The Conservation Reserve Program

An Economic Assessment

C. Edwin Young
C. Tim Osborn*

Introduction

The Conservation Reserve Program (CRP) is the current centerpiece of USDA's natural resource conservation efforts. Among its multiple goals are to reduce soil erosion and protect the Nation's long-term capability to produce food and fiber. The program also creates other, unintended economic effects. Some research has been done in USDA and elsewhere to assess specific aspects of the program. This report sorts out the major economic consequences of the program so that policymakers and producers can gain a broader and longer range view of the program.[1]

The CRP will boost net farm income and improve environmental quality substantially over the life of the program (1986-99). Food prices and Government administrative expenses will rise and local economic activity tied to farming will slow. These conclusions are based on simulations conducted using the Food and Agricultural Policy Simulator (FAPSIM), an annual econometric simulation model. The FAPSIM simulations were augmented with a variety of natural resource databases, CRP enrollment data through the first six signups, and several natural resource models. The original FAPSIM simulation projected large commodity price increases after 1992. For comparison, we also performed an additional simulation under the constraint that prices do not rise after 1992 to obtain the range of figures given in this report.

*The authors are agricultural economists in the Commodity Economics Division and the Resources and Technology Division, respectively, Economic Research Service, U.S. Department of Agriculture (USDA).

[1]The analysis was conducted prior to the 1988 drought. Therefore, the estimated economic effects do not reflect the price and stocks changes that resulted from the drought.

Background on the CRP

The CRP is a voluntary cropland retirement program that was established in the Conservation Title (XII) of the Food Security Act of 1985 (FSA, PL 99-1980). In exchange for placing cropland fields with highly erodible soil into the CRP for 10 years, USDA pays participating farm owners or operators an annual per-acre rent and one-half of the cost of establishing conservation practices and a permanent land cover. The law states that the Secretary of Agriculture shall place 40-45 million acres of highly erodible land into the CRP by the end of the 1990 crop year, and that to the extent practicable at least one-eighth of the total be planted to trees.[2]

CRP Participation

Enrollment in the CRP was assumed to expand from the halfway point that had been attained in mid-1988 to the full 45 million acres by the end of 1990. Participation trends in mid-1988 and data on the location of highly erodible cropland formed the basis for our projections about the location and magnitude of the CRP's effects. Regional patterns of enrollment by 1990 are expected to diverge from the mid-1988 pattern, as enrollment in high participation areas reaches eligibility limits and enrollment shifts to the Corn Belt and other areas where participation has been low. After 1996, some land returns to crop production after completing 10 years in the reserve.

The FSA also established three complementary natural resource conservation programs: "swampbuster," "sodbuster," and conservation

[2]Additional background information is provided in the appendix.

compliance. These programs require farmers to protect soil and water resources as a precondition to participation in USDA price and income support programs. Acreage now in the CRP will be subject to conservation compliance rules if it returns to production after having been in the reserve for the 10-year term.

Potential Enrollment

Approximately 101 million acres of highly erodible cropland are eligible for CRP enrollment. However, because enrollment is generally limited to no more than 25 percent of the cropland in a county, approximately 70 million acres are actually available for CRP enrollment (table 1). The majority of this cropland is located in the Corn Belt, Northern Plains, Southern Plains, and Mountain regions (fig. 1). Erodible land is further concentrated within these regions.

Actual Enrollment

Total enrollment in the CRP for the first six signups (through February 1988) included over 239,000 contracts covering approximately 25.5 million acres of cropland. About 24 million acres were retired from production as of the 1988 crop year, while the remainder was scheduled for 1989 retirement (table 2). Erosion on these acres fell by an average of 21 tons per acre per year (USDA, ERS, 1988). The direct Federal cost for retiring an acre of CRP land averaged $48 a year for rent and $37 to establish cover crops (one-time payment). Almost 90 percent of the cropland enrolled in the first six signups was planted in grass cover (table 3). Tree planting (6 percent) and wildlife habitat (4 percent) were the other primary conservation covers. Over 16,000 acres of cropland were enrolled for placement in filter strips in the sixth signup.

Retired wheat base totaled 7.6 million acres while retired corn base totaled 2.9 million acres for the first six signups (table 4). The largest proportional cuts in commodity base acreage were for barley, sorghum, and oats. These cropland retirements reduce the acreage eligible for USDA annual commodity programs. Base acreage reductions remain in effect for the full 10 years of a CRP contract.

Average CRP rental rates increased from $42 per acre per year for the first signup of March 1986 to about $48 per acre per year for the fifth and sixth signups (table 2). Two factors explain this increase. First, the geographic distribution of acres enrolled in later signups shifted to areas where agricultural land was more productive. The cost of retiring land in such areas is greater since it has higher cash rental rates and a more valuable commodity base.[3] Second, many farmers have become aware of the maximum rental rates paid by USDA for their areas. With this knowledge, farmers tend to submit bids near the cap even if they might be willing to accept lower rental payments. State programs which supplement USDA rental payments and/or cover establishment cost shares are not included in the data on CRP rents.

Regional Enrollment Patterns

CRP enrollment for the first six signups was greatest in the Northern Plains region. Over 6 million acres were enrolled, representing 45 percent of the region's eligible land (table 5). Enrollment was also high in the Southern Plains and Mountain regions. The lowest enrollment was in the Northeast. Although about 78 percent of all U.S. counties contain some CRP enrollment, over 80 percent of all enrolled acreage is contained in only 18 percent of U.S. counties. Most of these counties are located in the Mountain, Northern Plains, and Southern Plains regions (fig. 2).

Most of the geographic pattern of CRP enrollment is explained by differences in the amount of eligible land in a given area. How CRP payments compare with prevailing market rents for cropland (bid/rent ratio) also helps determine regional enrollment trends (Dicks, 1987a). The highest level of participation for the first six signups (52 percent of available acreage) was in the Mountain region, where the ratio of CRP rental payments to average market rent was also highest (2.1). The Corn Belt had the lowest bid/rent ratio (0.8), and low participation (22 percent).

Enrollment Projections

Total enrollment reaching 45 million acres by the end of 1990 was projected assuming that enrollment criteria and other rules remain the same as they were before 1988 (table 6). Acreage projected for enrollment in the near future was allocated among regions based on actual regional enrollment shares through 1987.

But enrollment cannot reach 45 million acres unless regional shares change, because some counties will approach the 25-percent cap on land retirement. For

[3]This was especially true for the fourth signup where, due to a one-time bonus for corn base retirement, a proportionally higher amount of valuable Corn Belt acreage was enrolled, resulting in a higher average rental rate of $51 per acre.

Table 1—Regional distribution of highly erodible cropland eligible for the CRP

Region	Total cropland	Harvested cropland	CRP eligible[1]	CRP available[2]	Share of total		Share of harvested	
					Eligible	Available	Eligible	Available
	Million acres				*Percent*			
Northeast	17.3	12.9	4.2	3.0	24	17	33	23
Appalachian	22.7	17.3	6.8	4.7	30	21	39	27
Southeast	18.2	13.4	3.1	2.7	17	15	23	20
Delta States	21.9	17.9	2.5	2.1	11	10	14	12
Corn Belt	92.4	82.4	21.8	16.4	24	18	26	20
Lake States	43.9	17.9	6.2	5.7	14	13	35	32
Northern Plains	93.4	71.7	16.9	13.3	18	14	24	19
Southern Plains	44.9	29.7	16.9	8.7	38	19	57	29
Mountain	43.3	25.7	18.5	10.0	43	23	72	39
Pacific	22.7	15.8	4.4	3.1	19	14	28	20
United States	420.7	323.7	101.2	69.7	24	17	31	22

[1]Two-thirds of the field must meet one of the following conditions (see appendix for definition):
1) In land capability class VI-VIII.
2) In land capability class II-V and eroding at 3T (2T or above if planted to trees).
3) Erodibility index exceeds 8 and eroding above 1T.
[2]Assumes that no more than 25 percent of the eligible land in any county may be enrolled in the CRP.

Source: USDA, Soil Conservation Service, National Resources Inventory, 1982.

Table 2—CRP enrollment, signups 1-6

Item	Contracts	Acres	Average rental rate	Average erosion reduction
	1,000	*Million*	*$/acre/year*	*Tons/acre/year*
Signup period:				
#1--March 1986[1]	9.4	0.75	42.06	26
#2--May 1986[1]	21.5	2.77	44.05	27
#3--August 1986[2]	34.0	4.70	46.96	25
#4--February 1987[3]	88.0	9.48	51.19	19
#5--July 1987[3]	43.7	4.44	48.03	17
#6--February 1988[4]	42.7	3.38	47.90	18
Total[5]	239.3	25.53	48.40	21
Cumulative enrollment by crop year:				
1986	21.0	2.04	43.11	28
1987	145.9	15.71	49.15	23
1988 tentative[6]	228.6	24.24	48.52	21
1989 tentative[6]	239.3	25.53	48.40	21

[1]Eligible acres included cropland in land capability classes II through V eroding at least three times greater than the tolerance rate (see definitions in appendix), or any cropland in land capability classes VI through VIII.
[2]Eligible acres expanded to include cropland in land capability classes II through V eroding at least two times the tolerance rate and having gully erosion.
[3]Eligible acres expanded to include cropland eroding above the tolerance rate with an erodibility index of eight or greater.
[4]Eligible acres expanded to include cropland in land capability classes II through V eroding at least two times the tolerance rate if planted in trees. Eligibility also extended to cropland areas 66 to 99 feet wide adjacent to permanent water bodies for placement in filter strips.
[5]Totals may not add due to rounding.
[6]Actual number of contracts, acres enrolled, rental rates, and erosion reduction are not final pending future signups.

Source: USDA, ERS, 1988.

Figure 1—Cropland eligible for the Conservation Reserve Program by farm production region

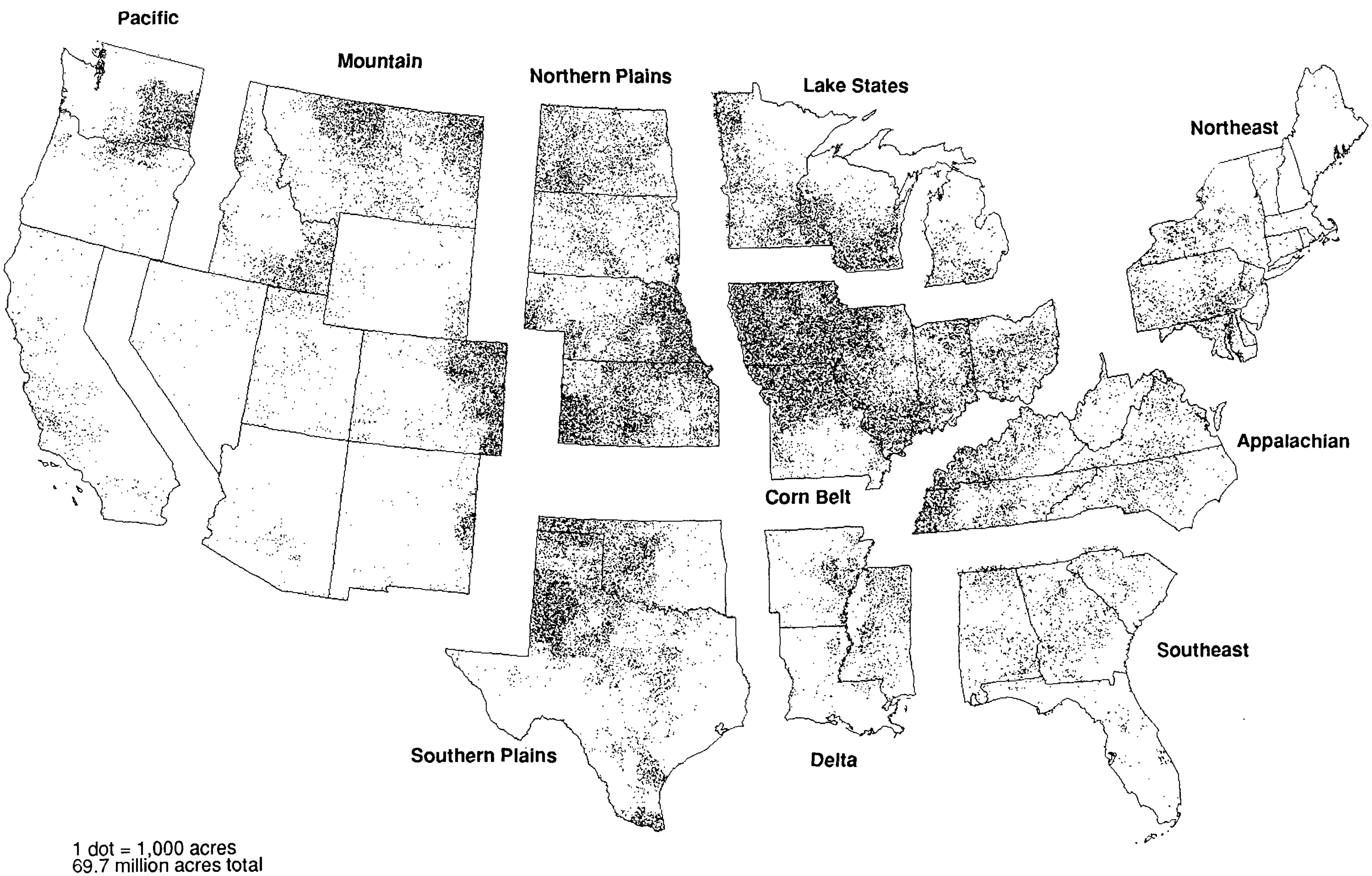


Table 3—Conservation practices used on CRP acreage, signups 1-6

Practice	FY 1986	FY 1987	FY 1988	FY 1989	Total[1]	
	1,000 acres					*Percent*
Grass cover	1,699	12,416	7,672	1,077	22,864	89.6
Trees	213	759	474	135	1,581	6.2
Wildlife habitat	126	488	373	61	1,048	4.1
Field windbreaks	1	3	1	0	5	0
Diversions	10	26	33	0	69	.3
Erosion, sediment, and water control structures	9	22	8	0	39	.2
Grass and sod waterway	2	5	2	0	9	0
Shallow water areas	0	1	1	0	2	0
Filter strips[2]	0	0	13	3	16	.1
Total[3]	2,043	13,670	8,536	1,276	25,525	100.0

[1]Totals may not add due to rounding.
[2]Filter strips were approved as a CRP conservation practice beginning with the sixth signup held during February 1988.
[3]More than one conservation practice may be applied to a given acre, so total acres may be less than the sum of acreage in all conservation practices.

Table 4—Commodity base acreage enrolled in the CRP, signups 1-6[1]

Crop	Base acreage in 1985	Enrolled in CRP	
	Million acres		*Percent*
Barley	12.4	2.0	15.8
Sorghum	18.9	1.9	10.2
Oats	9.2	.9	9.8
Wheat	91.7	7.6	8.3
Cotton	15.4	1.1	6.9
Corn	82.2	2.9	3.5
Rice	4.1	--	--
Peanuts	1.5[2]	--	--
Tobacco	.7[2]	--	--
Total	236.1	16.3	6.9

--=Negligible.
[1]Totals may not add due to rounding.
[2]Acres harvested.

1990, the projections assume that more acreage in the Corn Belt and other regions with low participation rates will be enrolled.[4] Between 1991 and 1995, we assume that enrollment will remain constant.

[4]In projecting 1990 enrollment, trend estimates through the sixth signup were dampened by including a proportionate weighting factor for the distribution of available acres. Expected rental rates increased to reflect higher rents required to attract this land.

Starting in 1996, some enrolled acreage becomes available for return to crop production. Most of this land will be subject to the conservation compliance program. If farmers return the land to crop production, they must use soil conservation practices or forgo participation in USDA commodity programs. In this analysis, we could not predict which CRP land would meet USDA requirements for soil conservation and qualify for reentry into production, or whether it would be profitable for farmers to take the land out of retirement under the conservation practices required. Therefore, we assumed that CRP land planted to trees would stay in retirement after contract expiration while land planted to grass would return to crop production. This relatively conservative assumption has little effect on the estimates made in the report.

Gross Economic Effects of the CRP

Taking 45 million acres out of crop production will have an economic impact on localized rural economies and on the entire U.S. agricultural sector. The size of changes in market prices, USDA expenditures, and natural resource use will depend on how much agricultural production falls.

The major economic effects of the CRP include less total crop production, higher commodity prices, decreased environmental and soil productivity damages caused by soil erosion, reduced Government costs for commodity programs, and diminished economic activity in rural areas where enrollment is heavy.

Baseline Assumptions

Because interest should be focused on changes resulting exclusively from implementation of the program, the CRP's effects were uniformly compared with a baseline situation characterized by the absence of the CRP. Clearly, estimates of the economic effects of the CRP depend critically upon the assumptions of the baseline. Since agricultural programs and policies that would have occurred without the CRP are unknown, there is no single correct baseline scenario.

We used the following baseline: if the CRP had not been implemented, other agricultural programs

Table 5—Regional patterns of CRP enrollment, signups 1-6

Region	Enrollment	Share of CRP-eligible acres	Average rental rate	Ratio of CRP rent to average cash rent[1]	Average cover crop cost-share	Average erosion reduction
	1,000 acres	*Percent*	*$/acre/year*	*Ratio*	*$/acre*	*Tons/acre/year*
Northeast	134	4	57	1.5	60	48
Appalachian	863	18	54	1.3	42	28
Southeast	1,246	46	42	1.4	35	15
Delta States	778	37	43	1.1	31	22
Corn Belt	3,558	22	70	.8	39	19
Lake States	2,073	36	58	1.1	31	17
Northern Plains	6,040	45	47	1.5	34	17
Southern Plains	4,101	47	40	1.7	20	34
Mountain	5,219	52	40	2.1	37	20
Pacific	1,514	49	49	1.2	37	13
Total[1]	25,526	37	48	1.1	37	21

[1]Average county rents from ERS land value survey.
[2]Totals may not add due to rounding.

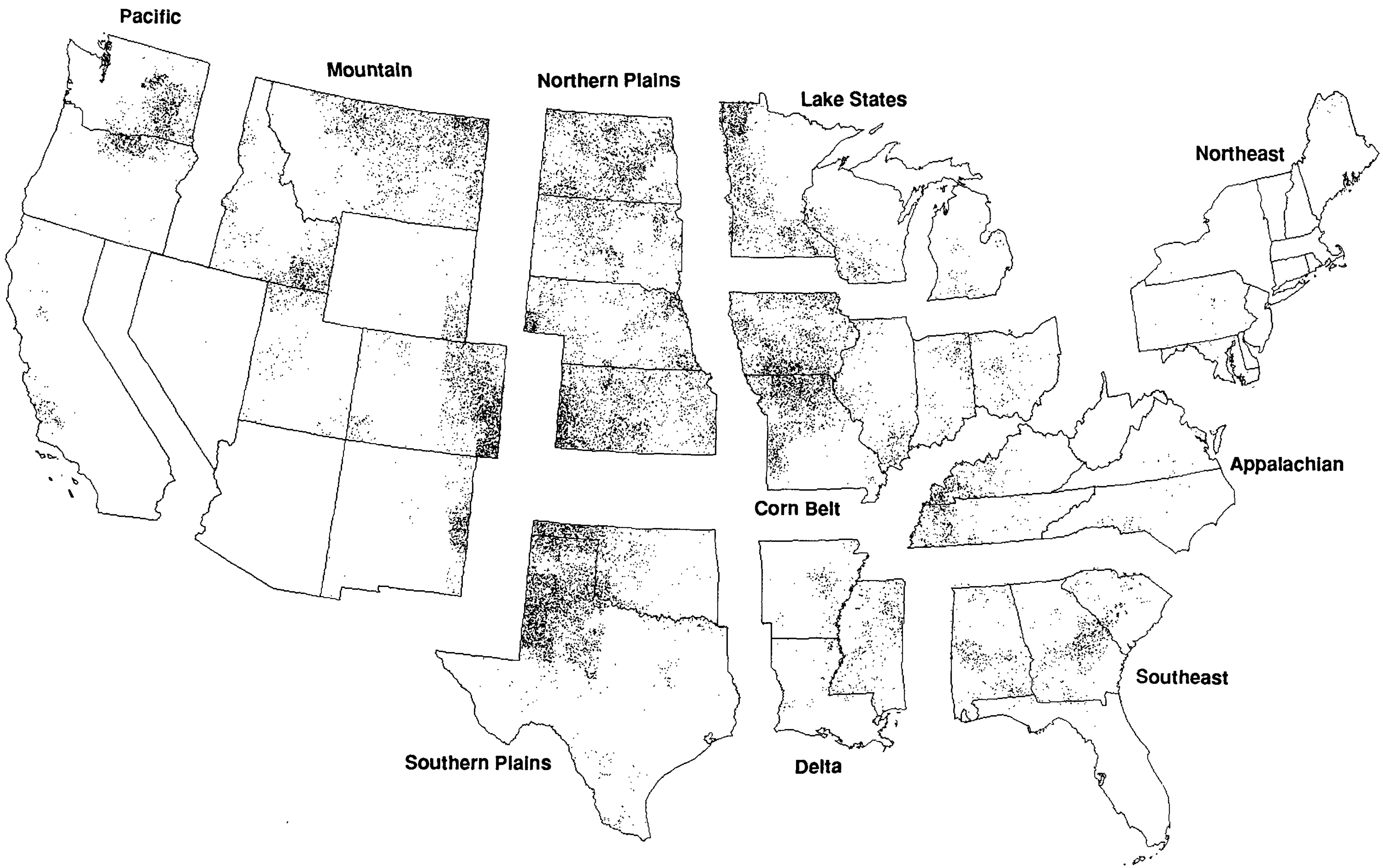
Table 6—Projections of cumulative CRP enrollment

Region	1988[1] Enrollment	1988[1] Rental costs	1988[1] Cover crop cost-share	1989[2] Enrollment	1989[2] Rental costs	1989[2] Cover crop cost-share	1990[3] Enrollment	1990[3] Rental costs	1990[3] Cover crop cost-share
	1,000 acres	*---$/acre---*		*1,000 acres*	*---$/acre---*		*1,000 acres*	*---$/acre---*	
Northeast	128	57	71	429	64	72	730	64	72
Appalachian	891	54	48	1,430	60	48	1,969	60	48
Southeast	1,161	42	35	1,533	49	35	1,905	48	35
Delta States	797	43	32	1,114	50	32	1,432	50	32
Corn Belt	3,838	69	38	5,742	79	38	7,648	79	38
Lake States	2,329	58	33	3,058	67	33	3,788	66	33
Northern Plains	6,135	47	38	7,882	54	38	9,630	53	38
Southern Plains	4,289	40	45	5,534	45	45	6,779	45	45
Mountain	5,709	40	31	7,089	45	31	8,469	45	31
Pacific	1,724	49	39	2,187	56	39	2,649	56	39
Total[4]	27,001	48	37	35,998	56	39	44,999	56	39

[1]Assumes enrollment through first six signups (table 3) plus 1.5 million acres distributed according to the distribution of the original 25.5 million acres enrolled.
[2]A linear interpolation between 1988 and 1990 enrollment projections.
[3]Assumes that the final 18 million acres to enter the program will be distributed according to the distribution of remaining CRP-eligible cropland.
[4]Totals may not add due to rounding.

Source: Dicks, unpublished (1987).

Figure 2—Conservation Reserve Program enrollment by farm production region, through July 1988



1 dot = 1,000 acres
28.13 million acres enrollment through seventh signup, July 1988

would have been the same as under current law. Acreage reduction programs and paid land diversions are the main agricultural programs that are relevant to this assumption, because they create effects similar to the CRP's effects. We assumed that farm programs would have been the same since there is no consensus on the level of supply control that would have occurred in the absence of the CRP, or on the mix of other programs (loan rates, target prices, and annual land diversion payment rates) that would have been required to achieve a similar level of supply control.

An equally valid but different baseline assumption is that supply control programs would have been expanded in the absence of the CRP. However, identification and estimation of the economic effects of this expanded supply control scenario would be difficult and would require many arbitrary assumptions. Had we assumed that other supply control programs would grow if the CRP had not been put into effect, estimates of some economic effects would have been quite different from those presented in this report.

Agricultural Gains

Farm prices, producer income, and land values will rise under the CRP. Higher commodity prices generated by the CRP boost farm income by an estimated $9.2-$20.3 billion in present value between 1986 and 1999. Landowners gain as CRP rental payments are transferred to them from the Government. Planting trees as the cover crop on CRP acreage adds to the future income of the farm sector. The value of eligible cropland will be supported by the future value of CRP payments.

Crop Production and Prices

Prices for all the crops covered in the analysis rise slowly at first, with barley, cotton, and wheat prices rising the most in the early phase of the program. Prices climb rapidly after 1990 according to the original simulation, so we compared the original results with a second analysis that holds commodity prices stable after 1992. This second analysis assumes that USDA policymakers would institute policies to moderate price increases.

The extent of production and price adjustments caused by the CRP depends on: 1) the productivity of the land retired; 2) interactions with other Government programs; and 3) the responsiveness of production and consumption to prices.

A farmer electing to retire land via the CRP will tend to enroll the least productive acreage. The percentage reduction in the total production of commodities thus will be less than the percentage reduction in acres.

Some of the land enrolled in the CRP would have been idled anyway under acreage reduction programs or voluntary paid diversion programs. Thus, part of the production decline is not due solely to the CRP, but would have occurred without the CRP.

As total production falls due to the CRP, prices of agricultural commodities rise, causing farmers to plant additional acreage. This partially offsets the drop in production due to the CRP and moderates the increases in commodity prices. Stocks also moderate the price increases. We assumed that for every acre retired by the CRP approximately 0.2 acres would enter production from other sources, such as land formerly under another acreage reduction program, pastureland, or fallow. This land was assumed to have average productivity and erodibility.

Cropland retirement reduces soil erosion, thus creating a benefit for future crop production. Studies have shown that a portion of the increase in soil productivity accrues to the landowner (Ervin and Mill; Miranowski and Hammes). The aggregate value of soil productivity benefits is discussed later in the report.

The effects of the CRP on crop production and prices were simulated using the Food and Agricultural Policy Simulator (FAPSIM) (Salathe and others). FAPSIM, an annual econometric simulation model, contains livestock and crop submodels that balance commodity prices and quantities under various policy assumptions. It calculates how changes in farm programs affect farm income, consumer price indexes, and Government expenditures. The projections of CRP enrollment in table 6 were incorporated into the model to simulate the effects of the CRP on production, prices, and farm income. The acreage reduction program set-aside requirements for wheat were assumed as follows: 22.5 percent for 1986, 27.5 percent for 1987-89, and 20 percent thereafter. For corn, set-aside requirements were held constant at 20 percent. A 15-percent paid land diversion was also assumed for corn.

Corn prices increase by slightly more than 2 percent in the projection for 1990 while small grain prices increase by 12 percent (table 7). By 1994 corn prices were projected to increase by over 18 percent. Prices for the program commodities continue to increase through 1994 because planted acreage falls and total supply declines.

By 1990, when 45 million acres of cropland were assumed to have entered the CRP, the net reduction in cropland is 37 million acres. Estimated changes in planted acreage for the major crops are summarized in table 7. By 1990 the cuts in planted acreage ranged from about 8 percent for oats to 25 percent for barley.

The estimated changes in commodity prices depend on the underlying assumptions concerning demand and supply elasticities, the rate of decrease in surplus stocks, and the response of USDA program managers. Prices would increase faster if demand were more inelastic, if stocks were drawn down at a faster rate, or if greater supply reduction resulted from retiring an acre of CRP cropland (less slippage or higher assumed crop yields). Price differentials between the with- and without-CRP scenarios would be lower if foreign competitors reacted to the higher price by expanding production, if farmer participation in other USDA price and income support programs changed to take advantage of the price effects, or if USDA program managers altered supply control programs to moderate the price shifts. These factors could operate in such a manner as to completely negate the price changes.

Table 7—Commodity market changes under the CRP

Item	1988	1990	1992	1994
		Percent change		
Wheat:				
Acres	-8.3	-13.3	-12.7	-10.8
Production	-7.0	-13.5	-12.6	-10.6
Stocks	-3.0	-14.8	-29.7	-26.8
Prices	5.8	11.8	15.7	22.6
Corn:				
Acres	-4.7	-8.6	-7.2	-5.7
Production	-4.0	-7.7	-6.4	-4.9
Stocks	-5.7	-23.4	-35.0	-36.3
Prices	.1	2.3	11.8	18.4
Sorghum:				
Acres	-12.3	-21.6	-19.5	-18.4
Production	-9.3	-19.0	-16.3	-14.2
Stocks	-10.3	-82.2	-176.4	-188.6
Prices	2.2	7.1	18.7	24.3
Barley:				
Acres	-13.2	-24.7	-22.3	-23.8
Production	-11.1	-22.4	-19.8	-20.6
Stocks	-13.3	-72.5	-140.3	-226.3
Prices	7.6	12.0	20.7	32.9
Oats:				
Acres	-4.7	-8.1	-8.2	-8.2
Production	-7.8	-12.3	-11.2	-10.5
Stocks	-15.2	-41.5	-45.7	-45.1
Prices	4.4	12.0	19.8	23.3
Cotton:				
Acres	-9.3	-14.4	-14.2	-17.2
Production	-4.9	-8.6	-7.9	-12.1
Stocks	-9.2	-18.6	-22.1	-30.3
Prices	6.0	11.0	15.0	17.6
Rice:				
Acres	.1	-.6	-.9	-1.1
Production	.1	-.6	-.9	-1.0
Stocks	.1	-1.0	-1.5	-1.9
Prices	-.2	4.3	6.5	9.1
Soybeans:				
Acres	-5.6	-8.4	-8.2	-8.2
Production	-4.8	-7.2	-6.8	-6.6
Stocks	-.9	-1.2	-1.9	-2.5
Prices	4.5	7.2	10.8	13.0

A more realistic alternative assumption is that the overall price effects shown by FAPSIM are overestimated. A simple way to accommodate this assumption is to assume that no additional price increases attributable to the CRP occur after 1992. The price differentials remain constant from 1992 through 1995 and then begin to decline as CRP cropland returns to production. This somewhat arbitrary assumption yields an intermediate time path of price adjustments. The lower end of the range of price and income changes is based on this assumption.

Farm Income

Based on the assumptions made for this report, farm income is estimated to increase substantially under the CRP. Most of the benefits will come later, as commodity prices climb after 1992. Because our estimates of farm income are sensitive to assumptions made about prices, we examined two scenarios—one assuming that prices rise as estimated using the FAPSIM model, and another holding prices constant after 1992.

The present value of net farm income at a 4 percent rate of discount, excluding direct CRP rental payments and establishment costs paid to farmers, was estimated to increase by $20.3 billion over the life of the CRP (fig. 3). Approximately 85 percent of the increase in net farm income occurs after 1992 when commodity prices rise rapidly according to the first set of assumptions in the FAPSIM model. As some of the land initially enrolled in the CRP comes back into production after 1995, net income begins to decline because supply increases and prices fall.

Under the second assumption, which uses the results from FAPSIM but holds market prices constant after 1992, the present value of net farm income increases by only $9.2 billion.

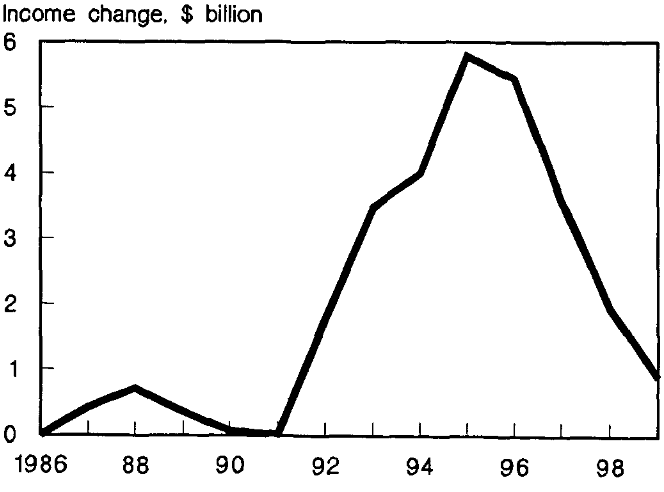
Reduced agricultural production caused by the CRP will boost total agricultural revenue, assuming that the demand for agricultural commodities is inelastic. Higher crop prices raise total revenue from the sale of farm products. Aggregate production costs will likely fall since less total land is used for agricultural production. Thus, the CRP should lead to an increase in total net farm returns. In addition to these market changes, CRP rental payments add to the income of farmers.[5] When land enrolled in the CRP is planted to trees, the discounted future value of the trees increases the net wealth of the landowner. The increase in income will be partially offset by the farmer's share of the costs of establishing vegetative cover and the loss of Government payments associated with the retirement of crop base.

If market prices exceed loan rates, farmers will lose income from deficiency payments. This decline does not completely offset the price increase since deficiency payments are paid only on base production and the revenue gain from higher market prices affects all acreage.

Farmers must pay for at least 50 percent of costs to establish ground cover and must maintain the cover for the duration of the CRP contract. Average production costs increase as fixed costs for items such as machinery and land must be spread over a smaller cropland base. Average production costs may also rise if farmers use more fertilizers and pesticides on their non-CRP cropland to boost yields in response to higher crop prices.

[5]CRP rental payments are not included in the estimated $9.2-$20.3 billion increase in net farm income. Rental payments are transfers from the Government to farmers and do not add to national income.

Figure 3
Farm income rises under the CRP



Timber Production. An acre of trees yields nearly $2,000 per acre (discounted at 4 percent) over 45 years. Total income to landowners who plant trees on their CRP acreage grows by $4.1-$5.4 billion, based on an estimate of up to 3.5 million acres of trees in the reserve. Cropland planted to trees under the CRP provides a future source of income to landowners when the trees are harvested. Over 1.5 million acres were planted to trees during the first six signups. Most of this land is in the Southeast and Delta regions. If this trend were to continue, approximately 2.7 million acres would be converted to trees with a 45-million-acre CRP. Changes in the program designed to encourage tree planting could result in over 3.5 million acres planted to trees.

Trees planted under the CRP must be retained until they grow to a marketable size to contribute to future net income. Managed stands of Southern pine typically are thinned for pulpwood after 15-17 years of growth. Commercial thinnings are then repeated at 10-year intervals until final harvest at age 40-45 years. Outside the South, production periods may be almost twice as long because of shorter growing seasons and differences in tree species.

Based on evidence from tree planting under other programs, it is likely that about 85 percent of trees will be retained beyond the 10-year CRP contract period. Alig and others found that 86 percent of the acres planted to trees in the South under the Soil Bank Program were still in trees after 15-20 years, while Kurtz and others found an 85 percent retention rate for 10-year-old Agricultural Conservation Program tree plantings. Genetically improved tree seedlings, advances in reforestation science, and a favorable market outlook for forest products are other factors that suggest that most trees planted under the CRP will be retained to harvest.

An average CRP acre planted to trees could produce 7,400 cubic feet of commercial wood over 45 years.[6] Thus, 2.7-3.5 million acres of CRP trees would produce 20.0-25.9 billion cubic feet of wood over the same time span.

The present value of an acre of trees would be over $2,040 at a 4 percent rate of discount. The present value of maintenance and harvesting costs would be approximately $210 per acre. The farmer's share of costs to establish trees averaged about $37 per acre based on information from the first six CRP signups. Under the assumption that 85 percent of the tree acres were retained until final harvest, the present

[6]These estimates were provided by Robert Moulton, Forest Service, USDA.

value of 2.3-3.0 million acres of CRP trees ranges from $4.1 to $5.4 billion.

This estimate should be interpreted as a maximum value. Variations can be expected because trees grow faster than average on some sites and slower than average on other sites. Landowners respond to changes in timber prices, harvesting more when prices are high and less when prices are low (Binkley; Boyd). Some land planted in trees may not be harvested so that the landowner might enjoy the aesthetic value associated with standing timber, but no attempt was made to estimate this value.

Land Values

Landowners gain around $60-$100 per acre in the value of their land if it is eligible for the CRP. This effect depends on regional markets. Currently available evidence indicates that the CRP's effects on land values are concentrated in the Mountain States and Northern Plains where farmland markets are depressed.

Farm programs that are tied to production affect land values (Herdt and Cochrane; Floyd). Farm programs such as the CRP increase net farm income by raising prices through direct payments or production controls. The increases in income tend to become capitalized into the value of cropland. As the CRP boosts land values, landowners gain wealth from the program. In a perfectly competitive land market, increases in the value of land caused by the CRP would be identical to the present value of CRP increases in farm returns.[7] How much land values rise due to the CRP depends on the size and duration of the changes in farm income and returns to land.

The CRP raises agricultural land values in several ways:

- The CRP provides an alternative market for eligible cropland. The minimum value of a CRP-eligible acre equals the present value of the 10 annual CRP rental payments less maintenance costs and the farmer's share of costs to establish cover crops.
- Enrollment reduces the effective supply of cropland in localized areas and pushes up cash rental rates and land values.
- The future value of any timber production on CRP land increases its value.
- Farmers may be able to lease CRP land to hunters in areas where hunting demand is high and leasing of land for hunting is a common practice.[8]
- Expected net returns rise because the CRP increases commodity prices. The value of cropland rises to reflect the increase in expected net returns. Net returns increase as commodity prices rise, reflecting lower acreage reduction requirements and reduced commodity program participation. If landowners correctly anticipate the increased net returns from market level changes in prices, they will demand higher CRP rental payments as a condition for program participation. However, the general value of all cropland will increase when commodity market prices rise.
- Future productivity of the land is preserved because the CRP cuts soil erosion. Studies have shown that a portion of the increase in soil productivity accrues to the landowner (Ervin and Mill; Miranowski and Hammes).

Research designed to quantify the CRP's impact on land values shows a range of $60-$100 per acre. Shoemaker estimated that the program added up to $60-$70 per acre to CRP-eligible cropland values in the United States (table 8). The greatest estimated increases in land values occurred in the Northeast and Southeast regions. Shoemaker used data from the first five CRP signups, and assumed that rental bids by farmers for the first signup were based on marginal returns to the land. However, bids from signups two through five were not assumed to be based on marginal returns since farmers were aware of the maximum acceptable rental rate in their region and tended to bid near the maximum. Shoemaker's results represent maximum (not actual) estimated effects, since average bid caps rose in response to several factors.

Land values may rise as much as $100 per acre, depending on regional markets. An alternative way

[7]Since this report estimates the increase in net farm income separately, it would be inappropriate to include the increase in land values due to increased profitability of agricultural production when evaluating the overall performance of the CRP. To do so would represent double-counting the effects of the CRP on farm income.

[8]Hunting lease value increases were not estimated for this report. Later in this section, the total value of increased hunting activity resulting from the CRP is estimated.

to view the effect of CRP rental rates on land values is that the CRP establishes a floor on the value of land eligible for the reserve. Where the discounted value of the 10-year CRP contract less cover establishment and maintenance costs is greater than the average value of the cropland, a new minimum price is established for CRP-eligible cropland (fig. 4). The minimum value of eligible land exceeds average cropland values in the Mountain and Northern Plains regions. The average land value in the Mountain region is about $220 per acre, while the present value of the 10-year CRP contract for similar cropland is $320 per acre. Thus, producers in a competitive land market must bid closer to $320 per acre for CRP-eligible land. Even though the land is poor quality for agricultural production, its value could increase by approximately $100 per acre due to the floor set by the CRP.

Table 8—Gains in the value of land eligible for the CRP (present value), signups 1-5

Region	Discount rate (percent) 4	6	8
		$/acre	
Northeast	99	90	83
Appalachian	58	53	48
Southeast	132	120	110
Delta States	74	68	62
Corn Belt	74	68	62
Lake States	58	53	48
Northern Plains	58	53	48
Southern Plains	49	45	41
Mountain	74	68	62
Pacific	33	30	28
United States	71	65	59

Source: Shoemaker, 1989.

Export Losses

The FAPSIM model projects that U.S. exports of agricultural commodities decline under the CRP. Crop production falls, which lowers stocks and increases commodity prices. Higher commodity prices curb the quantity of agricultural products exported. The largest percentage export reductions were projected for wheat and corn after 1991 (table 9). Soybeans, sorghum, and cotton exports fall by about 4-8 percent. If U.S. export cutbacks are substantial in markets where it is a major supplier (such as in the corn, wheat, soybean, cotton, and rice markets), world prices may rise, causing other countries to expand production.

The effects of the CRP on U.S. trade competitiveness vary over time. The CRP has little effect on competitiveness in the short run, because economically marginal cropland was retired initially. How-

Figure 4
CRP maintains a floor on value of eligible land, 1987

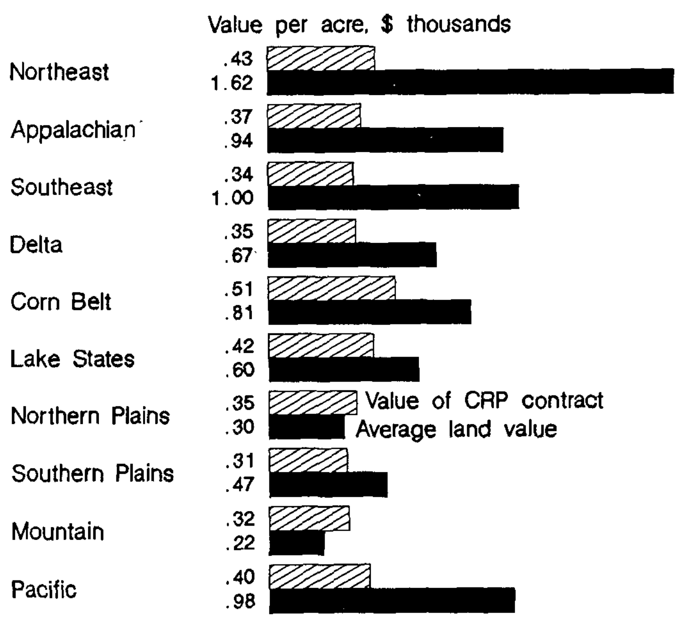


Table 9—Decline in U.S. exports under the CRP[1]

Crop	1988	1989	1990	1991	1992	1993	1994	1995
				Percent reductions				
Wheat	5.2	7.8	9.6	8.7	12.7	18.1	17.4	16.6
Corn	.1	.2	1.4	4.1	6.6	10.5	10.1	10.7
Soybeans	2.1	2.8	3.1	3.7	4.4	5.1	5.2	6.9
Cotton	1.9	3.1	1.6	5.1	1.4	4.6	.1	5.7
Sorghum	4.1	3.5	7.8	5.6	8.8	.8	2.8	3.5

[1]Assumes annual imports for each crop are constant.
Source: FAPSIM simulation, August 19, 1987.

ever, as the program retires more productive land, export competitiveness declines. In the long run, the comparative advantage of resource quality among countries becomes an important determinant of agricultural trade flows. If the CRP helps maintain the productivity of the U.S. resource base while other countries do not enact conservation policies, U.S. comparative advantage in agriculture and longrun competitiveness may be strengthened.

Consumer Food Costs

The simulation projected that consumer food costs will increase by less than 1 percent in any year as a result of the CRP, peaking around 1995. The present value of the increase in consumer cost was estimated to be $25.2 billion over the program's life. A 1-cent increase in crop prices does not result in a 1-cent increase in consumer food cost since farm prices account for less than 30 percent of the average retail price of food. If we assume that price increases stop at 1992, the rise in consumer food costs would be less ($12.7 billion present value).

The rise in consumer cost hurts lower income households more since they generally spend a larger portion of their disposable income on food. Measures such as the food stamp program offset a portion of this burden, but the price rises would likely require some additional spending on food assistance programs.

Natural Resource Benefits

Soil, water, and wildlife resources will improve under the CRP. The improvements will be felt mostly in off-farm areas that are currently affected by agricultural soil erosion. The value of improvements in natural resources is estimated at $6.0-$13.6 billion (present value). Soil productivity benefits account for only $0.8-$2.4 billion, even though protecting soil productivity for the future is a primary factor in determining whether a field is eligible for enrollment in the reserve. Estimates of benefits to natural resources depend on how much cropland is retired in a particular region and on how much soil erosion is reduced. Delivery of eroded soils to waterbodies is an important source of water pollution.

Erosion Control Benefits

Soil loss from water and wind erosion will be reduced under the CRP. Soil erosion, caused by the actions of water and wind, is the primary problem on U.S. cropland targeted by the CRP. Sheet and rill erosion (water erosion) is the primary problem in the Eastern States. Wind erosion generally affects the arid Western States. Preserving soil yields long-range benefits to soil productivity.

Sheet and Rill Erosion

A 45-million-acre CRP will cut roughly 25 percent of total soil erosion estimated to occur annually on U.S. cropland. Ribaudo and others (1990) estimate that the 45-million-acre CRP will reduce erosion by approximately 17 tons per acre per year on average, for a total annual erosion reduction of about 750 million tons by the final signup (table 10). Erosion control benefits diminish over the life of the program, since cropland with the most serious erosion problems was enrolled first. The average annual erosion reduction for acreage enrolled in the first six signups is about 21 tons per acre (table 2). Land retired in the first two signups averaged 26-27 tons of annual erosion reduction per acre. This fell to an annual average reduction of 17-18 tons per acre in the fifth and sixth signups.

Rising commodity prices caused by the CRP will induce farmers to bring other land into production, so some additional erosion will occur. However, legislation denies commodity program benefits to farmers who bring erodible land into production without conservation measures ("sodbuster"), so new erosion will be minor. The total increase in erosion on new lands brought into production will average 30 million tons per year by 1990, not nearly enough to outweigh the erosion control gains of the CRP. This represents only 4 percent of the total reduction in erosion on CRP-enrolled lands in the United States. The increase in erosion due to the new cultivated land varies from 9 percent of the

Table 10—Erosion reduced on cropland enrolled in CRP

Region	1988	1990
	Million tons/year	
Northeast	1.5	8.4
Appalachian	22.7	46.6
Southeast	16.4	25.4
Delta States	15.7	25.8
Corn Belt	64.8	115.9
Lake States	34.7	48.3
Northern Plains	93.8	128.7
Southern Plains	126.1	179.5
Mountain	105.6	140.3
Pacific	20.0	28.1
Total	501.3	747.0

Source: Ribaudo and others, 1990.

erosion reduction on CRP-enrolled lands in the Lake States to less than 2 percent in the Southern Plains and Appalachian region (Ribaudo and others, 1990).

Wind Erosion

The 45-million-acre CRP could yield about $0.5 billion in savings from reduced wind erosion in arid regions. Using a preliminary method developed by Piper, the present value of wind erosion benefits for a 45-million-acre CRP was estimated at $0.4-$1.1 billion, with a most likely estimate of $0.5 billion (table 11). These benefits are concentrated primarily in the Southern Great Plains. About 50 percent of the benefits occur in Texas alone, while 90 percent occur in Texas, Colorado, Kansas, New Mexico, and Oklahoma combined. Reductions in wind erosion

Table 11—Environmental benefits of the CRP, net present value, 1986-99

Region	Soil productivity	Water quality	Wind erosion	Wildlife
		$million		
Best estimate:				
Northeast	36	127	na	368
Appalachian	107	407	na	326
Southeast	43	280	na	376
Delta States	46	376	na	243
Corn Belt	473	584	na	846
Lake States	239	406	na	1,470
Northern Plains	216	306	148	100
Southern Plains	271	338	155	67
Mountain	150	458	217	18
Pacific	45	275	28	34
Total	1,626	3,557[2]	548	3,848
Low estimate:				
Northeast	18	76	na	282
Appalachian	54	160	na	250
Southeast	22	167	na	288
Delta States	23	231	na	187
Corn Belt	237	273	na	649
Lake States	120	232	na	1,127
Northern Plains	108	162	109	77
Southern Plains	136	181	99	52
Mountain	75	248	153	14
Pacific	23	152	25	26
Total	813	1,883[3]	386	2,952
High estimate:				
Northeast	54	179	na	454
Appalachian	161	657	na	402
Southeast	64	400	na	463
Delta States	69	531	na	300
Corn Belt	709	895	na	1,043
Lake States	359	576	na	1,812
Northern Plains	324	459	312	123
Southern Plains	407	500	282	83
Mountain	224	671	440	23
Pacific	68	406	72	42
Total	2,439	5,274[4]	1,106	4,745

na=Not applicable.
[1]Totals may not add due to rounding.
[2]Excludes filter strip benefits of $170 million.
[3]Excludes filter strip benefits of $0.
[4]Excludes filter strip benefits of $250 million.

due to the CRP are high in other regions of the Western United States, but the economic benefits are low because population in these areas is relatively small.

Estimating the economic damages attributable to wind erosion is difficult and uncertain due to the limited amount of information on this topic. Estimates of erosion reductions from wind erosion control practices are less precise than similar estimates for sheet and rill erosion (USDA, Soil Conservation Service, 1987). And only a few studies have quantified damages from wind erosion. As indicated by the wide range spanned by our estimate and the preliminary nature of the estimation method, considerable uncertainty is associated with this estimate.

Wind erosion damages are caused by high winds carrying fine soil particles, primarily in the Western States. Because drought is common and plant cover is sparse, the wind picks up soil particles, adding to particulate air pollution. Environmental Protection Agency studies have shown that agriculture contributes significantly to air pollution in the San Joaquin area of California, the Phoenix-Tucson area of Arizona, the Las Cruces area of New Mexico, and around Lubbock, Texas (Jutze and Axetell; Record and Baci). Wind erosion episodes can produce short-term particulate loads in the air in rural areas higher than particulate pollution in urban areas. Households and businesses pay more for maintenance and cleaning and for damage to nonfarm machinery. Some people's health suffers from heavy particulate pollution.

Soil Productivity

Reductions in soil erosion can lead to benefits by maintaining the soil's ability to produce in the future. The present value of the soil productivity benefits for the 45-million-acre CRP was estimated at $1.6 billion, but could range from $0.8 to $2.4 billion (table 11). The Corn Belt and Lake States gain most per acre by preserving their fertile soils.

Excessive erosion reduces crop yields over time by diminishing water-holding capacity and water infiltration rates, and increasing nutrient losses. Applying more fertilizer may mitigate nutrient losses, but fertilizer will not restore yield loss linked with lost water-holding capacity. Soil productivity can be conserved and the costs of adding fertilizer can be avoided by stopping excessive erosion.

By multiplying estimates of the average damages per ton of soil loss times the estimates of erosion reduction due to the program, we projected which regions benefit most from soil productivity gains (Ribaudo and others, 1990). Soil productivity benefits per ton were estimated using the Erosion Productivity Impact Calculator (EPIC). The yield loss and fertilizer cost increases per ton of erosion were simulated over a 50-year time period. The Corn Belt and the Lake States gain more productivity benefits than the Mountain and Northern Plains regions, because higher soil productivity in the Corn Belt and Lake States outweighs the lower enrollment in these regions.

Water-Quality Benefits

The value of improved surface water quality attributable to the CRP is between $1.9 and $5.3 billion. The CRP affects mainly surface water but could also reduce damages to ground water from agricultural pollution.

Nutrients from chemical fertilizers, animal manure, pesticides, and sediment flow from farmland into waterways as a result of soil erosion. These diminish water quality and impose costs on water users. Excess nutrients, primarily nitrogen and phosphorus, in surface water speed growth of aquatic vegetation. Too much vegetation decreases fish populations and degrades recreational resources. Nutrients and pesticides that leach into ground water can contaminate drinking water supplies. Sediment washing off cropland into waterways can fill reservoirs, block navigation channels, interfere with water conveyance systems, damage aquatic plant life, and impair recreational resources.

Surface Water

The present value of offsite surface water-quality benefits from the CRP ranges from $1.9 billion to $5.3 billion (table 11) (Ribaudo and others, 1990). Per-acre benefits varied widely among the regions. Midpoints ranged from less than $30 per acre for the Northern Plains to nearly $250 per acre for the Delta region. These benefits depend on the amount of erosion per acre reduced by retiring the land, and the demand for water services (indicated by the damages per ton of erosion). The Appalachian and Delta regions have the highest per-acre reductions in sheet and rill erosion for land enrolled in the CRP, and the highest per-acre benefits for surface water quality.

Erosion reductions are relatively high in the Corn Belt, but water-quality damages per ton of erosion are very low. A region such as the Northeast, with modest per-acre reductions in erosion but high damages per ton of erosion, has much greater per-acre benefits.

Surface water-quality benefits of the CRP were estimated for nine damage categories for each geographic region following procedures described in Ribaudo, 1989. Depending on available information concerning the relationship between erosion and offsite damages, three different methods were used to link reductions in erosion and changes in pollutant delivery with the economic benefits to water users.

The analysis used a damages-avoided approach to assess effects of the CRP on flooding, navigation, roadside ditches, and irrigation canals. This approach measures changes in expenditures made to counteract or prevent damages from pollutants as a means of estimating the benefits to improved water quality.

Changes in costs of treating water or producing items with water were the basis for the second method used here. This method applies to activities such as water treatment, municipal and industrial use, and water storage. The change-in-treatment-or-production-cost approach is used when water quality is assumed to be a perfect substitute for some input(s) in the production of a good or service.

The change-in-consumer-surplus approach was the third way water-quality benefits were analyzed. This method is used when water quality influences the demand for a good, such as recreation. A change in water quality causes the demand for recreation to shift. The area between the two recreation demand curves measures consumers' willingness to pay for improved water quality.

Recreational fishing increases when water quality improves in the Appalachian and Corn Belt regions. The method used to estimate recreational fishing benefits assumed that recreational activity was harmed by erosion if fish habitat standards were violated.

Filter Strips. Converting 93,000 cropland acres to filter strips would add up to $300 million to the surface water-quality benefits of the CRP. The most likely estimate is $170 million.

Eligibility for the CRP was expanded beginning with the February 1988 signup to include filter strips within about 100 feet of water bodies. Installation of filter strips curbs sediment and nutrient pollution of surface waters by slowing runoff. Vegetation near the water can trap and use the soil particles and nutrients. Over 16,000 acres were devoted to filter strips of the 3.4 million acres enrolled during the sixth signup. Assuming that the proportion of land in filter strips remains constant for the remaining signups, approximately 93,000 acres of filter strips would be established under a 45-million-acre CRP.

Ground Water

Retiring highly erodible cropland through the CRP is not likely to generate much improvement in ground water quality. Data and methods to make a monetary estimate are not available, but relatively little land is suited for protecting ground water via the CRP. Most erodible cropland is on slopes and loses water through surface runoff. When water runs off the surface, fewer pollutants leach to ground water since less water moves to the ground water (Crowder and Young). Almost 76 million acres of cropland overlay aquifers that are potentially vulnerable to ground water contamination from farming. But only 16 percent of this cropland is highly erodible, so very little is available for CRP enrollment (Algozin and others).

If the CRP were targeted to land that is both vulnerable to ground water contamination and highly erodible, future ground water contamination could be controlled somewhat (fig. 5). Since retired cropland is no longer used for crop production, agrichemical use is reduced or eliminated, and excess agrichemicals do not leach into ground water.

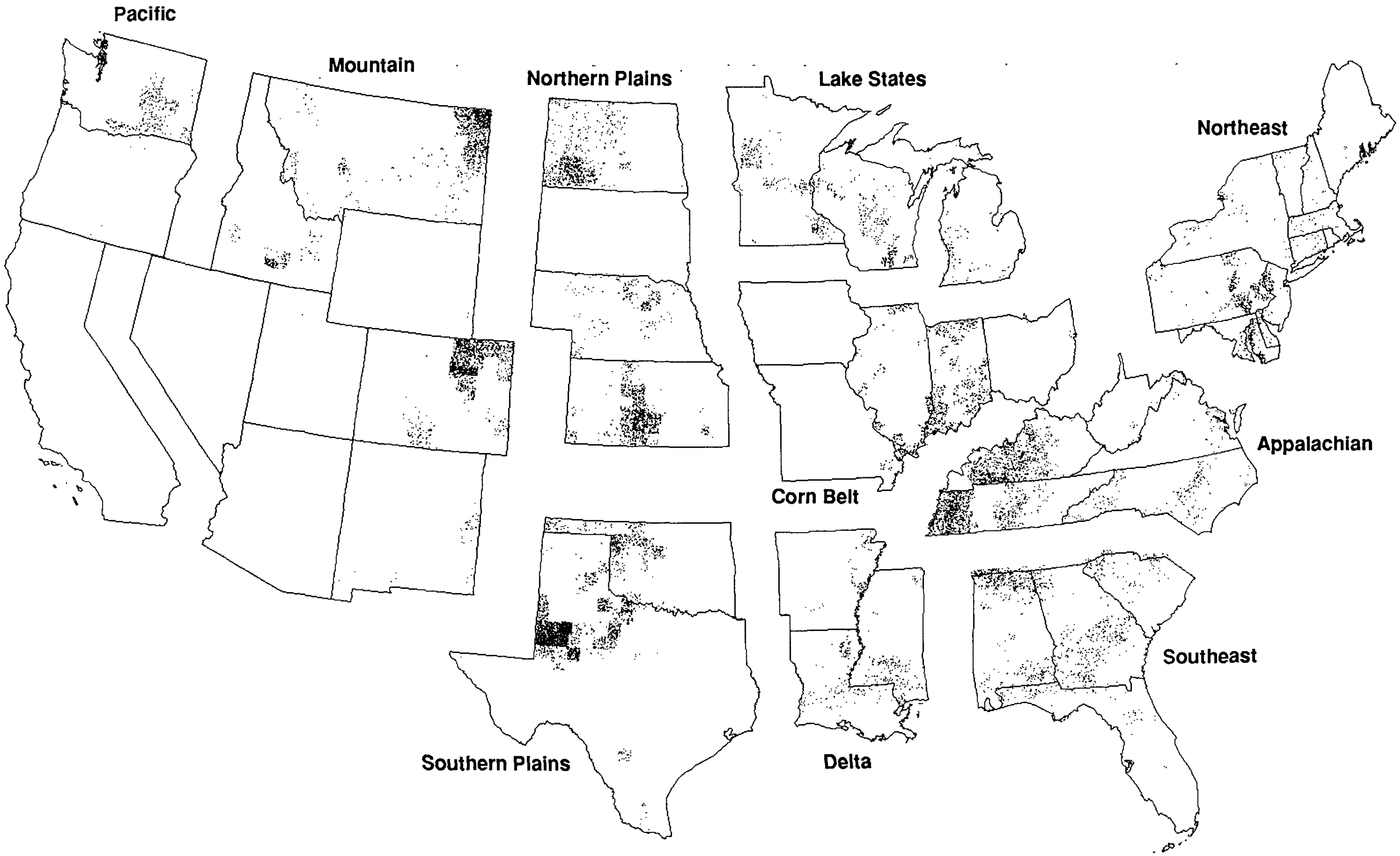
To best control ground water contamination, the CRP should focus on regions like the Southern Plains, where erodible land is found in areas susceptible to ground water pollution. Over 65 percent of the cropland at risk of causing ground water contamination in the Southern Plains is highly erodible. Over 40 percent of the erodible land in the Southeast, Delta, and Appalachian regions is vulnerable to ground water contamination, so these regions would also be appropriate targets.

We could not develop estimates of the economic benefits of ground water improvement attributable to the CRP because we lack methods for valuing changes in ground water quality. Data were not available to determine the susceptibility of CRP-enrolled acreage to ground water contamination.

Wildlife Habitat Improvements

Better habitat for wildlife on acreage retired from farming provides economic benefits for hunting amounting to $3.0-$4.7 billion (present value).

Figure 5—Cropland eligible for the Conservation Reserve Program and potentially vulnerable to ground water pollution



1 dot = 1,000 acres
17.2 million acres of eligible and potentially vulnerable cropland

People who enjoy viewing wildlife also benefit, but we are not able to make a monetary estimate. The largest percentage gain in grassland habitat will be in the Lake States and Corn Belt.

Animals use grassy areas near cropland for nesting cover, food, winter cover, and corridors for movement. New grassland habitat created by the CRP is expected to increase farmland wildlife populations. The major beneficiaries will be people who engage in wildlife-related recreational activities, like hunting, fishing, birdwatching, and photography.

We estimated how changes in wildlife populations affect participation in hunting of small game species including pheasant, quail, grouse, prairie chicken, rabbits, hares, and squirrels. The effect of the CRP on waterfowl populations was not estimated.

Wildlife benefits resulting from the CRP were estimated from changes in participation rates for small game hunters due to expanding grassland habitat (Ribaudo and others, 1990) (table 11). The new participation rates were then used to estimate the number of new hunters as a result of the CRP. Standard day values of $28 and $45 were selected from the literature for the value of an average day of hunting. For a point estimate we used $36.50.

The primary factor affecting wildlife benefits was the change in the percentage of grassland in a region. The Lake States and Corn Belt have the largest percentage increases in grassland from the CRP. Although grassland enrollment was high in some of the Western States, these States already have large amounts of rangeland, so that percentage changes in grassland area were small.

The procedures used to estimate wildlife benefits assumed hunter participation rates will continue to increase as more habitat becomes available. But since all CRP land is on private property, hunters may not have access. Our projections were based on adjusted 1980 participation rates and did not reflect recent declines in the popularity of hunting. These caveats imply that the estimates for small game hunting may be high. However, the user-day values employed were conservative and benefits for waterfowl hunters and people who view or photograph wildlife were not included. The final estimates therefore probably undervalue the total benefits to people who take part in recreation involving wildlife.

Ground Water Savings

Over the 15-year life of the CRP, enough ground water to irrigate up to a million acres a foot deep (acre-foot) could be saved due to retirement of irrigated land in regions suffering from ground water depletion. The ground water savings help to preserve the level of water tables that had been declining due to heavy use of water for irrigation and other needs. Other irrigators in the vicinity gain because costs to pump irrigation water from the ground are lower, or at least do not continue to climb as the water table falls.

From 600,000 to 775,000 irrigated acres may enroll in the CRP (Schaible). Annual ground water savings ranging from 0.8 to 1.0 million acre-feet of water would result if this acreage were retired. Ground water savings of this magnitude would save remaining irrigators between $14 and $28 million (net present value) in pumping costs.

Enrollment in the CRP has partially contradicted the common expectation that producers would retire their least productive, dryland acres. CRP enrollment in the Southern Plains is correlated strongly with ground water decline areas (Schaible). Both the physical characteristics of aquifers and the economics of irrigating cropland explain why producers may choose to retire irrigated land.

For those areas in which the water level has dropped so much that pumping costs are high and returns for irrigated crop production are low, irrigators prefer the CRP as an alternative to reverting to higher risk dryland production. The CRP is especially attractive for those irrigators faced with high pumping lifts and major capital expenditures to revitalize old irrigation systems. For irrigators whose well output is falling, the CRP offers the option of enrolling some of their land and using the water saved to fully irrigate other land. For those irrigators who, expecting the high prices of the 1970's to continue, expanded their irrigated base on acreage with low productive potential, the CRP now offers a way out of a financial crisis. And in areas where CRP rental payments approach average cash rental rates for irrigated cropland, producers may choose to enroll irrigated acres.

USDA Costs

The CRP will cost the Government about $21.5-$22.8 billion over the life of the program. Peak outlays are expected in 1990-95. Most of the costs are offset by savings in USDA commodity programs amounting to $16.2-$19.5 billion. Payments to compensate farmers for land retirements are the largest cost component.

Program costs include: 1) CRP rental payments to participating farmers for 10 years, 2) cost shares to establish cover crops, 3) technical assistance costs for verifying field eligibility and designing conservation plans, and 4) miscellaneous program administration costs. Some of these costs represent transfers of resources from earlier programs. Cost savings from implementing the CRP go to the Commodity Credit Corporation (CCC). When cropland formerly in CCC programs is removed from production, the CCC saves on price support payments. When market prices increase as a result of the CRP, the CCC saves on deficiency payments. Curbing production of surplus commodities saves the CCC storage costs. Besides the CCC, other Government erosion control programs save resources which otherwise would have been applied to the CRP land.

The analysis did not examine potential effects of the CRP on costs for the Export Enhancement Program (EEP). The EEP was designed primarily to maintain the U.S. share of world trade in agricultural products and is a relatively small component of USDA program costs. Total EEP expenditures are determined by the U.S. Congress, not by USDA, and represent less than 10 percent of USDA expenditures designed to reduce commodity stocks.[9]

CRP Program Costs

Total Government costs for the 45-million-acre CRP will reach $21.5-$22.8 billion (present value). Rental costs will peak at about $2.5 billion annually during 1990-95, when the program reaches 45 million acres. The total cost figure allows for increases in rental payments above the rates estimated in our analysis of potential enrollment. The payment increases may be needed to offer enough incentive to enroll 45 million acres. In addition to rent, the USDA also pays for technical assistance and half the cost of establishing cover crops on acreage in the reserve.

Program operation costs for the CRP are substantial since cropland is rented from farmers over a 10-year period, and the Government provides one-half of the cost of establishing permanent vegetative cover on retired acreage. USDA also incurs various program administration costs. The Agricultural Stabilization and Conservation Service (ASCS) incurs costs associated with acceptance, verification, and selection of bids. The Soil Conservation Service (SCS) incurs costs of verifying the erodibility of land which is offered for CRP enrollment. Both SCS and the Forest Service (FS) pay technical assistance costs in the design of conservation plans for establishing permanent cover. Finally, the Extension Service (ES) incurs expenses to inform and educate the public concerning the existence and operation of the program.

Rental Costs

Annual expenditures for rental payments reach a maximum of $2.5 billion from 1990 through 1995 when the full 45 million acres of cropland are retired (table 12). Expenditures for rental payments decline after 1995 as land initially enrolled begins to leave the program. Using a 4 percent rate of discount, the discounted value of CRP rental costs was estimated at $19.5 billion.

Rental payments may have to be raised to persuade more farmers to retire land. We adjusted our cost estimate to account for the possibility of rents going up. The discounted value of rental costs rises by

Table 12—Projected CRP rental costs

Year	Projected	Present value[1]
	$million	
1986	88	88.0
1987[2]	778	748.1
1988	1,309	1,210.2
1989	2,020	1,795.8
1990	2,531	2,163.5
1991	2,531	2,080.3
1992	2,531	2,000.3
1993	2,531	1,923.4
1994	2,531	1,849.4
1995	2,531	1,778.2
1996	2,443	1,650.4
1997	1,753	1,138.7
1998	1,222	763.3
1999	511	306.9
Total[3]	25,310	19,496.4

[1] Discounted at 4 percent for 10 years.
[2] Excludes one-time corn bonus of $323 million.
[3] Totals may not add due to rounding.

Source: Tables 4 and 7.

[9] By reducing commodity stocks, the CRP creates a potential expenditure savings for the EEP. Conversely, the CRP increases commodity prices, increasing the differential between the U.S. and world prices for commodities. As this differential increases, EEP bonuses must increase to maintain a given level of exports. Thus, the direction of the change in EEP expenditures cannot be determined, although the net effect is expected to be negligible. Consequently, this analysis assumes that the CRP does not affect EEP costs since the goal of EEP is to maintain the U.S. share of agricultural trade and not to reduce the supply of excess commodities.

$1.3 billion if we assume that rental payments are 10 percent higher in 1989 and 20 percent higher in 1990 than the payment rates projected in our original analysis of CRP enrollment (table 6).

Over the life of the program total rental costs climb because the total amount of land enrolled in the program grows and because per-acre rental payments are expected to rise as the program expands. Rental rates will likely rise further during future signups in response to two factors. First, a fixed amount of land is eligible for CRP enrollment and, second, as more land enters the program, higher rental rates will be necessary to induce remaining landowners to participate. Since these landowners either did not elect or were not selected to participate in earlier signups, it is reasonable to assume that they require higher rental payments than current rules permit. Second, if the CRP increases net farm income, the opportunity cost of retiring land in the CRP will increase. Land devoted to farming is worth more when farm income is up. This places more upward pressure on CRP rental rates.

A bonus was offered to farmers who retired corn base during the fourth signup (February 1987) for the 1987 program year. A one-time payment of $2 per bushel for corn base was made as an inducement to retire corn base and to encourage CRP participation. This added about $323 million to the cost of the program. The bonus increased the amount of corn base acres enrolled during the February 1987 signup. For the second, third, and fifth signups 6.8 percent, 7.1 percent, and 5.5 percent, respectively, of the acreage enrolled represented corn base; while for the fourth signup 24.7 percent of the acres represented corn base (Dicks and others, 1988a). Of course, participating landowners may have been willing to retire the same land without the bonus. Others may have simply decided to advance their intended participation in the CRP to take advantage of the bonus. While it is difficult to assess the net impact that this bonus had on total enrollment, the bonus does appear to have influenced the decision to retire corn base during the fourth signup.

Technical Assistance and Cover Crops

Spending for technical assistance and to establish cover crops was largest in 1987 when the greatest amount of land was retired. The discounted value of technical assistance and establishing cover crops was estimated to be $0.1 billion and $1.6 billion, respectively, for the entire program (table 13).

Technical assistance costs for the CRP are about $2.53 per acre based upon information from the USDA budget. While ASCS, SCS, and FS pay some program costs, they also save on the costs of other programs. Land enrolled in the CRP is removed from commodity programs administered by ASCS. Likewise, SCS and FS do not need to design and implement conservation plans for highly erodible land subject to the conservation compliance provisions if it is enrolled in the CRP. After 1995 the savings will fall, because cropland can be taken out of the CRP and conservation plans will be needed if the farmers plan to cultivate the land and wish to participate in USDA programs.

CCC Commodity Program Savings

Direct costs to the CCC fall by about $12.2 billion as land that was producing program crops is set aside. The CCC saves $7.3 billion indirectly because the CRP boosts market prices and the CCC pays out less in deficiency payments.

Table 13—CRP cost for technical assistance and cover crops

Year	Technical assistance		Cover crops	
	Projected[1]	Present value[2]	Projected	Present value[2]
		$million		
1986	5.2	5.2	76.0	76.0
1987	35.0	33.7	517.0	497.1
1988	28.2	26.1	417.0	385.5
1989	22.8	20.3	350.0	311.1
1990	22.8	19.5	350.0	299.2
Total	114.0	109.7	1,710.0	1,569.0

[1]Assumes $2.53 per acre for technical assistance.
[2]Discounted at 4 percent. Totals may not add due to rounding.

Source: Tables 4 and 7.