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Conservation Benefits of the USDA's 1983 Payment-in-Kind and Acreage Reduction Programs

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CONSERVATION BENEFITS OF THE USDA'S 1983 PAYMENT-IN-KIND AND ACREAGE REDUCTION PROGRAMS. By D. Colacicco, A. Barbarika, Jr., and L. Langner. Natural Resource Economics Division, Economic Research Service, U.S. Department of Agriculture. ERS Staff Report No. AGES860908.

ABSTRACT

The U.S. Department of Agriculture's 1983 Payment-in-Kind and Acreage Reduction Programs reduced soil erosion on the land withdrawn from production by an average of 1.8 tons per acre per year over the 80 million acres diverted. The erosion reduction could have been significantly greater had the program targeted highly erodible land and had the diverted acres been adequately protected from erosion. Water withdrawal was reduced by 1.6 acre-feet per acre because of diverted lands that would have been irrigated. About 35 percent of the diverted acres provided suitable cover for wildlife. The analysis was based on data from a sample of over 4,900 farms in 278 counties.

Keywords: Acreage reduction, payment-in-kind, soil conservation, soil erosion, wildlife habitat

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SUMMARY

The U.S. Department of Agriculture's Agricultural Stabilization and Conservation Service and Soil Conservation Service conducted a sample survey of the conservation effort on the 80 million acres of land diverted under the 1983 Payment-in-Kind and Acreage Reduction Programs. This report summarizes the findings and discusses the policy implications.

The acreage diversion programs reduced average annual soil erosion on diverted lands from 7.6 to 5.8 tons per acre per year (TAY). Erosion on the 80 million diverted acres was reduced by an estimated 135 million tons per year. Almost 90 percent of the savings occurred on land that, without the diversion programs, would have eroded at more than twice the tolerance level (the level at which soil productivity is just maintained).

Acreage diversion programs increased the level of erosion protection on the idled land. Of the 80 million diverted acres, 41 million were eroding at or below the tolerance level before diversion. The programs increased that to 47 million acres. Also, the programs reduced by nearly 40 percent the acreage eroding at twice the tolerance level.

Conservation practices with life spans of 5 or more years were applied to only 5.2 million acres (7 percent of the diverted land), indicating only a modest long-term effect on soil erosion.

About 35 percent of the diverted land provided suitable cover for wildlife. This percentage agrees with previous surveys and indicates that annual set-aside programs alone do not guarantee the concurrent provision of adequate wildlife habitat.

Soil savings could be increased significantly by targeting diversion to highly erodible land. The survey found that land diverted in 1983 was no more erodible than U.S. cropland in general. If, for example, only lands that were eroding at twice the tolerance level had been removed from production, an additional 307 million tons of soil would have been saved.

More can be done to protect diverted land from erosion. Many of the diverted acres were found to be inadequately protected, having little or no cover, and some even lost more soil with diversion than without. Almost a third of the diverted land had essentially no cover. If all the idled land had more than 50-percent cover, soil savings would have been nearly double.

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INTRODUCTION

The goals of reducing erosion on idled acreage, improving wildlife habitat, and conserving water supplemented the 1983 acreage reduction programs' primary goal of reducing production. This report discusses how well these supplementary goals were met and makes recommendations to improve future benefits.

Recent studies by the U.S. Department of Agriculture's Economic Research Service (USDA, ERS) addressing the effect of U.S. farm policies on soil erosion concluded that current commodity programs do not encourage soil conservation as much as they could and, in some cases, may even cause increased erosion (7,8,9).1/ Soil conservation is not consistently promoted because of several factors: price support programs encourage the production of erosive crops; farmers participating in acreage diversion programs tend to idle their least profitable land, which may not be the most erodible; and annual diversion programs provide little incentive to adopt long-term conservation measures. However, as this report documents, the acreage reduction component of USDA programs do promote soil conservation through less intensive land use on the diverted acreage.

The Payment-in-Kind (PIK) Program, Acreage Reduction Program (ARP), and Paid Land Diversion (PLD), which the Agricultural Stabilization and Conservation Service (ASCS) implemented to bring supplies more in balance with demand and to bolster farm income, offered various incentives to farmers to reduce planting. Farmers reducing acreage by a combined 20 percent in the ARP and the PLD programs received a cash payment, target price protection, and eligibility for nonrecourse loans on their 1983 crop. PIK commodities for farmers diverting additional land further supplemented these benefits. The 10-30 PIK program required diversion of an additional 10 to 30 percent of base, while Whole Base PIK contracts required diversion of the farm's entire base acreage.2/

Farmers were required to protect their idled land from wind and water erosion by applying approved cover or other conservation measures (appendix 1). It was

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1/ Underscored numbers in parentheses refer to sources listed in the References.

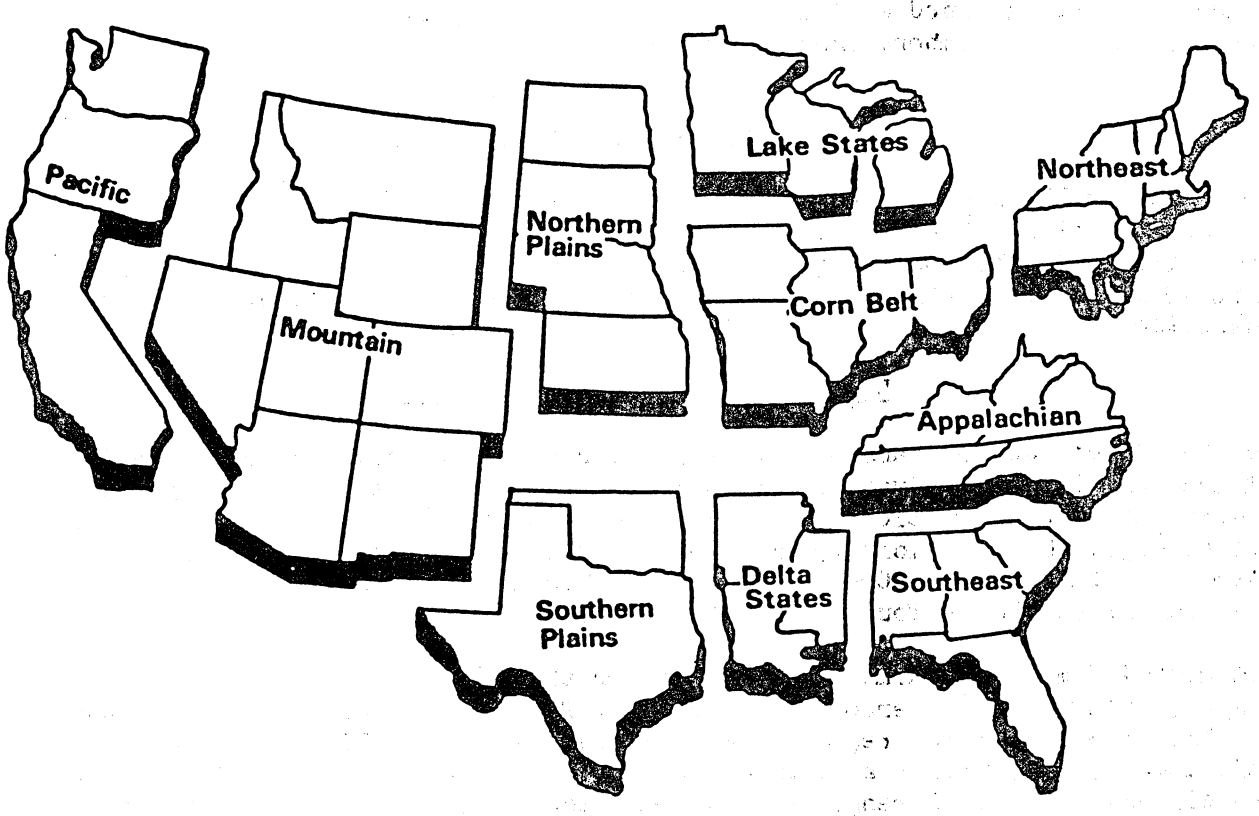
2/ Base acreage is the number of acres that the farmer has on record with the ASCS county office as having been planted to the commodity in previous years.

also permissible to devote the diverted land, frequently called conservation use acres (CUA), to wildlife food plots or wildlife habitat. Land devoted to small grains or row crops in 2 of the last 3 years, land in established summer fallow in 1 of the last 2 years, and acreage devoted to conservation use in 1982 were eligible for designation as CUA. Except for those in the winter wheat program, farms enrolled prior to planting. An ERS report discusses in more detail the rationale and major features of the PIK program (11).

PROCEDURES AND DATA SOURCES

Sample counties were selected based on a previous national survey conducted by the USDA's Soil Conservation Service (SCS) (10). The sample counties were stratified by farm production region, land use, and SCS's conservation effort. Up to 28 participating farms were subsampled randomly from each of the 227 sample counties. The probabilities of selection, based on the total number of sampled counties per strata, determine the expansion factors used to generate estimates at the regional and national levels. The survey was designed to give reliable estimates at the regional level and was generally successful. Estimates of the coefficients of variation of the expanded values were derived by methods described in Hanson and others (4).

Figure 1. Farm Production Regions



The data for each farm's diverted land were collected from a slightly modified Conservation Reporting and Evaluation System (CRES) data sheet as completed by SCS and ASCS personnel. SCS field personnel used the Universal Soil Loss Equation (USLE) and the Wind Erosion Equation to estimate the average annual expected soil loss due to sheet, rill, and wind erosion, with and without 1 year's diversion in the rotation for each sampled field. The cover and management values (C and P factors of USLE) were modified to reflect the current year's idling of the land. Where applicable, estimates of other (mostly gully and irrigation) erosion were made. The figures in the without diversion scenario are based on the erosion that would have occurred if the land had remained in its previous rotation. Those in the with diversion scenario are based on the erosion that would be expected to occur if the conservation use were made part of the rotation.

The above procedure, which, in effect, allocated the soil savings over a varying period of years, may have substantially underestimated the effect of the 1-year diversions. A more realistic approach would have been simply to compare the soil loss on the idled land with the loss that would have occurred if the land had been planted to the PIK commodity. Instead, the average annual erosion rate of the rotation with 1-year's diversion was recorded as the with diversion erosion rate.

Other data sources used in the analysis include the 1982 Census of Agriculture, the 1982 National Resources Inventory (NRI), and ASCS deficiency reports. The CRES data were collected on diverted acreage only and compared with the 1982 NRI data for nondiverted cropland. The ASCS deficiency reports are summaries of limited data on all participants in the diversion programs. The aggregate statistics for the limited data in the deficiency reports may not be as reliable as the expanded estimates from our CRES sample, so, unless otherwise noted, we used the numbers from the survey in this analysis.

RESULTS AND DISCUSSION

Shortly after PIK was announced, ASCS, SCS, and ERS were asked to evaluate the soil conservation effort on the diverted land and to determine the extent that participation in the 1983 programs reduced erosion, affected water usage, and improved wildlife habitat. In this section we present the findings from the evaluation.

Diversion Program Participation

The 1983 diversion programs were very popular with farmers. In some counties, all land eligible for diversion was diverted. The land per county that could be diverted from production of a crop could not exceed 45 percent of the crop's base acreage. Many regions probably had a substantial number of counties affected by this limit. Overall a third of base acreage nationally was diverted, nearly three-fourths of all eligible land.

Just over 1.2 million farms were enrolled in the 1983 cropland diversion programs, which was 61 percent of total U.S. farms with cropland acreage (table 1). The ASCS deficiency reports indicate that about 80 million acres were designated as CUA, nearly a fifth of all U.S. cropland. Over half of the farms participating and the acreage diverted were located in just two regions, the Corn Belt and the Northern Plains.

Table 1--Participation in 1983 diversion programs by number of farms and acreage diverted

Region	Number of participating farms	Proportion of farms in region	Total acres diverted	Percentage diverted of all cropland 1/	Percentage of all cropland in the base	Percentage diverted of eligible base 2/
	Thousands	Percent	Millions	Percent		
Appalachian	98	40	2.9	13	40	70
Corn Belt	370	60	19.0	21	55	83
Delta States	51	67	3.2	15	53	61
Lake States	140	58	8.2	19	52	79
Mountain	51	68	6.6	15	48	71
Northeast	32	34	1.9	11	26	93
Northern Plains	266	83	21.6	23	68	75
Pacific	21	60	2.9	13	50	57
Southeast	62	50	2.3	12	40	69
Southern Plains	142	74	12.1	27	92	65
Total 3/	1,234	61	79.8	19	58	73

1/ Based on acres of cropland (12).
2/ No more than 45 percent of a county's base could be enrolled.
3/ Totals may not add due to rounding.
Source: (14)

The highest rates of program participation were in the Northern Plains and Southern Plains, where about three-fourths of the farmers enrolled about a fourth of each region's cropland. The lowest participation rates were in the Northeast and Appalachian regions, with 34-40 percent of the farms signing up and 13 percent or less of the cropland diverted. Participation of farmers was influenced by their establishment of a base acreage of program crops and their perception of the benefits of the PIK program. Farmers in the Southern and Northern Plains have the largest proportion of acreage with a base because these regions grow principally wheat and cotton, both program crops. The Northeast, Southeast, and Appalachian States have the lowest proportions of base acreage because of the prevalence of nonprogram crops in these regions. However, Northeastern farmers evidently liked the program because over 90 percent of the eligible base was enrolled. Farmers in areas with a much larger proportion of base acreage (that is, the Pacific, Southern Plains, and Delta States) did not sign up as readily.

Three-fourths of the farms that diverted cropland participated in the PIK portion of the programs, and one in five diverted a crop's entire base under Whole Base PIK provisions (table 2). There was always some ARP and PLD land on PIK participating farms because of the PIK requirements. Therefore, we could not make distinctions between different programs on the same farm. Comparisons could be made only between (1) farms that had ARP and PLD contracts but no PIK contracts, (2) those that had ARP, PLD, and 10-30 PIK contracts but no Whole Base contracts, and (3) those that had ARP, PLD, and Whole Base PIK contracts.

Among farms that diverted cropland in 1983, no consistent relationship between average farm size and level of program participation was observed (table 2). While 10-30 PIK farms were larger than non-PIK farms, Whole Base PIK farms were the smallest of the three categories but still larger than the average U.S. farm with cropland, 220 acres (12). The PIK commodity payments were not counted against the $50,000 single-farm cash payment ceiling, and larger farms may have participated more in the 1983 acreage reduction programs than in the past. The data in table 2 indicate that large farms were less likely than smaller farms to divert their entire base. This may have been due to the requirement that all the farmers in a county had to have the opportunity to

Table 2--Average farm size, number of farms, and acreage diverted, by level of participation in 1983 cropland diversion programs

Participation level	Average farm size	Number of farms	Proportion of participating farms	Acreage diverted	Proportion of total acreage diverted
	Acres	Thousands	Percent	Millions	Percent
ARP and PLD only 1/	330	270	24	8.6	11
10-30 PIK	385	618	55	50.7	65
Whole Base PIK	261	225	20	18.7	24
All programs 2/	344	1,124	100	78.0	100

1/ Acreage Reduction Program and Paid Land Diversion.
2/ Totals may not add due to rounding.

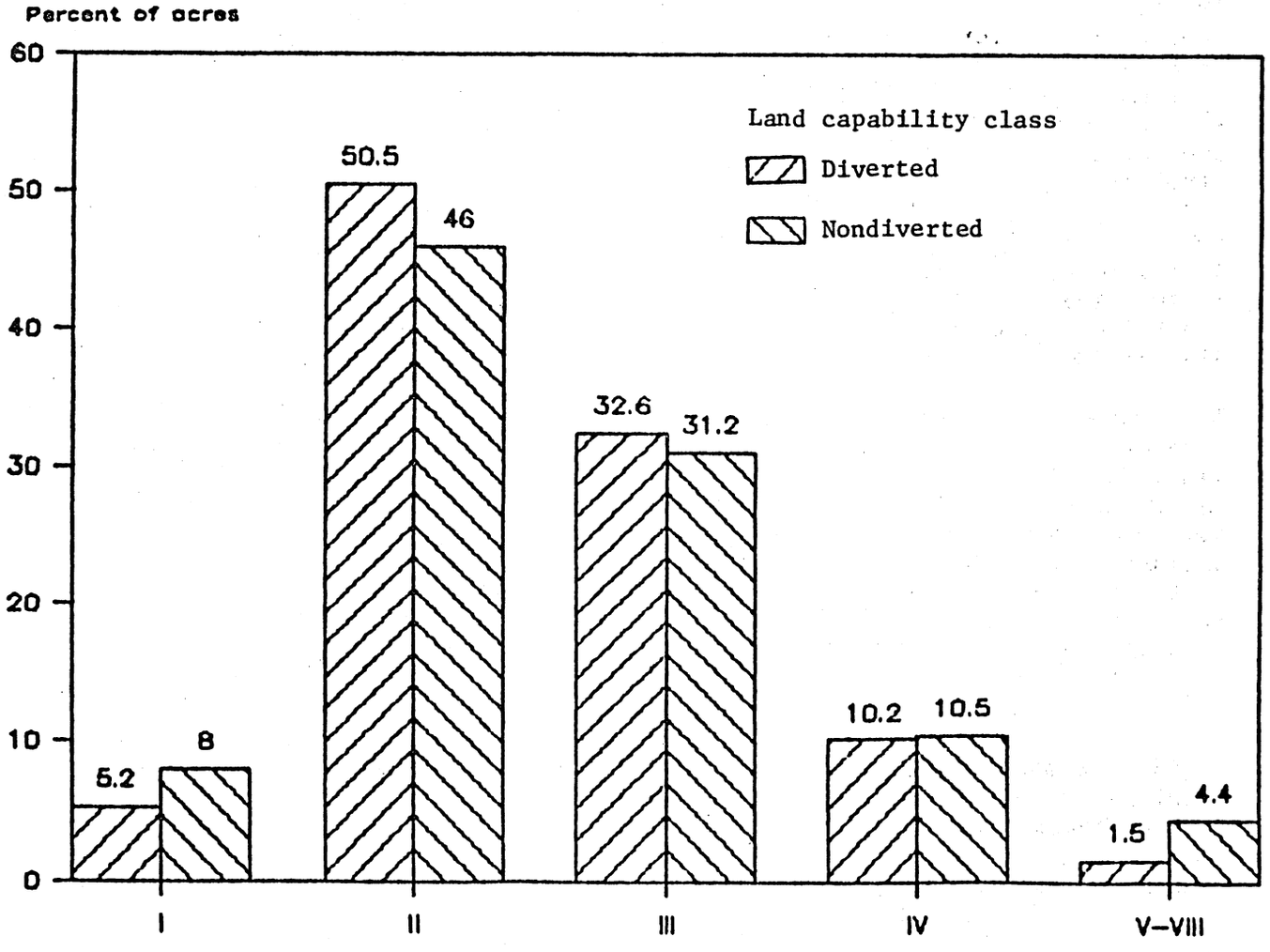
join the 10-30 PIK program before any farmers could participate in the Whole Base PIK program.

Participants in the diversion programs tended to be cash grain or livestock grain operators (90 percent), to have family or individual proprietorship operations (97 percent), and to be full-time farmers (66 percent, app. table 2).

Soil Capability of Diverted Land

The average capability of land placed in the 1983 acreage diversion programs was about the same as that of nondiverted cultivated cropland (fig. 2). Farmers as a group clearly did not divert land that was lower in capability than nondiverted cropland. This represents a result, to the extent that productivity and capability are correlated, contrary to conventional wisdom and the findings of a study by Weisgerber of the 1966 diversion program (15).

Figure 2. Distribution of diverted cropland compared with nondiverted cropland among land capability classes



Weisgerber discussed two factors that would influence the average productivity of diverted lands. The intrafarm effect is the diversion of land with the lowest productivity on a farm, and the location effect is the diversion of more acreage from low-productivity regions than from high-productivity regions. Weisgerber examined these effects and estimated that in 1966 the diverted lands were about 80-90 percent as productive as the nondiverted land. The location effect accounted for a substantially larger component of the productivity difference than the intrafarm effect.

Productivity differences, estimated using capability class differences, were not evident in 1983. The location effect disappeared, and there was no clear relationship between average regional productivity and participation rates. Some of the farm production regions identified in the earlier study as having low productivity and high rates of cropland diversion, such as the Southeast and Appalachian regions, had below-average participation rates in 1983. Conversely, some of the farm production regions identified earlier with high productivity and low participation, such as the Northeast and Corn Belt, had high participation in the 1983 programs.

The larger amount of cropland diverted in 1983 (80 million acres compared with 63 million acres in 1966) and the incomplete correlation between capability and productivity may largely explain why these relationships were not found. Also, the incentive to participate in PIK was no greater for farmers in areas with poor land than for those in areas with good land because PIK payments were tied to crop yields.3/ There is evidence of an intrafarm effect even though some factors, such as a wet spring in some regions and a late program announcement, may have restricted some farmers' ability to be selective in choosing which land to divert. Comparison of the capability class of the diverted land by level of program participation shows that the higher the level of participation per farm, the better the average quality of diverted land (table 3). This is consistent with the intrafarm effect. Farms would divert their poorest land first, then, as more land must be diverted under PIK, the farmer must select better land. An estimated 60 percent of land entered in Whole Base PIK was class I or II, compared with 55 percent for that in 10-30 PIK and 50 percent of that in ARP and PLD only.

The proportion of "e"-type soils, those classified as having severe erosion problems, found on diverted land in 1983 was almost identical to that found on all U.S. cultivated cropland. Fifty-six percent of diverted class II-VIII land was subclass e, while 57 percent of U.S. cultivated cropland of class II-VIII was subclass e. The distribution among the other soil subclasses was also similar to that found on all U.S. cropland. These findings further indicate that the land withdrawn was similar to that cropped and that diverted land was not more limited in productive capability due to erosion or other problems than land not withdrawn.

Erodibility of Diverted Land

We had hypothesized that the diverted lands would be more erodible than cropland in general, but this was rejected in our analysis of the data (table 4). Combined sheet, rill, and wind erosion that would have occurred at a rate of 7.6 tons per acre per year (TAY) on the CUA, had it been used in crop production, was slightly below the 8.1 TAY average for U.S. cropland in general

3/ Usually, these were county average yields as established by ASCS.

as estimated by the 1982 National Resources Inventory. This finding is consistent with the results discussed in the previous section that diverted land was not less capable than nondiverted land.

The level of participation in the diversion programs was expected to be negatively correlated to erosion. We expected to find the lowest erosion rates on Whole Base PIK diverted land because these farmers had the least flexibility in deciding which land to remove from production; 10-30 PIK farms would have

Table 3--Distribution of diverted land in 1983 among land capability classes compared with nondiverted cropland by level of program participation

Land class	Participation level on diverted cropland			Nondiverted cropland
	ARP and PLD 1/	10-30 PIK	Whole Base PIK	
	Percent of land			
I	2.4	4.3	9.5	8.0
II	48.2	50.1	50.8	46.0
III	32.7	35.1	25.6	31.2
IV	15.0	8.0	13.2	10.5
V-VIII	1.6	1.7	.9	4.4
Total 2/	100.0	100.0	100.0	100.0

1/ Acreage Reduction Program and Paid Land Diversion.
2/ Totals may not add due to rounding.

Table 4--Estimated sheet, rill, and wind erosion rates on 1983 CUA without the diversion programs compared with all cropland

Type of erosion	Participation level			All programs	All cropland
	ARP and PLD only 1/	10-30 PIK	Whole Base PIK		
	Tons per acre per year				
Sheet and rill	4.9	4.6	6.7	5.2	4.8
Wind	2.4	3.0	1.2	2.4	3.3
Total 2/	7.3	7.6	7.8	7.6	8.1

1/ Acreage Reduction Program and Paid Land Diversion.
2/ Totals may not add due to rounding.
Source: (12)

the next lowest erosion rates, and the ARP- and PLD-only farms would have the highest. However, erosion rate is positively correlated to participation level (table 4).

These unexpected findings can be explained partially by the property discussed by Ogg and others (6) and by Bills (2) in that the least productive land is not always the most erodible. Interregional effects (Weisgerber's location effect) would also play a role by countering the intrafarm effect. This would occur if regions with high average erosion rates had high Whole Base participation.

There were some notable differences in erosion rates in some regions when the type of erosion is considered (app. table 3). In the Mountain and Southern Plains regions, average erosion on CUA without the programs was about half the rate as on cropland in general. Here, the lands enrolled in the programs were much less susceptible to wind erosion than other cropland in the region. Overall, if the idled land were cropped, it would have suffered slightly more sheet and rill erosion and, in some cases, considerably less wind erosion than land not withdrawn from production.

Soil Conservation Benefits of Diversion

Based on the soil loss estimation procedures used, the 1983 acreage diversion programs reduced average annual soil loss on the diverted lands by 1.8 TAY for a total savings of 135 million tons per year nationally on the 75.2 million acres affected (table 5).4/ The average soil loss on this land was 5.8 TAY compared with 7.6 TAY without the programs, a 24-percent reduction. However, these estimates understate the actual savings of the 1-year program because the data represents the annual savings over the rotation and not just the 1983 soil savings. Thus we will proceed in the rest of this report to discuss the results based on average annual erosion rate estimates that are available, rather than on the preferred estimates that are not.

Benefits by Region

About two-thirds of the soil savings occurred in the Northern Plains and Corn Belt, the regions with the largest acreages in the programs. However, the Appalachian and the Southeast regions, with much lower acreages in the programs, reduced their soil loss on the diverted acreage by more than half. No significant soil savings were found in the Pacific, Mountain, or Southern Plains regions. The sampled counties in the Mountain region incurred more soil loss as a group with the diversion programs than without them. However, the variability in erosion among the sampled counties, as noted by the large coefficient of variation, was very great in this region and the increase in soil loss was not significantly different from zero.

The poor showing in the West could be attributed to regional differences in farming practices and wind erosion. While there was no reported wind erosion

4/ The 75.2 million acres of affected land in table 5 represent an expanded estimate of the number of acres for which erosion was reported with and without diversion. It is 5 million acres below the total diverted acreage according to the ASCS deficiency reports shown in table 1, and about 3 million acres less than the estimated number of diverted acreage from our survey.

Table 5--Soil erosion effects of diversion, regionally and nationally, 1983

Region	Diverted acreage affected by erosion		Erosion rate				Soil saved 1/			
			Without diversion		With diversion					
	Million acres	(CV) 2/	TAY	(CV)	TAY	(CV)	Million tons	(CV)	TAY	(CV)
Appalachian	2.3	(23)	9.5	(10)	4.5	(12)	11.3	(32)	5.0	(18)
Corn Belt	17.2	(18)	7.8	(12)	5.7	(14)	36.1	(42)	2.1	(36)
Delta States	3.1	(24)	6.0	(13)	4.7	(18)	4.1	(30)	1.3	(32)
Lake States	7.8	(32)	7.2	(19)	6.4	(19)	5.8	(42)	.7	(25)
Mountain	2.6	(43)	6.1	(30)	7.2	(20)	-2.8	(139)	-1.0	(132)
Northeast	1.5	(38)	7.5	(17)	4.9	(17)	3.9	(65)	2.6	(35)
Northern Plains	20.1	(14)	7.7	(21)	5.1	(12)	54.0	(35)	2.7	(62)
Pacific	6.0	(42)	6.6	(39)	6.1	(26)	2.7	(258)	.5	(251)
Southeast	1.7	(27)	7.7	(11)	3.5	(19)	7.2	(22)	4.2	(20)
Southern Plains	13.0	(21)	8.3	(23)	7.4	(14)	12.9	(95)	1.0	(91)
National 3/	75.2	(8)	7.6	(8)	5.8	(7)	135.2	(28)	1.8	(28)

1/ Because of rounding, totals may not equal the difference between without and with diversion.

2/ The coefficient of variation (CV) is defined as 100 times the standard error divided by the mean. CV's of less than 50 indicate significant (at 95% level) differences from zero.

3/ Totals may not add due to rounding.

in the Appalachian, Southeast, or Northeast regions, considerable wind erosion occurred in the more western regions, where much of the idled land had been in cotton or wheat, and with little or no protective crop residue cover. Thus, there would be increased or, at best, unchanged soil loss caused by wind on these diverted lands.

The acreage diversion programs increased the amount of land adequately protected from erosion. Figure 3 compares the distribution of diverted land at three levels of protection without and with the programs. Forty-nine percent of the diverted acres in the absence of a program would have eroded above the tolerance (T) level, compared with 40 percent with the diversion programs.5/ There was also a 50-percent reduction in the proportion of diverted land losing soil at greater than 2T with the diversion programs.

Almost 90 percent of the estimated soil savings occurred on land that would have eroded at over twice the tolerance level without the diversion programs (table 6). Erosion on land that was eroding at or below the tolerance level before diversion increased by an estimated 6.2 million tons with diversion, due mainly to soil losses that occurred on fallow land. Although the programs saved a total of 135 million tons of soil, the amount of adequately protected land increased by only about 6 million acres. Much of the diverted land that would have eroded at excessive levels, 2T or more, evidently shifted to the intermediate category, T to 2T, rather than to the adequately protected category.

Benefits by Level of Program Participation

The erosion reduction varied considerably depending on the type of diversion program in which the farmer was enrolled (table 7). Savings per acre increased with the degree of program participation. Per acre savings on the Whole Base PIK farms were 2.4 TAY, compared with 1.7 on 10-30 PIK, and 1.1 on the non-PIK farms. These findings are consistent with the earlier findings that participation is positively related to erosion rate.

Benefits by Type of Erosion and Land Capability

Reduced sheet and rill erosion was responsible for 80 percent (109 million tons) of the 135 million tons of soil saved by the diversion programs (table 7). The remaining savings, about 26 million tons, were from reduced wind erosion. Other, mostly gully and irrigation, erosion increased slightly for unknown reasons, but the survey did not find enough diverted acreage with changes in other erosion to give reliable estimates.

Land capability was inversely related to soil savings (table 7). Class III lands had per acre savings 2-1/2 times greater than that found on class I and II lands. Class IV lands had three times the soil savings of class I and II lands, and class V-VIII had seven times the savings per acre. Most of the total tons of soil saved came from class II and III lands due to the prevalence of these lands in the diversion programs. Land in those classes accounted for 83 percent of the land and 74 percent of the savings.

5/ T values, based on rates of soil formation, range from 2 to 5 TAY and are defined as the maximum rate at which soil loss can occur without damaging long-term soil productivity (5).

Figure 3. Distribution of CUA in relation to the tolerance (T) level without and with the diversion programs, 1983

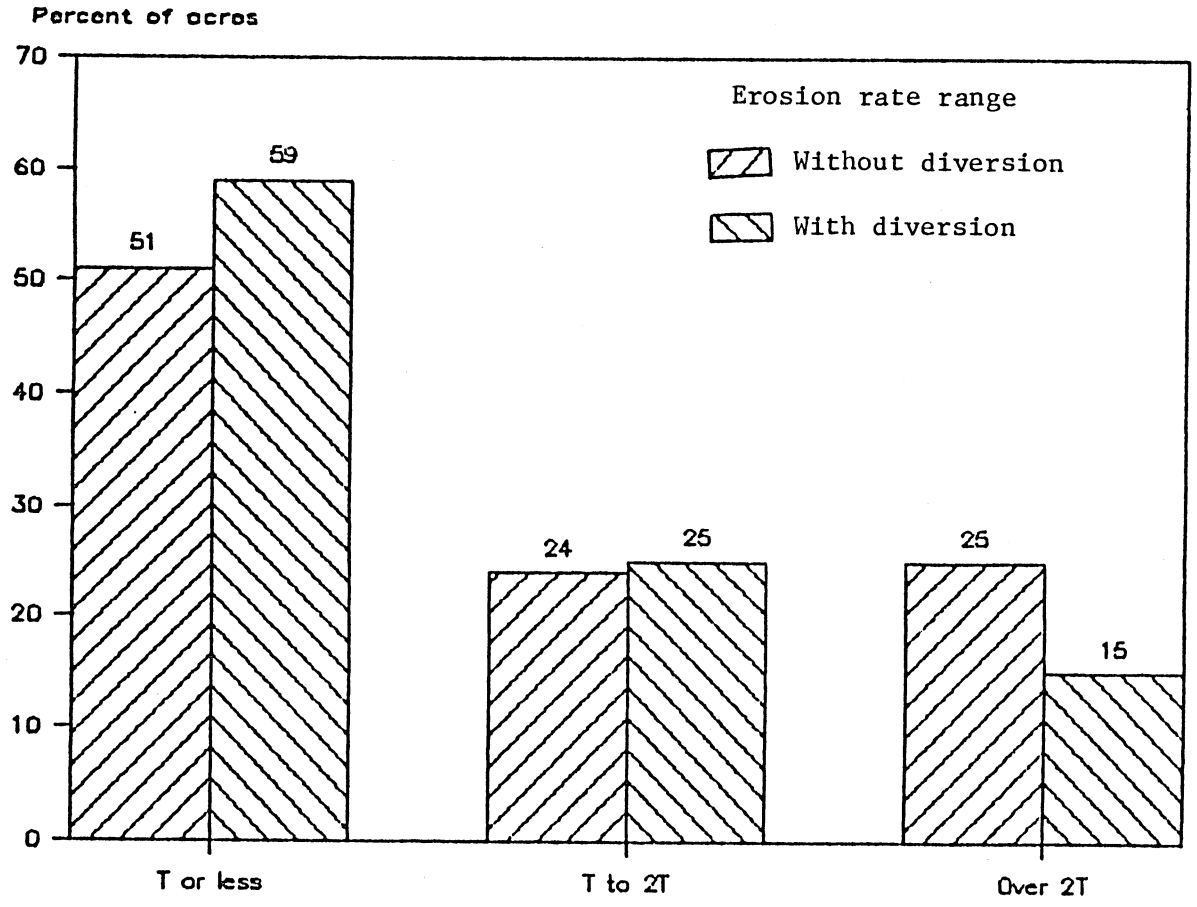


Table 6--Erosion rate categories, acreage affected, and soil savings due to diversion, 1983

Without diversion erosion rate category	Acreage in category: Without diversion	Acreage in category: With diversion	Soil savings: Million tons	Soil savings: TAY 1/
	- - Million acres - -		Million tons	TAY 1/
T or less	38.3	44.4	-6.2	-0.2
T to 2T	18.0	18.8	24.1	1.3
Greater than 2T	18.9	12.0	117.4	6.2

1/ Tons per acre per year.

Benefits Related to Commodity Programs

Farms in the feed grain program accounted for most of the soil savings on diverted land (table 8). These farms also had the highest per acre savings, reducing erosion on their diverted acreage by 32 percent. Primarily because of wind erosion on fallow land, wheat program participants had the worst performance, with an average erosion reduction of only 14 percent on diverted acres. Land in the rice program did not have an erosion problem, but the small preprogram erosion rate was reduced even further with the diversion program.

Benefits Related to Cover

The percentage of cover found on the diverted land was, as expected, highly correlated to soil savings (table 8). Land with good cover reduced soil loss by over 3 TAY, but land with little or no cover had an increase in soil loss with the diversion programs. Forty-three percent of the diverted acres had a ground cover of less than 40 percent, which did relatively little to protect the land from erosion. Erosion rates were reduced the same on land

Table 7--Soil erosion effects of diversion by level of program participation, type of erosion, and land class, 1983

Item	Acreage affected by erosion	Erosion rate: Without diversion		Erosion rate: With diversion		Soil saved 1/	
	Million acres	Million tons	TAY	Million tons	TAY	Million tons	TAY
Program:							
ARP and PLD	8.5	62.0	7.3	52.4	6.2	9.6	1.1
10-30 PIK	47.7	371.4	7.6	289.0	5.9	82.4	1.7
Whole Base PIK	18.0	140.1	7.8	96.8	5.4	43.2	2.4
Type of erosion: 2/							
Sheet and rill	71.3	389.4	5.5	279.7	3.9	109.8	1.5
Wind	39.8	180.0	4.5	153.6	3.9	26.4	.7
Other 3/	.7	4.1	5.7	5.0	6.9	- .9	-1.3
Land class:							
I	4.0	17.8	4.4	13.4	3.3	4.4	1.1
II	37.9	223.8	5.9	184.5	4.9	39.2	1.0
III	24.6	234.0	9.5	173.0	7.0	61.0	2.5
IV	7.5	77.7	10.4	55.2	7.4	22.6	3.0
V - VIII	1.1	20.2	17.8	12.1	10.7	8.0	7.1
Total 4/	75.2	573.2	7.6	438.3	5.8	135.2	1.8

1/ Because of rounding, savings may not equal the difference between without and with diversion.

2/ Total cannot be made for this group because more than one type of erosion exists on the same land.

3/ Mainly gully and irrigation erosion.

4/ Totals may not add due to rounding.

Table 8--Soil erosion effects of diversion by commodity program and cover, 1983

Item	Acreage affected by erosion	Erosion rate: Without diversion		Erosion rate: With diversion		Soil saved 1/	
	Million acres	Million tons	TAY	Million tons	TAY	Million tons	TAY
Commodity program:							
Feed grain only	26.6	226.9	8.5	153.7	5.8	73.2	2.8
Wheat only	12.9	85.0	6.6	73.1	5.7	11.8	.9
Cotton only	3.9	38.7	9.9	31.5	8.1	7.3	1.9
Rice only	1.4	4.2	2.9	3.5	2.4	.7	.5
Feed grain and wheat	23.4	168.9	7.2	128.8	5.5	40.2	1.7
Other combinations	7.0	49.9	7.1	47.8	6.8	2.0	.3
Cover:							
0 - 20%	22.5	153.8	6.9	165.9	7.4	-12.0	- .5
21 - 40%	10.5	87.3	8.3	71.3	6.8	15.9	1.5
41 - 60%	13.8	112.2	8.1	71.8	5.2	40.4	2.9
61 - 80%	12.5	103.8	8.3	61.5	4.9	42.3	3.4
81 - 100%	15.9	116.4	7.3	67.8	4.2	48.7	3.1
Cover type:							
Crop residue	21.6	170.1	7.9	119.6	5.5	50.5	2.3
Cropland conversion	1.8	12.5	6.8	9.6	5.2	2.9	1.6
Fallow	12.3	75.7	6.1	88.2	7.2	-12.9	-1.0
Natural	7.7	60.5	7.9	42.0	5.5	18.5	2.4
New seeding	3.3	23.6	7.1	14.2	4.3	9.4	2.8
Old seeding	1.2	8.7	7.1	6.3	5.2	2.4	2.0
Small grain	23.2	198.2	8.5	142.5	6.1	55.7	2.4
Volunteer stand	4.0	24.2	6.0	15.8	3.9	8.4	2.1
Total 2/	75.2	573.2	7.6	438.3	5.8	135.2	1.8

1/ Because of rounding, savings may not equal the difference between without and with diversion.

2/ Totals may not add due to rounding.

with over 80-percent cover as on land with 60- to 80-percent cover, indicating that there was little benefit in terms of soil savings after the land had a 60-percent cover.

Soil savings were also significantly affected by the type of cover on the diverted acreage. Crop residues and small grain planting, the most prevalent cover types, were found on 45 million acres and gave better than average protection. In fact, six of the eight categories had soil savings over the average 1.8 TAY. Land undergoing conversion from cropland to other uses had reduced savings due to the dramatic disturbance of the soil when ponds and waterways were constructed. Fallowed lands actually lost more soil with the diversion programs than without them.

While program requirements did not specify a certain percentage of cover, they did call for the CUA to be devoted as soon as practicable to approved cover or practices that protect the land from wind and water erosion (appendix 1). Cover crops of grasses, legumes, and small grains, including volunteer stands, were mentioned specifically as approved covers. Crop residues from reduced till operations were also mentioned. Other cover or practices were permissible if they were approved by SCS district or State conservationists or by the ASCS State committee. Natural cover and fallow found on an estimated 20 million acres were not in the list of approved cover types and should only have been allowed where erosion was not a problem.

Program Effects in Targeted Counties

Diverted land in the 339 erosion-targeted counties had lower production capabilities and was more susceptible to erosion than U.S. cropland in general.6/ While 44 percent of all diverted land and 46 percent of all U.S. cropland was class III or higher, 73 percent of diverted land in targeted counties was class III or higher (table 9).

Erosion rates on CUA before diversion in targeted counties were higher than the rates found on CUA in nontargeted sample counties. They were also higher than those found on U.S. cropland in general. Erosion declined from 10.7 TAY to 6.8 TAY on the estimated 3.3 million acres affected (table 9). The resultant average erosion reduction of 3.9 TAY was more than double the 1.8 TAY savings found nationally. Land enrolled in the 1983 diversion programs in the targeted counties was more erodible than nondiverted land in the targeted counties. The CUA's were eroding at 10.7 TAY without diversion while average land in the targeted counties was eroding at 9.1 TAY, based on 1982 NRI estimates. About half of the total 13.1 million tons saved were saved on class III land, while the largest savings, 7.3 TAY, occurred on class V-VIII land. The best cover type in the targeted counties was new seedings of grasses and legumes, which was also the best cover type nationally. Fallow, the worst cover type, had increased soil losses of 10 TAY as a result of diversion.

Long-Term Conservation Measures on Diverted Lands

Conservation measures applied to diverted lands were eligible for Federal cost-sharing or technical assistance. Fifty percent of the acreage diverted in 1983

6/ The targeting program provides extra conservation funds to these areas, designated as having severe erosion problems. There were 932 fields on 595 farms in the sample from the counties.

was treated with conservation practices. However, only about 5.2 million acres, or 7 percent, of the diverted acres were treated with long-term practices, indicating a modest effect on soil erosion in future years (table 10). Contour farming, stripcropping, and terraces were the most popular long-term practices.

Water Conservation Benefits of Diversion

Approximately 13 million acre-feet of water were not used as a result of the diversion of an estimated 8.4 million acres of irrigated land (table 11). The estimated reduction does not necessarily represent a savings because the water not used on diverted lands may have been used on other land. The 8.4 million acres affected represent 17 percent of the 49 million acres irrigated in 1982 (12). Over half of the decrease in water used on diverted land for irrigation occurred in the Pacific region. Over three-fourths of the water not used in the Pacific region occurred on fields where ground water was a major water source before CUA diversion.

Table 9--Soil erosion effects of diversion in targeted counties, 1983

Item	Acreage affected by erosion	Erosion rate: Without diversion		Erosion rate: With diversion		Soil savings 1/	
	Million acres	Million tons	TAY	Million tons	TAY	Million tons	TAY
Capability class:							
I	0.1	0.4	5.2	0.2	2.8	0.2	2.4
II	.8	6.3	7.5	3.7	4.3	2.7	3.1
III	1.5	17.3	11.2	11.1	7.2	6.2	4.0
IV	.7	8.4	12.1	5.2	7.5	3.2	4.5
V - VIII	.1	2.9	22.9	2.0	15.6	.9	7.3
Cover type:							
Crop residue	1.1	8.0	7.2	6.7	6.0	1.3	1.1
Cropland conversion	0	.2	13.9	.1	6.6	.1	7.4
Fallow	.2	2.4	10.5	4.8	20.9	-2.4	-10.3
Natural cover	.7	9.5	14.6	5.4	8.2	4.2	6.4
New seeding	.4	6.7	15.6	1.8	4.3	4.8	11.3
Old seeding	.1	.9	13.7	.3	4.2	.6	9.5
Small grain	.5	5.2	9.6	2.3	4.2	2.9	5.4
Volunteer stand	.2	2.4	10.1	.8	3.5	1.6	6.6
Total 2/	3.3	35.3	10.7	22.2	6.8	13.1	3.9

1/ Because of rounding, totals may not equal the difference between without and with diversion.
2/ Totals may not add due to rounding.

Program Effects on Wildlife Habitat

Wildlife can also be an important resource for agriculture, and in fact, USDA officially recognizes wildlife as a valid consideration in land management decisions (3). Idled land, if properly treated, can provide valuable cover for many species. Therefore, there was interest in assessing the effect of the 1983 programs on wildlife habitat.

Evaluation Procedures

The evaluation for wildlife cover depended primarily on the percentage of ground cover and intended tillage plans for the fall of 1983. The aggregated data were weighted to determine the number of acres of satisfactory wildlife cover for the entire year. For each of four seasons, cover was rated as satisfactory or unsatisfactory on the basis of the assumptions described below. The number of satisfactory acres in any given season was multiplied by 0.25, the fraction of the year the cover was present. This was done for all four seasons. Total satisfactory acreage was the sum of satisfactory acreage in each of the four seasons.

Five assumptions were made for assessing wildlife cover: (1) cover had to be greater than 40 percent to be satisfactory, (2) fall cover in 1983 was greater than 40 percent if summer cover was greater than 40 percent and no-till was to be used in the fall, (3) cover was unsatisfactory in the winter of 1982 and spring of 1983 if fields were in fallow or small grains in the summer of 1983, (4) spring cover was satisfactory if cover density was greater than 40 percent on summer fields in new seeding and volunteer stands but unsatisfactory in winter 1982, and (5) winter and spring cover were satisfactory if summer cover was greater than 40 percent on fields in old seeding or crop residue.

For example, if a 100-acre small grain field at sample time had more than 40-percent ground cover, then cover was deemed to be satisfactory for the summer of 1983. However, cover was assumed to be unsatisfactory in the preceding two seasons because the cover type was small grain. If the field was assumed to be no-tilled in the fall, cover would also be satisfactory in the fall of 1983. Using the weighting scheme, the total number of acres in satisfactory wildlife cover for the year would equal 50 acres: (.25)(0 acres in the winter of 1982) + (.25)(0 acres in the spring of 1983) + (.25)(100 acres in the summer of 1983) + (.25)(100 acres in the fall of 1983).

The aggregated data are useful for comparing the proportion of satisfactory wildlife cover in the regions of the country and for determining which cover crops were most effective for providing cover. However, the aggregated data cannot be used to determine how many acres were in continuous cover throughout the year. For instance, the value of cover for nesting habitat depends on adequate cover through both spring and summer. Therefore, the data were also broken down on a seasonal basis to show the number of acres of cover available in each season.

Density is only one component of cover. The other component is height of cover. However, these results assess cover solely on the basis of percentage of ground cover because no data were available on the height of cover. The results will overestimate the amount of satisfactory cover to the extent that adequate density was not accompanied by adequate height.

Wildlife Results

Thirty-four percent of the CUA provided satisfactory wildlife cover (table 12). The proportion of total diverted acreage considered satisfactory varied considerably by both region and cover type. The Northeast region had the highest proportion (70 percent), while the Pacific region had the smallest (13 percent). However, these two regions accounted for only a small percentage of total diverted acreage. Most of the diverted acreage was in the Corn Belt, Northern Plains, and Southern Plains. The proportion of satisfactory cover in those three regions ranged from 24-42 percent.

New seedings, old seedings, and volunteer stands of grasses and legumes provided the highest percentages of satisfactory cover. However, these three cover types accounted for only 11 percent of the total diverted acreage (table 13). Fields left fallow provided no satisfactory cover. Small grains had a relatively small proportion of acreage in satisfactory cover, but small grain acreage providing satisfactory cover was large because of the large acreage in small grains.

The amount of satisfactory cover on the diverted land on a seasonal basis is presented in table 14. Because 40-percent ground cover is a minimal figure, the results based on 60-percent ground cover are also presented. In the fall/winter of 1982 and spring of 1983, only fields in crop residue, old seedings, or new seedings were assumed capable of providing cover. Since the assumptions used to assess cover in both seasons are the same, the results are also identical. Increasing the ground cover requirement from 40 to 60 percent would reduce the amount of satisfactory acres. The reduction would come almost entirely from acreage in crop residue.

The highest proportion of acreage in satisfactory cover occurred in the summer. In the fall, about half of the summer cover was then lost because of conventional tillage. Over half the acres in crop residue, and new and old

Table 10--Diverted acreage treated or served by conservation practices with long-term (5 or more years) effects on erosion, 1983

Long-term practices 1/	Acreage treated or served
	1,000 acres
Contour farming	842
Diversions and grass waterways	136
Grade stabilization structures	156
Pasture and hayland planting and management	699
Strip-cropping	3,133
Terraces	154
Miscellaneous	64
Total	5,184

1/ Expected to have effects on soil erosion for at least 5 years.

Table 11--Effects of land diversion on water use on conservation use acres that were irrigated prior to diversion, 1983

Region	Surface water		Well water		Multiple sources		All sources		
	Million A-F 1/	A-F per acre	Million A-F	A-F per acre	Million A-F	A-F per acre	Million A-F	Million acres	A-F per acre
Appalachian	0	0	0	0	0	0	0	0	0
Corn Belt	0	0	0	0	0	0	0	0	0
Delta States	.6	1.3	.1	1.0	.3	1.7	1.0	.8	1.3
Lake States	0		0	0	0	0	0	0	0
Mountain	.6	2.1	.6	1.7	.5	2.1	1.7	.9	1.9
Northeast	0	0	0	0	0	0	0	0	0
Northern Plains	1.4	.8	.1	.8	.3	.7	1.7	2.2	.8
Pacific	1.7	3.0	2.0	2.7	3.5	3.7	7.2	2.3	3.2
Southeast	0	0	0	0	0	0	0	0	0
Southern Plains	1.0	.5	.3	4.2	0	1.8	1.4	2.2	.6
Total 2/	5.3	1.0	3.1	2.3	4.5	2.6	13.0	8.4	1.6

1/ Acre-feet.
2/ Totals may not add due to rounding.

Table 12--Diverted acreage with satisfactory wildlife habitat by region, 1983

Region	Acreage in region		Proportion satisfactory
	Total	Satisfactory for wildlife	
	- - Million - - acres		Percent
Appalachian	2.3	1.4	63.4
Corn Belt	17.2	7.2	42.0
Delta States	3.1	1.2	39.8
Lake States	8.0	2.9	35.6
Mountain	2.9	.4	13.6
Northeast	1.5	1.0	70.2
Northern Plains	20.7	7.2	34.5
Pacific	5.9	.8	13.1
Southeast	1.7	1.1	66.5
Southern Plains	14.7	3.6	24.3
Total 1/	78.0	26.9	34.4

1/ Totals may not add due to rounding.

Table 13--Diverted acreage with satisfactory wildlife habitat by cover type, 1983

Cover type	Acreage in region		Proportion satisfactory
	Total	Satisfactory for wildlife	
	- - - Million - - - acres		Percent
Cropland conversion	1.8	0.1	4.1
Crop residue	22.5	9.3	41.3
Fallow	13.2	0	.2
Natural cover	7.7	3.5	44.9
New seeding	3.5	2.9	83.3
Old seeding	1.2	1.1	86.3
Small grain	24.1	6.9	28.5
Volunteer stand	4.1	3.2	77.1
Total 1/	78.0	26.9	34.4

1/ Totals may not add due to rounding.

seedings were lost to wildlife in the fall due to conventional tillage. As a result, only 19 percent of the total acres provided continuous cover for three seasons, but less than 19 percent provided year-round continuous cover.

Comparison with Midwest Survey

In 1983, 12 Midwestern States were surveyed for the fourth time since 1972 to estimate the condition of wildlife habitat on diverted acreage (1). The 12 States were Colorado, Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. The results of this survey were compared with our results in the same 12-State region.

The Midwest survey was conducted to determine the adequacy of nesting cover on diverted acreage. Two visits were made to each sample site. Data were collected on density of ground cover, cover type, height of cover, and the date the cover was disturbed. Therefore, the Midwest data set provided more information on wildlife cover conditions than the USDA data set. However, the Midwest survey dealt only with conditions in the spring and summer, the two critical seasons for nesting.

In table 15 the distribution of diverted acres in the 12-State region is shown by cover types. The original Midwest data had 27 cover types, which had to be grouped into the eight USDA types. To the extent that different classification schemes were used, small discrepancies might be expected. Also, the first check on the Midwest survey occurred in June, which may have been earlier than the USDA survey visits in this area. Some fields that were fallow earlier in the summer probably had some cover by the later check. These two factors together explain some of the differences between the two surveys, but they are unlikely to account for some of the larger discrepancies.

Even though the numbers are different, the trends are consistent between the two surveys. If the four regions represented in the 12-State area are ranked according to the proportion of satisfactory cover provided, the findings for both surveys are identical. Similarly, the ranking of cover types by satisfactory cover provided is identical.

Table 14--Diverted acreage with satisfactory wildlife habitat by season, 1983

Season	Acreage with satisfactory cover			
	Density > 40%		Density > 60%	
	Million acres	Percent 1/	Million acres	Percent 1/
Fall/winter 1982	14.9	19	9.3	11
Spring 1983	14.9	19	9.3	11
Summer 1983	43.5	56	29.0	37
Fall 1983	22.7	29	14.9	19

1/ Percentage of all diverted acreage.

The results of the two surveys can be compared for satisfactory nesting cover (table 16). For the USDA survey, only fields in crop residue and new and old seeding were assumed to provide any cover in the spring. Therefore, only

Table 15--Distribution of acreage among cover types in USDA and Midwest surveys, 1983

Cover type	Proportion of acreage	
	USDA survey	Midwest survey
	Percent	
Cropland conversion	4	1/
Crop residue	24	32
Fallow	7	23
Natural cover	9	1/
New seeding	6	15
Old seeding	1	7
Small grain	46	18
Volunteer stand	3	5
Total	100	100

1/ The Midwest survey did not include these cover categories.

Table 16--Diverted acreage suitable for nesting cover in the USDA and Midwest surveys, 1983

Cover type	Proportion of satisfactory acreage	
	USDA 12-State region 1/	Midwest survey
	Percent	
Crop residue	24	12
Fallow	0	0
New seeding	90	27
Old seeding	91	36
Small grain	0	11
Volunteer stand	0	16
Average	12	16

1/ Based on ground cover greater than 60 percent.

fields in those three cover types could be assumed to provide cover in the spring and summer. For the 12-State region, only 12 percent of the total acreage met this criterion, using a ground cover requirement of greater than 60 percent. The Midwest survey found that 14 percent of total acres provided satisfactory nesting cover. However, this similarity in results is caused largely by the exclusion of all but three cover types in the USDA survey. The percentage of satisfactory cover is much higher for the CUA than the Midwest survey in those three categories.

Despite the differences between the two surveys, the data from both imply that little wildlife cover was provided on diverted acres in 1983. The existence of an annual set-aside program is not sufficient to guarantee the concurrent provision of wildlife habitat. Explicit guidelines must be incorporated into set-aside programs if providing habitat is to be one goal of such programs.

RECOMMENDATIONS FOR FUTURE PROGRAMS

The results of the study indicate two ways in which the soil conservation benefits of the commodity programs can be enhanced. First, the programs could be modified to withdraw the more erodible lands from production and, second, the programs could ensure that the lands withdrawn from production are adequately protected from erosion.

Erosion rates on land diverted under the 1983 commodity programs were representative of those on U.S. cropland in general. The analysis also indicates that lands eroding at higher rates will have significantly higher soil savings when withdrawn from production than those eroding at lower rates. Thus, an increase in the percentage of diverted lands in the more erodible groups, such as land class/subclass IVe through VIIe, would significantly increase the conservation benefits of the diversion program. The second method of enhancing the soil conservation benefits, protecting the diverted land from erosion, was only partially done under the 1983 programs. These programs resulted in a significant increase in adequately protected acreage but still left about 40 percent of diverted acreage eroding at levels greater than the tolerable rate.

The price-enhancing feature of the commodity programs makes it feasible to cultivate marginally productive lands that would not be in production in a competitive market situation. In many cases, these marginally productive lands are also eroding at high rates. To reduce commodity program costs, the Federal Government offers farmers participating in the programs a payment based on the average yield on their farms if they will withdraw some of their land from production. As might be expected, the farmers divert their worst cropland, keeping their best in production. However, the quality of cropland varies between farmers. One participating farmer's diverted land may be better than the land another participating farmer keeps in production. Thus, the land being diverted from production through current commodity programs may be better and less erodible than the land that would have been withdrawn had the free market been allowed to operate. This means that an indirect result of the commodity programs is an increase in erosion and a decrease in the future productivity of American agriculture.

Ogg, Webb, and Huang (6) have shown that removing the least productive lands from production, as the free market would do, would have removed more than twice as many highly erodible acres from production as the 1978 commodity

programs did. While the total acreage reduction required for a given level of production control would increase under free market conditions, the total cost of the production control program should decrease significantly because the farmers should be willing to accept a lower payment per acre to set aside the less productive land. But not all highly erodible lands are marginally productive. An analysis (9) of alternative acreage reduction strategies evaluates an option that emphasizes removing highly erodible land. The findings indicate that for about the same cost as a nontargeted acreage reduction program, targeting a moderately sized diversion program (of about 21 million acres) could increase by over fourfold the amount of highly erodible land withdrawn from production as a nontargeted acreage reduction program of the same size.

The feasibility of targeting the diverted lands based on erosion rates decreases as the total number of acres to be diverted increases because it would be harder to find lands that would meet a targeting criteria. However, even programs as large as 1983's can be targeted toward land eroding at higher rates. Table 17 shows the distribution of land by erosion rate group for each of the 1983 program commodities and the total number of acres withdrawn from production of each commodity. All the program commodities, except rice, have acreages losing soil at a rate greater than T that are larger than the number of acres withdrawn from production in 1983. All the cotton diverted acreage could have been drawn from land eroding at greater than 2T, and 80 percent of the land diverted under the feed grain and wheat programs could have been drawn from land eroding at greater than 2T. The 1983 programs limited the amount of land per county that could be withdrawn from production of a particular crop to 45 percent of the total county's base acreage for the crop. Such limitations reduce the effectiveness of this type of targeting.

An estimated additional 307 million tons of soil, a 227-percent increase, could have been saved if the 1983 diversion programs had withdrawn only the land that was eroding at rates greater than 2T. This is the increased savings that would have occurred if all 80 million diverted acres had been selected from land that was eroding at these higher rates. Lack of complete participation and high productivity of some erodible soils are among the reasons preventing any program from realizing the total potential savings. However, targeting the diversion programs to the more erodible soils would alleviate a negative side effect of the commodity programs, by producing significant soil savings, but it would be more costly.

The second method of achieving soil conservation benefits, protecting the diverted land from erosion, was only partially attained in 1983. The programs caused an increase in adequately protected acreage, but still left about two-fifths of the diverted acreage eroding at levels greater than the tolerable rate.

Program requirements concerning permissible practices on CUA's could be modified to increase soil savings. If fallow had not been permitted and the 12.3 million acres fallowed in 1983 had been covered with crop residues, for example, the 1983 programs would have saved an additional 40 million tons, an increase of 30 percent. The effect on farm costs of changes to conservation treatment requirements would have to be considered. If costs were increased, participation might decrease, and overall soil savings could go up or down.

The conservation benefits might also be improved by requiring a certain percentage of cover on the land. Almost a third of the idled land had

essentially no cover. A requirement of 50-percent cover would increase soil saved by 86 percent--over 116 million tons. Here as well, the effect of the requirement on participation would need to be considered to determine if the full amount of increased soil savings could be expected.

Providing wildlife habitat and controlling erosion can be complementary activities, but farmers must be provided with incentives to maintain and increase habitat. A multiyear set-aside program requiring grass and legume cover would be very beneficial to wildlife. Such a program would guarantee continuous cover throughout the breeding season as long as mowing is prohibited until after September 1 and would also provide winter cover. An annual set-aside can provide good nesting cover if cover is established by May 1 and left undisturbed (that is, no mowing and plowing) until September 1. Leaving crop residues through the winter provides both food and cover for wildlife. Only 19 percent of the acreage had satisfactory cover through the winter on the diverted land, and less than 19 percent had cover through both the spring and summer, the two seasons critical to nesting success.

Federal agricultural programs can also discourage the conversion of existing wildlife habitat into crop production. By denying farm program benefits on land converted from valuable wildlife habitat, farmers would have less incentive to convert such highly productive and increasingly scarce habitat as wetlands, prairies, and riparian areas.

Past land retirement programs, especially in the thirties and forties, were effective in providing wildlife habitat. By drawing on past experience and using information on the habitat needs of wildlife, Federal agricultural programs can incorporate the enhancement and protection of habitat in a manner consistent with both erosion control and production control.

Table 17--Acreage of program crops diverted, by erosion rate, FY 1983

Commodity	Erosion rate: Less than T	Erosion rate: T to 2T	Erosion rate: Over 2T	Acreage diverted 1/
	Million acres			
Feed grains	63.1	29.9	32.9	39.7
Wheat	47.0	21.5	20.9	30.5
Cotton	4.8	2.7	9.0	6.5
Rice	4.1	.4	.1	1.7
Total	119.0	54.5	62.9	78.4

1/ Estimated from survey.
Source: (13)

REFERENCES

1. Berner, A. H. "Federal Land Retirement Program: A Land Management Albatross?" Transactions of the North American Wildlife and Natural Resources Conference, vol. 49 (1984), 118-131.

2. Bills, Nelson L. "Soil Erosivity and Crop Yield: Implications of a Land Retirement Program for New York Cropland." Northeastern Journal of Agricultural and Resource Economics, vol. 14, No. 1 (April 1985), 57-64.

3. Carlson, C. A. "Wildlife and Agriculture: Can They Coexist?" Journal of Soil and Water Conservation, vol. 40 (1985), 263-366.

4. Hanson, M. H., W. N. Hurwitz, and W. G. Madow. "Sample Survey Methods and Theory." Vol. I. Methods and Applications. New York: John Wiley and Sons, Inc., 1953.

5. McCormack, D. E., K. K. Young, and L. W. Kimberlin. "Current Criteria for Determining Soil Loss Tolerance." Determinants of Soil Loss Tolerance. ASA Special Publication No. 45 (1982). Pp. 95-111.

6. Ogg, C. W., S. Webb, and W. Huang. "Cropland Acreage Reduction Alternatives: An Economic Analysis of a Soil Conservation Reserve and Competitive Bids." Journal of Soil and Water Conservation, vol. 39 (November-December 1984), 379-383.

7. Osteen, C. D. Impacts of Farm Policies on Soil Erosion: A Problem Definition Paper. U.S. Department of Agriculture, Economic Research Service. ERS Staff Report No. AGES841109. January 1985.

8. Reichelderfer, K. H. Do USDA Farm Program Participants Contribute to Soil Erosion? U.S. Department of Agriculture, Economic Research Service. AER-532. April 1985.

9. U.S. Department of Agriculture, Economic Research Service. Analysis of Policies to Conserve Soil and Reduce Surplus Crop Production. AER-534. April 1985.

10. U.S. Department of Agriculture, Soil Conservation Service. Evaluation of Conservation Technical Assistance--Part 1 National Summary. April 1985.

11. U.S. Department of Agriculture, Economic Research Service. An Initial Assessment of the Payment-In-Kind Program. April 1983.

12. U.S. Department of Agriculture. Census of Agriculture tapes. 1982.

13. U.S. Department of Agriculture. National Resources Inventory tape. 1982.

14. U.S. Department of Agriculture, Agricultural Stabilization and Conservation Service. Deficiency Payment Reports, July 27, 1984.

15. Weisgerber, P. Productivity of Diverted Cropland. U.S. Department of Agriculture, Economic Research Service. ERS-398. April 1969.

APPENDIX 1: APPROVED COVER AND PRACTICES 1/

A. The conservation use acreage shall be devoted as soon as practicable to one or more of the following approved covers, or to other cover or practices described in subparagraph B:

1. Annual, biennial, or perennial grasses and legumes:

   a. Including volunteer stands other than weeds that meet the criteria set forth by the Agricultural Stabilization and Conservation State Committee (STC).

   b. Excluding soybeans, corn, grain sorghum, and cotton.

2. Barley, oats, rice, wheat, and other small grains, including volunteer stands, that meet the criteria set forth by STC. One of the following must apply, except for volunteer stands, not considered grain unless harvested:

   a. Grain must be clipped before reaching the disposal deadline.

   b. Seeds must have been planted too late to form grain.

   c. Before the disposal deadline, the producer may request an extension of the disposal deadline and pay for a farm visit.

      (1) The service charge is set by the County Committee (COC).

      (2) The State committee establishes a date by which mature stands of small grains shall be clipped, shredded, or lightly tilled. The date shall be no later than 30 days following the end of the normal harvest date for the county.

      (3) A COC representative will randomly check the acreage before and after the disposal deadline to verify that the crop was not harvested and proper clipping, shredding, or tilling was performed.

3. The crop residue from the use of no-till or minimum till practices.

B. Other cover or practices that will protect the acreage from wind and water erosion throughout the calendar year may be approved if they are all of the following:

1. Recommended by the COC in consultation with the Soil Conservation Service (SCS) district conservationist. Document in COC minutes.

2. Approved by STC, with written concurrence of the SCS State conservationist that the practices will sufficiently protect the land from wind and water erosion. Concurrence must be obtained annually.

   a. Before the approval of practices, STC should consult with appropriate wildlife agencies and organizations (such as State

1/ Taken from regulations issued by ASCS, June 1983.

wildlife agencies, fish and game commissions, Izaak Walton League, Audubon Society, and wildlife management institutes) and other interested groups (such as Extension Service, vocational agriculture, Junior Chamber of Commerce, Chamber of Commerce, and Lions Club) to see if additional practices that further the goals of these entities can be developed.

b. Control measures shall be consistent with erosion control measures normally carried out on other cropland in the area. It is not intended to require control measures that would be more costly to the producer than what is normally accepted for the area.

C. Any nonprogram crop, except soybeans, popcorn, sweetcorn, and perennial or biennial vegetables, may be planted on conservation use acreage as follows:

1. SCS must agree that the cover will prevent wind and water erosion according to subparagraph B:

2. The crop may:

a. Not be harvested. The STC shall establish a deadline by which the crop shall be clipped or otherwise disposed of except for those producers requesting to let the crop remain standing. In such case, the producer must request and pay for a farm visit to verify that the crop was not harvested.

b. Not be grazed during the nongrazing period.

D. Residue and stubble of destroyed program crops may be approved under subparagraph B. STC must set conditions to ensure that crop residue, as opposed to regrowth, will not be grazed after the end of the nongrazing period.

E. Conservation use acreage may be seeded to crops in the fall for harvest the next year. The land may be prepared in the fall of the current year and left bare only when recommended and approved according to subparagraph B.

APPENDIX 2: EDITING OF CRES RECORDS

CRES records were edited for errors which were removed where appropriate. The editing criteria used to eliminate records that contained inconsistencies determined to be irreconcilable are shown below. The criteria regarding soil erosion and water withdrawals resulted in the elimination of 170 and 65 records, respectively.

1. Delete if reported losses due to wind, sheet, and rill erosion increased by more than 20 tons per acre per year (TAY).

2. Delete if water used after diversion is greater than water used before diversion, or if reduced water withdrawals exceeds 10 acre-feet per acre per year.

3. Delete if reported reduction in soil loss is greater than allowed per table below.

SCS practice code	Maximum allowable reduction in erosion
Chiseling and subsoiling	50 percent
Conservation cropping system	1/
Conservation tillage system	1/
Contour farming	70 percent
Cover and green manure crop	1/
Crop residue use	1/
Grasses and legumes in rotation	200 TAY (sheet and rill only)
Grassed waterway or outlet	200 TAY (sheet and rill only)
Irrigation water management	30 percent
Irrigation land leveling	10 percent
Pasture and hayland management	30 percent
Pasture and hayland planting	200 TAY (sheet and rill only)
Stubble mulching	1/
Stripcropping	500 TAY (wind only)
Terrace	200 TAY (sheet and rill only)
Wildlife upland habitat management	30 percent

1/ Percentage cover determines maximum allowable reduction in soil loss as follows:

Percentage cover	Maximum allowable percentage reduction in erosion
0-20	40
21-40	70
41-60	85
61-80	95
81-100	97

Appendix table 1--Sample sizes and proportions, nontargeted counties, 1984

Region	Diverted acreage				Participating farms				Counties		
	Surveyed	Total	Estimate	Percentage surveyed	Surveyed	Total	Estimate	Percentage surveyed	Surveyed	Total	Percentage surveyed
	Thousands	Million acres		Percent	Thousands			Percent	Number		Percent
Appalachian	17.4	2.9	2.3	0.7	674	98	87	0.7	35	473	7.4
Corn Belt	26.5	19.0	17.2	.1	606	370	366	.2	25	495	5.1
Delta States	40.8	3.2	3.1	1.2	601	51	41	1.2	35	221	15.8
Lake States	11.2	8.2	8.0	.1	210	140	147	.1	10	242	4.1
Mountain	44.9	6.6	2.9	.7	311	51	21	.6	20	278	7.2
Northeast	10.3	1.9	1.5	1.0	226	33	29	.7	15	238	6.3
Northern Plains	40.5	21.6	20.7	.2	458	266	240	.2	20	318	6.3
Pacific	35.7	2.9	5.9	1.3	220	21	43	1.0	12	133	9.0
Southeast	14.2	2.3	1.7	.6	380	62	44	.6	20	339	5.9
Southern Plains	81.8	12.1	14.7	.6	712	142	107	.5	35	331	10.6
United States 1/	323.3	79.8	78.0	.4	4,398	1,234	1,124	.4	227	3,068	7.4

1/ Totals may not add due to rounding.
Source: (14)

Appendix table 2--Distribution of participating farms and soil erosion effect of diversion, 1983

Item	Number of farms	Acreage affected by erosion	Erosion rate				Soil saved 1/	
			Without diversion		With diversion			
	Thousands	Million acres	Million tons	TAY	Million tons	TAY	Million tons	TAY
Type of farm:								
Cash grain	687	45.6	333.0	7.3	253.1	5.6	79.9	1.8
Cotton	43	5.1	53.4	10.4	41.5	8.1	12.0	2.3
Tobacco	25	.4	2.7	7.4	1.2	3.4	1.4	3.9
Livestock	28	1.1	5.6	5.2	4.9	4.6	.7	.7
Livestock and grain	332	22.0	174.8	7.9	134.4	6.1	40.3	1.8
Other combinations	9	1.0	4.1	4.1	3.3	3.2	.8	.8
Size of farm:								
Less than 50 acres	83	1.0	4.5	1.0	2.8	2.7	1.8	1.7
50 - 179 acres	482	14.7	114.8	8.8	82.4	5.6	32.4	2.2
180 - 499 acres	382	24.2	197.6	8.2	147.3	6.1	50.2	2.1
500 - 1,999 acres	158	25.6	189.8	7.4	151.9	5.9	37.9	1.5
Over 1,999 acres	19	9.6	66.8	6.9	53.8	5.6	12.9	1.3
Type of ownership:								
Family or individual	1,088	70.1	542.9	7.7	415.9	5.9	127.0	1.8
Partnership or corporation 2/	9	2.6	20.5	8.0	14.8	5.8	5.7	2.2
Combination	27	2.5	10.0	5.0	7.5	3.0	2.5	1.0
SCS cooperator status:								
Noncooperator	519	28.0	215.0	7.7	59.7	6.4	35.7	1.3
Less than 1 year	22	1.1	14.7	13.8	9.3	8.7	5.4	5.1
1 to 3 years	49	3.4	19.2	5.7	18.5	5.5	.6	.2
More than 3 years	536	41.8	316.9	7.6	224.7	5.4	92.3	2.2
Other 3/	12	1.0	7.7	7.7	6.5	6.5	1.2	1.2
Days of off-farm work:								
None	741	55.6	414.7	7.5	317.2	5.7	97.5	1.8
1 - 99	78	4.7	58.5	12.4	47.0	10.0	11.5	2.4
100 or more	109	4.5	27.9	6.3	21.7	4.9	6.2	1.4
Other 3/	199	10.4	72.4	7.0	52.4	5.1	20.0	1.9
Decisionmaker:								
Owner operator	651	46.2	367.9	8.0	272.8	5.9	95.1	2.1
Tenant operator	310	17.1	133.6	7.8	112.1	6.6	21.5	1.3
Landlord	105	6.1	37.4	6.1	25.8	4.2	11.6	1.9
Other 3/	58	5.7	34.6	6.1	27.6	4.8	7.1	1.2
United States	1,124	75.2	573.5	7.6	438.3	5.8	135.2	1.8

1/ Because of rounding, savings may not equal the difference between without and with diversion.
2/ Nonfamily ownership.
3/ Includes unknown or not reported.

Appendix table 3--Erosion rates on diverted cropland without diversion and on all cultivated cropland, 1983

Item	Sheet and rill erosion		Wind erosion		Total	
	Diverted 1/	All 2/	Diverted 1/	All 2/	Diverted 1/	All 2/
	Tons per acre per year					
Region:						
Appalachian	9.4	9.5	0	0	9.4	9.5
Corn Belt	7.1	7.8	.7	.9	7.6	8.7
Delta States	5.8	5.8	0	0	5.9	5.8
Lake States	5.2	3.2	1.8	3.1	7.0	6.4
Mountain	3.0	2.5	3.7	8.2	5.7	10.7
Northeast	7.4	5.7	0	.1	7.4	5.8
Northern Plains	4.6	3.2	2.8	2.7	7.5	6.0
Pacific	4.5	3.5	1.7	1.7	6.3	5.2
Southeast	7.3	5.7	.1	.2	7.4	13.4
Southern Plains	2.2	2.6	5.3	10.9	7.5	13.4
Land class:						
I	3.8	2.6	.5	1.6	4.3	4.2
II	3.7	3.5	1.9	2.0	5.7	5.6
III	6.0	5.4	3.1	3.7	9.2	9.1
IV	7.2	7.7	2.6	7.0	9.9	14.7
V - VIII	14.8	12.2	2.1	8.3	16.9	20.5
United States	5.0	4.8	2.3	3.3	7.3	8.1

1/ Erosion rates on diverted cropland are averaged over all diverted acreage and do not include other erosion.

2/ Based on 1982 NRI (12).

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