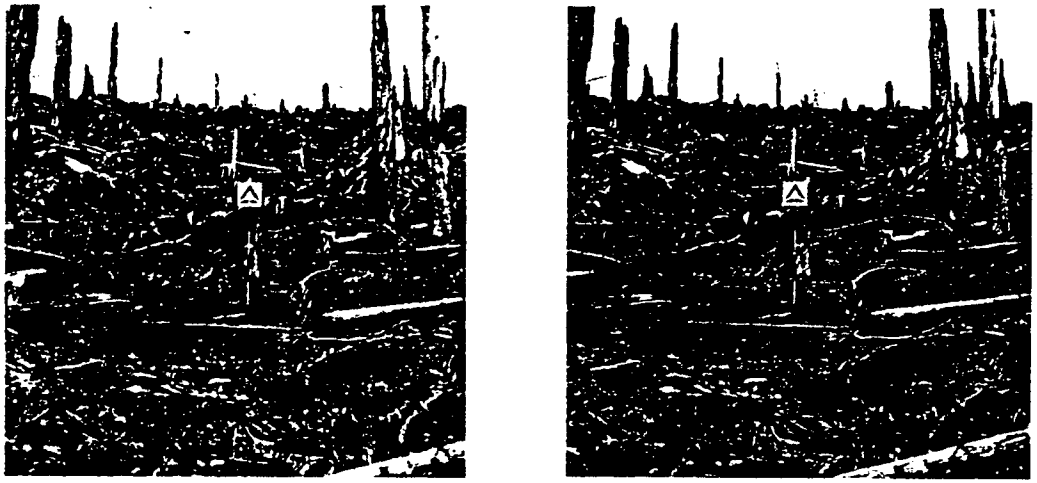
SERIES 4-DFWH-POST-04

DOWN AND DEAD WOODY FUEL LOADING

Size class (inches)	Load (tons/acre)	Mean diam.[a] (inches)	
		sound	rot
0.0-0.25	0.5	0.1	
0.26-1.0	.8	.5	
1.1-3.0	4.8	1.7	
Subtotal all 0-3 in	6.0		
3.1-9.0	14.8	5.5	5.0
9.1-20.0	19.3	12.8	12.6
>20.0	65.3	34.7	37.2
Subtotal all >3 in	99.3	12.0	13.4
TOTAL	105.3		

[a] Mean diam.=quadratic mean.

Stereo Pair: 4-DFWH-POST-04



ADDITIONAL FUEL INFORMATION

Sound residue >3-inch diameter:	86%	Average residue depth:	0.4 ft
Rotted residue >3-inch diameter:	14%	Average duff depth:	2.1 in

Percent residue >3-inch diameter is based on number of logs.

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SERIES 5-RA-POST

RED ALDER, POSTBURN

A SERIES OF 5 LEVELS

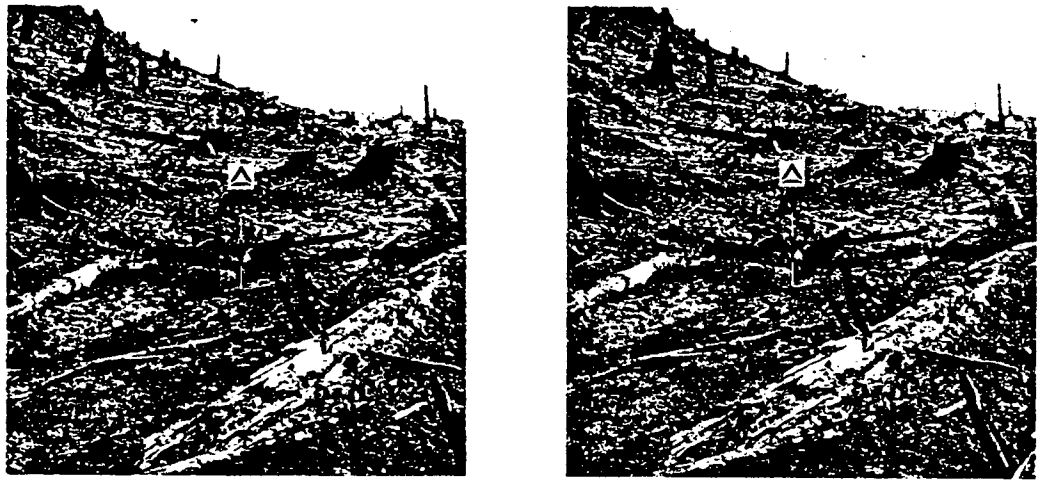
SERIES 5-RA-POST-01

DOWN AND DEAD WOODY FUEL LOADING

Size class (inches)	Load (tons/acre)	Mean diam.[a] (inches)	
		sound	rot
0.0-0.25	0.1	0.1	
0.26-1.0	.6	.5	
1.1-3.0	3.4	1.7	
Subtotal all 0-3 in	4.1		
3.1-9.0	4.3	4.2	5.5
9.1-20.0	10.1	12.8	14.5
>20.0	4.4		21.8
Subtotal all >3 in	18.9	6.0	13.9
TOTAL	23.0		

[a] Mean diam.=quadratic mean.

Stereo Pair: 5-RA-POST-01



ADDITIONAL FUEL INFORMATION

Sound residue >3-inch diameter:	78%	Average residue depth:	0.1 ft
Rotted residue >3-inch diameter:	22%	Average duff depth:	1.2 in

Percent residue >3-inch diameter is based on number of logs.

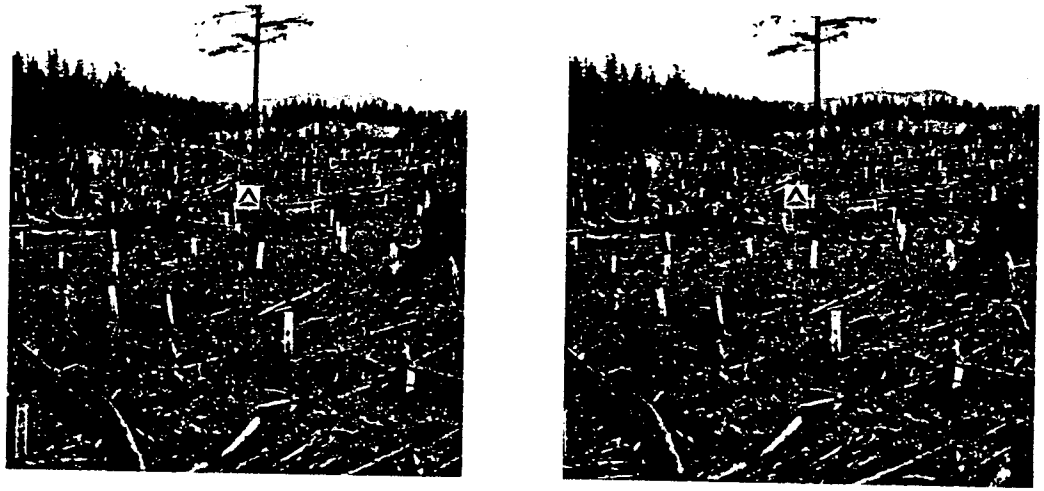
SERIES 5-RA-POST-02

DOWN AND DEAD WOODY FUEL LOADING

Size class (inches)	Load (tons/acre)	Mean diam.[a] (inches)	
		sound	rot
0.0-0.25	0.2	0.1	
0.26-1.0	1.0	.5	
1.1-3.0	3.7	1.7	
Subtotal all 0-3 in	4.9		
3.1-9.0	6.3	4.7	4.5
9.1-20.0	6.6	11.5	18.0
>20.0	14.4		39.3
Subtotal all >3 in	27.3	5.9	29.3
TOTAL	32.2		

[a] Mean diam.=quadratic mean.

Stereo Pair: 5-RA-POST-02



ADDITIONAL FUEL INFORMATION

Sound residue >3-inch diameter:	93%	Average residue depth:	0.1 ft
Rotted residue >3-inch diameter:	7%	Average duff depth:	0.5 in

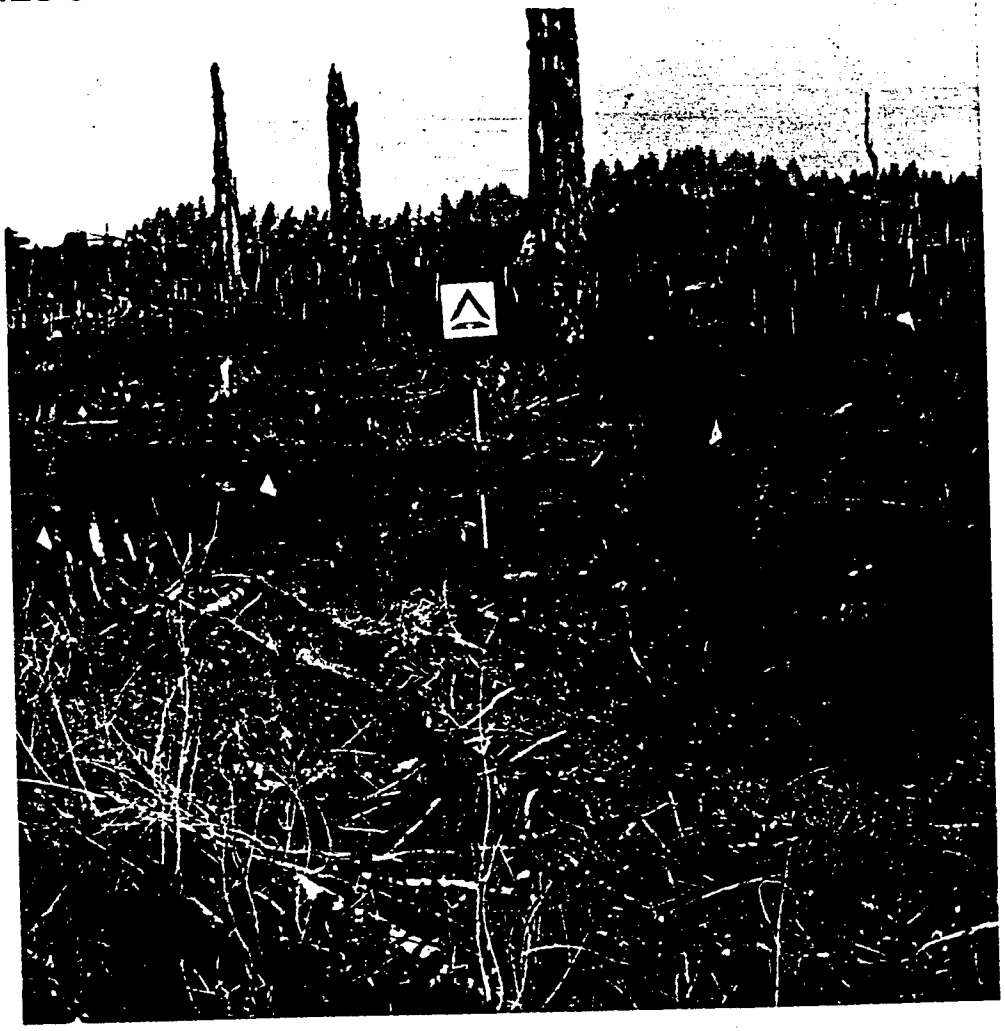
Percent residue >3-inch diameter is based on number of logs.

SERIES 5-RA-POST-03

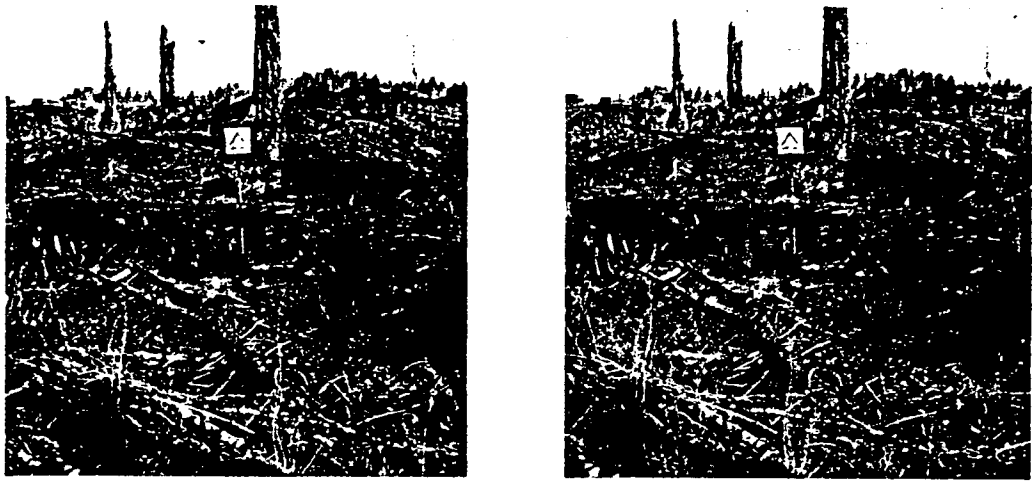
DOWN AND DEAD WOODY FUEL LOADING

Size class (inches)	Load (tons/acre)	Mean diam.[a] (inches)	
		sound	rot
0.0-0.25	0.1	0.1	
0.26-1.0	.6	.5	
1.1-3.0	1.9	1.7	
Subtotal all 0-3 in	2.5		
3.1-9.0	3.5	5.1	4.1
9.1-20.0	11.9	15.0	18.1
>20.0	32.5	23.9	32.2
Subtotal all >3 in	48.0	12.2	25.1
TOTAL	50.5		

[a] Mean diam.=quadratic mean.



Stereo Pair: 5-RA-POST-03



ADDITIONAL FUEL INFORMATION

Sound residue >3-inch diameter:	81%	Average residue depth:	0.0 ft
Rotted residue >3-inch diameter:	19%	Average duff depth:	0.5 in

Percent residue >3-inch diameter is based on number of logs.

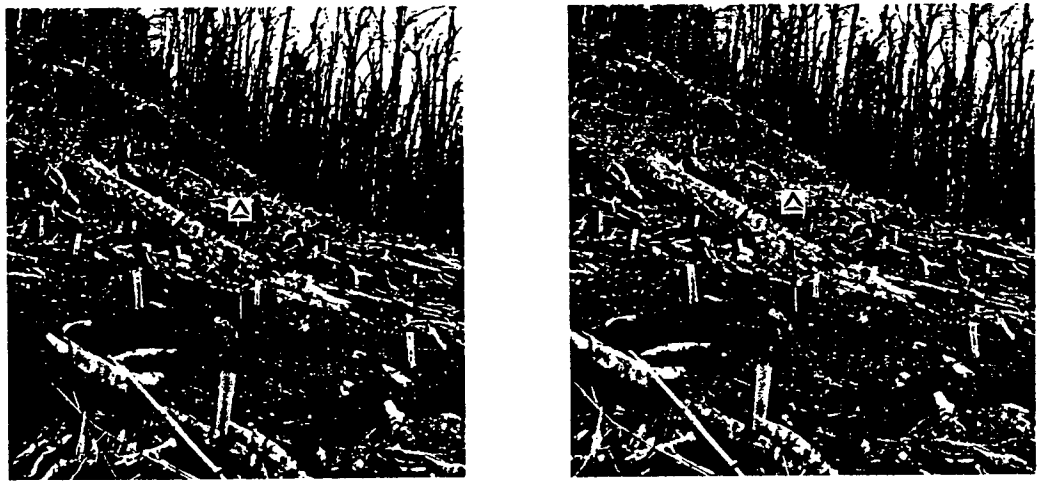
SERIES 5-RA-POST-04

DOWN AND DEAD WOODY FUEL LOADING

Size class (inches)	Load (tons/acre)	Mean diam.[a] (inches)	
		sound	rot
0.0-0.25	0.2	0.1	
0.26-1.0	1.4	.5	
1.1-3.0	4.2	1.7	
Subtotal all 0-3 in	5.8		
3.1-9.0	18.2	4.8	8.1
9.1-20.0	4.9	12.4	
>20.0	38.3	28.5	21.7
Subtotal all >3 in	61.4	8.3	14.2
TOTAL	67.3		

[a] Mean diam.=quadratic mean.

Stereo Pair: 5-RA-POST-04



ADDITIONAL FUEL INFORMATION

Sound residue >3-inch diameter:	98%	Average residue depth:	0.4 ft
Rotted residue >3-inch diameter:	2%	Average duff depth:	0.2 in

Percent residue >3-inch diameter is based on number of logs.

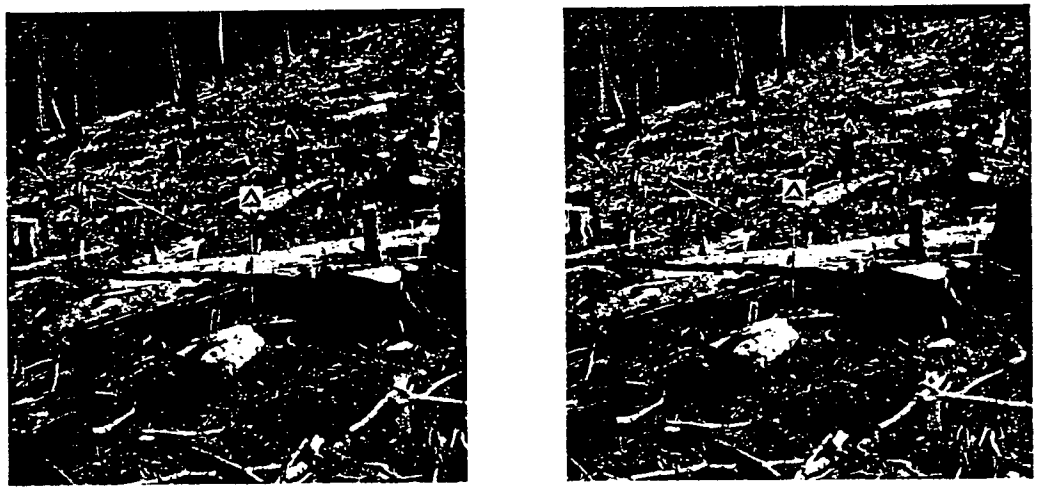
SERIES 5-RA-POST-05

DOWN AND DEAD WOODY FUEL LOADING

Size class (inches)	Load (tons/acre)	Mean diam.[a] (inches)	
		sound	rot
0.0-0.25	0.2	0.1	
0.26-1.0	1.2	.5	
1.1-3.0	2.8	1.7	
Subtotal all 0-3 in	4.1		
3.1-9.0	7.4	4.8	6.6
9.1-20.0	12.3	12.4	14.2
>20.0	53.3	21.3	27.8
Subtotal all >3 in	73.0	6.2	22.3
TOTAL	77.2		

[a] Mean diam.=quadratic mean.

Stereo Pair: 5-RA-POST-05



ADDITIONAL FUEL INFORMATION

Sound residue >3-inch diameter:	67%	Average residue depth:	0.2 ft
Rotted residue >3-inch diameter:	33%	Average duff depth:	0.8 in

Percent residue >3-inch diameter is based on number of logs.