RI-NW WATERSHED MAWAGEMENT Water Yield Small Watersheds

Measurement of Sediment Accumulation in Catchment Basins at Stream Gage Sites 1, 2 and 3 H. J. Andrews Experimental Forest

by

Raymond Graber

The purpose of this report is to present the data and the procedure used to measure the basins and in such a way that it will be possible to duplicate the method in successive years. The following is an outline of this procedure.

Survey of Catchment Basins

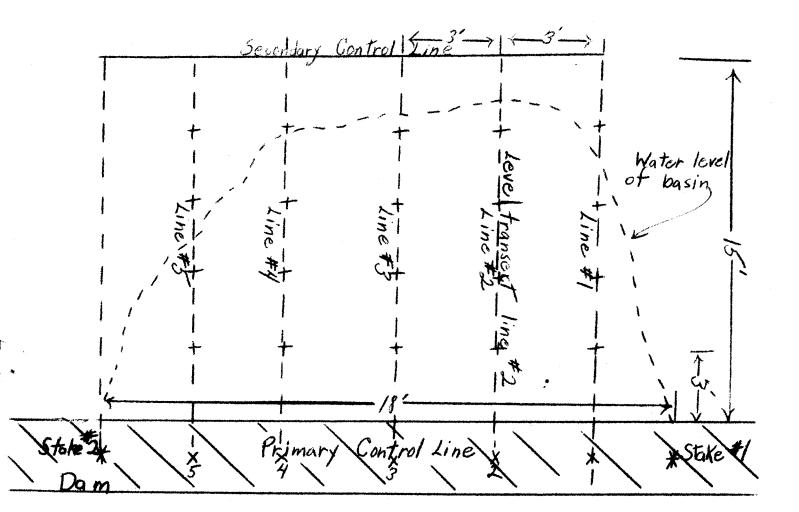
I. Requirements

Basin to be cross-sectioned at three-foot intervals and depth measurements are to be made. These measurements are to be compared with future measurements to discover the annual sediment accumulation.

II. Method

A. Instruments

- 1. Level and rod--rod equipped with light gage metal base
- 2. Compass (Silva)
- B. Control for level transects of basin
 - 1. A primary control line was laid out on the dam (Figure 1).
 - a. The primary line is marked at each end by a 4° x 4° x 30° cedar stake. The stakes are marked with aluminum foil and numbered.



Direction of stream

Hemlock with rail spike driven into, it. Elev, 100.00

+ marks spot where level reading was taken.

Figure 1.--Typical control system for cross-sectioning debris basin.

- 2. A secondary line was laid out on the opposite (upstream) side of the basin parallel to the primary line.
- 3. Starting on the right side (facing up stream) three-foot intervals were set off on the primary line and numbered.

- 4. Level readings were taken at three-foot intervals on the lines running perpendicular to and between the primary and secondary control lines.
- 5. Level readings were taken on the outlet to determine the elevation of the water surface.
- 6. All elevations are relative and in reference to a railroad spike driven into a hemlock. The assumed elevation of the spike is 100.00 feet in all three cases.
- C. Field Technique
 - 1. Stakes were driven at each end of an arbitrary primary control line which was laid out on and parallel to the axis of the dam. A string was strung between the stakes to mark the center of the primary control line. (Figure 1).
 - 2. A small log was placed on line between the stakes and three-foot intervals were marked with nails driven into the log.
 - 3. Using the hand compass (Silva), a secondary control line was established at the opposite end of the basin parallel to the primary control line. Using the same procedure as described above, a log was placed on line and three-foot intervals were marked off.

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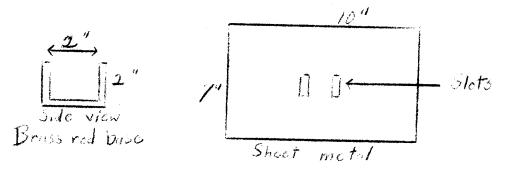
Example: Line one would be located three feet from primary control stake No. 1. at six feet would be line two. etc.

- 4. A string was then strung between the primary and secondary line logs. The string was fastened to the nails in the logs. This string acted as a guide for the level transects between the primary and secondary lines.
- 5. The rod man carried a seventy-five foot metal tape. One end was hooked over the nail on the primary control line. The rod man was then able to let out tape and accurately place the rod at threefoot intervals. The rod man stopped every three feet and a reading was taken by the instrument man.
- 6. Readings other than those taken at the three-foot interval: At the start and finish of each line a reading should be made at water level. The distance of these two readings from the primary control line should be recorded in the field notes. This information will be very helpful when a map of the basins is made. This was not done in the original survey, the water edge being determined by interpolation between the last reading inside the basin and the first reading outside.
- D. Additional Information

Bench marks -- A railroad spike was driven into a suitable Tsuga at each basin site. The assumed elevation of the bench mark in all cases was 100.00 feet. The asimuth to the Tsuga in each case is given on the map of that area included in the survey notes. The trees are marked with an aluminum foil cross.

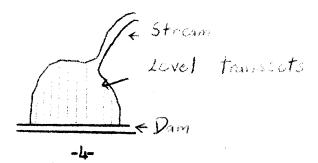
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Level Rod Base -- A $7^n \ge 10^n$ sheet metal forest boundary sign was used as a base. Two slots were cut in the center of the sign. The brass base was removed from the rod. The projecting legs of the brass base were pushed through special slots in the sheet metal. The base was then reattached to the rod.



The sheet metal base was flexible resulting in an accurate reading on uneven rocky ground as well as on the unstable silt soils in the basin.

Instrument location -- The best location for the level is as shown below.



By placing the level to the side, unnecessary focusing is avoided. The level must be at least nine feet from the nearest desired reading as it will focus at no distance less than nine feet.

E. Calculations

The purpose of this calculation is to show the annual sediment accumulation in the catchment basin.

The surface in square feet is taken from the scale drawing of the basin.

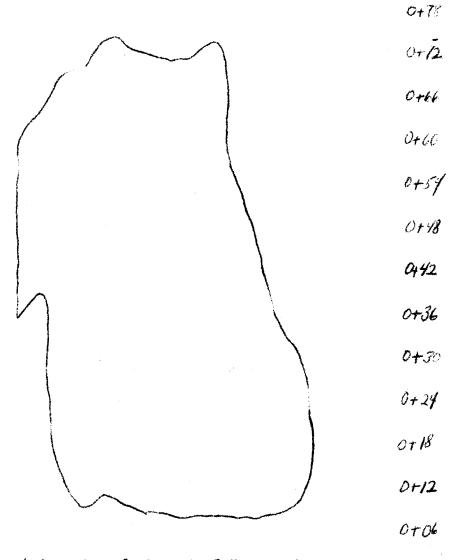
In the future the difference between the present average depth and the average depth of a later year multiplied by the surface area will equal the sediment accumulation in cubic feet. The same surface elevation must be used:

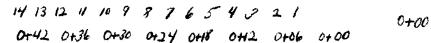
(area of water surface in sq. ft.) x (1956 av. depth - 1957 av. depth)= the volume sediment accumulation in cubic feet for the water year.

Original maps and field sheets are enclosed in the Andrews copy of this report. In case of loss, duplicates are being made for the Willamette Research Center copy.

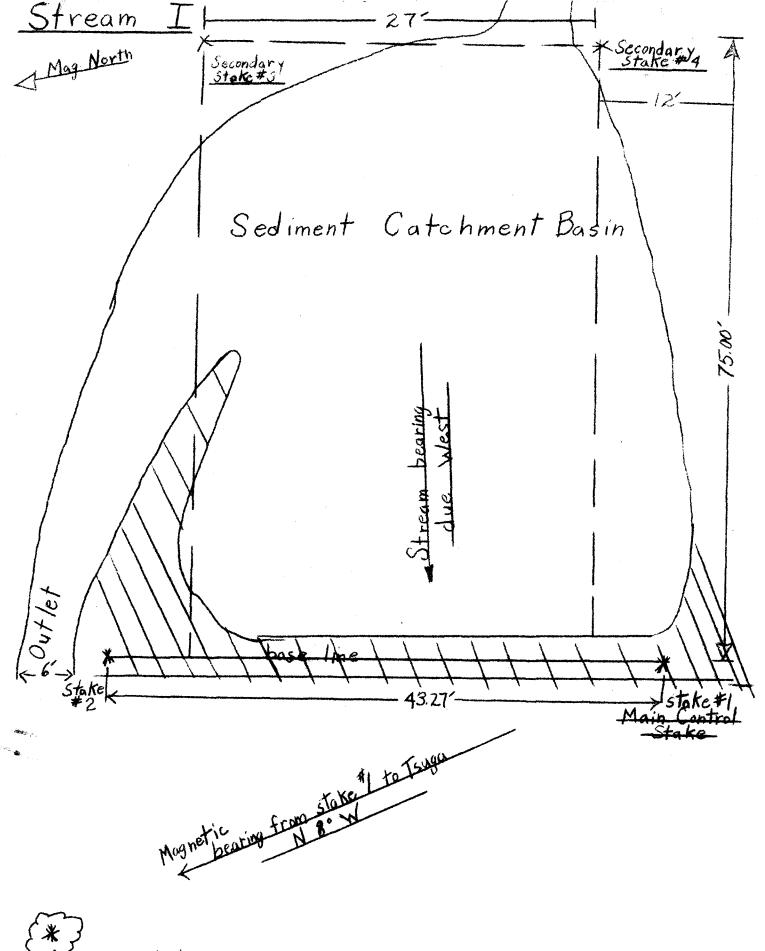
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Scole 14 = 12' Sept. 19, 1956 R.E. Graber



Tsuga heterophylla dbh. 17"

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RI - NW SOIL STABILIZATION

Watersheds

Date: **Sept. 5. 1955** Party: Level **Graber** Rod Allison Notes Graber

Benchmark: 100.00' H.I. 4.60 107.80 Elev.

Experimental Area: <u>I. J. Andrews E</u>, F. Basin Location: <u>Stream I</u>

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24	9.71	<u> </u>	0+24	<u> </u>	10.0		0+24		9.58				10.10	
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54	6.90		0+51		6.3		0+51		6.71				6.76	
57	5.70		0+57		5.8		0+57		6.57			L	6.64	
60	5.68		0+60		5.6		0+60	ļ	6.00				5.93	
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ELEVATIONS OF SEDIMENT ACCUMULATED

RI - NW

SOIL STABILIZATION Watersheds

H.I.

Elev.

Benchmark: 100.00*

4.61

107.80

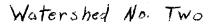
ELEVATIONS OF SEDIMENT ACCUMULATED IN CATCHMENT BASINS

In GRIDHIDHI DROINO

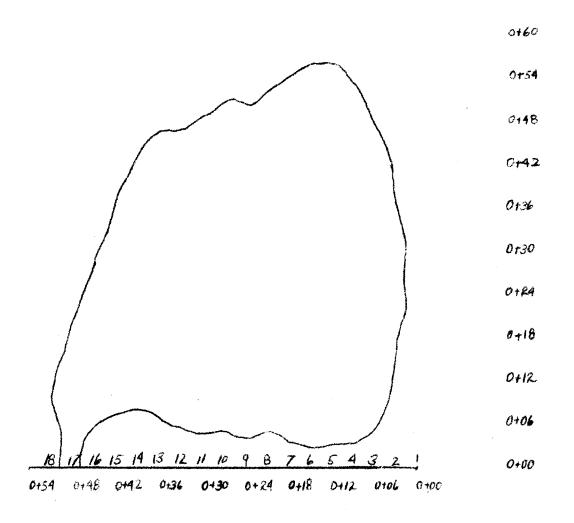
Date: Sept. 6, 1956 Party: Level Graber Rod Allison Notes Notes

Experimental Area: H. J. Andrews E. F. Basin Location: <u>Stream I</u>

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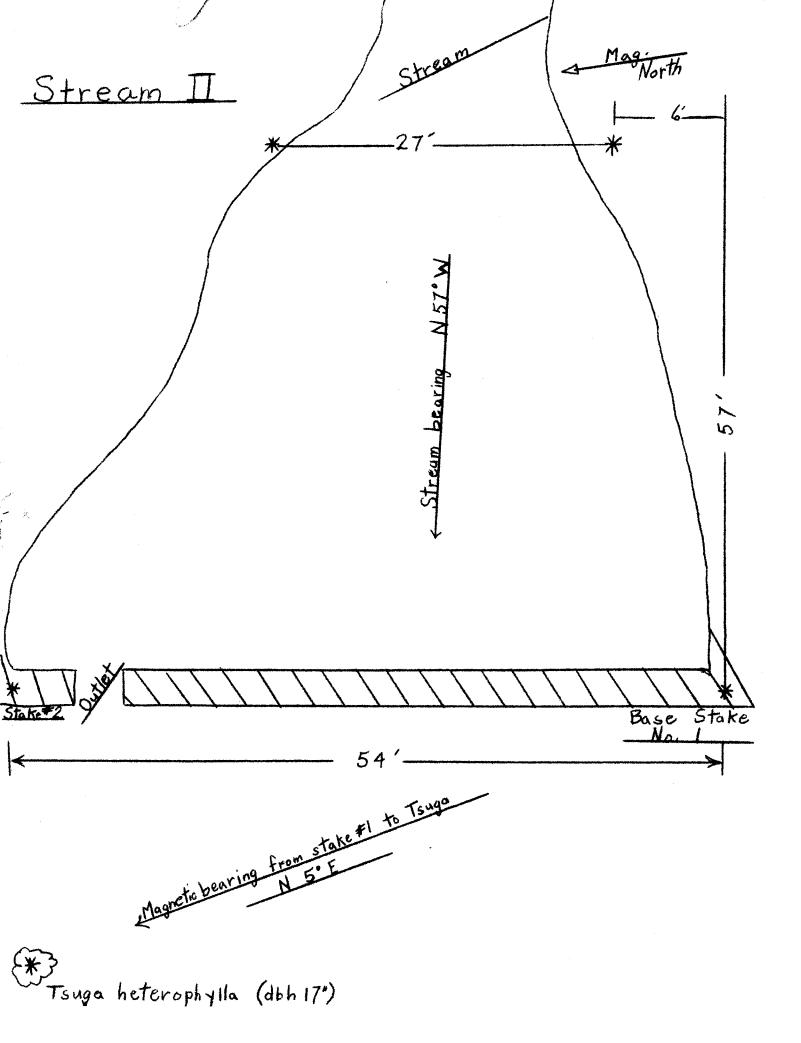


Catchment Basin Map



Scole 1"= 12' Sept. 27, 1956 RE, Graber

Y



Date: Sept. 6, 1956 Watersheds Party: Level Graber Benchmark: 8.10 Experimental Area: H. J. Andrews Rod Allison H.I. 4.66 Notes Graber Basin Location: Streen II Elev. 103.44 Transects (Designated in ft. starting at crest of dam) Station* H.I. Elev. +8.10 Rod reading Benchmark elevation = 100.00* 100.00 B.M. elev. TOB. TO Ħ. I. --4.66 103.14. LINE 6. 22 LIBL 9 Ct. 0 ft. LTTE 2 3.14. 3 11811 Station Station Station Station 3.61 قدينا 0+00 3.76 3.55 مديد 4.50 5.30 3.71 0+03 6.06 5.01 0+06 7.16 25 6.74 10 5.30 0+00 17 0+12 5.20 6.97 5.74 1.3 7.08 0+15 4.31 zł 5.83 7.18 0+18 .80 <u>. 11</u> 6.19 7.16 0+21 91 7.32 7.7 0+24 13 7.77 0+27 7.79 7.01 3.01 8.16 .60 0+30 2.62 7.95 7.71 .81 0+33 2.39 8.05 7.89 8.08 6.01 7.78 0+36 1.20 7.64 7181 0+39 0.28 4.78 7.16 7.74 4.63 0+12 7.3 7.35 0+15 5.77 .17 0+48 0+51 6.55 0+54 صل مل 5.10 3.09 .95 0+57 13.68 102.61 119.8L Total Average

ELEVATIONS OF SEDIMENT ACCUMULATED

IN CATCHMENT BASINS

RI - NW

SOIL STABILIZATION

FORM RI-2

IN CATCHMENT BASINS SOIL STABILIZATION Date: <u>Sept. 6, 1956</u> Party: Level Graber Watersheds Benchmark: Rod Allison Experimental Area: H. J. Andrews R. F. H.I. 4.66 Notes Graber Basin Location: Stream II Elev. 103.44 Transects (Designated in ft. starting at crest of dam) Station* H.I. Elev. H.I. Elev. H.I. Elev. H.I. Elev. H.I. Elev. Elev. H.I. Elev. H.I. LIME 8. LINE LINE 7 6 LINE 5 Station Station Station Station 3.84 1.15 3.91 4.2 0+00 4.84 5.5 5.71 5.80 0+03 6.13 6.60 6.81 7.19 0+06 7.26 7.29 10 0+00 J. 7 .11 2) h 7.18 0+12 .69 .66 0+15 7.18 7.63 .60 7.1.8 0+18 7.90 7.6 7. 0+21 7.65 EC. 7.6 7.6 7.76 8.00 61 0+24 7.78 7.76 7.60 7.78 0+27 7.84 7.85 0+30 8.5 7.88 7.87 7.72 7.86 7.76 0+33 7.78 7.87 8.19 0+36 7.92 7.71 7.77 7.78 0+39 7.7 7.56 7.95 7.69 0+12 7.5 7.13 7.43 0+45 7.5 7.8 7.98 7.34 6.80 <u>منده.</u> 6.11 _0+51 5.0 6.01 5.6 6.11 0+5 5.01 0+57 5.78 5.6 18.30 126.01 119.07 127.99 Total. Average

ELEVATIONS OF SEDIMENT ACCUMULATED

RI - NW

FORM RI-2

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	chmark:										Party	Eeve:		
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	+		<u></u> ጥາ	ransec.	ts (De	signat	ed in	ft. sta	arting	at cr	est of	dam		
tation*			<u>_</u>	anocc		DIGINAU			-1 01116	<u> </u>				
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09	6.33				6.5				6.09				6.68	
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RI - NW

SOIL STABILIZATION Watersheds

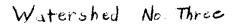
ELEVATIONS OF SEDIMENT ACCUMULATED IN CATCHMENT BASINS

Benchmark: H.I. 4.66 Elev. 103.44

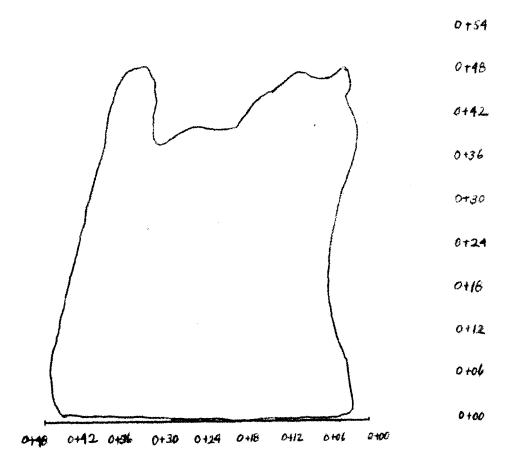
Experimental Area: M. J. Andrews Basin Location: Stream II

Date: Sept. 6, 1956 Party: Level Graber Rod Allison Notes Graber

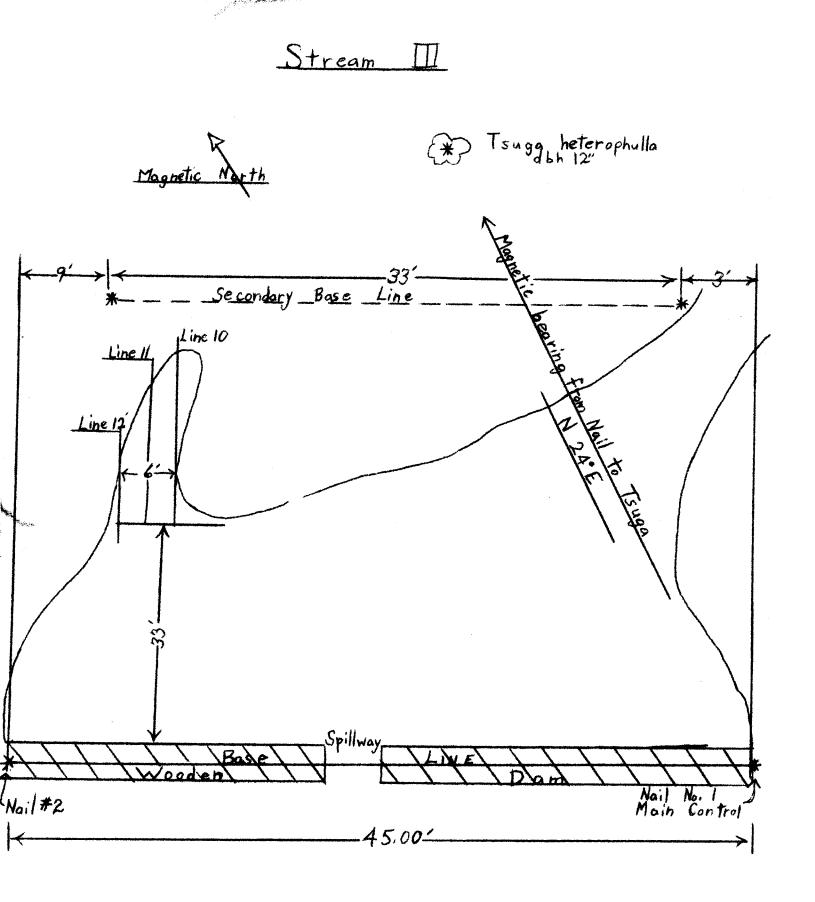
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Catchment Basin Map



Scale 1"= 12" Sept. 27, 1956 R.E. Graber



Sheet 1

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RI - NW SOIL STABILIZATION

H.I.

Elev.

Benchmark: 100.00

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Watersheds

ELEVATIONS OF SEDIMENT ACCUMULATED IN CATCHMENT BASINS

FORM RI-2

Date: <u>Sent. 10, 1955</u> Party: Level Graber Rod Refferty Notes Graber

Experimental Area: H. J. Andrews Basin Location: Streen III

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