

TARCV: A Microcomputer Program for Timber
Appraisal Report Compilation for Variable
Radius Plot Sampling

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Copies of this document and the TARCV program disk for the IBM-PC are available from the authors, c/o the Department of Forest Resources, University of Minnesota, St. Paul, MN 55108.

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INTRODUCTION

TARCV is a computer program written for the IBM-PC in BASIC. This program is designed to compile forest inventory or timber appraisal data from Bitterlich horizontal point sampling tallies for 1 or more points (also known as variable radius plot sampling). It augments the multiproduct tally sheet developed by the authors (Ek and Droessler, 1987) but may be used alone with other tally methods. Appraisal data is transferred from the appraisal sheet into TARCV via keyboard entry.

Input data required by the program consists of the acreage of the appraisal tract, the basal area factor of the angle gauge used, the number of plots taken and the species and product breakdown of the tallied trees. Full-screen editing capability allows correction of input data errors. The species codes used (listed in APPENDIX A) are from the Minnesota Department of Natural Resources. The codes reside in the file TARCSPP.DAT on the TARCV diskette. Other codes (from 1 to 99 only) may be substituted by editing this file.

Total and per acre timber product volumes are calculated from the same volume tables as in the multiproduct tally sheet. Ek et al. (1986) describe the quantification of the taper relationships and construction of volume tables to various utilization standards, based on a computerization of Table 8 in Gevorkiantz and Olsen (1955). The product specifications are: a 1 foot stump and a choice of a 3 or 4 inch top diameter inside bark (tdib) for pulpwood; a 6 inch and larger tdib for boltwood; and an 8 inch and larger tdib for sawtimber. Coefficients of variation and standard errors for product volumes are also calculated assuming simple random sampling.

Appraisal data and results can be sent to the screen for viewing, sent to the line printer for a hardcopy and/or saved in a file for future reference.

A copy of the source and executable program code is available from the authors.

INSTRUCTIONS FOR USING TARCV

Insert the TARCV diskette into the default diskette drive and enter: TARCVEPS. This is the version that uses control characters conforming to the EPSON FX-80 printer manual. Entering TARCVCEN instead will cause execution of an alternative version (generic printer version) that will work on almost any printer. The initial title and author screen will then appear and remain until a carriage return <CR> is entered. Upon entering a <CR>, the main menu is presented with 5 options as follows:

TARCV

Timber Appraisal Report Compiler

1985

Main Menu:

1. Program documentation.
2. Type in new timber appraisal data.
3. Edit saved appraisal data.
4. Display, print or save appraisal report.
5. Quit.

Which menu selection: (1, 2, 3, 4 or 5) ?

Simply depress the key corresponding to the chosen menu item (1,2,3,4 or 5). Item 1 prints program documentation to the screen regarding volume table construction with the appropriate citations. Item 2 allows appraisal data to be entered into the program. Item 3 initiates the full screen editor to correct input errors. Item 4 presents the PRINT MENU for obtaining the appraisal volumes from the appraisal data. Item 5 ends TARCV.

To enter appraisal data, depress <2> on the MAIN MENU. A portion of the appraisal template appears on the screen with the APPRAISER field in a reverse-video prompt. Type in the appraiser name(s) and <CR> to enter the data and continue to the next field. You may backspace within a field to correct errors but once out of a field, you must wait to correct errors until all the fields have been filled. The minimum required input information is the TOTAL ACRES IN SALE AREA, BASAL AREA FACTOR, NUMBER OF PLOTS, TOP DIAMETER INSIDE BARK AND PLOT ENTRY OPTION. Enter a (3) or (4) for the TOP DIAMETER INSIDE BARK. The PLOT ENTRY OPTION response is a (C) or (S). If statistics are desired, enter an (S). If statistics are not required, enter a (C). Responding with an (S) requires the data to be entered in by plot. See APPENDIX B for a (S)eparate plot data entry example and a (C)ummulative plot data entry example. The other fields are for convenience and future reference only. Any optional field may be skipped by entering a <CR> instead of data. Once all fields have been addressed, the option to edit is given as:

Press: <CR> to continue or <E> to edit

By depressing an <E> or <e>, the header information can be corrected. Position the reverse-video prompt in the field in error and type in the correct information with a <CR> to end the input. The backspace key does work so that any errors made within the field can be corrected by using the <BACKSPACE> key. If a mistake is made in a previous field, use <CR> to position the reverse-video prompt back in the field and enter the revision. Once all corrections have been made, use the <ESC> key to exit edit and continue to the tree data entry template.

If editing is unnecessary, use the <CR> key to continue to the tree data entry template. The first screen indicates the format for sawtimber percent defect specification. Look at the examples shown on the screen for entering defects from 0 to 99 percent. A short instruction for data entry from the University of Minnesota Timber Appraisal Tally Sheet (Ek and Droessler, 1987) is also given. The PLOT NUMBER and NUMBER OF TREES are assigned default values. The default value is overridden by entering a new value directly over the default. For instance, the PLOT NUMBER is initially assigned as (1). If the first plot you enter is number 10, type (10) in place of (1). The PLOT NUMBER defaults to the previously entered PLOT NUMBER, so you only need type in a PLOT NUMBER when new plot data is entered. Plots do not have to be in order by number, but all the trees on a plot must be adjacent in the list. If the default is correct, use the <CR> to advance to the next field. The NUMBER OF TREES field refers to the number of trees on that plot with identical products in them. This is a convenience to avoid entering every tree tallied if many are the same species and have identical products in them. For instance, if each of 4 red pine trees on a plot have 5 pulpsticks in them, enter a 4 for the NUMBER OF TREES field and enter a 5 under the NUMBER OF PULPSTICKS field. The NUMBER OF TREES always defaults to (1). Again, type in the appropriate number if other than one. Any data entry errors can be corrected with the <backspace> key. Continue to enter the data until the complete appraisal is entered. To end the tree data entry template, use the <F3> key in place of the PLOT NUMBER. An "END" will appear in the PLOT NUMBER field.

Single product tally trees may contain a maximum of nine 8 foot sawlogs, nine 8 foot bolts or ten 8 foot pulpsticks. Multiple product tally trees may contain any combination of sawlogs and pulpwood or boltwood and pulpwood to a maximum of ten 8 foot lengths. Any other combination such as sawtimber and boltwood or all tree products will result in an error message and the opportunity to re-enter the correct product breakdown.

After completing the tree data entry, a comparison between the NUMBER OF PLOTS entered in the header template and the number of unique plots entered in the tree data entry is done if (S)eparate plot data entry was specified in the PLOT ENTRY OPTION. If they do not match, a warning is issued to the screen, listing the two values. This check is a precaution so that the volumes and statistics calculated are based on the same number of plots. If (C)UMULATIVE plot data entry was specified (no statistics will be given), you may use the default PLOT NUMBER of (1) throughout the tree data template. This will significantly reduce data entry effort. Use <CR> each time for the default plot number (1) is sufficient, and a separate tally of trees for each plot is unnecessary. For instance, identical trees (same species and products) can be lumped together on one line for the whole appraisal, not just for one plot. However, if sampling error statistics are important, a separate tally of trees by plot is required and the data must be entered by plot. In either case the correct number of field plots in the appraisal must be entered in the header field for NUMBER OF PLOTS. The warning message will be given, but you can ignore it and ignore any statistics that are calculated. For example, if you enter 5 for the NUMBER OF PLOTS but only enter 4 different plot numbers

in the tree input template, or vice-versa, the program will find the difference. For correct calculation of statistics, plots with no trees on them must be entered with a unique PLOT NUMBER, 0 for the NUMBER OF TREES and no product tally.

After the tree data entry is complete, the message:

Save appraisal data (<CR>/N) ?

allows the appraisal data to be saved. By using the <CR> key, the user is prompted for a file name with the following:

Enter filename:

Any name for the file can be used, however, a self-explanatory name such as F2044.DAT might be used for appraisal data for timber sale permit number 2044. See APPENDIX B for an example tally. If the data is not important, enter an <N> or <n> in response to the Save appraisal data prompt. The data will reside in memory as long as no other file is created or requested and appraisal results can be obtained from it. However, no further opportunity to name the file exists.

The MAIN MENU will appear after the file name prompt. If tree data entry errors are made, you may correct them by depressing <3> for the "Edit saved appraisal data" item. If editing is chosen, a message to the screen indicates the current file in memory as follows:

Current file is: F2044.DAT

<CR> to go: or enter new filename:

If no file is in memory (such as just entering the program and wanting to edit a previously saved data file), you must enter a file name to be read into memory for editing. If the current file is the file you want to edit, use the <CR> key. If the current file is not the one you want to edit, type in the desired file name. Any previously entered data file resident on available media can be edited. Once a file is chosen, the header data scrolls to the screen. If no errors exist in the header information, use the <ESC> key to advance to the tree data information. The reverse-video field locator may be moved using the <CR> key and the arrow keys on the numeric keypad. Once the error field has been reached, re-enter the data with a <CR> to accept the correction. The backspace key can be used to correct additional mistakes made in the field. The <ESC> key may also be used at any position within a field (except the first position) to delete the field for retyping.

If an excess data line exists, it may be deleted by replacing the plot number with 0 (zero). Any data lines with plot number 0 will not be written to the data file after editing. If an additional data line is needed, locate the cursor on any line with the same plot number as the additional line. If the additional line is a new plot, locate the cursor at the first data line in the file or on the first line of any plot.

Depress the <INS> key and the screen will be rewritten with an additional line of all zero's. This line can be edited as the additional line. If the plot number is left as zero, the line will not be saved.

Once all errors are corrected, use the <ESC> key at the first position in any field to end the editing session. The new, corrected data takes on the original file name given to the data and the original file with errors takes on the original file name with the [.BAK] extension. This saves the original data file if needed.

No program limits exist for the number of plots TARCIV may process. The program was developed and tested on an IBM-PC with 256 K of memory.

The MAIN MENU now allows you to obtain appraisal results. Use the <4> key to advance to the PRINT MENU. The PRINT MENU appears as follows:

Print Timber Appraisal Report:

Report Menu:

1. On Printer
2. On Screen
3. To a file
4. Return to Main Menu

Which menu selection : (1,2,3 or 4) ?

Item 1 will print the appraisal results on your printer. The report is followed by 2 form feeds to facilitate viewing the printed output. Item 2 will scroll the results to the screen in a page format. Item 3 will create a file of the appraisal results. You will be asked for a file name if you choose Item 3. The file name request is identical to the request for editing a file. If the current file is correct, use the <CR> key, if it is not, type in the desired file name. An appropriate file name for the appraisal results for permit number 2044 might be F2044.TAR, TAR representing (T)imber (A)ppraisal (R)eport. Item 4 will return you to the MAIN MENU, from which you may choose any item.

LITERATURE CITED AND REFERENCES

- Ek, A. R. and T. D. Droessler. 1987. A multiproduct tally sheet for timber inventory in the Lake States. Submitted to the Northern Journal of Applied Forestry.
- Ek, A. R., T. D. Droessler and M. T. Checky. 1986. Taper equations for the Lake States composite volume tables and their application. University of Minnesota, College of Forestry, Department of Forest Resources Staff Paper Series No. 57. 4 p. plus appendices.
- Gevorkiantz, S. R. and L. P. Olsen. 1955. Composite volume tables for timber and their application in the Lake States. USDA Technical Bulletin 1104. 51 pp.

APPENDIX A. Species codes

- 1, Black Ash
- 2, American Elm
- 3, Silver Maple
- 4, Red Elm
- 5, Rock Elm
- 6, Willow
- 12, Trembling Aspen
- 13, Paper Birch
- 14, Balm of gilead
- 15, Cottonwood
- 16, Largetooth Aspen
- 17, Hybrid Poplar
- 21, Red Maple
- 22, Sugar Maple
- 23, Basswood
- 24, Yellow Birch
- 25, Walnut
- 26, Butternut
- 27, Cherry
- 31, Red Oak
- 32, Black Oak
- 33, English Oak
- 34, White Oak
- 35, Burr Oak
- 36, Scarlet Oak
- 37, White Ash
- 39, Green Ash
- 41, Bitternut Hickory
- 42, Shagbark Hickory
- 43, Hackberry
- 45, Box Elder
- 51, White Pine
- 52, Norway Pine
- 53, Jack Pine
- 54, Scotch Pine
- 55, Ponderosa Pine
- 61, White Spruce
- 62, Balsam Fir
- 63, Colorado Spruce
- 64, Norway Spruce
- 65, Black Hills Spruce
- 71, Black Spruce
- 72, Tamarack
- 73, White Cedar
- 81, Red Cedar
- 99, Misc.

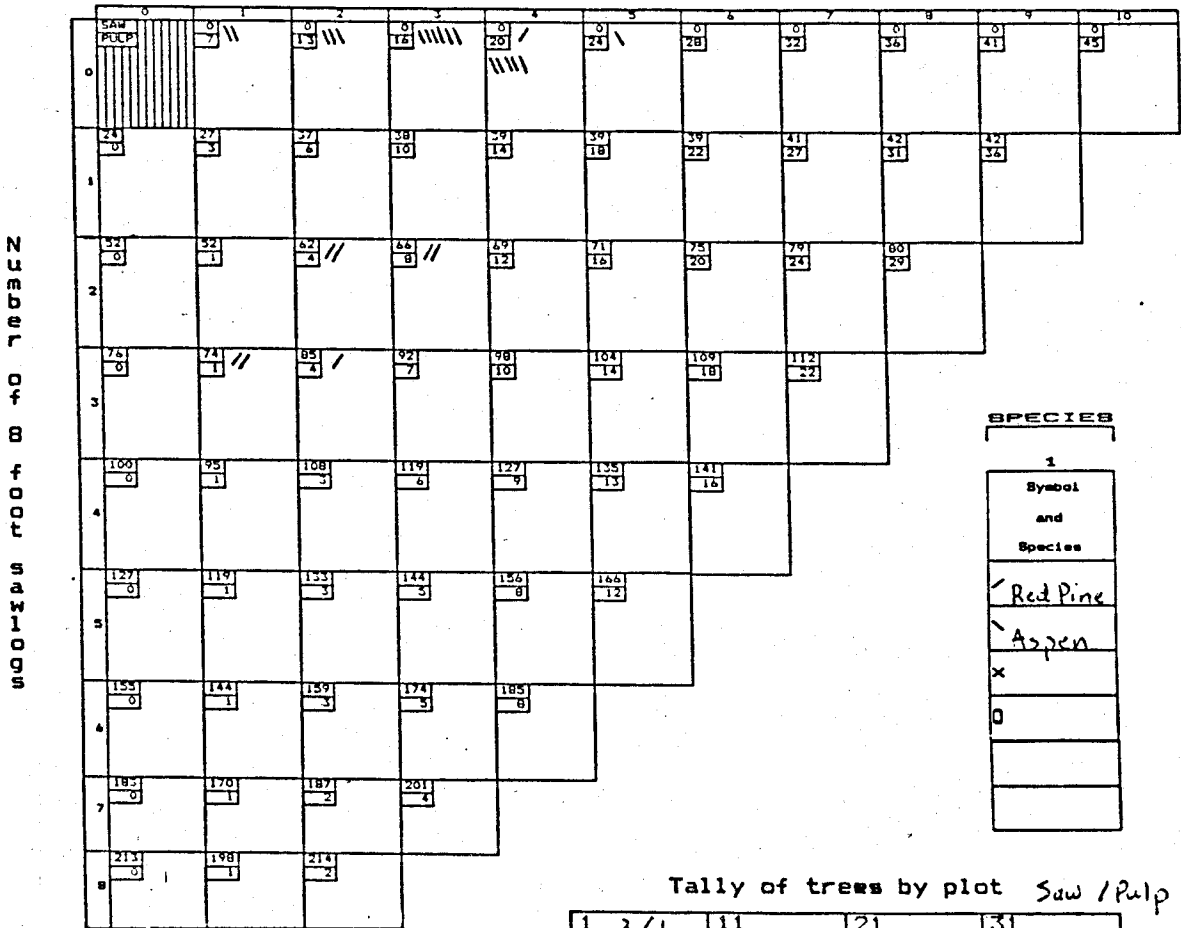
APPENDIX B. An example tally and output

a) Timber appraisal tally

Timber Appraisal Tally *

Property No.: 2044 Description: _____ Crew: ARE and TDD
 Location: T 49N R 17W S 28 Acreage: 22 Date: 7/20/85 BAF: 20

Number of 8 foot pulpsticks above sawlogs



* Pulpwood volumes are from a 1 foot stump to a 3 inch top diameter inside bark.
 Sawlog volumes are from a 1 foot stump to an 8 inch and larger top diameter inside bark in board feet, scribner log rule.

c) Timber appraisal report

Timber Appraisal Report

Appraiser: Alan R. Ek and Terry D. Droessler

Date: 09-05-1985

Permit number: 2044

County: Carlton

State forest number: Section: 28 Township: 49N Range: 17W

Region, area & district number:

Total acres in sale area: 22

Basal area factor: 20

Number of plots: 5

Pulpwood top diameter inside bark: (3 or 4 inches): 3

Cumulative or separate plot entry: C

TOTALS (PER ACRE x ACRES)

Species	Sawlogs MBF	Bolts cords	Pulpwood cords	Total cords	Percent bolts
12 Trembling Aspen	0.00	0.00	240.24	240.24	0.0
52 Norway Pine	43.03	0.00	44.00	44.00	0.0
0 All species	43.03	0.00	284.24	284.24	0.0

PER ACRE

Species	Basal area	Sawlogs MBF	Bolts cords	Pulpwood cords	Total cords	Percent bolts
12 Trembling Aspen	68	0.00	0.00	10.92	10.92	0.0
52 Norway Pine	32	1.96	0.00	2.00	2.00	0.0
0 All species	100	1.96	0.00	12.92	12.92	0.0

Pulpwood volumes are from a 1 foot stump to a 3 inch top diameter inside bark.

Boltwood volumes are from a 1 foot stump to a 6 inch and larger top diameter inside bark.

Sawlog volumes are from a 1 foot stump to an 8 inch and larger top diameter inside bark in board feet, Scribner log rule.

d) Example data file: F2044.DAT
(separate data entry)

Alan R. Ek and Terry D. Droessler
09-05-1985
2044
Carlton

28
49N
17W

22
20
5
3
5

1	2	52	3	0	0	0	1	0
1	1	52	3	0	0	0	2	0
1	1	52	0	0	0	0	4	0
2	2	52	2	0	0	0	2	0
2	2	52	2	0	0	0	3	0
3	3	12	0	0	0	0	3	0
3	3	12	0	0	0	0	4	0
4	2	12	0	0	0	0	1	0
4	3	12	0	0	0	0	2	0
5	3	12	0	0	0	0	3	0
5	2	12	0	0	0	0	4	0
5	1	12	0	0	0	0	5	0

e) Timber appraisal report

Timber Appraisal Report

Appraiser: Alan R. Ek and Terry D. Droessler

Date: 09-05-1985

Permit number: 2044

County: Carlton

State forest number: Section: 28 Township: 49N Range: 17W
Region, area & district number:

Total acres in sale area: 22

Basal area factor: 20

Number of plots: 5

Pulpwood top diameter inside bark: (3 or 4 inches): 3

Cumulative or separate plot entry: S

TOTALS (PER ACRE x ACRES)

Species	Sawlogs MBF	Bolts cords	Pulpwood cords	Total cords	Percent bolts
12 Trembling Aspen	0.00	0.00	240.24	240.24	0.0
52 Norway Pine	43.03	0.00	44.00	44.00	0.0
0 All species	43.03	0.00	284.24	284.24	0.0

PER ACRE

Species	Basal area	Sawlogs MBF	Bolts cords	Pulpwood cords	Total cords	Percent bolts
12 Trembling Aspen	68	0.00	0.00	10.92	10.92	0.0
52 Norway Pine	32	1.96	0.00	2.00	2.00	0.0
0 All species	100	1.96	0.00	12.92	12.92	0.0

Pulpwood volumes are from a 1 foot stump to a 3 inch top diameter inside bark.

Boltwood volumes are from a 1 foot stump to a 6 inch and larger top diameter inside bark.

Sawlog volumes are from a 1 foot stump to an 8 inch and larger top diameter inside bark in board feet, Scribner log rule.

	Coefficient of Variation	Standard error of totals
Sawlogs (MBF)	137.18%	1200.01
Bolts (cords)	0.00%	0.00
Pulpwood (cords)	66.60%	3.85