

AN ECONOMIC SPREADSHEET TEMPLATE TO ESTIMATE THE BENEFITS AND COSTS OF HIGH MANAGEMENT TIMBER FILTER STRIPS

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Notes on Spreadsheet Template:

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Software: Microsoft Excel version 7.0

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Introduction

This paper provides directions for using a spreadsheet template that assesses the impact vegetative filter strips have on the finances of a farm operation. A *high management timber option* is explored here, where the land along a stream or ditch is taken completely out of production and converted to timber. Timber harvests occur to provide future benefits. The high timber management option assumes that landowners thin and prune stands to produce high value veneer at the end of the growing period.

For general background information on vegetative filter strips, please see AEX-467, "Vegetative Filter Strips: Application, Installation and Maintenance." For general background on the environmental, economic, and financial decisions related to vegetative filter strips, please see AE-6-98, "The Economics of Vegetative Filter Strips." That Fact Sheet focuses on the most important economic considerations associated with the decision to install a filter strip. It provides estimates of the economics of four different types of vegetative filter strips, using the typical costs and benefits one might expect in the state of Ohio.

While the estimates in the Fact Sheets above are useful for many purposes, they may not always fit a particular situation. Because land values, the size of the application, the cost share payment, and the project duration differ from place to place, the financial impacts may vary from landowner to landowner. This template provides a tool for farmers to determine the benefits and costs for their own situation.

Additional templates that explore hay, grass and legumes, and low timber management, as well as the Fact Sheets described above, are available through the Department of Agricultural, Environmental, and Development Economics at The Ohio State University at

<http://www-agecon.ag.ohio-state.edu/Faculty/bsohngen/bmp/bmpinfo.htm>.

Discounting and Present Value

Because the costs and benefits of vegetative filter strips occur at different times, financial considerations must use the net present value approach. While discounting can be a complicated subject to learn, the spreadsheet template does these calculations automatically. All necessary components to correctly account for interest rates are included. All that is needed is the user's preferred project duration and interest rate.

The spreadsheet template is set up to calculate the net benefits of the project, accounting for benefits and costs that occur today and in the future. This is the relevant decision variable that will allow landowners to determine how much of an impact the proposed project will have on their bottom line over the life of the project. The final net benefit or cost estimate is the net present value of the gain or loss in profits that the farmer may expect over the life of the project. In addition, the annual values are presented to show the average effect on profits from year-to-year.

Template Instructions

These instructions are organized to help individuals input sixteen necessary values into the spreadsheet, and to understand the results. The worksheet is set up so that the user first inputs the necessary pieces of information. Once this information is entered, the calculations occur automatically and the results can be viewed at the bottom of the page.

Each step in the calculations is explained below. The initial numbers used in this worksheet represent typical values for the state of Ohio. Users have the ability to alter certain numbers according to their own situation.

The rows in the worksheet represent particular cost or benefit items that occur with the establishment of the filter strip. They are numbered from row 1.1 and row 2.7. Although there may be additional benefits and costs, depending on the landowner's particular situation, these represent the most common to most applications in Ohio.

The first column in the spreadsheet template lists the names of the benefits or costs. Column A lists the number of years over which these costs and benefits occur. Column B is the dollar value of the benefit or cost for each acre in each year the benefit or cost is presented, and Column C is the present value of Column B over the correct number of years. Values in Column D are the present value of the costs or benefits for the number of acres specific for the filter strip application. Negative numbers indicate costs inside brackets (in red) and positive numbers indicate benefits (in black).

Required Inputs

There are sixteen necessary inputs for this spreadsheet template to work:

(1) Interest rate: The interest rate chosen should be the same as the interest rate a bank has charged you for a recent loan.

(2) Time period: The user must input the length of time they plan to maintain the filter strip.

The default value used in the spreadsheet is 80 years. Since this spreadsheet analyzes a timber filter strip, we caution against using numbers lower than 40 years. Timber stands in Ohio take 40-80 years to mature without management, and shorter time period may reduce the quality and value of the stock at harvest, below which the parameters in this spreadsheet would not be accurate.

(3) Number of acres: Input the size of the filter strip in acres.

- (4) Cost-share contract length:** Input the length of time the cost-share contract will run. For CRP contracts, this is typically 10-15 years.
- (5) Signup bonus:** Some cost share programs have sign-up bonuses. These bonuses can be factored in directly by providing the dollars per acre provided by the program. \$150 per acre per year is the default value for the input.
- (6) Cost share for initial establishment costs:** Cost share programs like CRP often pay half the cost of establishing a filter strip. Individual contracts may vary, however, so landowners should input the expected amount of cost share paid by the program they choose. The default value is \$200 per acre in the spreadsheet.
- (7) Cost share for rental payments:** Cost share programs like CRP often pay half of the annual value of land rent for the life of the contract, usually 10-15 years. The default value is \$60 per acre per year for the years the contract is in force. Note that while CRP contracts last only 10-15 years, timber filter strips must be maintained longer to obtain future benefits of harvest. The value of these payments is calculated only for the number of years given in (4).
- (8) Annual rental rate:** Input the value of the land you are using for the filter strip in crops. \$120 is used as the default value to represent a typical land rental rate for corn-soybean rotations in Ohio.
- (9) Pruning or not at the 10th year of project:** Pruning helps produce veneer logs, and it increases the value of trees harvested in the future. However, pruning operations cost about \$130 per acre. Landowners can decide whether or not to do this operation depending on their own judgement. Failing to prune, however, reduces

the future quantity of veneer logs. Put 1 in the column if pruning at the 10th year is considered, or put 0 if not.

(10) Pruning or not at the 25th year of project: Put 1 in the column if pruning at the 25th year is considered, or put 0 if not. Note that failing to prune will reduce the quantity of veneer timber available. With pruning operations at years 10 and 25, we assume that 30% veneer is available. Choosing not to prune in either year 10 or 25 will reduce this proportion by 10%.

(11) Thinning or not at the 12th year of project: Thinning helps increasing the size and quality of trees at harvest, and it provides higher revenue for landowners in the future. Thinning costs for the first thinning are \$90 per acre, and there are no associated revenues due to small log sizes. Some firewood may be harvested, but this is not assumed to be sold for profit. Put 1 in the column if the first thinning is intended, or put 0 if not.

(12) Thinning or not at the 30th year of project: The second and third thinning can provide revenue by selling the trees harvested. The net revenue of \$665.2 per acre for the second thinning is shown in row 2.3. Put 1 if the thinning at the year 30th is intended, or put 0 if not.

(13) Thinning or not at the 55th year of project: Potential net revenues for the third thinning are assumed to be \$1852.5 per acre in year 55. Put 1 if the thinning at the 55th year is intended, or put 0 if not.

(14) Timber harvests: Input a 1 if you expect to harvest the trees and sell them on the market at the maturity age, and a 0 if you expect to clear the land without selling trees. Most landowners are likely to plan to sell the trees.

(15) Timber price of sawlogs: Timber prices differ by species. The table of average stumpage prices is therefore provided to the right of the template for reference purpose. The default price is \$390 per thousand board feet.

(16) Timber price of veneer: Logs used for veneer provide the highest return for landowner. For example, walnut veneer prices range from \$1,500 to \$5,000 per thousand board feet. There are few good data sources for veneer prices, so landowners should check with a local service forester for current price estimates.

Information on Calculations

The calculations in this spreadsheet are given for each row. The rows in the spreadsheet are identified by numbers corresponding to the text below. Most values for the worksheet are provided for the users, based on typical usage.

Costs

ROW 1.1 Seedling Purchase and Planting Costs

Seedling purchase and planting costs occur only at the very beginning of the project. Typical current costs for planting seedlings in Ohio is \$378 per acre.

ROW 1.2 First Pruning

First pruning occurs at the end of the 10th year. The pruning operation costs \$130 per acre. The present value is discounted by the expected interest rate for this 10-year period. A cost is only included here if the user indicates this in input (9).

ROW 1.3 Second Pruning

Second pruning occurs at the end of the 25th year. This pruning is assumed to cost the same as the first, \$130/acre. The present value is discounted over 25 years. A cost is only included here if the user indicates this in input (10).

ROW 1.4 Thinning

The first thinning at the 12th year results in no timber harvests because trees are too small, but it costs \$90 per acre. This cost is discounted, and it is only assumed to occur if the landowner indicates this thinning as an input.

ROW 1.5 Mowing Cost

Mowing is assumed to occur five times per year over the first 3 years, with an estimated cost of \$25/acre per mowing. The present value of these costs for the filter strip is calculated in column C. Mowing costs are assumed to occur at the beginning of the year, so that discounting only happens in the second and third years.

ROW 1.6 Land Rent

The present value of land rent is calculated in this row for all acres in the filter strip. Land rents occur for the entire life of the project, and are assumed to occur at the end of each year.

ROW 1.7 Total Costs

The total costs sums the values from row 1.1 to 1.6. Column D generated by multiplying the number of acre and the cost per acre. It shows the total costs of installing and maintaining the filter strip for the size determined by the user.

Benefits

ROW 2.1 Initial Cost Share Payment

Signup bonus and the establishment cost share payment are the initial benefits landowners typically receive. The category sums up both of the bonus and the cost share, the inputs by the user in the top of the spreadsheet. These are assumed to occur at the beginning of the first year.

ROW 2.2 Rental Cost-Share Payment

Landowners may also receive land rental payments as cost-share. These will occur for the number of years in the contract, which was input above. These payments are assumed to occur at the end of each year. The amount of total land rent that is cost-shared is entered above.

ROW 2.3 Second Thinning

The second thinning offers some net revenue for landowners. The revenues used in this fact sheet account for the cost of thinning. The second thinning is assumed to occur at the end of the 30th year. Net revenue is assumed to be \$665.20/acre in the year the thinning occurs, although this value is discounted in column C.

ROW 2.4 Last Thinning

The last thinning generally occurs in the 55th year of the project. The net revenue for this thinning is larger than the second thinning because the trees are larger. We assume \$1852.50/acre for the net revenue of selling the trees at the third thinning. Column C discounts these values back to the present.

ROW 2.5 Timber Returns from Sawlogs

Generally, 70% of the timber harvest will be sold as sawlogs. The price depends on the type of species planted. The default values are for walnut. Timber returns reflecting the value of

the stock in the year it is harvested are shown in column B. The present value of this is shown in column C. Timber returns rise with the time period the landowner expects to maintain the filter strip, although the present value can fall. The calculation of timber growth uses: (1) Doyle Rule; (2) 4 years to grow 2 inches of diameter; (3) 2 logs harvested per tree; (4) 50 merchantable logs per acre at harvest.

ROW 2.6 Timber Returns from Veneer

As much as 30% of the final harvest can be used for veneer wood. The final percentage of veneer, however, depends on the thinning and pruning options used. The percent veneer is assumed to decline, however, as additional pruning and thinning operations are omitted.

ROW 2.7 Total Benefits

Total benefits represent the sum of rows 2.1 to 2.6.

Net Benefits (Costs) with Cost Share

ROW 3.1 Present Value of Net Benefits (Costs)

This row represents the impact of the filter strip on farm profits over the life of the project assuming the landowner participates in a cost share program. Positive numbers (in black) indicate that the filter strip adds to profits while negative numbers inside brackets (in red) indicate the filter strip is a cost.

ROW 3.2 Annual Net Benefits (Costs)

This row shows the average annual benefits or costs of the filter strip.

Net Benefits (Costs) without Cost Share

ROW 4.1 Present Value of Net Benefits (Costs)

This row calculates the net benefits or costs by ignoring the benefits of the cost share contract, represented in rows 2.1 and row 2.2. The values in row 4.1 can be compared to those in row 3.1 to determine the benefit of the cost share program. Positive numbers (in black) indicate that the filter strip adds to profits while negative numbers inside brackets (in red) indicate the filter strip is a cost.

ROW 4.2 Annual Net Benefits (Costs)

This row shows the average annual benefits or costs of the filter strip when the landowner does not participate in a cost share program.