A Farm-level Economic Analysis of Wildlife Habitat Buffers in Missouri

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Farm-level Economic Analysis of Wildlife Habitat Buffers in Missouri

Estimated incentive for producers to participate in the federal CRP practice CP-33, Habitat Buffers for Upland Birds.

August 2007

Background Information for CP-33

The conservation practice CP-33 is a fairly recent addition to the list of options available through the federally administered conservation reserve program (CRP). The first contracts in Missouri were signed in program year 2005.

The program has rapidly gained interest since release. As of May 31, 2007, there were 1,956 active contracts statewide on 21,692 acres. The Missouri allocation of acres eligible for enrollment has increased from the original 20,000 to 32,500. The state allocation now ranks third behind Kansas and Illinois.

The basic intent of the program is to establish habitat buffers around the edges of existing crop fields to provide cover for bobwhite quail, ringneck pheasant, and other upland birds. According to the technical requirements, edge buffers are strips of wildlife-friendly forbs, grasses, and shrubby vegetation, ranging in width from 30 to 120 feet. Land enrolled in the program becomes unavailable for agricultural production for the duration of the contract, a period of 10 or 15 years. The buffer area can not be hayed, grazed, or used for turn rows, roads, crop or equipment storage, or for wildlife food plots. However, crossing the buffer for normal access to a field is permitted.

The incentives for CP-33 enrollment are among the more generous for continuous CRP practices. In return for establishing a buffer, three forms of payments are available. First, participants are eligible for an up front signing incentive payment (SIP) of $100 per acre. Second, cost share assistance reimburses participants for nearly all of the cost incurred to establish approved cover on the enrolled acres. In addition to the common CRP cost share rate of 50 percent, CP-33 participants are also eligible for a practice incentive payment (PIP) equal to 40 percent of installation costs for a total of 90 percent cost-share. And, third, for the life of the contract, the participant receives an annual rental payment based on the relative productivity of the soil and the average dry land cash rental rate. The annual payment is combined with a maintenance incentive payment (MIP) of $4.00 per acre to cover maintenance obligations. The average annual rate paid in Missouri, including the MIP, was $86.38 per acre in early 2007. As of this writing, a process has begun to adjust the soil rental rates upward for future contracts.

Certain restrictions apply to this program and other continuous CRP enrollments. Among them are the requirements that a producer must have owned or operated the land for at least 12 months prior to submitting the offer to enroll, and the cropland, including field margins, must have been planted to an agricultural commodity at least four of the years from 1996 to 2001. Unlike the general CRP program, sign-up for CP-33 is non-competitive and participants know their payment rate in advance.

The initiative is administered by the United States Department of Agriculture (USDA) Farm Service Agency. In Missouri, technical assistance is provided by the USDA-Natural Resources Conservation Service and the Missouri Department of Conservation.

A popular application of the program has been to establish buffers along field margins where planted crops compete with existing timber and hedgerows. In most years, crop yields are dramatically reduced along tree lines, but the impact is weather dependent and difficult to estimate over time. Historically, a selling point of the program has been that yields are often low enough at the field edge that revenue is less than the cost of planting and harvesting those acres. Of course, market prices are also part of the equation.

Participant Decision

Potential participants, be they owners and/or operators, are faced with an economic decision regardless of their wildlife enhancement goals. Do they realize a net gain or loss by enrolling acres in this program? What is the magnitude of the economic impact, over time and under risk?

The objective of this project was to estimate the net economic benefits to the farmer for idling land in return for CP-33 incentive payments. Other studies are being conducted by public agencies to further quantify the impact on wildlife populations.

Methods and Procedures

To analyze the farm-level decision, we turned to the Food and Agricultural Policy Research Institute (FAPRI) system of representative farms to estimate the expected stream of revenues for a farm enrolled in CP-33. This approach is well established and offers the advantage of using "real-world" parameters in a stochastic simulation model that incorporates projections of future product prices and input costs. This is particularly important in view of recent and expected developments in agricultural commodity markets. In this report, the farm-level results of enrolling in CP-33 were compared to a baseline projection without a CP-33 practice. We assume that current government policy is extended indefinitely. For more information on the representative farm baseline modeling process and the most recent baseline projections, go to the FAPRI-MU web site. The report is #04-07, *Baseline Outlook for the Missouri Representative Farms.*

This study applied provisions of CP-33 on three representative farms. The first step was to build a new benchmark farm to work out details of the simulation and learn how the program was operating. We then broadened the analysis by applying the same procedures to two existing representative farms.

Benchmark Farm

To develop data for the benchmark farm, we set up a structured discussion with a group of enrolled producers. With the valuable assistance of Missouri Department of Conservation staff, five cooperative farmers in Carroll County were identified to serve on a discussion panel. Carroll County, located in North Central Missouri, is one of the leading areas in the state for CP-33 activity. At the first session, held in late March 2007, producers had an orderly discussion of their current farming operations that, by consensus, resulted in a baseline representative farm that

included the major elements of the individual farms. Data for the representative farm were entered into the simulation model and preliminary results were presented to the panel at this session.

The baseline representative farm developed at that meeting has 700 arable acres, 440 acres owned and 260 leased, on a 50-50 share with landlords. The majority of the land is above the flood plain on rolling fields. Over time, 200 acres have been enrolled in various CRP programs with a weighted average annual rental payment of $70 per acre. On average, corn and soybeans are each raised on 216 acres and 58 acres are planted to wheat and double crop-soybeans.

Whole farm average yields for the baseline farm, including low yields on field edges are as follows: 145 bushels for corn, 43 bushels for full season soybeans, 58 bushels for wheat, and 20 bushels for double-cropped soybeans. These average yields are based on panel member records for the most recent five years. A ten year history of yields was obtained from crop insurance records of the panel members. These localized yields are the basis of the distribution to estimate variability.

With permission from the producer panel, we met in early May with USDA personnel at the Carroll County USDA Service Center to review details of all the CP-33 tracts offered by the panel members. Some of the contracts were still pending at that time. Weighted averages from this set of contracts were calculated to define field configuration, field size, buffer width, establishment costs, and soil rental rates for the representative farm.

The panel has installed, or plans to install, buffers on a total of 14 fields. In general, the group is using the practice on relatively narrow field edges with heavy timber. The minimum width of 30 feet was the most common. In some cases, participants have enrolled all of a narrow field neck with timber on three sides. It was determined that to represent the collection of landscape features and buffer designs, the best fit was a scenario with two fields enrolled in CP33. For purposes of this analysis, one field has two acres enrolled and ten acres remaining in crop production. The soil rental rate for this field (contract) calculates to $89.37 per acre, including the MIP. The second field has eight acres enrolled and 40 acres left in crop production. The soil rental rate for this contract with MIP is $90.07 per acre. Average yields are lower on the smaller field due to cultural practices. We assumed that acres in the enrolled fields are owned by the operator.

The weighted average establishment cost per acre for the benchmark farm is $182.09. Cost-share assistance, including PIP, is $163.88 per acre enrolled. Post establishment, some maintenance is required to meet the conditions of the contract. According to the panel and our own estimates, the $4.00 per acre MIP is a reasonable estimate of the annualized maintenance costs for spot spraying and/or burning to control undesirable species.

With the above information in-hand and preliminary baseline and scenario simulation results generated, we met a second time with the producer panel. The purpose of this meeting was to review our methods and validate that our estimates and assumptions were reasonable. In particular, pre- and post-installation yield estimates are critical to the economic analysis. Based on their personal experience and limited yield monitoring data, the producers challenged us to revise our original yield estimates of what occurs at the field edge. For the final scenario, we estimated that, as a percent of field average, typical yields on the margin are: 35 percent for corn, 40 percent for soybeans, and 90 percent for wheat. We also adjusted the simulation model to reflect greater variability around the depressed yields. After buffer installation, a new field edge is created where

yields will likely suffer due to wildlife damage. We estimated a five percent yield loss on these acres. Average yields (2002-2006) for the different "fields" on the representative farm are shown in Table 1.

Table 1. Estimated average yields, Carroll County representative farm

	Corn	**Soybeans**	**Wheat**	**DC Beans**
	bushels	bushels	bushels	bushels
Baseline				
Field A edge, 2 acres	49.5	16.7	50.0	8.0
Field A middle, 10 acres	141.4	41.9	55.6	20.0
Field B edge, 8 acres	52.8	17.8	53.3	8.5
Field B middle, 40 acres	150.7	44.6	59.2	21.3
Other fields, 440 acres	148.9	44.1	58.5	21.1
Whole-farm, weighted avg., 500 acres	145.0	43.0	58.0	20.0
Scenario (CP-33 installed on two fields)				
Field A new edge, 2.5 acres	134.4	39.8	52.8	19.0
Field A middle, 7.5 acres	141.4	41.9	55.6	20.0
Field B new edge, 6 acres	143.2	42.4	56.3	20.3
Field B middle, 32 acres	150.7	44.6	59.2	21.3
Other fields, 440 acres	148.9	44.1	58.5	21.1
Whole-farm, weighted avg, 490 acres	148.9	44.1	58.5	21.1

The farm was simulated for ten years with the Farm Level Income and Policy Simulator Model (FLIPSIM). This model iterates 500 different financial futures of the farm, given price, yield, and cost combinations. The financial results are calculated on a cash basis, after tax. We assumed that the first year of the practice occurred in 2006 with no prorated payments. That is, the practice was installed and all upfront and cost share payments were received in that year. Because prices and yields for 2006 are known, there is no risk calculated for the beginning year of simulation. In the projected years, 2007 through 2015, yields and prices vary as they have historically.

For the two fields with enrolled acres, we simulated a crop rotation plan identical to the average for the farm, i.e., soybeans were planted in 2006 followed by corn, then corn followed by wheat and double cropped soybeans, and back to soybeans. Over the ten years of analysis, corn is planted on the enrolled fields in 2007, 2010, and 2013. This approach minimizes potential skewing of the financial results simply by choice of crop.

Because of relatively small acreage enrollments our analysis assumed there would be no changes in capital or labor requirements. Nor would changes occur in land values or farm cash income from opportunities such as leasing hunting rights.

Other farms

CP-33 acreage and yield adjustments were imposed on the additional representative farms in the same ratio as the benchmark farm. Establishment costs and cost-share assistance per acre were assumed to be identical to the benchmark farm. Soil rental rates were estimated based on county average information and farm crop yields. Enterprises and CP-33 payments for the three farms are compared in Table 2. Descriptions of the additional representative farms follow.

The Ralls County panel farm in Northeast Missouri was first established in 1997. The farm consists of 1460 acres planted to row crops and a cow-calf operation of 80 cows running on 400 acres. Unlike the Carroll County farm, this one does not have any "risk-free" income from acres enrolled in the general CRP sign-up. Land tenure is partitioned with 49 percent of the acres owned, 36 percent cash leased, and 15 percent share leased on 50-50 basis.

A total of 20 acres are enrolled in CP-33. Four acres of buffer strips are installed in a 24 acre field with a soil rental rate and MIP of $65.00 per acre. The second field consists of 96 total acres with 16 enrolled at $75.00 per acre.

The Bates County farm in West Central Missouri has some similarity to the Ralls County farm in that it farms 1400 acres of row crops. The beef cattle enterprise plays a larger role in future income. Soybeans are a more prominent enterprise. Calves are raised from 150 cows on 440 forage acres. Soybeans are double cropped on 340 acres. Average crop yields and the soil rental rate are both less than the Ralls County farm. Yield risk is also greater for the Bates farm. In terms of land tenure, 43 percent of the acres are owned, 34 percent are cash leased, and 23 percent are share leased. Shares lease arrangements are 40-60 for corn and 33-67 for other crops. The scenario examines an enrollment of 20 acres.

We looked at multiple farms to add robustness to the analysis. However, it is important to note that although we use the county designation to identify the uniqueness of a representative farm this does not infer any general conclusions about profitability or CP-33 incentives for other farms in the named counties.

Table 2. Comparison of the representative farms

	Carroll	**Ralls**	**Bates**
Beef cows, number	0	80	150
Forage acres	0	400	440
Total CP-33 acres enrolled	10	20	20
General CRP acres	200	0	0
Cropped acres *	500	1460	1400
Planted acres	568	1516	1740
Corn acres	216	584	530
Soybean acres	216	745	530
Wheat acres	68	131	340
Double-cropped acres	68	56	340
2006 farm corn yield, bu	145	125	120
2006 farm soybean yield, bu	43	42	36
2006 farm wheat yield, bu	58	68	60
2006 DC bean yield, bu	20	16	24
Rental rate + MIP, field A, $ per acre	89.37	69.00	69.00
Rental rate + MIP, field B, $ per acre	90.07	79.00	69.00

* Baseline acres

Simulation Results

The core of this analysis is presented as selected output variables in Tables 4 through 6 for each representative farm. The baseline and scenario absolute numbers are the means of 500 iterations. These numbers are largely self-explanatory, but the following discussion pertaining to the Carroll County farm is provided to aid interpretation.

Over the next ten years, government payments from all direct sources (general CRP, direct payments, counter-cyclical payments, marketing loan benefits, and cost share assistance) average $8570 for the baseline farm. With the installation of CP-33, government payments increase each year. Over ten years the farm will receive an additional $11,580 in payments. The additional government payments do not offset the foregone revenue from the market of $19,890 for the same period. Thus, total receipts decline in the CP-33 scenario.

With fewer acres to farm, annual cash operating expenses decline by $11,760. The net effect of these changes is reflected in a positive advantage for CP-33 in net cash farm income.

From the farmer's perspective, the felt change appears in returns to family living. This is a residual value that quantifies the cash available for operator withdrawal after paying all cash expenses including taxes, debt service, and cash outlay for capital replacement. This single variable is perhaps the best indicator of the economic incentive for the farmer. By this metric, the farm family has more cash in each year of the scenario, accumulating an additional $12,470 over ten years that would not have been generated without CP-33 in place. On an annual per acre basis (500 baseline cropped acres) the farm family is better off by an average amount of $2.49 per acre.

The risk of a cash flow deficit is moderately high to severe for the baseline farm. Under the scenario, the probability of generating insufficient cash to meet all farm business and family living obligations declines, but only slightly.

Results for the other representative farms follow a similar pattern. For the Ralls County farm, the returns to family living increase by $28,340 over ten years. For the Bates County farm, returns to family living increase by just $4,090.

Again, results indicate a positive incentive. But the relative difference of $24,250 seems large for two similar farms in terms of size and enterprises. The explanation lies with both the receipt and the cost components. Removing acres from production is a more costly decision for the Bates farm. Although the Ralls farm yields are higher, higher commodity prices and double cropping make an acre slightly more valuable to crop for the Bates farm. A lower CRP rental rate for the Bates farm compounds the difference.

On the cost of production side, less savings are realized on the Bates farm primarily due to crop mix and enterprise variable costs differences. The effect of these changes on net cash farm income is actually negative, but the change in cash flow (after debt reduction, financing capital replacement, and taxes) is slightly positive. As a sidenote, the Bates farm is the most profitable of the three.

Land Management Alternatives

This study focuses on one management option. In practice, farmers consider the relative merits of multiple options. Depending on the particular site, practices such as root plowing, shallow ripping, and various degrees and means of tree removal may boost average field yields and therefore increase farm income. These cultural practices have a long history in agriculture.

We did not attempt to analyze the economics of all these scenarios which may improve income with relatively little costs. We did test an option of complete tree removal as a means of estimating the net benefits achievable at the upper range of yields. Some call this fencerow-to-fencerow farming.

In this test our assumptions are probably more liberal than conservative, but within the realm of possibilities. Assume that the tree lined, ten acre strips on the Carroll farm can be fully cropped and yields can be improved to equal the average of the remainder of the field the first year after clearing. Also assume that the farmer has an upfront cash expense of $4500 for clearing, fertility, and other work to prepare the field edges. How does this scenario compare with the baseline? How does this scenario compare with the CP-33 option? The answers are found in Table 3, presented as cumulative results over the life of the contract.

Both alternatives improve income relative to the baseline. Net cash income for the dozing option is greater than it is for the CP-33 option. However, considering debt reduction, taxes, and financing issues, cash available for withdrawal (returns to family living) over ten years is greater for the CP-33 option. The conclusion is that for this scenario there is a slight cash flow advantage to the conservation practice, but it is a close call given the assumptions and complexities that underlie the simulations.

Table 3. Comparison of three management options for the Carroll County representative farm. Cumulative results after ten years, $1,000.

Management Option	Baseline	CP33 Change	Dozing Change	CP33 vs. Dozing
Government payments	85.74	11.58	0.06	11.52
Market receipts	1,774.48	-19.89	20.21	-40.10
Total receipts	1,860.22	-8.31	20.27	-28.58
Cash operating expenses	999.18	-11.76	10.52	-22.28
Net cash farm income	861.05	3.47	9.77	-6.30
Returns to family living	367.83	12.47	5.97	6.50

Table 4. Financial implications of installing 10 acres of CP-33 on the Carroll County representative farm

Calendar year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Average	Cumul.
						Whole-farm						
Government payments, ($1,000)												
Baseline	11.9	7.8	7.9	7.9	8.1	8.1	8.2	8.4	8.6	8.7	8.57	85.74
CP33 scenario	15.4	8.7	8.8	8.8	9.0	9.0	9.1	9.3	9.5	9.6	9.73	97.32
Absolute change	3.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.16	11.58
Percentage change, %	29.6	11.5	11.2	11.4	11.2	11.1	10.8	10.6	10.4	10.2	13.5	
Market receipts, ($1,000)												
Baseline	163.6	171.6	176.8	178.4	179.2	180.1	180.2	181.5	182.3	180.8	177.45	1,774.48
CP33 scenario	162.4	169.9	174.0	177.0	177.1	177.1	178.7	179.8	179.2	179.4	175.46	1,754.59
Absolute change	-1.2	-1.7	-2.8	-1.4	-2.1	-3.0	-1.5	-1.7	-3.1	-1.4	-1.99	-19.89
Percentage change, %	-0.7	-1.0	-1.6	-0.8	-1.2	-1.7	-0.8	-1.0	-1.7	-0.8	-1.1	
Total receipts, ($1,000)												
Baseline	175.5	179.4	184.7	186.4	187.3	188.3	188.4	189.9	190.9	189.5	186.02	1,860.22
CP33 scenario	177.9	178.6	182.8	185.8	186.1	186.1	187.8	189.1	188.7	189.0	185.19	1,851.91
Absolute change	2.4	-0.8	-1.9	-0.5	-1.2	-2.1	-0.6	-0.8	-2.2	-0.5	-0.83	-8.31
Percentage change, %	1.4	-0.4	-1.0	-0.3	-0.6	-1.1	-0.3	-0.4	-1.2	-0.3	-0.4	
Cash operating costs ($1,000)												
Baseline	96.7	98.4	98.7	96.6	96.8	97.2	96.8	105.7	105.9	106.3	99.92	999.18
CP33 scenario	97.9	96.9	97.3	95.7	95.0	95.7	95.8	103.9	104.2	105.1	98.74	987.42
Absolute change	1.2	-1.5	-1.4	-0.9	-1.7	-1.5	-1.0	-1.9	-1.7	-1.2	-1.18	-11.76
Percentage change, %	1.2	-1.6	-1.4	-0.9	-1.8	-1.6	-1.0	-1.8	-1.6	-1.1	-1.2	
Net cash farm income ($1,000)												
Baseline	78.8	81.0	86.0	89.8	90.5	91.0	91.6	84.2	85.1	83.1	86.11	861.05
CP33 scenario	80.0	81.8	85.5	90.2	91.0	90.4	92.0	85.2	84.6	83.9	86.45	864.52
Absolute change	1.2	0.7	-0.5	0.4	0.5	-0.6	0.5	1.0	-0.5	0.7	0.35	3.47
Percentage change, %	1.5	0.9	-0.6	0.4	0.6	-0.7	0.5	1.2	-0.6	0.9	0.4	
Returns to family living ($1,000)												
Baseline	54.7	47.4	45.3	52.6	47.6	38.6	39.3	21.6	15.4	5.5	36.78	367.83
CP33 scenario	56.2	48.2	45.3	53.5	48.5	39.0	40.5	23.4	17.0	8.6	38.03	380.30
Absolute change	1.5	0.9	0.1	0.9	1.0	0.4	1.2	1.8	1.7	3.1	1.25	12.47
Percentage change, %	2.8	1.8	0.1	1.7	2.0	1.0	3.0	8.3	10.9	56.8	3.4	
Ending cash reserves ($1,000)												
Baseline	18.5	29.1	37.9	55.2	66.4	68.4	71.4	57.4	42.2	24.6	47.11	
CP33 scenario	20.1	31.5	40.1	58.0	70.0	71.9	75.5	62.5	47.3	30.6	50.75	
Absolute change	1.5	2.4	2.2	2.8	3.6	3.5	4.1	5.2	5.1	6.0	3.64	
Percentage change, %	8.2	8.2	5.8	5.1	5.3	5.1	5.8	9.0	12.2	24.3	7.7	
Probability of a cash deficit (%)												
Baseline	na	34.2	36.6	26.6	38.4	54.8	51.6	75.6	81.2	80.4	53.27	
CP33 scenario	na	31.0	36.6	24.0	36.0	54.4	50.6	75.6	80.8	79.4	52.04	
Absolute change	na	0.0	-2.6	-2.4	-0.4	-1.0	0.0	-0.4	-1.0	-1.2	-1.00	
						Per cropped acre (pre-enrollment crop + forage acres)						
Returns to family living, $ per acre												
Baseline	109.38	94.7	90.5	105.2	95.1	77.2	78.6	43.2	30.7	11.0	73.57	
CP33 scenario	112.44	96.5	90.6	107.0	97.0	78.0	81.0	46.8	34.0	17.3	76.06	
Absolute change	3.06	1.7	0.1	1.8	1.9	0.8	2.3	3.6	3.3	6.3	2.49	

Table 5. Financial implications of installing 20 acres of CP-33 on the Ralls County representative farm

Calendar year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Average	Cumul.
						Whole-farm						
Government payments, ($1,000)												
Baseline	34.5	23.3	23.7	23.6	24.1	24.3	24.7	25.4	25.9	26.3	25.59	255.90
CP33 scenario	41.3	24.8	25.3	25.2	25.6	25.8	26.3	26.9	27.5	27.9	27.65	276.51
Absolute change	6.8	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.06	20.61
Percentage change, %	19.7	6.6	6.5	6.5	6.4	6.3	6.1	6.1	5.9	5.8	8.1	
Market receipts, ($1,000)												
Baseline	479.3	505.0	521.8	521.7	520.5	525.0	525.6	526.4	531.6	529.0	518.58	5,185.75
CP33 scenario	476.7	501.8	516.5	519.1	517.1	519.5	522.9	523.0	525.9	526.3	514.87	5,148.74
Absolute change	-2.5	-3.2	-5.2	-2.7	-3.4	-5.5	-2.7	-3.4	-5.7	-2.7	-3.70	-37.01
Percentage change, %	-0.5	-0.6	-1.0	-0.5	-0.7	-1.0	-0.5	-0.6	-1.1	-0.5	-0.7	
Total receipts, ($1,000)												
Baseline	513.8	528.3	545.5	545.4	544.6	549.3	550.3	551.8	557.5	555.3	544.17	5,441.65
CP33 scenario	518.1	526.6	541.8	544.2	542.7	545.3	549.1	549.9	553.4	554.1	542.53	5,425.25
Absolute change	4.3	-1.7	-3.7	-1.1	-1.9	-3.9	-1.2	-1.9	-4.1	-1.2	-1.64	-16.40
Percentage change, %	0.8	-0.3	-0.7	-0.2	-0.3	-0.7	-0.2	-0.3	-0.7	-0.2	-0.3	
Cash operating costs ($1,000)												
Baseline	364.8	374.9	379.9	380.4	385.5	379.6	383.3	381.1	376.9	376.1	378.26	3,782.55
CP33 scenario	367.1	370.9	377.6	378.5	381.1	377.0	381.2	376.5	374.1	373.7	375.76	3,757.60
Absolute change	2.3	-4.1	-2.4	-1.9	-4.4	-2.6	-2.1	-4.7	-2.8	-2.4	-2.50	-24.95
Percentage change, %	0.6	-1.1	-0.6	-0.5	-1.1	-0.7	-0.5	-1.2	-0.7	-0.6	-0.7	
Net cash farm income ($1,000)												
Baseline	149.0	153.4	165.6	165.0	159.1	169.7	167.0	170.6	180.6	179.2	165.91	1,659.10
CP33 scenario	151.0	155.8	164.3	165.7	161.6	168.3	167.9	173.4	179.3	180.4	166.77	1,667.68
Absolute change	2.0	2.4	-1.3	0.7	2.6	-1.4	0.9	2.8	-1.3	1.3	0.86	8.58
Percentage change, %	1.3	1.6	-0.8	0.4	1.6	-0.8	0.5	1.6	-0.7	0.7	0.5	
Returns to family living ($1,000)												
Baseline	95.3	74.9	69.2	64.3	35.7	32.6	15.4	25.6	27.0	36.1	47.59	475.91
CP33 scenario	98.8	77.2	69.6	66.3	39.1	33.7	18.2	30.3	29.9	41.0	50.43	504.25
Absolute change	3.6	2.3	0.4	2.0	3.5	1.1	2.9	4.7	2.9	4.9	2.83	28.34
Percentage change, %	3.8	3.1	0.6	3.1	9.7	3.3	18.7	18.4	10.9	13.6	6.0	
Ending cash reserves ($1,000)												
Baseline	62.2	104.0	144.1	183.1	195.2	208.8	207.4	221.6	245.7	286.4	185.85	
CP33 scenario	65.9	110.0	149.5	189.6	204.3	217.5	217.5	234.3	258.3	300.6	194.73	
Absolute change	3.6	6.0	5.4	6.5	9.1	8.7	10.1	12.8	12.5	14.2	8.88	
Percentage change, %	5.8	5.7	3.7	3.6	4.7	4.2	4.8	5.8	5.1	4.9	4.8	
Probability of a cash deficit (%)												
Baseline	na	29.6	33.4	35.2	47.2	50.6	54.6	49.6	45.6	42.6	43.16	
CP33 scenario	na	28.6	33.2	34.6	45.0	50.4	54.2	48.6	45.2	40.8	42.29	
Absolute change	na	-0.2	-0.6	-2.2	-0.2	-0.4	-1.0	-0.4	-1.8	-0.9	-0.85	
						Per cropped acre (pre-enrollment crop + forage acres)						
Returns to family living, $ per acre												
Baseline	51.21	40.2	37.2	34.6	19.2	17.5	8.3	13.7	14.5	19.4	25.59	
CP33 scenario	53.14	41.5	37.4	35.6	21.0	18.1	9.8	16.3	16.1	22.0	27.11	
Absolute change	1.93	1.2	0.2	1.1	1.9	0.6	1.5	2.5	1.6	2.6	1.52	

Table 6. Financial implications of installing 20 acres of CP-33 on the Bates County representative farm

Calendar year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Average	Cumul.
						Whole-farm						
Government payments, ($1,000)												
Baseline	33.8	24.4	24.8	24.7	25.2	25.5	25.7	26.3	26.8	26.9	26.40	263.97
CP33 installed	40.4	25.8	26.1	26.1	26.6	26.8	27.1	27.6	28.2	28.3	28.30	282.96
Absolute change	6.7	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.90	18.99
Percentage change, %	19.7	5.6	5.5	5.5	5.5	5.4	5.3	5.3	5.1	5.0	7.2	
Market receipts, ($1,000)												
Baseline	525.6	524.6	534.5	534.6	534.3	536.7	541.7	547.0	549.7	553.0	538.17	5,381.74
CP33 scenario	523.6	521.7	527.5	531.8	531.0	529.4	539.3	542.7	542.6	550.1	533.98	5,339.83
Absolute change	-2.1	-2.9	-7.0	-2.8	-3.3	-7.2	-2.4	-4.3	-7.1	-2.9	-4.19	-41.91
Percentage change, %	-0.4	-0.6	-1.3	-0.5	-0.6	-1.3	-0.4	-0.8	-1.3	-0.5	-0.8	
Total receipts, ($1,000)												
Baseline	559.4	549.1	559.2	559.3	559.5	562.1	567.4	573.3	576.5	580.0	564.57	5,645.71
CP33 installed	564.0	547.5	553.7	557.9	557.6	556.3	566.4	570.3	570.7	578.4	562.28	5,622.79
Absolute change	4.6	-1.5	-5.6	-1.5	-1.9	-5.9	-1.0	-2.9	-5.8	-1.5	-2.29	-22.92
Percentage change, %	0.8	-0.3	-1.0	-0.3	-0.3	-1.0	-0.2	-0.5	-1.0	-0.3	-0.4	
Cash operating costs ($1,000)												
Baseline	366.1	374.4	376.3	375.5	375.2	374.7	384.6	390.3	394.6	397.8	380.95	3,809.45
CP33 installed	368.7	371.4	373.5	374.2	371.8	371.8	383.2	387.0	391.6	396.5	378.98	3,789.77
Absolute change	2.6	-3.0	-2.7	-1.3	-3.4	-2.9	-1.4	-3.3	-3.0	-1.3	-1.97	-19.68
Percentage change, %	0.7	-0.8	-0.7	-0.4	-0.9	-0.8	-0.4	-0.8	-0.8	-0.3	-0.5	
Net cash farm income ($1,000)												
Baseline	193.3	174.7	183.0	183.8	184.3	187.4	182.8	183.0	181.9	182.2	183.63	1,836.26
CP33 installed	195.3	176.1	180.1	183.7	185.8	184.4	183.2	183.3	179.1	181.9	183.30	1,833.03
Absolute change	2.0	1.4	-2.8	-0.1	1.5	-2.9	0.4	0.4	-2.8	-0.2	-0.32	-3.23
Percentage change, %	1.0	0.8	-1.5	-0.1	0.8	-1.6	0.2	0.2	-1.5	-0.1	-0.2	
Returns to family living ($1,000)												
Baseline	124.6	92.9	88.6	113.4	104.0	88.9	29.5	51.5	22.0	44.0	75.94	759.43
CP33 installed	128.0	94.5	86.9	113.8	105.7	87.6	30.4	52.2	20.2	44.1	76.35	763.52
Absolute change	3.4	1.6	-1.7	0.4	1.7	-1.4	0.9	0.7	-1.7	0.2	0.41	4.09
Percentage change, %	2.7	1.7	-1.9	0.4	1.7	-1.6	3.0	1.3	-7.9	0.4	0.5	
Ending cash reserves ($1,000)												
Baseline	91.6	151.7	207.5	288.4	360.4	417.9	416.5	436.5	426.8	439.0	323.64	
CP33 installed	95.0	156.8	210.9	292.3	366.0	422.3	421.9	442.8	431.6	444.2	328.38	
Absolute change	3.4	5.0	3.4	3.9	5.7	4.4	5.4	6.3	4.8	5.2	4.74	
Percentage change, %	3.7	3.3	1.6	1.3	1.6	1.1	1.3	1.4	1.1	1.2	1.5	
Probability of a cash deficit (%)												
Baseline	na	14.4	14.8	9.6	13.4	19.0	58.0	41.6	63.4	45.6	31.09	
CP33 installed	na	13.6	15.2	9.0	12.0	19.4	57.6	41.0	66.0	44.0	30.87	
Absolute change	na	0.4	-0.6	-1.4	0.4	-0.4	-0.6	2.6	-1.6	-0.2	-0.16	
						Per cropped acre (pre-enrollment crop + forage acres)						
Returns to family living, $ per acre												
Baseline	67.72	50.5	48.1	61.6	56.5	48.3	16.0	28.0	11.9	87.9	47.67	
CP33 installed	69.57	51.4	47.2	61.9	57.5	47.6	16.5	28.4	11.0	88.3	47.92	
Absolute change	1.85	0.9	-0.9	0.2	0.9	-0.8	0.5	0.4	-0.9	0.4	0.25	

Conclusions

This study used stochastic simulation procedures to estimate the financial outcome of CP-33 participation for three representative farms over a ten year period. Cropland acres for the farms in this study ranged from 500 to 1460. Enrolled acres ranged from 1.3 to 2.0 percent of the planted acres.

Based on the results of these simulations, it appears that many farm businesses in Missouri have an economic incentive to idle unproductive cropland acres through participation in the CP-33 program. Returns to family living improved over the life of the contract for each farm we tested. We did not estimate an economic value for any improvement in wildlife populations as result of buffer installation.

As this analysis indicates, the magnitude of the net benefit is farm specific due to a number of factors, including cropping patterns. Future commodity prices, pre- and post-installation yields, and operating costs, all in relation to the soil rental rate are important factors. Each farm situation has a unique set of values for these variables. In this study, the additional returns to family living, over ten years, ranged from $4,090 to $28,340.

With the long term bullish outlook for commodity prices, cost savings must account for a large share of net benefits for the practice to have a positive outcome. For the three representative farms we evaluated, CP-33 payments recovered 45 to 58 percent of foregone crop receipts. Although the payments are more certain than future crop revenue, there is only a slight decline in financial risk with relatively small enrollment acres.

It is possible that under certain circumstances the choice to enroll could reduce the net income stream. Key among the assumptions in this study is the estimated yield loss occurring on the field edge before practice installation. Results could be very different if the practice was installed where yields were not heavily discounted.

One other land management alternative was tested against the CP-33 option. CP-33 enrollment had a slight economic advantage to one that spends $450 per acre upfront in an effort to get field trend yields on ten acres of edge. This study did not examine the economics of management options at the end of the contract life.

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Notes

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