

RI-MW  
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 Gruber 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 Gruber 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 rod readings (which were not under water last year) to the 1956 totals for rod readings as computed by Gruber. A new average (1956) rod 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, ~~as 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. N. J. Andrews Experimental Forest.  
September, 1956. (RI-NW, WATERSHED MANAGEMENT, Water Yield, Small Watersheds or Water Relations, Quality.)

RI-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. RDG RDG	6.821	7.369	7.021	5.841	6.576	8.478
WATER LEVEL	4.130	4.950	5.840	4.860	3.940	5.930
AV. DEPTH BASIN	2.691	2.419	1.181	.981	2.636	2.548
DEPTH 1956	2.691		1.181		2.636	
DEPTH 1957		2.419		.981		2.548
DIFFERENCE		.272'		.200'		.088'
SURFACE EL. WATER '56	108.27		102.26		91.62	
SURFACE EL. WATER '57		108.30		102.22		91.70
DIFFERENCE		-.03		+.04		-.08
DIFFERENCE WATER LEVEL CORRECTION	.272		.200		.088	
		t.030		-.040		t.080
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.

RI - NW  
SOIL STABILIZATION  
Watersheds

ELEVATIONS OF SEDIMENT ACCUMULATED  
IN CATCHMENT BASINS

FORM RI-2

Benchmark: 100.00  
H.I. 113.35  
Elev.

Experimental Area: H.J. ANDREWS EXP. FOR.  
Basin Location: STREAM NO. 1

Date: Aug. 20, 1957  
Party: Level Rothacher  
Rod Franklin  
Notes Rothacher

Station*	Transects (Designated in ft. starting at crest of dam)												
	LINE No. 1-3		LINE 2 - 6		LINE 3 - 9'		LINE 4 - 12'		LINE 5 - 15'		LINE 6 - 18'		LINE 7 - 21'
H.I.	Elev.	H.I.	Elev.	H.I.	Elev.	H.I.	Elev.	H.I.	Elev.	H.I.	Elev.	H.I.	Elev.
0+00													
0+03													
0+06	3.14		3.75 SWL	4.73	7.25	3.92 SWL	3.85	6.00	3.76 SWL	3.80	3.76		
0+09	4.83		5.00	6.00	7.00	5.90	5.90	5.44	5.44	5.52	5.38		
0+12	6.55		7.90	8.91	8.10	7.90	7.90	7.97	7.97	7.93	7.93		
0+15	6.77		9.20	10.92	9.63	9.67	9.67	9.51	9.51	9.45	9.45		
0+18	6.72		9.20	10.73	10.97	11.10	11.10	11.13	11.13	11.00	11.00		
0+21	6.73		8.81	10.66	10.76	11.02	11.02	11.10	11.10	10.50	10.50		
0+24	7.11		9.01	10.26	10.10	10.10	10.10	10.24	10.24	9.83	9.83		
0+27	6.88		8.70	9.45	9.51	9.55	9.55	9.45	9.45	9.36	9.36		
0+30	6.04		6.85	9.02	9.00	9.08	9.08	9.32	9.32	8.74	8.74		
0+33			7.81	8.65	8.34	8.89	8.89	9.10	9.10	8.39	8.39		
0+36			6.40	8.30	8.15	9.05	9.05	8.80	8.80	8.20	8.20		
0+39			6.45	7.85	7.60	8.47	8.47	8.34	8.34	8.10	8.10		
0+42	46.70		5.11 SWL	7.20	7.34	8.08	8.08	8.30	8.30	8.29	8.29		
0+45			5.07	6.66	7.68	7.60	7.60	8.40	8.40	8.58	8.58		
0+48	37.14			5.22	7.35	7.40	7.40	8.14	8.14	9.46	9.46		
0+51			81.76	6.43	7.69	7.65	7.65	8.04	8.04	8.08	8.08		
0+54				5.57	7.40	7.37	7.37	7.67	7.67	7.70	7.70		
0+57			63.16		6.07		6.90		7.45		7.50		
0+60				132.03	5.44	6.70	6.13		7.00		7.35		
0+63					4.48		5.02	6.85	6.76		6.75		
0+66				110.24	4.05		4.84		6.25		6.29		
0+69					4.10		4.30		5.57	4.85	5.85		
0+72					4.10		4.52		4.94		5.00		
0+75							4.62		4.40		4.19		
					147.47		170.67		173.96		178.00		
					131.38		160.35		159.75		165.05		

7 10 16 19 22 27 28

Benchmark = 100.00  
Rod Rod - Rothacher = 13.25 Rod Rod on Water = 4.95  
Line of Sight = 113.35 108.30 = Water level elevation

Total

Average

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

**RI - NW  
SOIL STABILIZATION  
Watersheds**

## ELEVATIONS OF SEDIMENT ACCUMULATED IN CATCHMENT BASINS

**FORM RI-2**

Benchmark: 100.00

H. I.  
Elev.

Experimental Area: H.J. Andrews Exp. For.  
Basin Location: Stream No. 1

Date: Aug. 20 1967  
Party: Level FORMACION  
Rod FRANKLIN  
Notes ROTACION

Station*	Transects (Designated in ft. starting at crest of dam)													
	LINE 8 - 34'		LINE 9		LINE 10		LINE 11		LINE 12		LINE 13		LINE 14	
	H. I.	Elev.	H. I.	Elev.	H. I.	Elev.	H. I.	Elev.	H. I.	Elev.	H. I.	Elev.	H. I.	Elev.
0 + 06	3.52		3.12											
0 + 09	4.91	w.l.	4.20	4.92	3.57	11.92	3.26							
0 + 12	6.70		6.39		5.25		4.32	12.72	3.15		2.54			
0 + 15	8.70		7.82		7.40		6.12	w.l.	4.55	16.52	3.51			
0 + 18	9.75		9.63		8.87		8.02		5.11	w.l.	4.12			
0 + 21	10.41		10.73		9.22		8.71		5.97		3.65			
0 + 24	10.30		10.65		9.70		7.74		4.96		3.10			
0 + 27	9.40		9.25		9.62		7.64		4.97		3.00		3.49	
0 + 30	9.08		9.62		8.23		7.72		3.49	-7.5	3.12		4.06	31.02
0 + 33	8.60		9.80		8.67		7.14		4.29		3.54		5.09	
0 + 36	8.39		8.90		8.47		6.70		4.12		4.46	37.06	5.39	
0 + 39	8.16		8.42		8.02		6.61		4.83	w.4.	4.90		5.39	
0 + 42	8.45		8.33		7.95		6.62		5.21		5.86		5.26	
0 + 45	8.60		8.20		7.34		5.82		5.67		5.58		5.10	
0 + 48	9.33		7.90		7.00		5.85		5.79		5.32		5.11	
0 + 51	7.82		7.36		6.04		6.15		5.61		5.30		5.00	
0 + 54	7.49		7.01		6.10		5.82		5.36		5.50		5.05	53.02
0 + 57	7.34		6.73		6.32		5.54		5.64		5.76		4.23	
0 + 60	6.85		6.66		6.30		5.00		5.76		4.94	11.02	3.29	
0 + 63	6.64		6.26		6.24		5.75		5.56	15.22	4.07	w.2.	1.70	
0 + 66	6.52		6.64		5.99		5.85	9.92	4.36	w.m.	3.10			
0 + 69	6.50		5.93		5.55		4.89	w.l.	3.24		0.62			
0 + 72	5.54	13.02	6.60	64.72	5.15	25.02	3.33		1.72					
0 + 75	4.62	w.l.	4.66		3.68	w.l.	2.72							
THIS YR	174.33		169.10		135.97		124.21		91.25		47.01		465.70	
LAST YR	165.88		159.79		153.79		132.97		93.56		43.16		40.27	

WATER LEVEL @ OUTLET  
OF POOL

800 READING  
WATER LEVEL @ GULF OF PODA = 4.84

~~Rec'd - 4-25~~

TIME OF SCENE 7 11:30 AM

100-22500-103-35

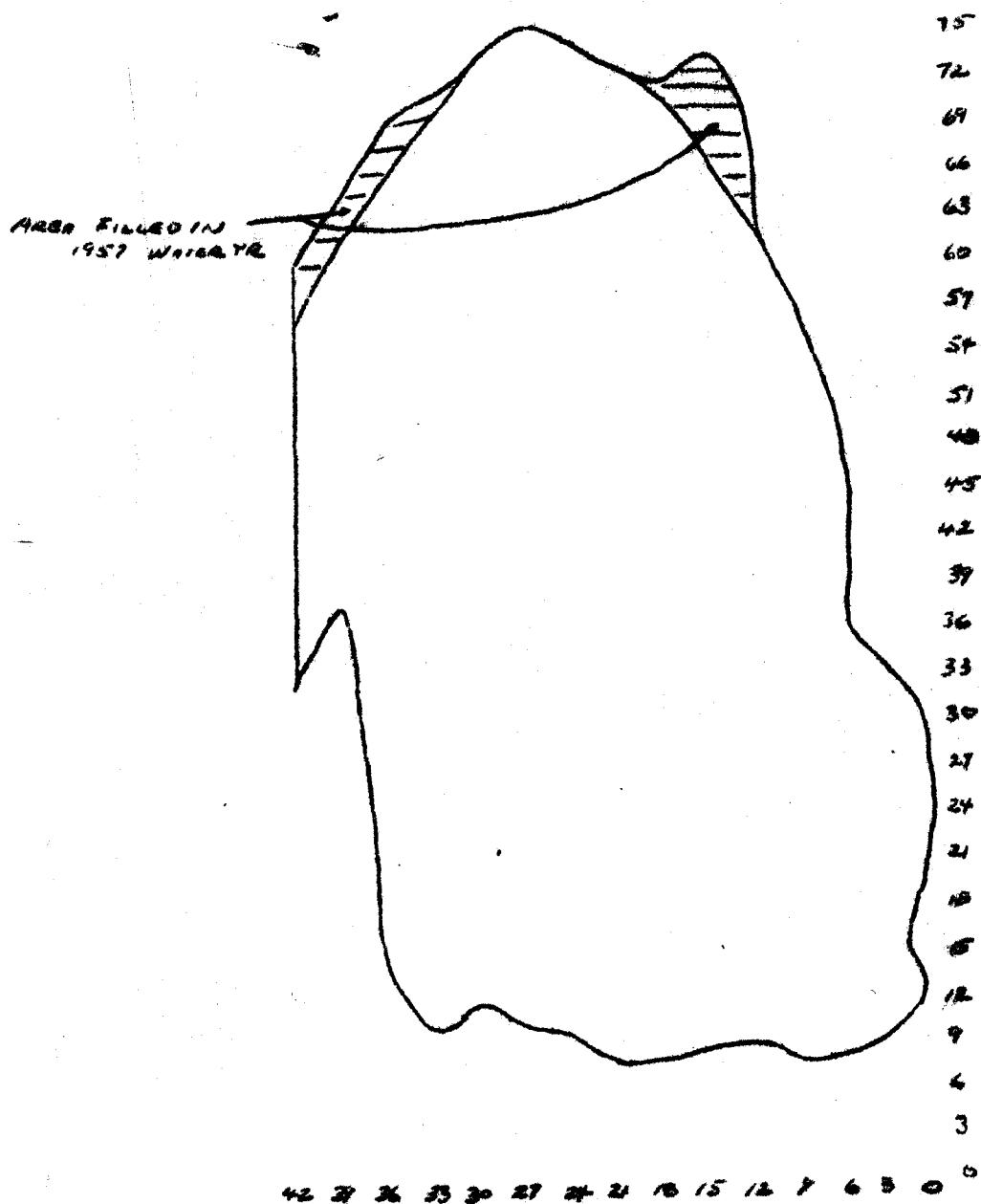
Time of Scene 7 11:30 AM

Total

### Average

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

SEDIMENT BASIN  
WATERSHED No. 1



SURFACE AREA = 14.66 Sq.m. by POLAR PLANIMETER

$$\frac{X144}{2111} \text{ Sq ft Surface Area}$$

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 Experimental  
Basin Location: Stream No. II

Date: Aug. 21, 1957  
Party: Level Franklin  
Rod Walker  
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.
0+00			2.72	2.97	2.83	2.74	2.64				
0+03			3.69	3.25	4.42	3.25	5.01	4.82	4.16		
0+06			4.31	4.09	5.15	6.22	5.95	6.14	5.71		
0+09			4.63	4.66	5.80	6.37	6.40	6.41	6.31		
0+12	3.10		4.50	4.23	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	4.40	5.71	6.24	6.35	6.38	6.13	6.48			
0+24	4.94	4.94	6.29	6.42	6.40	6.30	6.38	6.38	6.30		
0+27	5.55	5.55	6.55	6.57	6.38	6.29	6.57	6.57	6.57		
0+30	4.80	4.80	6.50	6.64	6.53	6.49	6.57	6.57	6.57		
0+33			6.30	6.76	6.59	6.50	6.59	6.48	6.48		
0+36			5.19	6.72	6.70	6.75	6.57	6.57	6.57		
0+39			4.69	4.54	6.69	6.58	6.55	6.60	6.60		
0+42			4.87	4.87	6.16	6.52	6.53	6.42	6.49		
0+45				5.91	5.95	5.78	5.69	6.14	6.14		
0+48				5.22	5.58	4.20	4.56	4.66	4.66		
0+51				4.89	4.89	5.48	4.60	4.47	4.04		
0+54						4.89	4.40	4.50	4.12		
Total Year	10.49	51.50	96.81	105.78	107.30	107.62	98.08				
Total Year	8.34	57.00	113.24	124.94	133.66	126.94	119.08				
Sq. 11 Water	4.81										
	4.87										
	4.90										
	4.86	= Rod Rd. on water surface									
	107.08										
	- 4.86										
	102.22	= Elevation of water surface									
Total											114
Average											

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

RI - NW  
SOIL STABILIZATION  
Watersheds

ELEVATIONS OF SEDIMENT ACCUMULATED  
IN CATCHMENT BASINS

FORM RI-2

Benchmark: 100.00  
H. I. 107.08  
Elev.

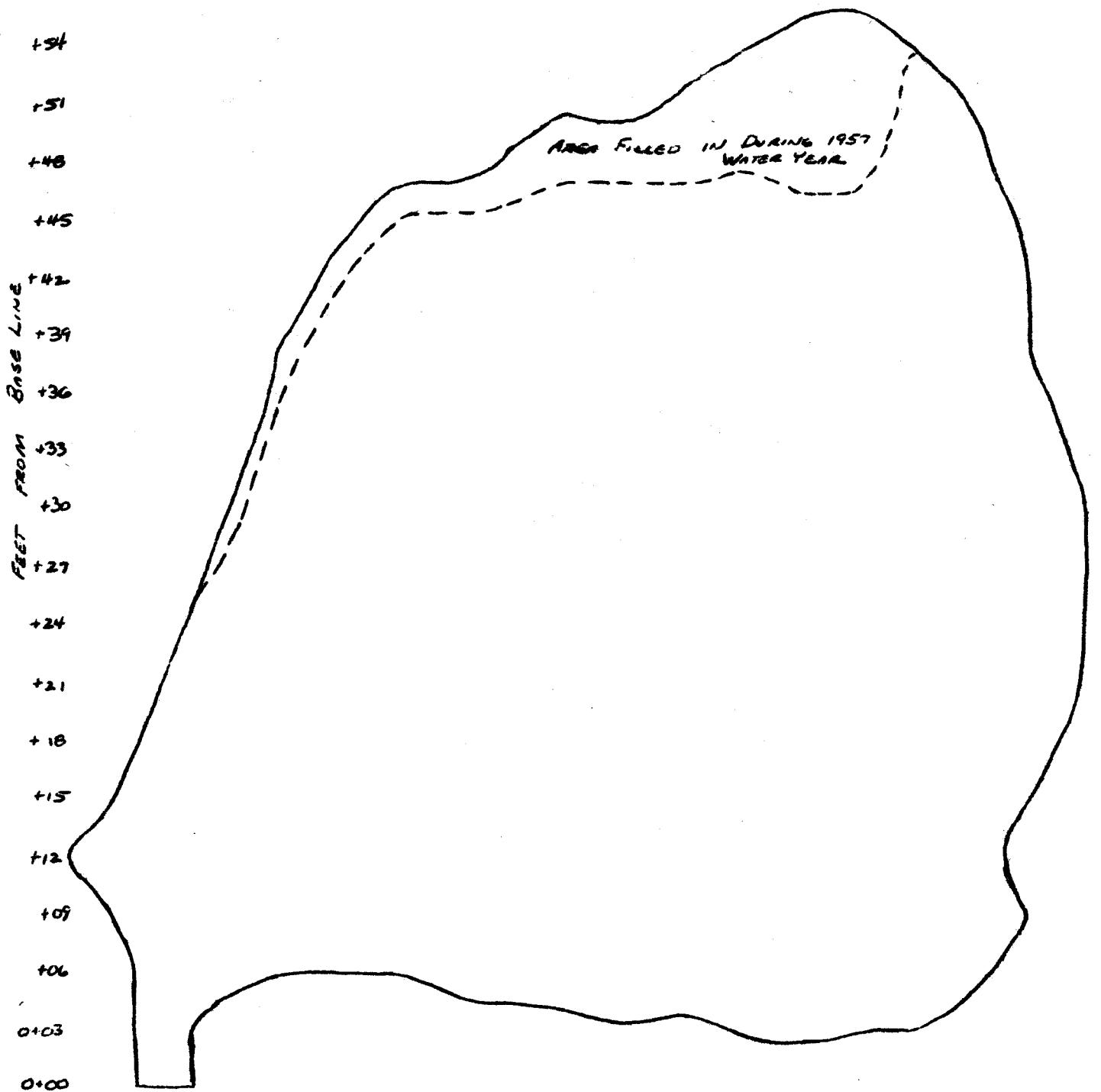
Experimental Area: H. J. Andrews E. T.  
Basin Location: Stream # II

Date: Aug. 21, 1957  
Party: Levee Franklin  
Rod Yardstick  
Notes Franklin

Station*	Transects (Designated in ft. starting at crest of dam)							
	Line 8 H. I. Elev.	Line 9 H. I. Elev.	Line 10 H. I. Elev.	Line 11 H. I. Elev.	Line 12 H. I. Elev.	Line 13 H. I. Elev.	Line 14 H. I. Elev.	
0+00	2.71	2.73	2.63	3.08	2.42	2.42	2.77	
03	4.08 <sup>47 = WE</sup>	4.33 <sup>35 = WE</sup>	3.81 <sup>425 = WE</sup>	4.17 <sup>45 = WE</sup>	3.19 <sup>5 = WE</sup>	3.20	3.24	
06	5.54 ✓	5.80 ✓	5.43 ✓	5.50 ✓	5.24 ✓	4.80 <sup>WE</sup>	4.50 <sup>WE</sup>	
09	6.17	6.37	6.15	6.12	5.64	5.56 ✓	5.67 ✓	
12	6.31	6.43	6.34	6.37	5.90	5.85	5.82	
15	6.14	6.29	6.37	6.35	6.08	6.03	5.67	
18	6.27	6.26	6.14	6.12	5.96	5.82	6.15	
21	6.42	6.47	6.17	6.19	5.94	5.87	5.94	
24	6.41	6.39	6.39	6.30	6.19	6.23	5.60	
27	6.48	6.44	6.47	6.43	6.32	6.36	6.03	
30	6.48	6.46	6.51	6.35	6.37	6.30	5.92	
33	6.48	6.51	6.46	6.53	6.42	6.18	5.79	
36	6.53	6.49	6.46	6.45	6.34	6.02	5.53	
39	6.45	6.51	6.42	6.35	6.12	5.62	5.10 <sup>41 = WE</sup>	
42	6.33	6.39	6.21	6.01	5.62	5.14	3.19 ✓	
45	5.97 <sup>47 = WE</sup>	5.92 <sup>47 = WE</sup>	5.61 <sup>47 = WE</sup>	5.34 <sup>46 = WE</sup>	5.09 <sup>46 = WE</sup>	4.90 <sup>WE</sup>		
48	4.24	4.28 ✓	4.29 ✓	4.51 ✓	4.30	3.06		
51	3.82 ✓	3.75	3.71	4.15	3.89			
54	3.64	3.61	3.81	3.71				
THIS YEAR	96.04	93.9	91.42	90.92	83.13	75.87	66.11	
LAST YR	118.30	111.48	110.98	108.83	99.76	91.80	82.95	
	Line 15	Line 16	Line 17	Line 18				
0+00	3.19	4.34	4.98 ✓	4.26				
03	3.55 <sup>5.75 = WE</sup>	4.32 <sup>4.55 = WE</sup>	5.10	3.82				
06	4.99 ✓	5.10 ✓	5.19	3.74				
09	5.44	5.73	4.88 RK	3.71 <sup>4.5 = WE</sup>				
12	5.72	5.55	5.02	5.14 <sup>44 = WE</sup>				
15	5.94	4.98	4.89	4.55				
18	5.31	4.87	5.06 ✓	3.68				
21	5.33	5.31	4.82 WE					
24	5.66	5.00	3.65					
27	5.39	4.90 <sup>WE</sup>			TOTAL FOR 225 POINTS			
30	5.43	3.70			THIS YEAR	1,314.24		
33	5.28 <sup>35 = WE</sup>				LAST YEAR	1,579.62		
36	3.83 ✓							
					AVERAGE READING FOR POINTS			
THIS YEAR	58.32	41.44	35.20	5.14	THIS YEAR	5.841		
LAST YEAR	71.48	49.97	42.26	5.78	LAST YEAR	7.021		
					AVERAGE DEPTH IN BASIN			
					THIS YEAR	0.981 t. 04		
					LAST YEAR	1.181		
Total	AREA - 2025 sq ft x .160 = 324.00 cu ft				DIFFERENCE BETWEEN DEPTHS	-1.00		
Average						.160		

\*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 CM = 3'~~  
SEPT. 6, 1957  
J. F. FRANKLIN

57 48 46 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.

ELEVATIONS OF SEDIMENT ACCUMULATED  
IN CATCHMENT BASINS

FORM RI-2

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

Experimental Areas: ANDREWS EXP. FOR  
Basin Location: STREAM NO. III

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+03	6.36	/	7.32	/	9.36	/	9.02	/	9.02	/	9.14	/	8.89	/
0+06	6.35	/	8.30	/	8.60	/	10.20	/	10.33	/	10.39	/	10.35	/
0+09	5.94	/	8.25	/	9.75	/	10.24	/	10.32	/	10.10	/	9.90	/
0+12	6.38	/	8.32	/	9.55	/	10.61	/	10.24	/	9.88	/	9.70	/
0+15	5.36	/	8.15	/	10.13	/	10.65	/	10.06	/	9.78	/	9.76	/
0+18	7.72	/	6.63	/	10.46	/	10.30	/	9.85	/	9.75	/	9.86	/
0+21	7.73	/	6.45	/	9.59	/	10.01	/	9.95	/	10.03	/	10.04	/
0+24	2.95	/	7.91	/	9.51	/	9.94	/	10.06	/	10.17	/	10.04	/
0+27	6.08	/	7.90	/	9.30	/	9.34	/	10.10	/	9.93	/	9.55	/
0+30	5.93	/	8.42	/	8.96	/	9.45	/	9.70	/	9.15	/	9.00	/
0+33	6.21	/	8.06	/	8.60	/	8.83	/	8.79	/	8.49	/	8.72	/
0+36	6.38	/	7.30	/	8.34	/	8.36	/	8.10	/	7.52	/	7.52	/
0+39	6.77	/	7.28	/	7.80	/	7.92	/	7.75	/	6.37	/	5.97	/
0+42	6.67	/	7.00	/	7.05	/	7.05	/	6.53	/	4.73	/	5.58	/
0+45	5.91	/	6.75	/	6.84	/	6.73	/	4.79					
0+48	5.00	/	5.75	/	6.25	/	5.03							
0+51	4.98		4.14		3.31									

LINE 8 LINE 9 LINE 10 LINE 11 LINE 12 LINE 13 LINE 14 LINE 15

0+03	8.61	8.58	7.70	7.57	7.37	7.20	6.24	4.96					
0+06	10.38	10.30	10.46	10.42	9.48	8.70	7.42	5.52					
0+09	9.93	10.94	10.37	10.30	9.00	8.67	7.30	5.70					
0+12	9.70	10.07	10.31	10.06	9.00	9.00	7.31						
0+15	9.71	9.90	10.34	10.04	9.84	8.65	7.37						
0+18	9.79	9.67	9.96	10.00	9.53	8.00							
0+21	9.92	9.68	9.07	9.82	8.65	7.46							
0+24	9.66	9.55	9.45	9.26	8.42	6.35							
0+27	9.19	9.45	8.60	9.34	7.54	5.85							
0+30	9.00	8.58	6.48	7.86	6.55								
0+33	8.46	7.01	6.17	8.16	6.82								
0+36	7.10	6.81	7.30	7.24	7.07								
0+39	5.92	7.33	ON LOC	7.07	6.26								
0+42	5.99		5.07	7.04	5.62								
0+45			4.67										0.04
0+48			6.96	6.50	5.09								
0+51			6.07	5.20									

ROD READING ON REFLINER = 0.58

-2.37

97.69 = FL OF LINE/SIGHT

-5.93

91.70 = FL OF WATER LEVEL

4.99

-0.04

4.95

-2.58

-2.37 = HT OF INSTRUMENT

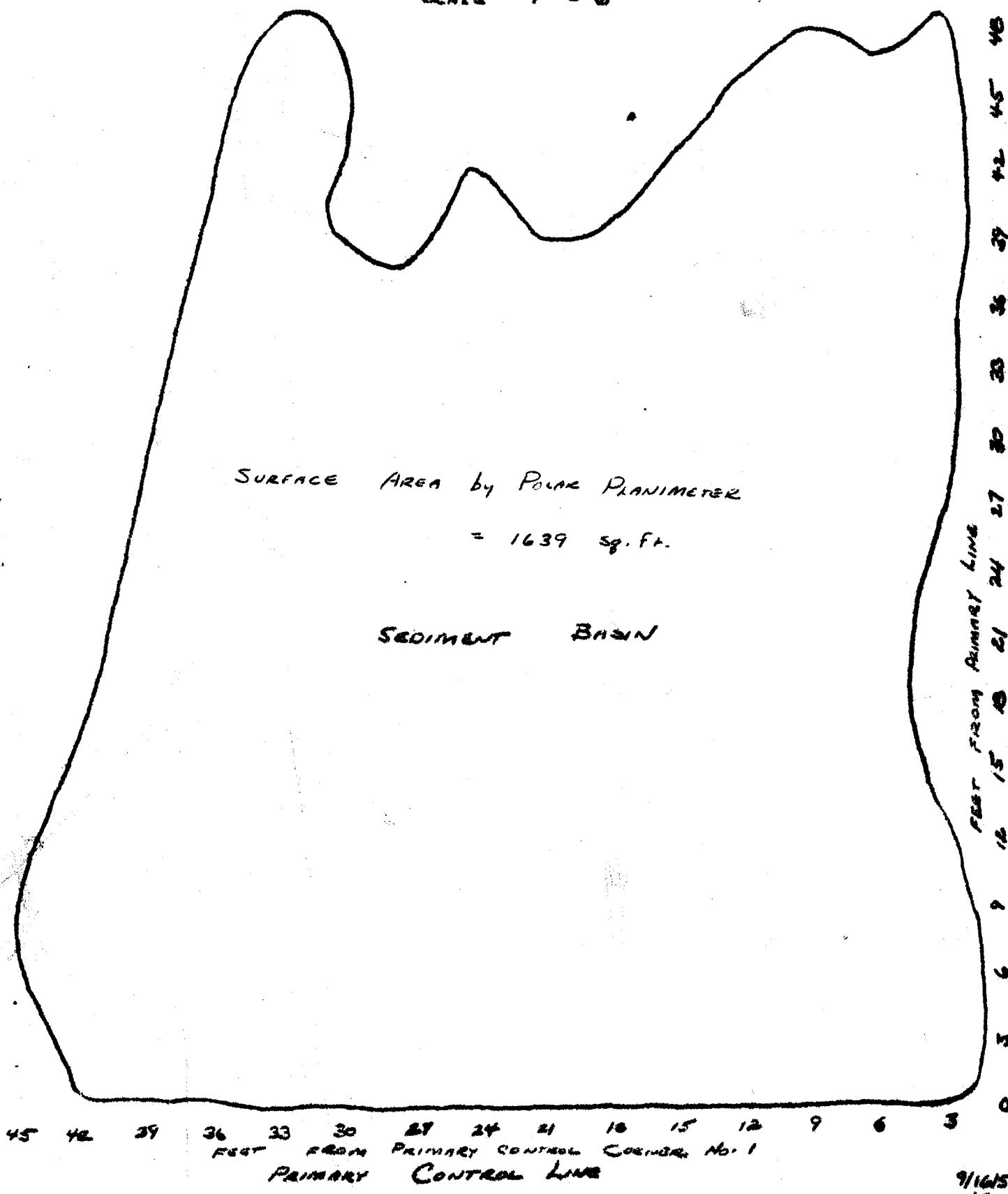
Total

Average

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

SEDIMENT BASIN W/S #3

SCALE 1" = 6'



7/16/57  
JP

WE-1

The previous with extra points added in. 24/66

1957

RCE

Line 1 - 9

19 points

$$\frac{1851.69}{180} = 7.509$$

77.67

Line 10 - 14

22 points

+ 7.62

$$\frac{534.18}{98} = 5.457$$
  
$$\underline{- 49}$$
  
$$5.477$$

6.835 and 100 reading

1956

100

124.39

$$\frac{124.39}{-124} \quad 6.301$$

~~200~~  
~~124~~

$$\begin{array}{r} 6.835 \\ - 6.301 \\ \hline 534 \end{array}$$

8000 ft. 237 fm.

$$\frac{1274.02}{101} = 12.6$$

$$\frac{1274.05}{101} = 12.5$$

one way 7.913

6.107

~~6.114~~  
6.1247

105.811 elev. of water

103.812

7.919

105.811 elev. of water from above figure (19.5")

$$\frac{167.28}{237} = 6.824$$

112.40

~~6.1247~~  
105.576 elev. of water above 112.40

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

623 ft / 2370 m

Willamette Research Center

RECEIVED  
EDWARD C. CHAMBERLAIN  
Oregon State College  
Corvallis, OregonUNITED STATES GOVERNMENT  
PNW Exp. Sta.

D TD October 10, 1957

# 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

**RISE**  
**WATERSHED MANAGEMENT**  
**Water Yield**  
**Small Watersheds**

*Sept 1957*

**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 Greber 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 Gruber 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 Gruber. 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 feet accumulation of sediment for each basin during the 1957 water year.

References.

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

N.W.  
 REPORTED MANAGEMENT  
 TERR RELATIONS  
 INCLINITY

SEDIMENT ACCUMULATION  
 SUMMARY OF CALCULATIONS  
 1957 WATER YEAR

WATER LEVEL	STREAM I	STREAM II	STREAM III			
	1956	1957	1956	1957	1956	1957
in. or 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. R.R. Rds	6.821	7.369	7.021	5.841	6.576	8.478
Water Level	<u>4.730</u>	<u>4.950</u>	<u>5.840</u>	<u>4.860</u>	<u>3.940</u>	<u>5.930</u>
In. 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		<u>.272'</u>		<u>.200'</u>		<u>.088'</u>
El. Water 56	108.27		102.26		91.62	
El. Water 57		<u>108.30</u>		<u>102.22</u>		<u>91.70</u>
Difference		<u>-.03</u>		<u>+.04</u>		<u>-.08</u>
Difference	.272		.200		.088	
Water Level Correction	<u>+.030</u>		<u>-.040</u>		<u>+.080</u>	
Corrected Diff.	<u>.302'</u>		<u>.160</u>		<u>.168</u>	
Area X Diff.	.302 X 2,111 = 637.52		.160 X 2,025 = 324.00		.168 X 1,634 = 275.35	
Cubic ft Sed. Accum.	<u>637.52</u>		<u>324.00</u>		<u>275.35</u>	

\* INCLUDES CORRECTION FOR 76 ELEVATIONS TAKEN SECOND DAY  
 @ DIFFERENT H.I.