

# **BASIC ASSUMPTIONS ABOUT COSTS AND BENEFITS OF CRP AND CREP PROGRAMS IN NORTHWEST OHIO**

**Brent Sohngen**

**AED Economics**

**The Ohio State University**

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This document provides the background economic information on calculations presented in the fact sheet “Comparison of CRP to CREP in Northwestern Ohio” by Brent Sohngen. The basic economic assumptions are first presented and discussed, and then tables with the economic effects are presented. For additional information, contact the author directly.

Data for these calculations was derived from a number of sources. Chris Gibbs, Steve Davis, and Bob George provided information on costs specific in Northwest Ohio. An earlier OSU Extension Fact Sheet, “Economics of Vegetative Filter Strips,” (AE-6-99) provided additional information.

Individuals interested in calculations for specific land applications should consult the spreadsheet templates available for download at:

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

These spreadsheets can be adopted for a wide variety of situations to help farmers understand the financial implications of alternative filter strip options. In particular, the spreadsheet templates include options for harvesting timber on riparian forest filter strips. This option is not included in this analysis, but may be an important consideration for landowners.

*Note: The author thanks Robert Fleming, Lynn Forster, Chris Gibbs, Chris Kaufman, and Robert Moore for helpful comments*

# Grass Filter Strips

## *Economic Assumptions*

Interest Rate: 8%

### Contract Length

Continuous CRP: 15 years

CREP: 20 years (with cash rental payments lasting only 15 years)

Cash Rent: \$100 per acre.

Without a filter strip, the landowner is assumed to make \$100 per acre. When a filter strip is placed on a productive acre of farmland, the farmer loses this \$100. This is known as an opportunity cost – the lost opportunity from producing cash crops and instead converting the land to a filter strip. Thus, cash rents are included as an economic cost of filter strips in this example.

Opportunity costs such as this are an important component of any economic analysis. Landowners must carefully consider if they are losing anything from the land when they convert it from production to a filter strip. Where the conversion of land occurs on good crop land, these costs may be considerable. If, however, the land is not all that suitable for crops, this cost may be small.

The cash flow analysis used here shows how these opportunity costs influence the economic decision to establish filter strips. The analysis shows the effect of the cash flows for the baseline case, which occurs when the landowner continues to produce crops, and the filter strip options under the alternative incentive payments provided by continuous CRP and CREP. Taking the difference between the filter strip options and the baseline case captures the influence of the lost opportunity of maintaining crops on the land.

Establishment Costs: \$40 per acre (year 0 only)

Establishment costs for grass filter strips are estimated to be approximately \$40 per acre. These costs include seed purchase, machinery and labor, and fertilizing costs. Note that these estimates may vary by region and application. However, \$40 per acre is considered to be reasonable estimate for Northwest Ohio.

Annual Mowing Costs: \$10 per acre (all years with filter strip)

Approximate mowing costs for grass filter strips are \$10 per acre. The economic analysis assumes that these occur twice the first year and once every other year thereafter over the life of the filter strip. These mowing costs are included in both the CRP and CREP options.

Establishment Cost Share: \$20 per acre (year 0 only)

Cost share for CRP pays for 50% of the establishment costs.

**Bonus Payments:**

The CREP program pays a \$200 per acre bonus payment in the first year of the contract. This bonus payment does not occur under continuous CRP.

**Maintenance Cost Share: \$5 per acre per year (all years with filter strips)**

Continuous CRP and CREP will provide a \$5 per acre per year maintenance cost share.

**CRP Rental Payments: \$120 per acre each year.**

Continuous CRP typically pays 120% of the cash rent for cost share payments over the life of the contract (15 years in this case). The CREP program on the other hand pays 155% of the cash rent for cost share payments over 15 years.

***Description of Table 1:***

Table 1 compares the present value of three alternative land management practices over the next 20 years. Using twenty years standardizes the comparison to the required 20 year CREP commitment.

**Continue cropping 1 acre (Column 2):**

Column 2 shows the present value of continuing to farm the land under consideration for a filter strip. In this case, the farmer receives \$100 per year in profits, with a net present value over 20 years of \$982.

**Continuous CRP (Columns 3-5):**

Columns 3 – 5 present the net present value of converting the land to continuous CRP grass filter strips for 15 years, and then converting the land back to cash crops for years 16 – 20.

Annual planting and maintenance costs are shown in the 3<sup>rd</sup> column. The 4<sup>th</sup> column presents annual cost share for establishment, maintenance, and land rental. In year 0, this is 50% of the establishment costs.

Cost share column shows the establishment cost share in year 0 as 50% of the establishment costs, and the 120% annual rental payment provided by the CRP program for the 15 years.

The “crop production” column is \$0 the first 15 years when the land is used for the filter strip because the landowner does not produce crops during that time period. During years 16 – 20, the farmer converts this land back to cash crops and gains the \$100.

The present value of the cash flows from this option are \$1,121.

CREP (Columns 6-8):

The CREP program requires the landowner to make a 20 year commitment to keeping the filter strip on the land. This means that he or she is not allowed to convert the land back into productive crops after 15 years, as with continuous CRP. Annual planting and maintenance costs are shown as well. Mowing costs \$10 per acre, and occurs twice the first year, and once every other year thereafter.

In return for the 20 year commitment, the landowner gets a \$200 up front bonus payment, and a higher annual rental payment of 155% of the cash rent.

The Present value of this option is \$1,489.

Capturing opportunity costs:

It is important for the landowner to consider the lost opportunities from shifting the land from production to the filter strip. This can be accomplished by comparing the baseline case where the farmer does nothing to the two cases where the farmer installs grass filter strips. In the continuous CRP case, for example, landowner net revenues are \$1,121, while if they continued to develop cash crops on the land, their net revenues would be \$982. Under these management assumptions, landowners gain approximately \$140 per acre.

For the CREP example, farmers potentially gain more from converting to filter strips. Total revenues in that case are \$1,489, which is a \$507 gain over continuing to crop the land.

## **Riparian Forest Filter Strips**

### *Economic Assumptions*

Interest Rate: 8%

#### Contract Length

Continuous CRP: 30 years (with cash rental payments lasting only 15 years)

CREP: 30 years (with cash rental payments lasting only 15 years)

Cash Rent: \$100 per acre.

Without a filter strip, the landowner is assumed to make \$100 per acre. When a filter strip is placed on a productive acre of farmland, the farmer loses this \$100. This is known as an opportunity cost – the lost opportunity from producing cash crops and instead converting the land to a filter strip. Thus, cash rents are included as an economic cost of filter strips in this example.

Opportunity costs such as this are an important component of any economic analysis. Landowners must carefully consider if they are losing anything from the land when they convert it from production to a filter strip. Where the conversion of land occurs on good crop land, these costs may be considerable. If, however, the land is not all that suitable for crops, this cost may be small.

The cash flow analysis used here shows how these opportunity costs influence the economic decision to establish filter strips. The analysis shows the effect of the cash flows for the baseline case, which occurs when the landowner continues to produce crops, and the filter strip options under the alternative incentive payments provided by continuous CRP and CREP. Taking the difference between the filter strip options and the baseline case captures the influence of the lost opportunity of maintaining crops on the land.

Establishment Costs: \$450 per acre (year 0 only)

Costs to establish riparian forest filter strips are estimated to be approximately \$450 per acre. These costs include seed purchase, and any machinery and labor costs associated with establishing the filter strips.

Annual Costs: \$125 per acre (first 3 years)

In addition to the initial planting and establishment costs, annual costs of mowing are estimated to be \$125 per acre (5 mowings at \$25 per mowing). Mowing keeps grass and other plants from shading trees during early years when they are becoming established. Thus, these costs are not necessary after 3 years when timber stands are established on the filter strip.

Establishment Cost Share: \$225 per acre (year 0 only)

Cost share for CRP pays for 50% of the establishment costs.

**Bonus Payments:**

The CREP program pays a \$500 per acre bonus payment in the first year of a contract for riparian filter strips. This bonus payment does not occur under continuous CRP.

**Maintenance Cost Share: \$5 per acre per year (all years with filter strips)**

Continuous CRP and CREP will provide a \$5 per acre per year maintenance cost share.

**CRP Rental Payments: \$175 per acre each year.**

Continuous CRP typically pays 175% of the cash rent for cost share payments for riparian filter strips over the first 15 years of the contract. The owner must continue to hold the land in forest filter strip until year 30.

***Description of Tables 2 and 3:***

Tables 2 and 3 compare the present value of continuing to crop the land, converting the land to riparian forest filter strips with the continuous CRP program, and converting the land to riparian forest filter strips with the CREP program.

**Continue farming 1 acre (Tables 2 and 3, Column 2):**

Column 1 shows the present value of continuing to farm the land under consideration for a filter strip. In this case, the farmer receives \$100 per year in profits, with a net present value over 30 years of \$1,126. Note that this is higher than the grass filter strip example because more years are included.

**Continuous CRP (Table 2, Columns 3-5):**

Columns 2 – 4 present the net present value of converting the land to continuous CRP riparian forest filter strips for 30 years, with government rental payments lasting 15 years.

Annual planting and maintenance costs are shown in the 3<sup>rd</sup> column. The 4<sup>th</sup> column presents annual cost share for establishment, maintenance, and land rental. In year 0, this is 50% of the establishment costs.

Cost share column shows the establishment cost share in year 0 as 50% of the establishment costs, the 120% annual rental payment provided by the CRP program for the 15 years, and a \$5 per acre annual maintenance cost share.

The “crop production” column shows \$0 for the entire 30 year time period when the land is used for the filter strip because the landowner loses the \$100 in productive cash crops during that time period. The land owner is assumed to maintain the forested riparian filter strip after the continuous CRP contract is finished. Although this differs from the grass filter strip example above, forest filter strips are more costly to convert back to crop land, and those costs are not considered in this analysis

The Present value of this option is \$523.

CREP (Table 3, Columns 3-5):

The CREP program for forest filter strips requires the landowner to make a 30 year commitment to keeping the filter strip on the land. This means that the “crop production” column shows \$0 for the entire 30 years when the land is used for the filter strip. Annual planting and maintenance costs of \$125 per acre for mowing the first three years are shown as well.

In return for the 30 year commitment, the landowner gets a \$500 up front bonus payment, a higher annual rental payment of 175% of the cash rent, and \$5 annual maintenance cost share

The Present value of this option is \$1,494.

Capturing opportunity costs:

It is important for the landowner to consider the lost opportunities from shifting the land from production to the filter strip. This can be accomplished by comparing the baseline case where the farmer does nothing to the two cases where the farmer installs riparian timber filter strips. In the continuous CRP case, for example, landowner net revenues are \$523, while if they continued to develop cash crops on the land, their net revenues would be \$1,126. Under these management assumptions, landowners lose approximately \$603 per acre with riparian filter strips

For CREP, however, farmers gain more from converting to riparian filter strips. Total revenues in that case are \$1,494, which is a \$368 gain over continuing to crop the land.



Table 1: Comparison of alternative grass filter strip incentive programs.

1	2	3	4	5	6	7	8	
	Continue Cropping	Continuous CRP				CREP		
		Planting and Management Cost	Cost Share	Crop Production		Planting and Management Cost	Cost Share	Crop Production
0	\$0	(\$40)	\$20	\$0		(\$40)	\$220	\$0
1	\$100	(\$20)	\$125	\$0		(\$20)	\$160	\$0
2	\$100	\$0	\$125	\$0		\$0	\$160	\$0
3	\$100	(\$10)	\$125	\$0		(\$10)	\$160	\$0
4	\$100	\$0	\$125	\$0		\$0	\$160	\$0
5	\$100	(\$10)	\$125	\$0		(\$10)	\$160	\$0
6	\$100	\$0	\$125	\$0		\$0	\$160	\$0
7	\$100	(\$10)	\$125	\$0		(\$10)	\$160	\$0
8	\$100	\$0	\$125	\$0		\$0	\$160	\$0
9	\$100	(\$10)	\$125	\$0		(\$10)	\$160	\$0
10	\$100	\$0	\$125	\$0		\$0	\$160	\$0
11	\$100	(\$10)	\$125	\$0		(\$10)	\$160	\$0
12	\$100	\$0	\$125	\$0		\$0	\$160	\$0
13	\$100	(\$10)	\$125	\$0		(\$10)	\$160	\$0
14	\$100	\$0	\$125	\$0		\$0	\$160	\$0
15	\$100	(\$10)	\$125	\$0		(\$10)	\$160	\$0
16	\$100	\$0	\$0	\$100		\$0	\$0	\$0
17	\$100	\$0	\$0	\$100		(\$10)	\$0	\$0
18	\$100	\$0	\$0	\$100		\$0	\$0	\$0
19	\$100	\$0	\$0	\$100		(\$10)	\$0	\$0
20	\$100	\$0	\$0	\$100		\$0	\$0	\$0
<b>Gain (Loss) for Each Column</b>								
	\$982	(\$95)	\$1,090	\$126		(\$100)	\$1,590	\$0
<b>Gain (Loss) for Each Option</b>								
	\$982			\$1,121				\$1,489

Table 2: Comparison of baseline to Continuous CRP incentive program for riparian forested filter strips.

1	2	3	4	5
	Continue Cropping	Continuous CRP		
		Planting and Management Cost	Cost Share	Crop Production
0	\$0	(\$450)	\$225	\$0
1	\$100	(\$125)	\$125	\$0
2	\$100	(\$125)	\$125	\$0
3	\$100	(\$125)	\$125	\$0
4	\$100	\$0	\$125	\$0
5	\$100	\$0	\$125	\$0
6	\$100	\$0	\$125	\$0
7	\$100	\$0	\$125	\$0
8	\$100	\$0	\$125	\$0
9	\$100	\$0	\$125	\$0
10	\$100	\$0	\$125	\$0
11	\$100	\$0	\$125	\$0
12	\$100	\$0	\$125	\$0
13	\$100	\$0	\$125	\$0
14	\$100	\$0	\$125	\$0
15	\$100	\$0	\$125	\$0
16	\$100	\$0	\$0	\$0
17	\$100	\$0	\$0	\$0
18	\$100	\$0	\$0	\$0
19	\$100	\$0	\$0	\$0
20	\$100	\$0	\$0	\$0
21	\$100	\$0	\$0	\$0
22	\$100	\$0	\$0	\$0
23	\$100	\$0	\$0	\$0
24	\$100	\$0	\$0	\$0
25	\$100	\$0	\$0	\$0
26	\$100	\$0	\$0	\$0
27	\$100	\$0	\$0	\$0
28	\$100	\$0	\$0	\$0
29	\$100	\$0	\$0	\$0
30	\$100	\$0	\$0	\$0
<b>Gain (Loss) for Each Column</b>				
		(\$772)	\$1,295	\$0
<b>Gain (Loss) for Each Option</b>				
	\$1,126			\$523

Table 3: Comparison of baseline to CREP incentive program for riparian forested filter strips.

1	2	3	4	5
	Continue Cropping	Planting and Management Cost	CREP	
			Cost Share	Crop Production
0	\$0	(\$450)	\$725	\$0
1	\$100	(\$125)	\$180	\$0
2	\$100	(\$125)	\$180	\$0
3	\$100	(\$125)	\$180	\$0
4	\$100	\$0	\$180	\$0
5	\$100	\$0	\$180	\$0
6	\$100	\$0	\$180	\$0
7	\$100	\$0	\$180	\$0
8	\$100	\$0	\$180	\$0
9	\$100	\$0	\$180	\$0
10	\$100	\$0	\$180	\$0
11	\$100	\$0	\$180	\$0
12	\$100	\$0	\$180	\$0
13	\$100	\$0	\$180	\$0
14	\$100	\$0	\$180	\$0
15	\$100	\$0	\$180	\$0
16	\$100	\$0	\$0	\$0
17	\$100	\$0	\$0	\$0
18	\$100	\$0	\$0	\$0
19	\$100	\$0	\$0	\$0
20	\$100	\$0	\$0	\$0
21	\$100	\$0	\$0	\$0
22	\$100	\$0	\$0	\$0
23	\$100	\$0	\$0	\$0
24	\$100	\$0	\$0	\$0
25	\$100	\$0	\$0	\$0
26	\$100	\$0	\$0	\$0
27	\$100	\$0	\$0	\$0
28	\$100	\$0	\$0	\$0
29	\$100	\$0	\$0	\$0
30	\$100	\$0	\$0	\$0
<b>Gain (Loss) for Each Column</b>				
		(\$772)	\$2,266	\$0
<b>Gain (Loss) for Each Option</b>				
	\$1,126			\$1,494