1973

QUANTITY AND QUALITY STUDY

OF

FLOATING WOOD MATERIAL

ON

WILLISTON LAKE

Engineering Division
British Columbia Forest Service

File: 0239259
Date: July, 1973

Submitted by: R.J. Bugslag

Noted by: H. Waelti

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I. SUMMARY

This estimate of debris based on ground and air photo investigation gives the most accurate estimate to date of the characteristics and quantity of the floating material on Williston Lake.

The total volume for the Finlay Reach is 180.9 million cubic feet, of which 112.0 million cubic feet is merchantable. The Parsnip Reach volume is 41.7 million cubic feet, of which 25.8 million cubic feet is merchantable. The total volume for both Reaches of 223 million cubic feet is contained in 7,800 acres having an estimated mean volume/acre of 28,560 cubic feet. These volumes only include all water accessible floating "buckskinned" material in the Parsnip and Finlay Reaches.

It should be noted that the ground samples and air photos were taken in late May when the pondage level was at an elevation of 2,180 and much of the debris was beached in concentrations along the shorelines due to heavy winds. This accounts for the high volume/acre figure.

LIST OF TABLES

1973 QUANTITY AND QUALITY STUDY OF FLOATING WOOD MATERIAL ON WILLISTON LAKE

1.0 OBJECTIVE

The main objective of this study was to determine the quality, volume and classification of the floating wood material on Williston Lake broken down under the following headings:

(1) Chippable Material

(2) Mandatory Sawlogs - volume of sawlogs that due to small defects are undesirable for whole log chipping

- Additional sawlog volumes by diameter classes

(3) Waste Material broken into the following sections - deciduous, undersized, rot and burn, or root waste.

This information in turn was broken down into 16 different areas on the Lake to better facilitate the planning and programming of future operations.

It should be noted here that this study deals specifically with the Finlay and Parsnip Reaches and although some mention is given to the Peace Reach in Appendix I, the volume of debris there has not been estimated here.

2.0 VOLUME COMPILATIONS

Four stages were used in calculating the volume of floating wood material on the lake.

2.1 LOW LEVEL FLYING

As a result of a previous study it was decided that fixed wing flying would be used, utilizing the Lands Department "Otter".

Six hundred low level photos were taken at random of the debris concentrations along the shoreline of the lake. Flying height of the 70 mm. photography was approximately 1,000 ft. above the water using a telephoto lens. At this height an area of 4.6 acres is available on each photo and the detail is clear for easy and accurate measurement. Control targets were set out on the debris and the flying altitude was recorded at regular intervals to aide in determining the photo scale. This worked out to an average of 55 feet per inch.

From the 600 photos, 130 suitable samples were chosen, transect lines were then superimposed on these samples. The number of sticks crossed by these lines were counted and the total length of sticks per acre for each sample was obtained by applying the stick count to the following formula:

Basic Formula

$$\frac{660\ n \propto}{IcB} = \text{Vol./acre}$$

$$\frac{660n}{IcB} = \text{Feet/acre}$$

n = piece count
B = Transect length in chains
Ic = Orientation factor ($2/\pi$ or .6366 for random)
660 = scale factor to convert to acreage (when B is in chains)

Specific Formula

$$\frac{43,500n}{IcB} = \text{feet/acre}$$

B = transect length in feet

$$\text{feet/acre} = \frac{68,426\ n}{B}$$

The resulting average length of material per acre for the Finlay and Parsnip Reaches was 38,264 feet.

2.2 GROUND SAMPLES

A crew comprised of two Government scalers from Prince George, two students and myself mobilized in early May to scale debris samples along the lake shore. 340,000 Lineal feet of material was scaled at random points around the perimeter of the Finlay and Parsnip to establish the relationship of volume to the lineal value obtained by the low level flying. See Map #1 for ground sample locations.

An example of the recording sheet used for ground sampling can be seen in Appendix II. The final analysis of this ground sample data was obtained by processing the information through a computer programme.

2.3 DEBRIS LAYERING

Due to B.C. Hydro's raising of the operating water level in the pondage and heavy winter wind conditions on the lake, most of the debris was beached when the ice went off the lake in early May. This beached material was layered from 1 thick on the flat foreshore areas up to 6 thick on the steeper foreshore areas. To obtain a mean layering factor for the lake, 340 individual debris thickness values were taken in conjunction with the ground samples. This strata factor worked out to an average of 2.25 layers. It is in this sampling estimate of layering, where our greatest margin for error lies.

Combining information from the low level flying, ground samples, and debris layering, we arrived at an average volume/ acre of 28,557 cubic feet.

2.4 AREA MEASUREMENT

High level photography of the Finlay and Parsnip Reaches was flown in May at an elevation approximately 7200' above sea level. The resulting average photo scale was 1" = 558'. An uncontrolled mosiac was made from the photos and the areas occupied by a significant volume of floating material were outlined and these areas measured directly on the air photos. Initially it was thought the debris areas would be classified into density types but field inspection resulted in a single type, "concentrated debris" breakdown. The total area of debris in the Parsnip and Finlay Reaches was 7800 acres, this in turn was broken down into the 16 areas shown on Map #2. The average volume/acre was then applied to these acreages and the resulting breakdown can be seen in Section 4.0. Areas of undisturbed downed material were not included in this study but they are referred to in Appendix I.

3.0 DEBRIS CHARACTERISTICS

The following is a brief description of the debris broken down into sampling classifications.

3.1 DEFINITIONS OF DEBRIS CLASSIFICATIONS

Merchantable Material - Any coniferous log that was estimated to contain a net total scale of 50% or more of the total volume of the log suitable for

the manufacture of any grade of lumber, were considered merchantable. Plus all coniferous material suitable for the manufacture of chips over the minimum dimension requirements.

Mandatory Sawlogs - These coniferous logs are classified as such due to brown rot or burn scars that make the logs undesireable for whole log chipping. They have a minimum length of 16 feet, a minimum butt diameter of 6 inches, and a minimum top diameter of 4 inches. In many cases these logs are marginal for chipping as the undesireable material would be almost completely worn away.

Chippable Material - This classification includes all coniferous logs with a minimum butt diameter of 4 inches that have neither brown rot nor burn scars. All logs meeting this minimum butt diameter are considered chippable volume to a 1 inch diameter top, with a min. length of 4'.

Waste Material - This classification includes all the deciduous volume, all coniferous material containing < 50% sound wood, all coniferous material with less than a 4 inch butt diameter, and all the root volume.

Buckskinned Logs - Logs which have been debarked due to the continuous wind, wave, and ice action of one or two seasons in the water are termed "buckskinned".

3.2 SPECIES COMPOSITION

As the majority of logs were "buckskinned" it made it more difficult to distinguish between species on the lake. White Spruce, Western White Spruce, and Lodgepole Pine are the major species on the lake. For the purpose of this report any abies or true fir recognized as such were included in the spruce volume.

This fir volume I feel would be < 5% of the total spruce volume. The easiest way found to distinguish between the pine and spruce was the tangential dimpling that is conspicuous on the pine's surface. While the spruce's surface may have small splits, it is not dimpled.

3.3 INCIDENCE OF ROT

Brown rot was more evident in the spruce than in the pine, resulting in these stems being classified as mandatory sawlogs or waste. Relatively few logs had decomposed to the point where they contained no salvageable volume. Many logs of both species had evidence of a brown pocket or sap rot but due to the heavy wave action and constant rubbing together of the debris their weakened fibres would be worn away, leaving only sound wood. Here then the classification to waste, sawlog, or chips relied exclusively on the scaler's judgement on the condition of the remaining wood. There seemed to be no substantial evidence of one area on the lake having a higher incidence of rot than any other. Logs considered marginal chippable material were placed in the mandatory sawlog classification.

3.4 BURN SCARS

Like logs containing brown rot, logs with burn scars are undesirable as chippable material. The majority of logs with burn scars in the debris had only small areas affected, and will present a problem in water sorting where only approximately one-third of the log's surface can be seen.

Again logs in this classification where undesirable material was worn away were considered marginal logs and were placed in the mandatory sawlog classification.

3.5 BARK AND BRANCHES

Constant wave action and the rubbing together in the concentrated debris has almost completely removed the bark and branches from all logs. No additional allowances for time or manpower will be needed in dealing with production figures in a sorting ground for bark or branches.

3.6 ROOTS AND TOPS

In a chipping operation tops are of no concern as whole log chipping will be employed. If a sorting area is introduced, the bucking of tops off for sawlogs and the removal of roots for both chips and sawlogs would justify the placement of a cutoff saw setup, as seen in Figure I, in the sorting area. <1% of pieces sampled had roots.

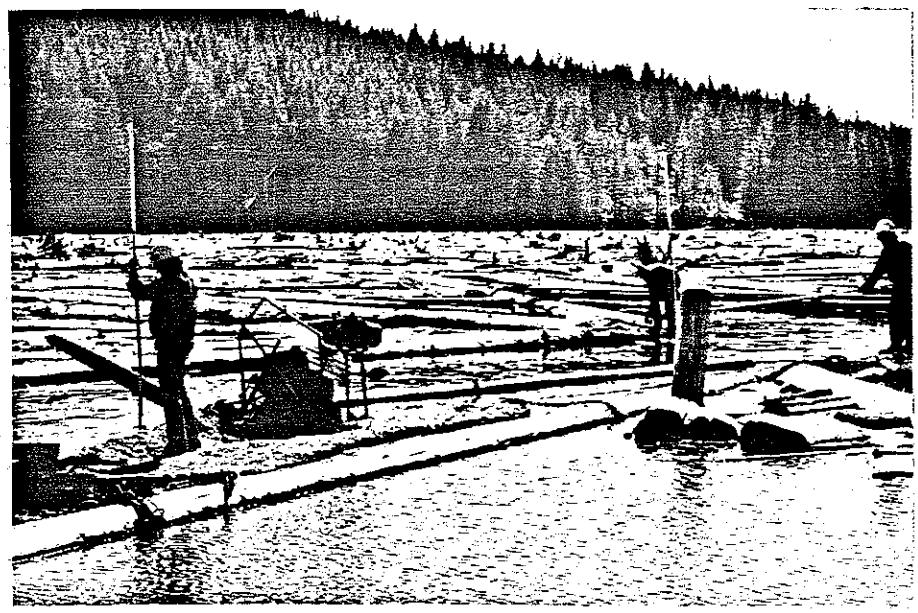


Figure I - Cutoff saw in sorting area - Lois Lake

4.0 VOLUME SUMMARIES AND BREAKDOWNS

The debris volume was broken into 2 main areas, the Parsnip and Finlay Reaches. These large areas were then broken down again into smaller operation areas seen on Map #2. These areas were chosen and broken down from known points on the ground to aide field operations. Tables 1-4 contain a physical description of the areas. The chip volume given in tables 1 and 2 is based on chipping all suitable chippable material. The waste volumes are further broken down in Tables 3 and 4.

4.1 VOLUME SUMMARIES

Table I - Volume Summary - Parsnip Reach

Area No.	Description	Area (acres)	Total Volume	Sawlog Volume (cu.ft.)		Chippable Volume (cu.ft)		Total Waste
				Pine	Spruce	Pine	Spruce	
1	West-Dastaiga Cr.-Weatherby Cr.	155	4,426,380	39,380	590,920	562,760	1,546,030	1,689,390
2	East-Chicho Camp-Scott Cr.	218	6,225,400	55,390	831,100	791,490	2,174,420	2,376,080
3	West-Weatherby Cove-Manson Arm	68	1,941,900	17,280	259,240	246,890	678,260	741,150
4	East-Scott Cr. -Harry's Hump	93	2,655,830	23,630	354,550	337,655	927,620	1,013,630
5	West-Manson Arm -Unknown Pt.	634	18,105,330	161,100	2,417,060	2,301,860	6,323,770	6,910,160
6	East-Harry's Hump-Peace	293	8,367,290	74,450	1,117,030	1,063,790	2,922,500	3,193,490
	TOTALS	1461	41,722,200	371,200	5,569,900	5,304,500	14,572,600	15,923,900
				5,941,100		19,877,100		

*Mandatory Sawlogs (Not Desireable For Chipping)

Table II - Volume Summary - Finlay Reach

Area No.	Description	Area (acres)	Total Volume	* Sawlog Volume (cu.ft.)		Chippable Volume (cu.ft)		Total Waste
				Pine	Spruce	Pine	Spruce	
7	West-Unknown Pt. -Bob Fry Cr.	694	19,818,800	176,340	2,645,800	2,519,710	6,922,230	7,564,110
8	East-Peace R.- Gregor Pt.	502	14,335,800	127,560	1,913,820	1,822,610	5,007,150	5,471,450
9	West-Bob Fry Cr. -Unknown Cr.	929	26,529,700	236,060	3,541,720	3,372,920	9,266,220	10,125,450
10	East-Gregor Pt. -John Dahl Pt.	927	26,472,600	235,510	3,534,090	3,365,660	9,246,270	10,103,650
11	West-Unknown Cr. -Stromquist Pt.	642	18,333,800	163,130	2,447,560	2,330,910	6,403,560	6,997,350
12	East-John Dahl Pt.-Banta Pt.	1102	31,470,100	280,020	4,201,265	4,001,030	10,991,790	12,011,030
13	West-Stromquist Pt.-Unknown Cr.	204	5,825,700	51,840	777,730	740,660	2,034,780	2,223,460
14	East-Banta Pt.- Chowika	581	16,591,200	147,630	2,215,000	2,109,440	5,795,130	6,332,490
15	West-Unknown Cr.- Uncle Bud's Bay	344	9,823,700	87,410	1,311,465	1,248,960	3,431,190	3,749,360
16	East-Chowika- Deserters Canyon	410	11,708,500	104,180	1,563,084	1,488,590	4,089,500	4,468,710
	TOTALS	6335	180,910,000	1,609,700	24,151,600	23,000,500	63,187,800	69,047,100
				25,761,000		86,188,000		

*Mandatory Sawlogs

4.2 WASTE MATERIAL BREAKDOWN

Table III - Waste Material Breakdown - Parsnip Reach

Area No.	Description	Area (acres)	Total Waste (cu.ft.)	Deciduous Waste (cu.ft)	Undersized Waste (cu.ft)	Rot & Burn Waste (cu.ft)	Root Waste (cu.ft.)
1	West-Dastaiga Cr-Weatherby Cv.	155	1,689,400	1,415,680	54,980	182,470	36,270
2	East-Chicho Camp-Scott Cr.	218	2,376,100	1,991,080	77,320	256,630	51,010
3	West-Weatherby Cove-Manson Arm	68	741,200	621,070	24,120	80,050	15,910
4	East-Scott Cr. -Harry's Hump	93	1,013,600	849,410	32,990	109,480	21,760
5	West-Manson Arm -Unknown Pt.	634	6,910,200	5,790,580	224,880	746,340	148,360
6	East-Harry's Hump-Peace	293	3,193,500	2,676,090	103,930	344,920	68,560
	TOTALS	1461	15,923,900	13,344,000	518,200	1,720,000	342,000

Table IV - Waste Material Breakdown - Finlay Reach

Area No.	Description	Area (acres)	Total Waste (cu.ft.)	Deciduous Waste (cu.ft)	Undersized Waste (cu.ft)	Rot & Burn Waste (cu.ft)	Root Waste (cu.ft.)
7	West-Unknown Pt. -Bob Fry Cr.	694	7,564,100	6,338,580	246,160	816,980	162,400
8	East-Peace R.- Gregor Pt.	502	5,470,500	4,584,970	178,060	590,950	117,470
9	West-Bob Fry Cr. -Unknown Cr.	929	10,125,400	8,484,930	329,520	1,093,620	217,390
10	East-Gregor Pt. -John Dahl Pt.	927	10,103,700	8,466,660	328,800	1,091,260	216,920
11	West-Unknown Cr. -Stromquist Pt.	642	6,997,300	5,863,640	227,720	755,760	150,230
12	East-John Dahl Pt.-Banta Pt.	1102	12,011,000	10,065,010	390,880	1,297,270	257,870
13	West-Stromquist Pt.-Unknown Cr.	204	2,223,500	1,863,210	72,360	240,150	47,740
14	East-Banta Pt.- Chowika	581	6,332,500	5,306,505	206,080	683,950	135,950
15	West-Unknown Cr.- Uncle Bud's Bay	344	3,749,400	3,141,890	122,020	404,960	80,500
16	East-Chowika- Deserters Canyon	410	4,468,700	3,744,690	145,430	482,650	95,940
	TOTALS	6335	69,047,000	57,860,000	2,247,020	7,458,000	1,482,000

4.3 SAWLOG VOLUME COMPARISONS BY DIAMETER CLASS

The following tables V and VI give the comparitive increase in volume for sawlogs and decrease in volume for chips when coniferous logs equal to and greater than the diameter stated are separated into sawlog sorts.

Table V - Sawlog Volume Comparisons by Diameter - Parsnip Reach

Utilization	Sawlogs (cu. ft.)		Chip Vol. (cu. ft.)		Waste (cu. ft.)
	Pine	Spruce	Pine	Spruce	
Mandatory sawlog material	371,000	5,570,000	5,304,000	14,573,000	15,924,000
14" Ø & over logs	646,000	8,597,000	5,007,000	11,469,000	16,023,000
12" Ø & over logs	1,267,000	10,723,000	4,366,000	9,272,000	16,113,000
10" Ø & over logs	2,388,000	13,716,000	3,221,000	6,208,000	16,209,000

Table VI - Sawlog Volume Comparisons by Diameter - Finlay Reach

Utilization	Sawlogs (cu. ft.)		Chip Vol. (cu. ft.)		Waste (cu. ft.)
	Pine	Spruce	Pine	Spruce	
Mandatory sawlog material	1,610,000	24,152,000	23,001,000	63,188,000	69,047,000
14" Ø & over logs	2,799,000	37,276,000	21,712,000	49,730,000	69,481,000
12" Ø & over logs	5,456,000	46,495,000	18,930,000	40,206,000	69,872,000
10" Ø & over logs	10,356,000	59,470,000	13,966,000	26,919,000	70,287,000

4.4 AVERAGE CHIPPABLE PIECE SIZES

Table VII below gives the average volume and dimensions per piece of chippable wood remaining when sawlog material is sorted out by the diameters given.

Table VII - Average Chippable piece size

Utilization	Average Vol. (cu. ft.)	Average Length (~~cu~~. ft.)	Average Dia. (inches)
All chippable Material	9	34	7.0
Removal 14" Ø & over logs	7	32	6.4
Removal 12" Ø & over logs	6	30	6.0
Removal 10" Ø & over logs	4	24	5.6

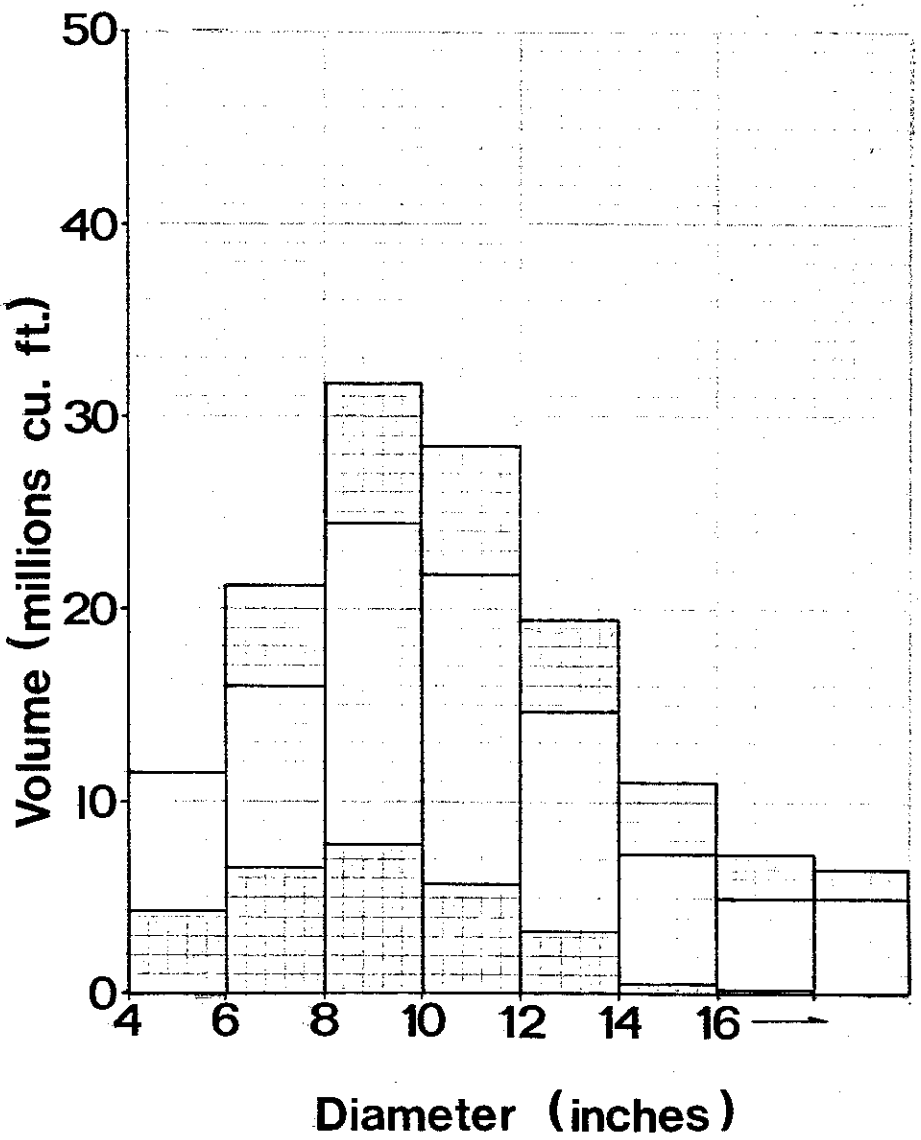
4.5 GRAPH TOTAL MERCHANTABLE VOLUME BY DIAMETER CLASS

The graph on page 13 shows the merchantable volume distribution by diameter class. This includes the mandatory sawlog volume, and the total chippable volume by species.

5.0 CHIP SAMPLING AND ANALYSIS

Two hundred coniferous logs were chosen at random along the lake, 40 logs from each of the five areas shown on map #3. A half dozen cottonwood were also taken from area #5 at Bevel Creek. These logs were then bundled and towed down the lake to the dewatering site at B.C. Forest Products mill in MacKenzie. Once loaded onto trucks they were trucked to Prince George and the chip sampling was carried out at ~~the~~ Northwood Pulps mill there. The logs were run through the chipper in random groupings of 6, and 20 lb.

Total Merchantable Volume By Diameter Class



Key

- MANDATORY SAWLOGS
- SPRUCE – CHIPPABLE
- PINE – CHIPPABLE

sample bag of chips was taken from each group. Every 7th log was identified by species and a separate 10 lb. sample bag of chips was taken from it. The 6 deciduous logs were run on their own and sampled. For the analysis and results of this sampling refer to the report on chip quality submitted by the "Western Forest Products Laboratory".

6.0 ACCURACY LIMITS OF STUDY

The accuracy limits of the floating material inventory are given below, broken down into the 4 stages in which the volume was calculated. These used as a basis for sampling reliability insure the volumes obtained are meaningful and useful as a basis for planning.

6.1 LOW LEVEL PHOTO SAMPLING

1) Total number of samples counted 130
2) Estimated mean length/acre for total lake 38,264 lineal feet
3) Estimated error at .95 confidence level $\pm$ 1615 lineal feet
4) Sampling error in percent $\pm$ 4.22%

6.2 GROUND SAMPLING AND LAYERING

1) Total number of samples measured 340
2) Estimated mean volum/lineal ft. .7463
3) Estimated error at .95 confidence level $\pm$ .0286285
4) Sampling error in percent $\pm$ 3.836%

6.3 AREA MEASUREMENT

The overall accuracy limits assume the area measurement on the high level mosiac is correct, and that all debris areas have been covered.

6.4 OVERALL ACCURACY LIMITS

1) Mean volume/acre 28,557 cu. ft.

2) Estimated error at .95 confidence level $\pm$ 814 cubic feet

3) Sampling error in percent $\pm$5.70%

8.0 CONCLUSIONS

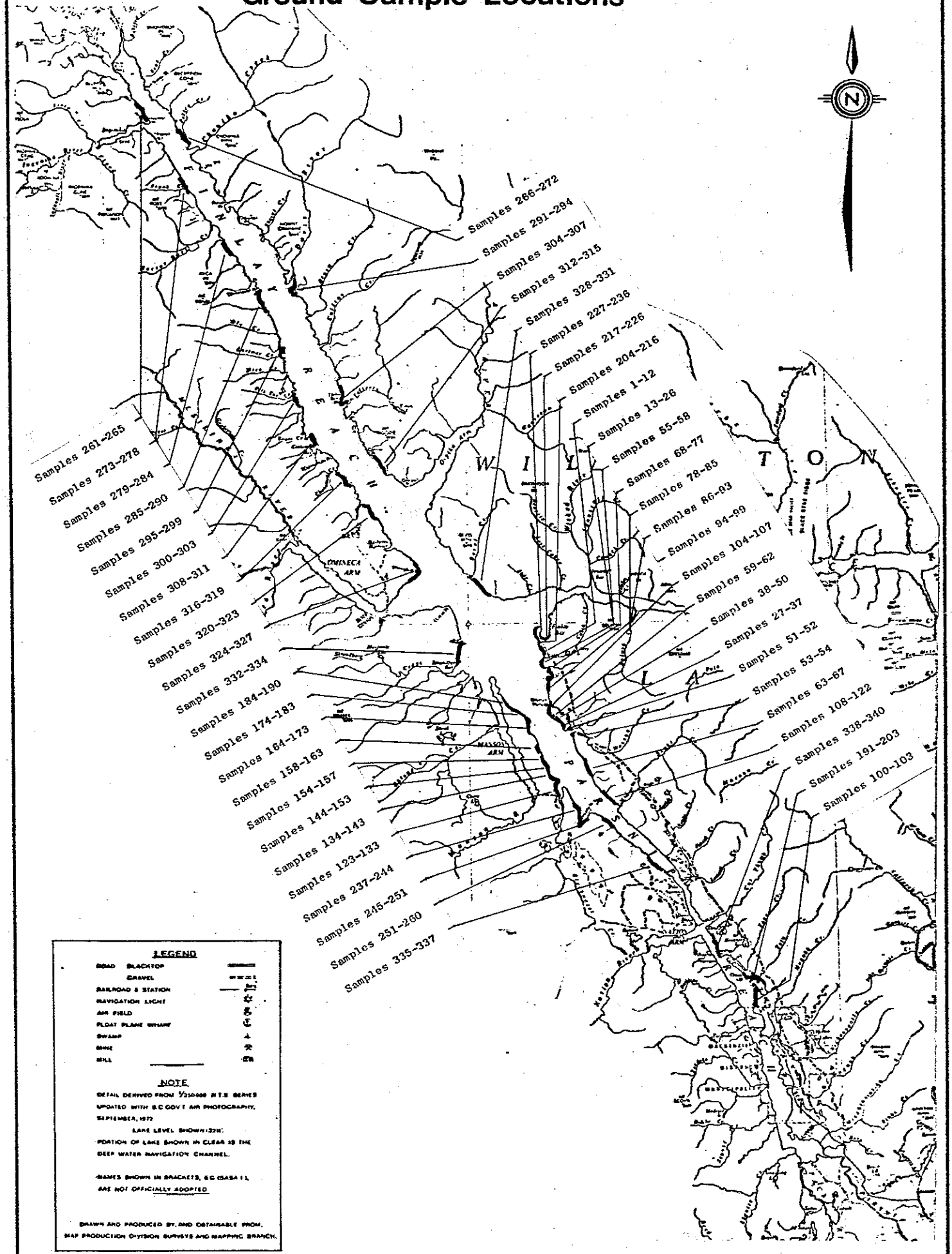
Using the combination of high and low level photography, coupled with ground investigations, this study has shown that it is possible to get an accurate estimate of the volume of floating material using this method of inventory. Also, if enough ground control targets are used and flying heights recorded, single low level photos taken from a fixed wing aircraft rather than stereo photos using a helicopter and boom can be used with good results. This is not only a less expensive method but less time is taken in flying. If the Lands' Department "Otter" is available it is very suitable for this type of photography.

One of the most noteable differences in this study from previous ones done on the lake is the smaller areas of debris and the higher average volume/acre within these areas. This is due to the debris being concentrated, beached along the shoreline. As the water rises in the pondage much of the debris will float and disperse, increasing the area covered, and decreasing the volume/acre.

The average volume per acre of 28,560 cu. ft. is related to the mean debris layering factor of 2.25. Any estimate of debris volume/acre in a specific area is directly proportional and can be calculated as follows: $\frac{2.25}{28{,}500} = \frac{\text{layering factor in specific area}}{\text{cu. ft. volume/acre in area}}$.

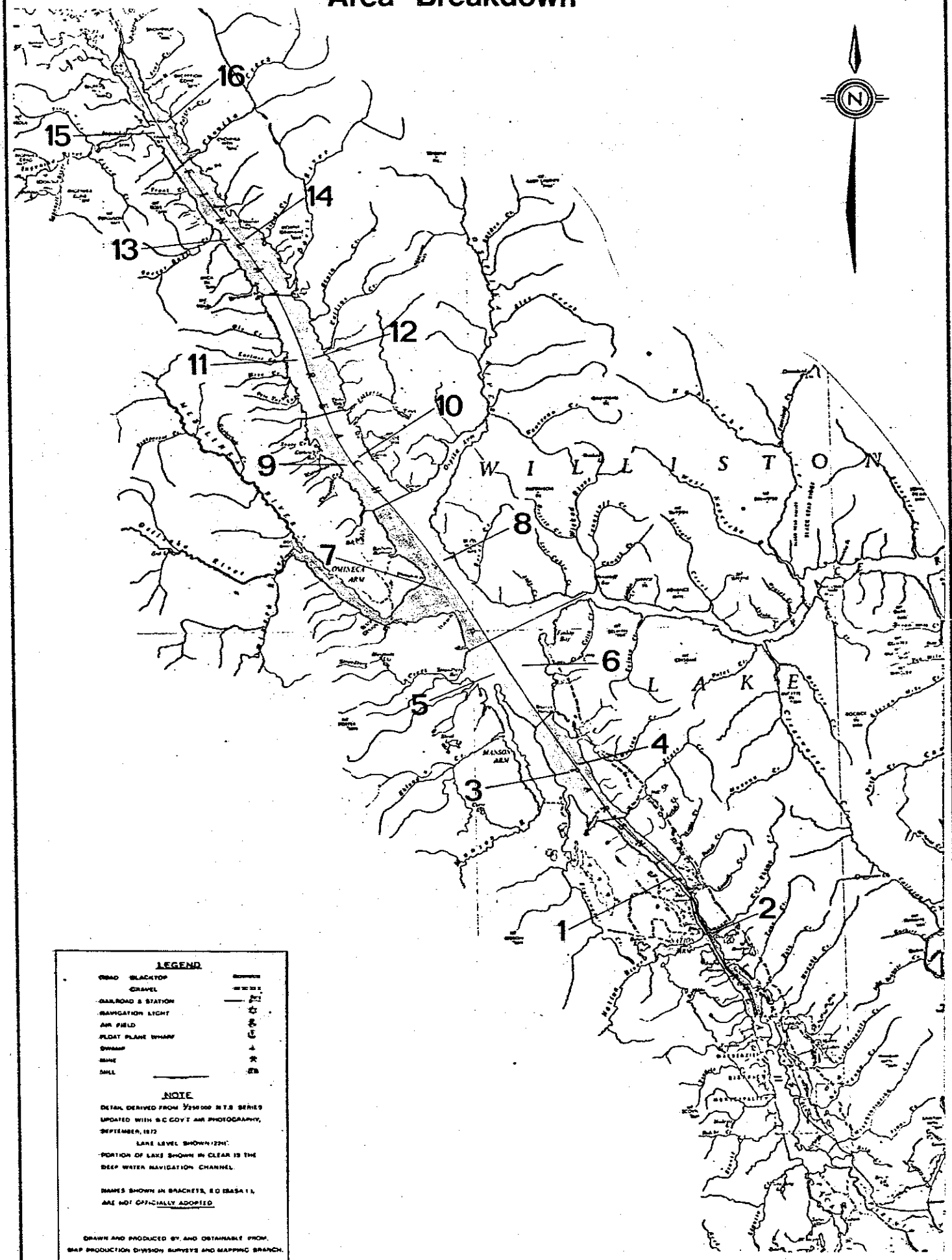
MAPS

Ground Sample Locations



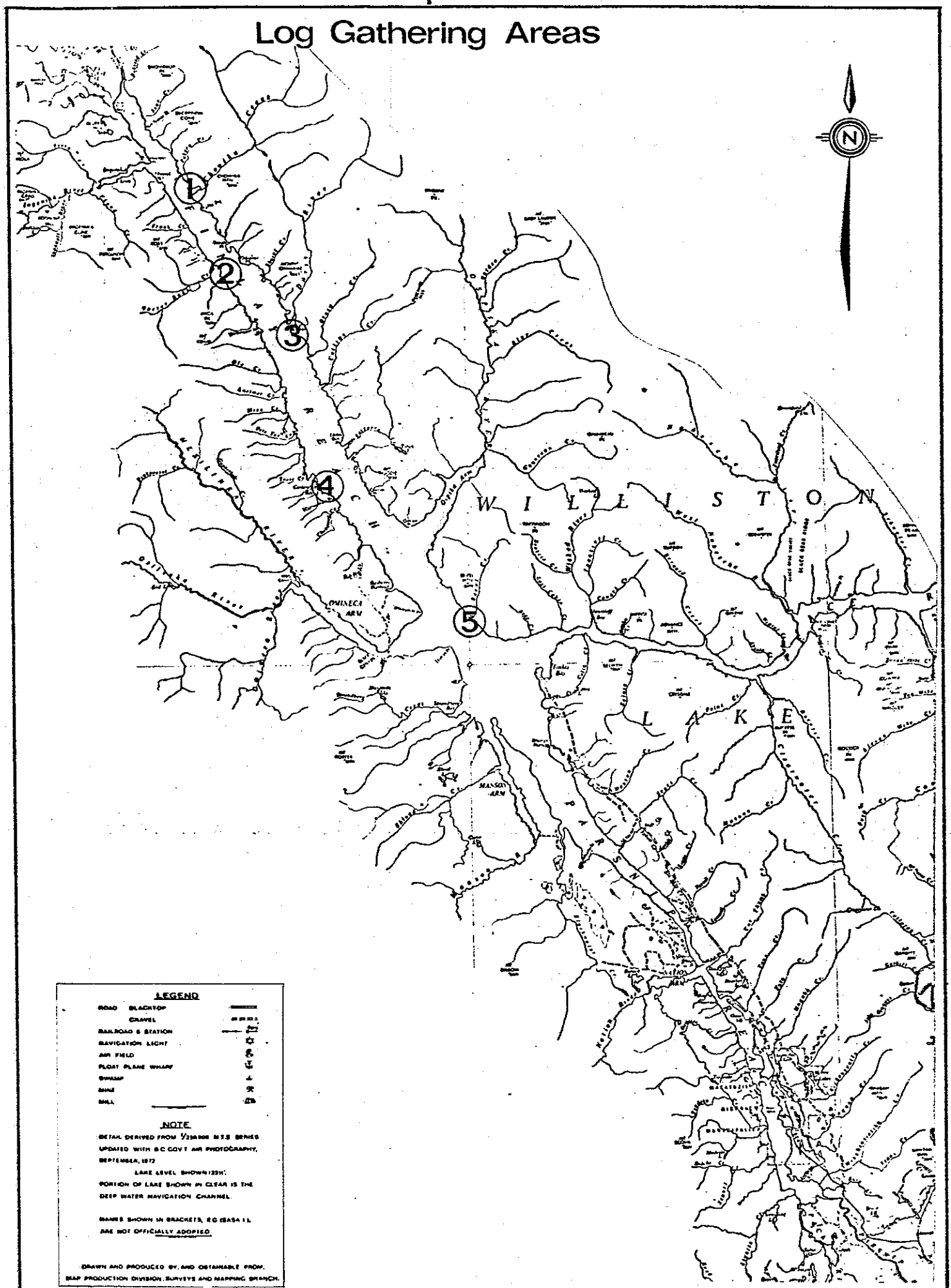
Map #2

Area Breakdown



Map # 3

Log Gathering Areas



LEGEND

ROAD BLACKTOP
GRAVEL
RAILROAD & STATION
NAVIGATION LIGHT
AIR FIELD
FLOAT PLANE WHARF
SWAMP
MINE
MILL

NOTE

DETAIL DERIVED FROM 1/250,000 N.T.S. SERIES UPDATED WITH B.C. GOVT. AIR PHOTOGRAPHY, SEPTEMBER, 1972

LAKE LEVEL SHOWN 2231'.

PORTION OF LAKE SHOWN IN CLEAR IS THE DEEP WATER NAVIGATION CHANNEL.

NAMES SHOWN IN BRACKETS, E.G. (BASALT) ARE NOT OFFICIALLY ADOPTED.

DRAWN AND PRODUCED BY, AND OBTAINABLE FROM, MAP PRODUCTION DIVISION, SURVEYS AND MAPPING BRANCH.

APPROX. SCALE : 1" = 13.3 mi.

APPENDIX

APPENDIX I

Comparison with study done by R. Edwards - 1972

The study done by R. Edwards included the Parsnip, Finlay, and the Peace reaches. It also included a volume of timber he called "undisturbed", these areas were defined as, relatively undisturbed floating material and scattered standing trees. As this study deals only with the floating "buckskin" material on the lake that is water accessable these undisturbed areas were not included in this study.

The following is a comparitive table of volumes from the two reports.

	Parsnip Reach			Finlay Reach		
	Acres	Total Vol.	Salv. Vol.	Acres	Total Vol.	Salv. Vol.
1972 Report	2,820	39,000,000	*520,000	12,320	212,000,000	*3,410,000
1973 Report	1,641	42,000,000	25,818,000	6,335	181,000,000	111,900,000

BOTH CHIPS & MANDATORY SAWLOGS

*sawlogs only

This 10% difference seems very reasonable in this type of inventory. This reports total volume is likely more on the conservative side due to shoreline areas of light fringe debris that were impossible to type out.

In addition to the volume of floating "buckskinned" material on the lake there are approximately *30,000 acres of undisturbed downed material with an average vol/acre *3,500 cu. ft. These areas are not affected by the wind and wave action and ~~as a result~~ most logs still retain their bark. As a direct result of the moisture retaining ability of the bark the wood diminishes more quickly in these areas than in areas of "buckskinned"

material. It is doubtful whether the small vol/acre and the present condition of the material in these areas warrants any kind of salvage operations there.

PEACE REACH

R. Edwards' estimate of floating material on the Peace Reach was approximately 26 million cu. ft. The "rough" volume breakdown of material in table VIII was obtained by using the percentages of merchantable, chippable and waste material obtained on the Parsnip and Finlay Reaches and applying them to the total volume.

Table VIII - Peace Reach Volume Breakdown

Total Vol.	Mandatory Sawlogs	Chippable Material	Waste
26,000,000	3,600,000	12,400,000	10,000,000

*from R. Edwards' report

BRITISH COLUMBIA FOREST SERVICE
ENGINEERING DIVISION
DEBRIS QUALITY STUDY

Date: ____________
By: ____________

1 [1] PROJECT— 2 3 4 [ ][ ][ ] SAMPLE— 5 6 7 [ ][ ][ ] AREA CLASS— 8 [ ]

9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

1	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
2	S	P	GROSS length			T.DIA.		B. DIA.		NET length			T. DIA.		B. DIA.		log	chips	waste	rot	top	% back
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31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
S	P	GROSS length			T.DIA.		B.DIA.		NET length			T.DIA.		B.DIA.		log	chips	waste	rot	top	% back

PROVINCE OF | FOREST SERVICE | DEPARTMENT OF WATER RESOURCES

DATE: April 24, 1973

FILE No. 0239259
0238446

SUBJECT: Discussion with Dr. Keays - Western Forest Products Lab, Vancouver April 17, 1973

ATTENTION OF: FILE NOTE

REMARKS: Under all market conditions profitable operation of a pulpmill requires soundwood chips with as small a percentage of unacceptable material as possible.

A small percentage of unacceptable chips (bark, brown rot) has a large effect on pulp yield and profit ratio; e.g., 5% bark results in an extra cost of $12 per ton of pulp (= 50% of profit margin).

Chip quality and pulp yield can be determined by examining chip samples (20 lbs. per sample). Chip samples should be obtained by chipping a large number of stems and taking 20 lbs. of the mix. Chip sampling will indicate (unscreened chips)

% overpize)
knots)
bark) undesirables
decay)
pin chips)

% accepts

Species distribution in chip sample not critical as long as at least 80% pine and spruce and not more than 20% abies, and neither pine nor spruce over 68% of mix.

Dr. Keays is interested in visiting the area and he was tentatively advised that arrangements will be made for some time in June.

The debris survey as scheduled will provide all information necessary to assess the suitability of the raw material for pulping.

If possible, decay should separate between brown rot and white rot; brown rot being bad for pulping whereas white rot does not destroy cellulose fibres.

Where possible, species should be noted in the samples rather than just the two groups, deciduous and coniferous.

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