

RI-NW
WATERSHED MANAGEMENT
Water Yield
Small Watersheds

Report of 1957 Survey of Catchment Basins

at Stream Gage Sites 1, 2, and 3

H. J. Andrews Experimental Forest

by
Jerry Franklin

As part of a continuing plan for the study of the three small watersheds, the catchment basins below the gaging stations were measured in August of 1957. This is a report on the measurement and analysis of the sediment accumulation in these three basins during 1957 water year.

Measurement.

The catchment basins were measured in accordance with the criteria laid down by Graber in the initial sediment measurement report of last fall. The basin was cross-sectioned at three-foot intervals and depth measurements made. A level and rod were used, the rod equipped with a flexible metal base made from a 7"x 10" sign.

Some difficulty was encountered in determining where each line started on the primary control line and where it ended on the secondary control line (i.e., which nails in the logs laid along the primary and secondary control lines went with which lines). This problem came up on all three basins. Once resolved, however, the logs were marked with aluminum tags indicating which lines the first and last nails on each log indicates. This will eliminate the problem and any possible error next year.

Lines which did not have either one or both ends located on a control log or stake were measured by offsetting from the nearest line that did have its ends located.

Elevations were tied into the bench marks set during the initial survey and described by Graber in his report.

Calculations.

According to the initial report the only necessary calculations would have been to determine the average depth of the basins for this year, subtract them from last years(1956) figures, and multiply by the total surface areas of the basins. This would have required using the same points and same water surface elevations used in last years calculations. This method would have been fine had the basins remained the same shape. This was not the case. Points which were below water last year were sometimes found above water level this year and, likewise, points which were above water in 1956 were occasionally found to be below water level now. This necessitated a slightly more complicated method of calculation.

The method used is as follows:

- (1) All points which were under water either this year or last were included in the calculations. This involved adding some points and their red readings (which were not under water last year) to the 1956 totals for red readings as computed by Graber. A new average (1956) red reading was thus obtained for each basin. In the 1957 calculations, points which were under water in 1956 were included in the totals whether they were this year or not. The points used are marked on the sheets by red checks.
- (2) A new map of each basin was drawn. This map was drawn to include all points which were under water either in 1956 or 1957 and they were used

in the calculations and, therefore, these points needed to be included in the total surface area. The area of the basins was determined from the maps by polar planimeter.

(3) Once the rod reading totals for the two years were determined, the average rod readings and average depths for the basins were determined for each of the two years. The difference in depths, between 1956 and 1957, corrected by a factor to take into account the differences in water surface elevations between the two years, was then multiplied by the surface area (in square feet) to give the total cubic foot accumulation of sediment for each basin during the 1957 water year.

References.

Graber, Raymond, Measurement of Sediment Accumulation in Catchment Basins at Stream Gage Sites 1, 2, and 3. H. J. Andrews Experimental Forest. September, 1956. (RI-NW, WATERSHED MANAGEMENT, Water Yield, Small Watersheds or Water Relations, Quality.)

R1-NW
WATERSHED MANAGEMENT
WATER RELATIONS
QUALITY

SEDIMENT ACCUMULATION SUMMARY OF CALCULATIONS 1957 WATER YEAR

SEDIMENT BASIN →	STREAM I		STREAM II		STREAM III	
	1956	1957	1956	1957	1956	1957
SUM OF POINTS	1,616.5	1,746.5*	1,579.62	1,314.24	1,203.50	1,551.57
TOTAL POINTS	237	237	225	225	183	183
AV. ROD RDS	6.821	7.369	7.021	5.841	6.576	8.478
WATER LEVEL	<u>4.130</u>	<u>4.950</u>	<u>5.840</u>	<u>4.860</u>	<u>3.940</u>	<u>5.930</u>
AV. DEPTH BASIN	2.691	2.419	1.181	.981	2.636	2.548
DEPTH 1956	2.691		1.181		2.636	
DEPTH 1957	<u>2.419</u>		<u>.981</u>		<u>2.548</u>	
DIFFERENCE	.272'		.200'		.088'	
SURFACE EL. WATER '56	108.27		102.26		91.62	
SURFACE EL. WATER '57	<u>108.30</u>		<u>102.22</u>		<u>91.70</u>	
DIFFERENCE	-.03		+.04		-.08	
DIFFERENCE	.272		.200		.088	
WATER LEVEL CORRECTION	<u>+.030</u>		<u>-.040</u>		<u>+.080</u>	
CORRECTED DIFF.	.302'		.160		.168	
AREA X DIFF.	.302 X 2,111 = 637.52		.160 X 2025 = 324.00		.168 X 1639 = 275.35	
CUBIC FT SED. ACCUM.	<u>637.52</u>		<u>324.00</u>		<u>275.35</u>	

* - INCLUDES CORRECTION FOR 76 READINGS TAKEN SECOND DAY @ DIFFERENT H.I.

Watersheds

Benchmark: 100.00

H.I. 113.25

Elev.

IN CATCHMENT BASINS

FORM RI-2

Date: Aug. 20, 1957

Party: Level **ROTHACHSE**

Rod **FRANKLIN**

Notes **ROTHACHER**[illegible]

*Numbered to right starting with 0 at borderline which extends upstream from left end of dam.

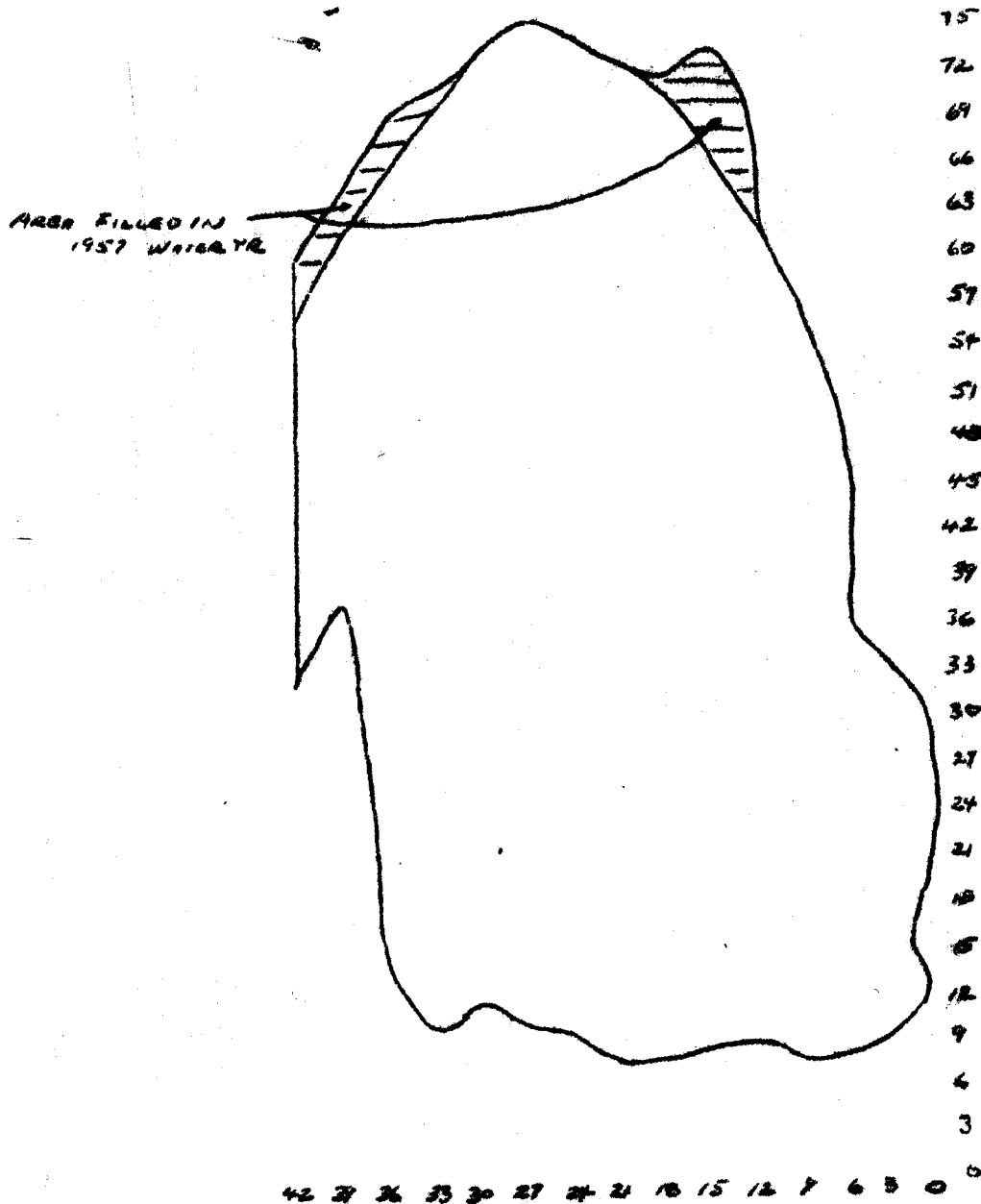
RI - NW
SOIL STABILIZATION
Watersheds
Benchmark: 100.00
H.I.
Elev.

Experimental Area: H. V. ANDREWS EXP. FOR
Basin Location: STREAM No. 1

Date: AUG. 20-31, 1957
Party: Level ROTHACHER
Rod FRANKLIN
Notes ROTHACHER

*Numbered to right starting with 0 at borderline which extends upstream from left end of dam.

SEDIMENT BASIN WATERSHED No. 1



SURFACE AREA = 1466 Sq. in. by POLAR PLANIMETER

144
2111 SQ FT SURFACE AREA

SCALE 1" = 12'

RI - NW
 SOIL STABILIZATION
 Watersheds
 Benchmark: 100.00
 H.I. 107.80
 Elev.

ELEVATIONS OF SEDIMENT ACCUMULATED
IN CATCHMENT BASINS

FORM RI-2.

Experimental Area: H.J. Andrews Exp. for
 Basin Location: Stream North

Date: Aug. 21, 1957
 Party: Level
 Rod: Yorker
 Notes: Franklin

Station*	Transects (Designated in ft. starting at crest of dam)													
	Line 1		Line 2		Line 3		Line 4		Line 5		Line 6		Line 7	
	H.I.	Elev.	H.I.	Elev.	H.I.	Elev.	H.I.	Elev.	H.I.	Elev.	H.I.	Elev.	H.I.	Elev.
0+00					2.72		2.97		2.83		2.74		2.64	
0+03					3.69	5.15	4.42	3.25	4.89	WE	5.01	WE	4.82	WE
0+06			4.31	1' off	5.15		6.22		5.95		6.14		5.71	
0+09			4.63	WE	5.80		6.37		6.40		6.41		6.31	
0+12	3.10		4.50	5.50	5.80		6.41		6.41		6.46		6.41	
0+15	3.48		5.10		5.99		6.33		6.40		6.37		6.17	
0+18	3.80		4.91		6.06		6.33		6.37		6.23		6.30	
0+21	4.40	5' off	5.71		6.24		6.35		6.38		6.33		6.48	
0+24	4.94	WE	6.29		6.42		6.46		6.30		6.38		6.50	
0+27	5.55	WE	6.55		6.57		6.38		6.29		6.57		6.57	
0+30	4.80	WE	6.50		6.64		6.53		6.49		6.57		6.57	
0+33			6.38		6.76		6.59		6.50		6.59		6.48	
0+36			5.19		6.72		6.70		6.75		6.57		6.57	
0+39			4.69	WE	6.54		6.69		6.58		6.55		6.60	
0+42			4.87	WE	6.16		6.52		6.53		6.42		6.49	4' off
0+45					5.91		5.95		5.78	WE	5.69	WE	6.14	WE
0+48					5.22		5.58		4.28		4.56		4.66	
0+51					4.89	WE	5.48		4.60		4.47	Stream	4.04	
0+54							4.89	WE	4.40		4.50	Stream	4.12	
1st Year	10.49		51.50		96.81		105.78		107.30		107.62		98.08	
2nd Year	8.34		57.88		113.24		124.94		133.66		126.94		119.08	
Spillway			4.81											
			4.87											
			4.90											
			4.86											
			= Rod Rdy on water surface											
			107.08											
			- 4.86											
			102.22											
			= Elevation of water surface											
Total														
Average														

*Numbered to right starting with 0 at borderline which extends upstream from left end of dam.

RI - NW
SOIL STABILIZATION
Watersheds
Benchmark: 100.00
H.I. 107.08
Elev.

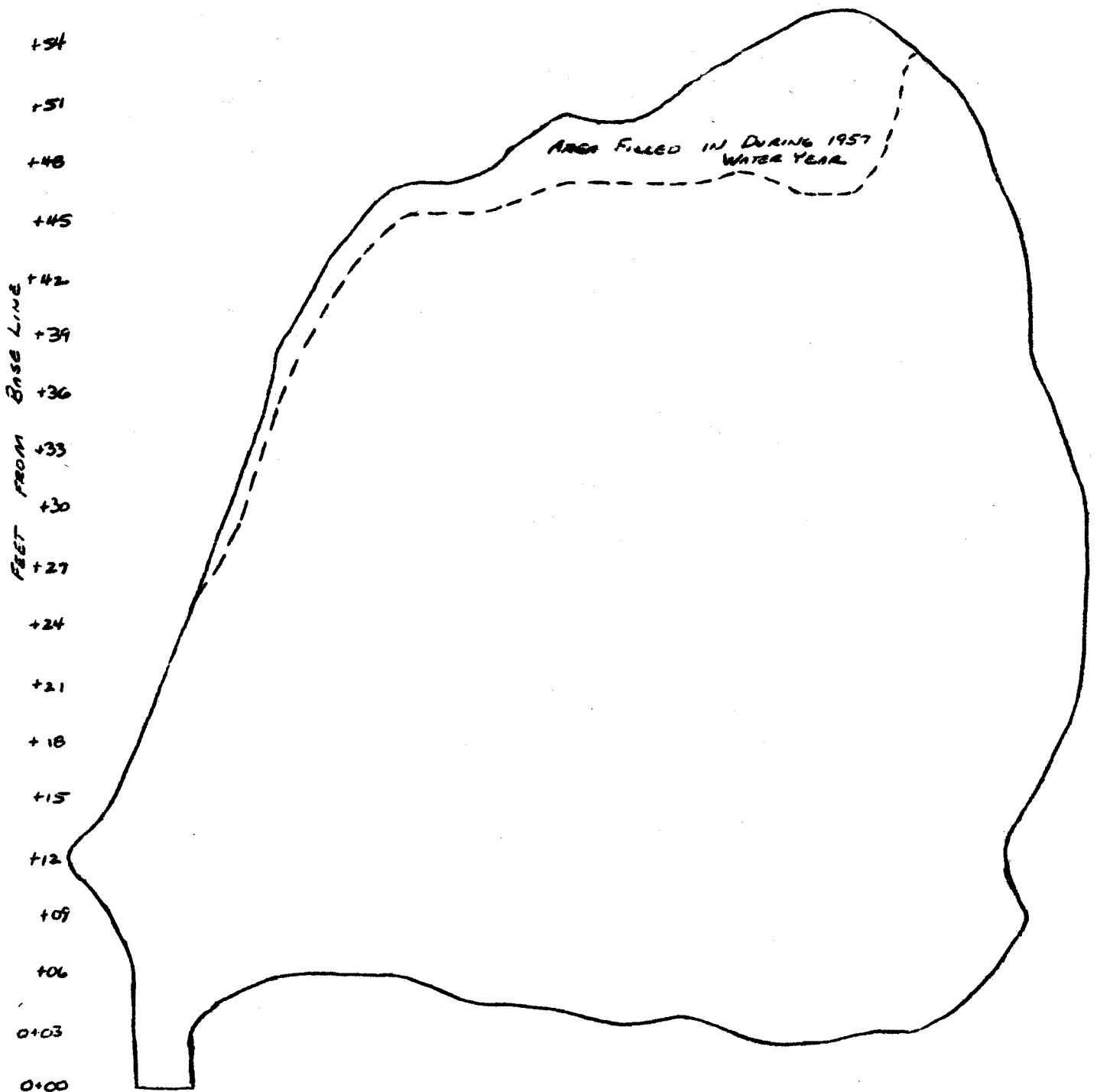
ELEVATIONS OF SEDIMENT ACCUMULATED
IN CATCHMENT BASINS

Experimental Area: H. J. Andrews E. T.
Basin Location: Stream # II

Date: Aug. 21, 1957
Party: Level Franklin
Rod Yakkee
Notes Franklin

*Numbered to right starting with 0 at borderline which extends upstream from left end of dam.

WATERSHED NO. TWO CATCHMENT BASIN MAP



AREA BY POLAR PLANIMETER
2025 SQ. FT.

Scale 1" = 3'
SEPT. 6, 1957
J. F. FRANKLIN

51 48 45 42 39 36 33 30 27 24 21 18 15 12 9 6 3 0
FEET FROM PRIMARY CONTROL CORNER NO. 2

RI - NW
SOIL STABILIZATION
Watersheds
Benchmark: 100.00
H.I.
Elev.

Experimental Area: MS. ANDREWS Exp. For
Basin Location: Stream No. III

Date: AUG. 23, 1957
Party: Level FRANKLIN
Rod YRKES
Notes FRANKLIN

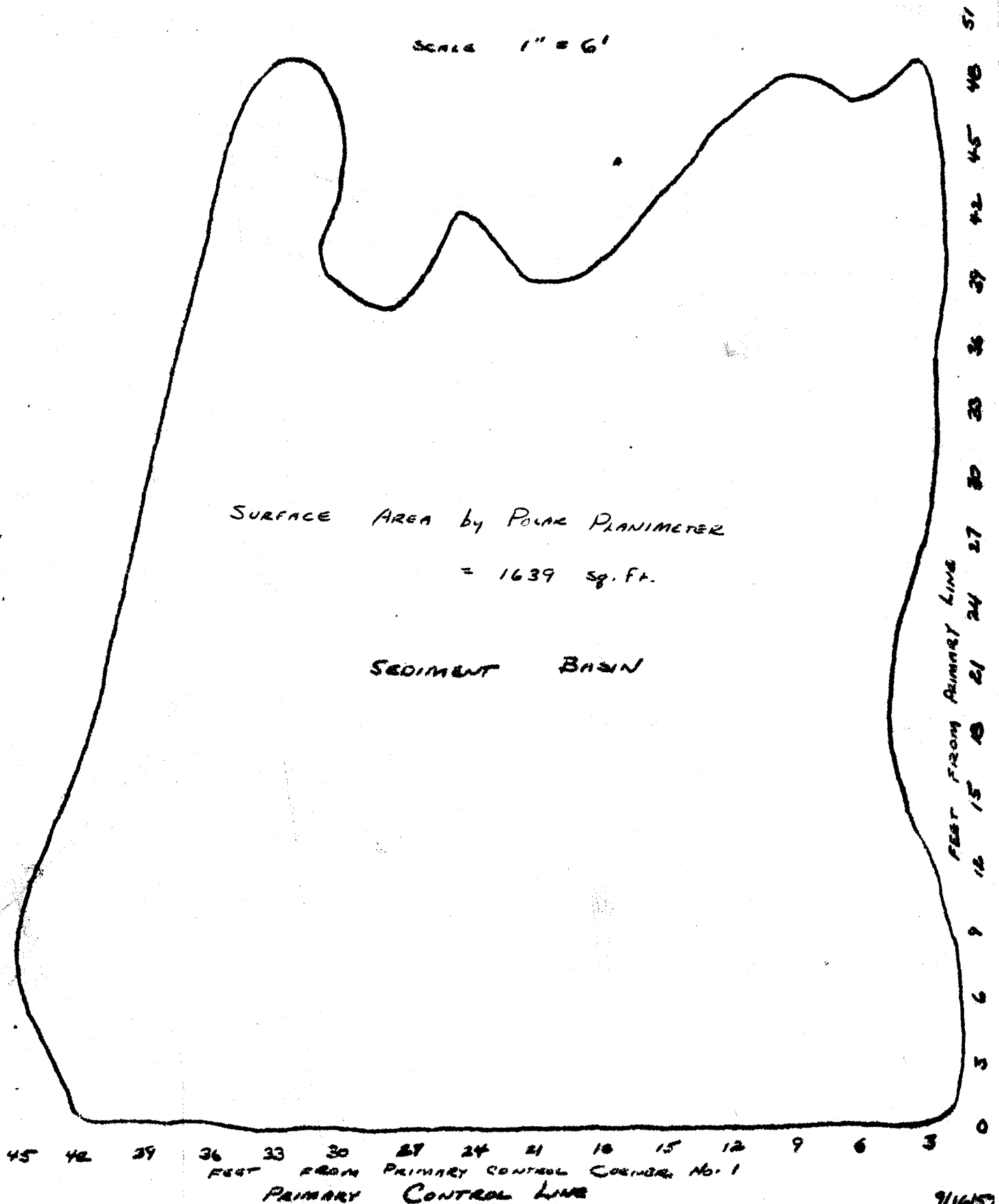
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SEDIMENT BASIN W/S #3

SCALE 1" = 6'

SURFACE AREA by POLAR PLANIMETER
= 1639 sq. ft.

SEDIMENT BASIN



9/16/57
JP

WE-1

Comparison with extra points addition. 4/66

1957

PLP

Line 1-9

19 points

77.67

$$\frac{1351.69}{180} = 7.509$$

Line 10-14

20 points

77.67

$$\frac{534.18}{98} = 5.457$$

$$\frac{141}{5.457}$$

6.835 averaged reading

1956

Line 1-9

134.39

$$\frac{1351.69}{212} = 6.301$$

$$\frac{212}{41} = 5.17$$

$$\frac{6.835}{6.301} = 1.086$$

$$\frac{534}{1}$$

23.1 points

$$\frac{1274.02}{101}$$

$$\frac{434.5}{-5}$$

23.1

ave. red. 7.913

$$\frac{6.107}{6.1207}$$

ave. red. 7.913

$$\frac{7.913}{105.871}$$

ele. of red. bottle above spine 19.5

$$\frac{1617.28}{23.1} = 6.824$$

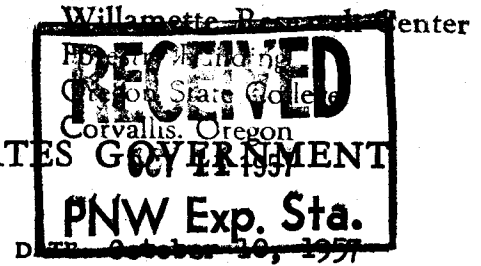
$$\frac{112.40}{105.576} = 6.824$$

$$\frac{105.576}{105.576} = .295$$

623 ft²/237000

Office Memorandum • UNITED STATES GOVERNMENT

TO : E. G. Dunford, Chief, WM Research



FROM : Robert H. Ruth, Willamette Research Center

SUBJECT: RI-NW, WATERSHED MANAGEMENT, Water Yield, Small Watersheds

Study C-2 •

Attached is the 1957 report on sediment accumulations in
the debris basins on the small watersheds.

Bob

egw

Attachment

RI-55
WATERSHED MANAGEMENT
Water Yield
Small Watersheds

Sept 1957

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SEDIMENT ACCUMULATION

SUMMARY OF CALCULATIONS

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