

WRC Research Report No. 217

**Evaluation of Policy Tools to Establish Forests and Protect Water
Quality in Cornbelt Watersheds**

by

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ABBREVIATIONS

- ASCS -- Agricultural Stabilization and Conservation Service
- AWR -- Agricultural Wetland Reserve Program
- CRP -- Conservation Reserve Program
- EPA -- U.S. Environmental Protection Agency
- SCS -- Soil Conservation Service
- USDA -- U.S. Department of Agriculture
- WQIP -- Water Quality Incentives Program

AN EVALUATION OF POLICY TOOLS TO ESTABLISH FORESTS AND PROTECT WATER QUALITY IN CORNBELT WATERSHEDS

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ABSTRACT

The 1990 Farm Bill provides a number of incentives to farmers and farmland owners to improve water quality by retiring critical croplands through the Conservation Reserve Program (CRP) and the Agricultural Wetland Reserve Program (AWR), and by controlling chemical use through the Water Quality Incentives Program (WQIP). This study utilizes two contingent valuation methodologies on 770 mail surveys and 157 personal interviews in 10 Cornbelt counties to estimate potential participation in these programs as a function of financial incentives offered. It also identifies possible barriers to increased enrollment and presents farmers' attitudes toward these programs as well as toward Swampbuster. The results show that potential enrollments in the WQIP are low; only 17.5% of respondents indicated an interest in participating. In contrast, potential enrollments of filter strips, recharge areas, and farmed wetlands in the CRP respond strongly to annual rental rates, particularly in the range \$90-140/acre. Enrollments in 30-year easements are lower, but also respond strongly to increased lump sum payments. In contrast, most respondents are clearly resentful of Swampbuster restrictions on wetland drainage.

Keywords: water quality, wetlands, economic incentives, contingent valuation, CRP

INTRODUCTION

Groundwater supplies drinking water to approximately 53% of the nation's population and to 97% of the population living in rural areas. Groundwater also provides about 55% of the water used by livestock (Feliciano, 1986; Olenius, 1988). Consequently, the maintenance of groundwater quality is a significant issue of public policy. The quality of the groundwater filling these domestic needs is directly linked to land-use activities (Blatt, 1986). Recent studies indicate that groundwater is being contaminated from agricultural as well as nonagricultural sources (BNA, 1986; Conner, 1985; Hallberg, 1987; Nielson and Lee, 1987; Olenius, 1988; U.S. House of Representatives, 1988; Office of Technology Assessment, 1990). According to the U.S. Department of Agriculture (USDA), groundwater has been contaminated by agricultural fertilizers in 31 states and by pesticides in 37 states (Olenius, 1988). In December, 1988, the U.S. Environmental Protection Agency (EPA) reported residues of 46 pesticides from normal agricultural use in the groundwater of 26 states (BNA, 1988). Evidence of groundwater contamination has sparked a broad range of public reactions, legislative activity to control contamination, and a Presidential initiative (Office of the President, 1989; USEPA, 1988).

Consequently, from a public policy perspective, farmers' attitudes toward the range of feasible policy options to control groundwater contamination from agricultural sources is a major concern. Using data collected from surveys of farmers located in diverse regions of the Midwest, we are evaluating the attitudes and potential responses of landowners and farm operators toward policy alternatives designed to mitigate the contamination of groundwater by agricultural activities. The specific policy alternatives that we are considering are those in the 1985 Food Security Act, the Food, Agriculture, Conservation and Trade Act of 1990 (Farm Bill), section 319 of the 1987 Amendments to the Clean Water Act, and policy tools that may be part of the 1992 reauthorization of the Clean Water Act and the 1995 Farm Bill.

Current agricultural practices in the Cornbelt states of Illinois, Iowa, Indiana, northern Missouri and southern Wisconsin have caused a widespread loss of aquatic habitat and decline in the quality of surface and groundwater due to excessive sedimentation and runoff and infiltration of fertilizers and pesticides (Karr, et al., 1985; Nielson and Lee, 1987; USDA, 1989). The conservation policies authorized by the 1985 Food Security Act and implemented by USDA, such as the Conservation Reserve Program (CRP) and Conservation Compliance, focus largely upon conserving soil rather than controlling nonpoint source pollution of aquifers and waterways. Thus conservation practices critical to water quality control -- potential retirement or change in chemical use on critical recharge areas, establishment of filter strips, and preservation and restoration of wetlands -- have not been achieved through existing USDA programs. A July, 1990 General Accounting Office report states that USDA is in a "unique position to potentially influence actions that can affect water quality," but that USDA has failed to develop and implement a coherent water resources policy (U.S. GAO, 1990).

Our research is investigating the potential response of farmers and farmland owners, given a range of levels of economic incentives, to a variety of existing and possible USDA water quality conservation policy initiatives including: (1) the Conservation Reserve Program (CRP) directed at groundwater recharge areas, filter strips, and wetlands; (2) 30-year conservation easements for these areas; and (3) the agricultural Water Quality Incentives Program (WQIP). If these policy initiatives could obtain substantial enrollments at affordable program costs, there would be major changes in landuse patterns in Cornbelt watersheds beneficial to ground and surface water quality. An increase in vegetated filter strips, wetlands, and tree plantings, and consequent reduction or elimination of chemical use on croplands critical for groundwater and surface water quality control, would significantly improve water quality and aquatic ecosystems in the Cornbelt, the region that suffers most severely from agricultural nonpoint-source pollution impacts.

OBJECTIVES

The overall objective of this project is to determine the potential of USDA water quality programs to change farmers' land and chemical use patterns in a manner that contributes to improved surface and groundwater quality. Six specific objectives emerge as measurable elements of this overall objective. The four objectives largely achieved to this date are: (1) to estimate the potential enrollment in the Water Quality Incentives Program, (2) to estimate the potential retirement of environmentally critical croplands (recharge zones, filter strips, farmed wetlands) into the CRP and Agricultural Wetland Reserve (AWR) Programs as a function of annual rental rates and lump sums offered, (3) to identify the barriers to enrollment of croplands in the CRP and AWR Programs and to identify changes in those programs that would improve enrollments, and (4) to determine farmers' attitudes toward the Swampbuster provision of the 1985 and 1990 Farm Bills. The two objectives upon which further work is required are: (5) to determine those factors that discriminate between farmers and landowners who say they would participate in the WQIP, CRP, and AWR and those who do not, and (5) to analyse the spatial patterns of land use that would emerge from a water quality perspective if the enrollments anticipated for different rental rates actually occurred.

PROCEDURES

This study is focused on 10 counties that represent the Cornbelt (Table 1). The 10 counties have been chosen for their availability of data, CRP enrollments, farm enterprises, and the potential for impacts on groundwater quality (as measured by DRASTIC scores [see Nielson and Lee, 1987]).

Two separate but related surveys were conducted to determine farmers' potential responses to a range of policy tools to encourage tree planting, wetland restoration, and retirement of cropland critical for water quality improvement. The first is a questionnaire mailed to 2067 farmers and farmland owners in the 10 counties selected. The farms were selected based on an assessment of the agricultural land in the respective counties and its potential eligibility for the USDA programs studied. The assessment was based on our understanding of the programs and the rules/regulations governing their implementation. Land that was deemed to be eligible was marked and, using USDA records, the landowner and/or farm operator was identified. Farmers were mailed a survey and a farm map based on ASCS tract maps that had the various land types identified and marked in different colors. Each survey included measurements as to the number of acres of land in each type. Seven-hundred seventy useful surveys were returned for an overall response rate of 37%. The second survey is a personal interview survey of 157 farmers and farmland owners in the same counties.

Table 1. Mail and Personal Interview Surveys Obtained from 10 Cornbelt Counties.

County	State	<u>Mail Surveys</u>		Response Rate (%) ^a	Personal Interviews
		Sent	Received		
Carroll	IL	231	97	42	20
Delaware	IA	206	109	53	19
Gibson	IN	254	92	36	7
Kankakee	IL	166	84	51	14
Louisa	IA	139	39	28	17
Mason	IL	184	104	57	19
Perry	MO	244	46	19	12
Rock	WI	234	70	30	10
Union	IL	191	56	29	19
Winnebago	IA	218	73	33	20
Total		2067	770	37	157

^a True response rates are higher for two reasons: (1) a number of surveys were received, but were incompletely or inaccurately filled out; (2) some of the surveys were sent to landowners who later proved not to be part of the relevant population.

RESULTS

WATER QUALITY INCENTIVES PROGRAM (WQIP)

The WQIP was passed by Congress in the 1990 Farm Bill but has thus far not been widely implemented due to lack of personnel and funding within the Soil Conservation Service (SCS). The WQIP consists of a chemical and manure management plan, jointly developed by the farm operator and the county SCS officer (district conservationist), with financial incentives to implement the plan. The plan consists of: (1) a description of farm enterprises and resources, (2) goals for surface and ground water quality protection and practices to meet those goals, (3) a plan for storing, mixing, loading, applying, and disposing of fertilizers, pesticides and animal wastes in a manner to protect farm water quality, and (4) following SCS recommendations on application rates of fertilizers and pesticides.

Our purpose was to estimate farmers' interest in enrolling in the WQIP and the compensation they demand for taking on the additional risks, costs, and potential yield losses that may be the result of implementing the plan. Of the 562 farmers responding, only 17.5% indicated that they would be interested in enrolling; 44.2% were not interested, 27.8% responded "maybe" and 9.9% responded "I don't know." Of those responding "yes" or "maybe," the mean request for compensation was \$75.90 per acre and the mean percentage cost-sharing request was 54.1%. These results are very disappointing in that they indicate that a voluntary program to use SCS oversight in improving farm chemical and manure management is likely to be unpopular and expensive. It may also be unnecessary since those farmers most interested in the program are most likely to already be using best management practices. A permanent solution to the problem of groundwater contamination with nitrates and pesticides can probably only come with new, more environmentally-benign innovations in fertilizer application and integrated pest management. Research in this area could perhaps be funded with excise taxes on the most harmful chemicals now in use.

POTENTIAL ENROLLMENTS IN THE CRP AND AWR PROGRAMS

Potential enrollments in the CRP and a 30-year easement program modelled on the AWR Program were estimated for three categories of cropland (filter strips, recharge zones and farmed wetlands) through both the mail and interview surveys. The mail survey used a contingent choice framework where farmland owners were presented with one of fifteen annual rental rates for the 10-year CRP and a corresponding lump sum payment for a 30-year easement. The annual rates used were \$50, 60, 70, 80, 90, 100, 120, 140, 160, 180, 200, 250, 300, 350, and 400 per acre per year with lump sum offers equal to ten times the CRP rate. Landowners indicated the acreage they would enroll at the offered price from the areas marked as eligible filter strips, recharge zones, and farmed wetlands on the farm map included in the survey. The interview survey accepted open bids from the landowners. The relationship between the results of these two methods represents an important methodological experiment in contingent valuation.

Results of the mail survey are presented in Figures 1a, 2a, and 3a for filter strips, recharge areas and farmed wetlands, respectively. Simple linear regressions of enrollment on price (Table 2) are also shown. The results show that enrollments increase with price for all six situations, but the coefficient for 30-year easements on filter strips is significant at only .119. Enrollments are higher for the CRP than for the easements for each of the three cropland types. In general, filter strips had the highest enrollment at any given price, with recharge areas the lowest. For example, at \$100/acre/year estimated filter strip enrollment is 42% of eligible acreage, but 25% for recharge areas. Further statistical analysis of these data will provide a truer picture of estimated enrollments at any given annual rental rate or lump sum.

Table 2. Coefficients and R-Square of Simple Linear Regressions of Enrollment on Price and Acreages on Which Bids Were Solicited.

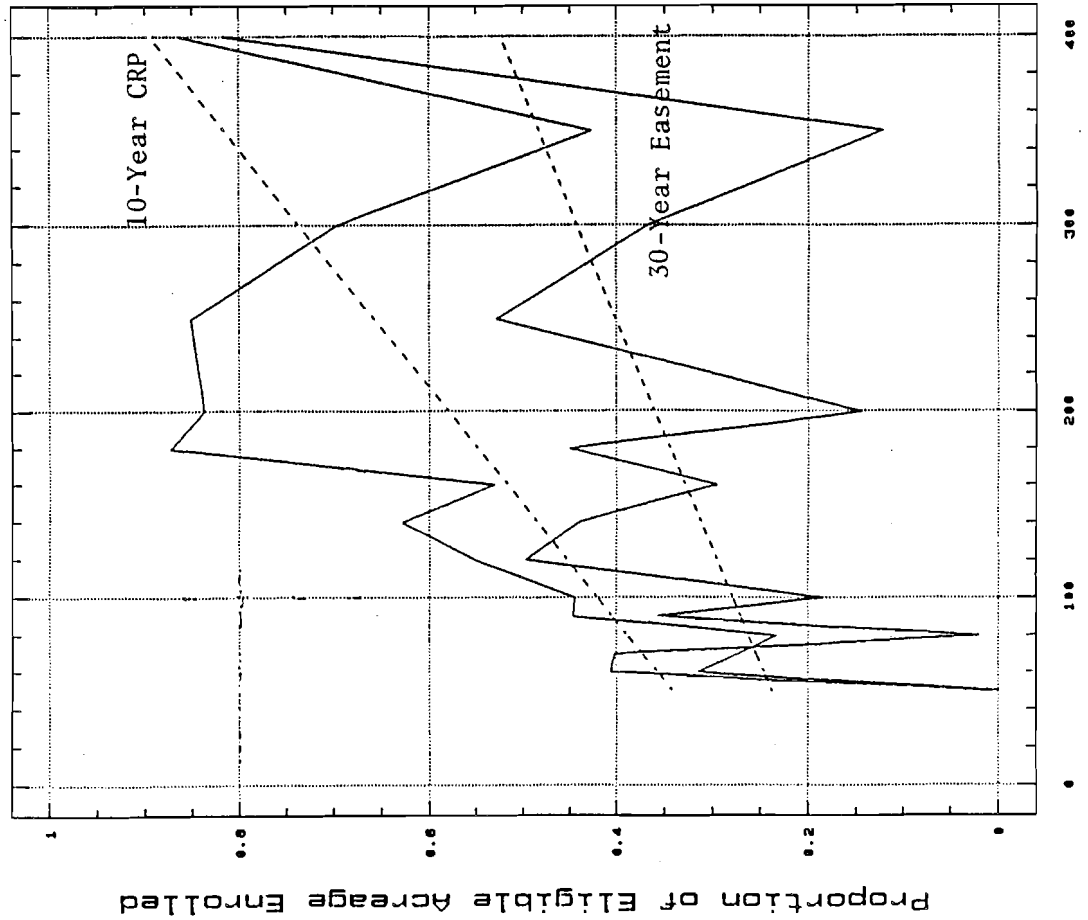
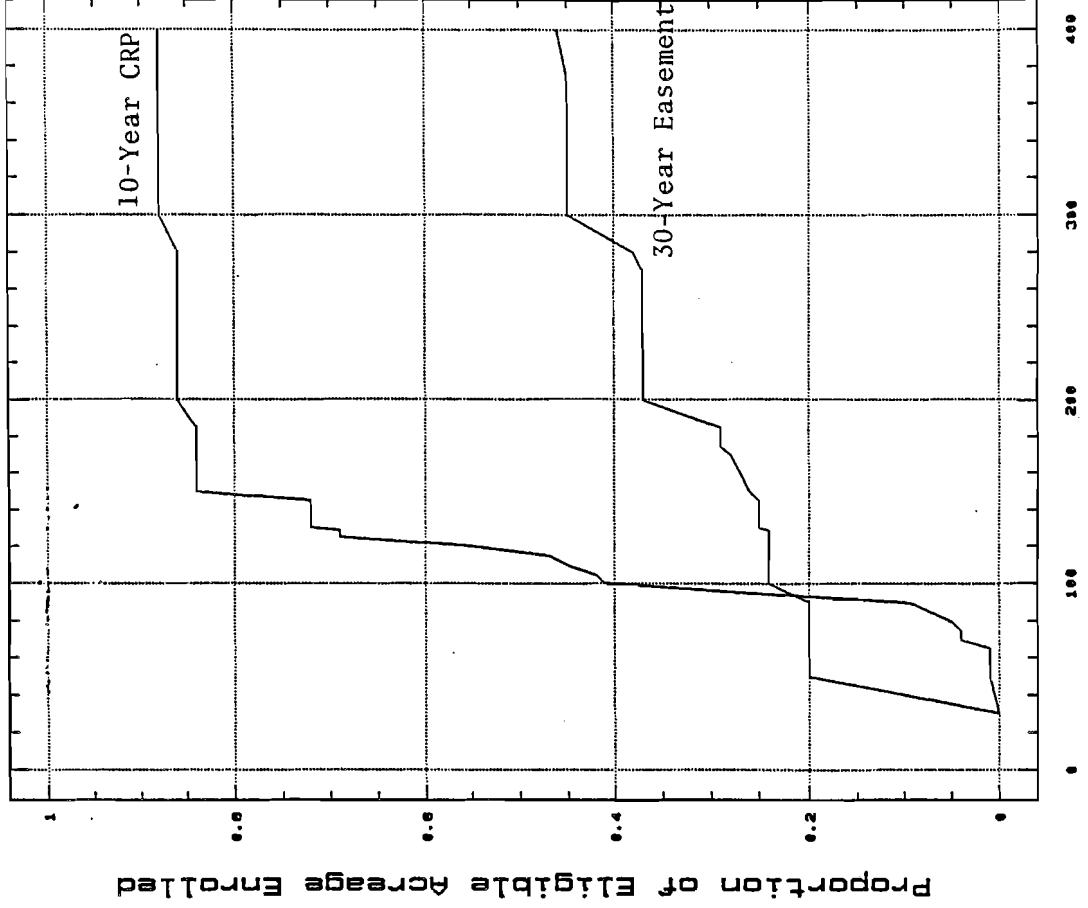
	Acreage	Coeff.	T-Value	Sign.	R-Square
Filter Strips	2,030				
10-Year CRP		.00158	3.15	.008	.43
30-Year Easements		.00049	1.67	.119	.18
Recharge Areas	57,588				
10-Year CRP		.00181	3.25	.006	.45
30-Year Easements		.00021	4.27	.001	.58
Farmed Wetlands	6,134				
10-Year CRP		.00051	3.82	.002	.53
30-Year Easements		.00183	4.90	.000	.65

Cumulative frequency distributions of landowners' bids in 157 personal interviews are shown in Figures 1b, 2b and 3b for filter strips, recharge zones and farmed wetlands, respectively. These graphs corroborate the mail survey data to the extent that enrollments fall generally in the same range, filter strip enrollments are slightly above those for recharge areas and farmed wetlands, and CRP enrollments are well above those for 30-year easements. However, the interview data show an important threshold in enrollments in the CRP occurring in the range \$90-140 per acre per year for each of the three cropland types studied. For filter strips, enrollment increases from 9% of eligible acreage at \$90 to 72% at \$140. For recharge areas this jump is from 10% to 62% and for farmed wetlands it is from 12% to 64%. Given that cropland rental rates for the acreages studied average \$103.69/acre/year, these results indicate that CRP enrollments are closely tied to current cropland rental rates.

Tree Planting

Table 3 shows potential enrollments of tree plantings in the CRP and 30-year easement programs on eligible filter strips and recharge acreages. These results should be interpreted in a context where grass and tree planting receive identical incentives for enrollment. For filter strips, only 1.5% of acreage eligible for the CRP would be planted to trees, 2.8% of all acres enrolled. For the 30-year easement program, however, enrollment of trees is greater; 4.4% of eligible acreage and 13.0% of enrollments, close to the original CRP goal of 12.5%. Results for recharge areas are not dissimilar. In the 10-year CRP, potential enrollments are 2.0% of eligible acreage, 5.0% of enrollments. For 30-year easements, enrollments are 1.7% of eligible acreage, 10.2% of total enrollments. Tree planting as a proportion of eligible acreage increases significantly with price for recharge areas, but not filter strips (see bottom of Table 3). It increases as a proportion of total enrollments only for recharge areas for the 10-year CRP. The variance in proportional enrollment at different prices reflects a "lumpy" enrollment pattern where one large enrollment dominates the data for the set of surveys in a particular price category.

Figure 4 displays a cumulative frequency distribution of bids for tree planting on filter strips and recharge areas obtained through the personal interviews. In the interviews, farmers could give separate bids for grass planting and tree planting; therefore these data represent potential enrollments if the CRP and 30-year easement programs provided incentives for planting trees in addition to those for planting grass. Enrollments are higher on recharge areas than on filter strips in both the 10-year CRP and the 30-year easement programs. This is probably due to filter strips sometimes run diagonally across fields or otherwise present an awkward placement for trees. Further, tree planting along filter strips can plug streamside tile outlets (Table 6). Enrollments are also higher for the 10-year CRP than the 30-year easement program due to higher total enrollments in the CRP. In the CRP, enrollment climbs rapidly



Annual Rental Rate (Lump Sum * 0.1)

Annual Rental Rate and Lump Sum (*0.1)

Figure 1. Enrollment of Filter Strips in the 10-Year CRP as a Function of Annual Rental Rates and in the 30-Year Easement Program as a Function of Lump Sum Payment. A. From 770 Mail Surveys with Simple Linear Regression Lines B. From 157 Personal Interviews as a Cumulative Frequency Distribution of Bids.

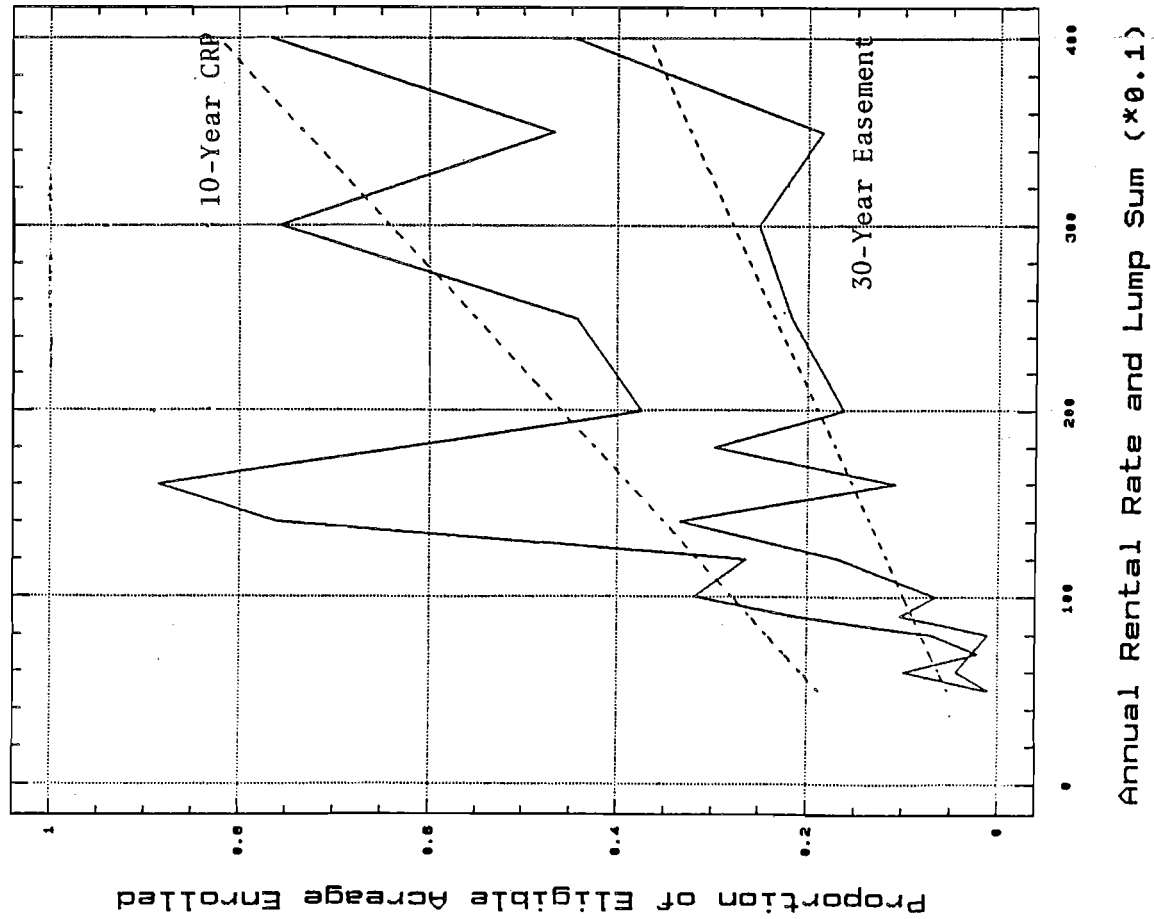
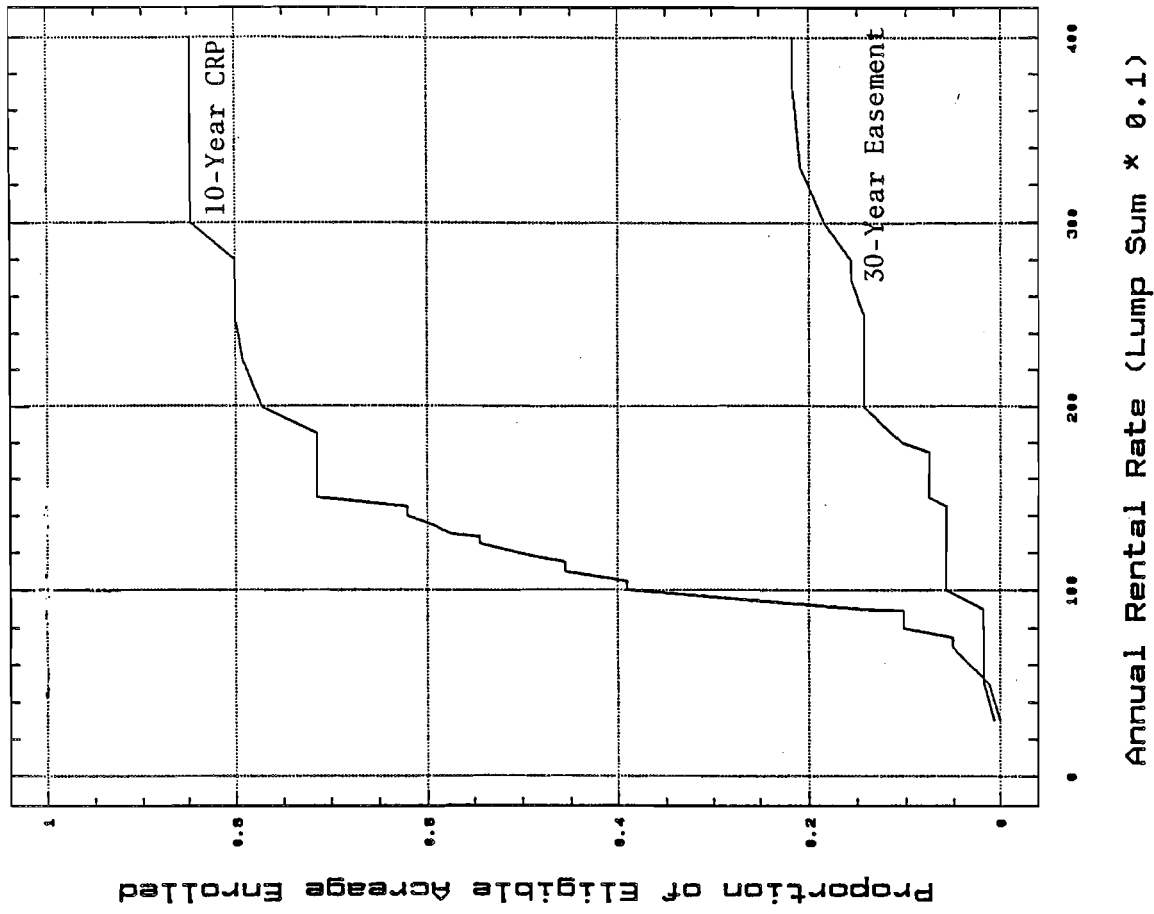


Figure 2. Enrollment of Recharge Areas in the 10-Year CRP as a Function of Annual Rental Rates and in the 30-Year Easement Program as a Function of Lump Sum Payment. A. From 770 Mail Surveys with Simple Linear Regression Lines B. From 157 Personal Interviews as a Cumulative Frequency Distribution of Bids.

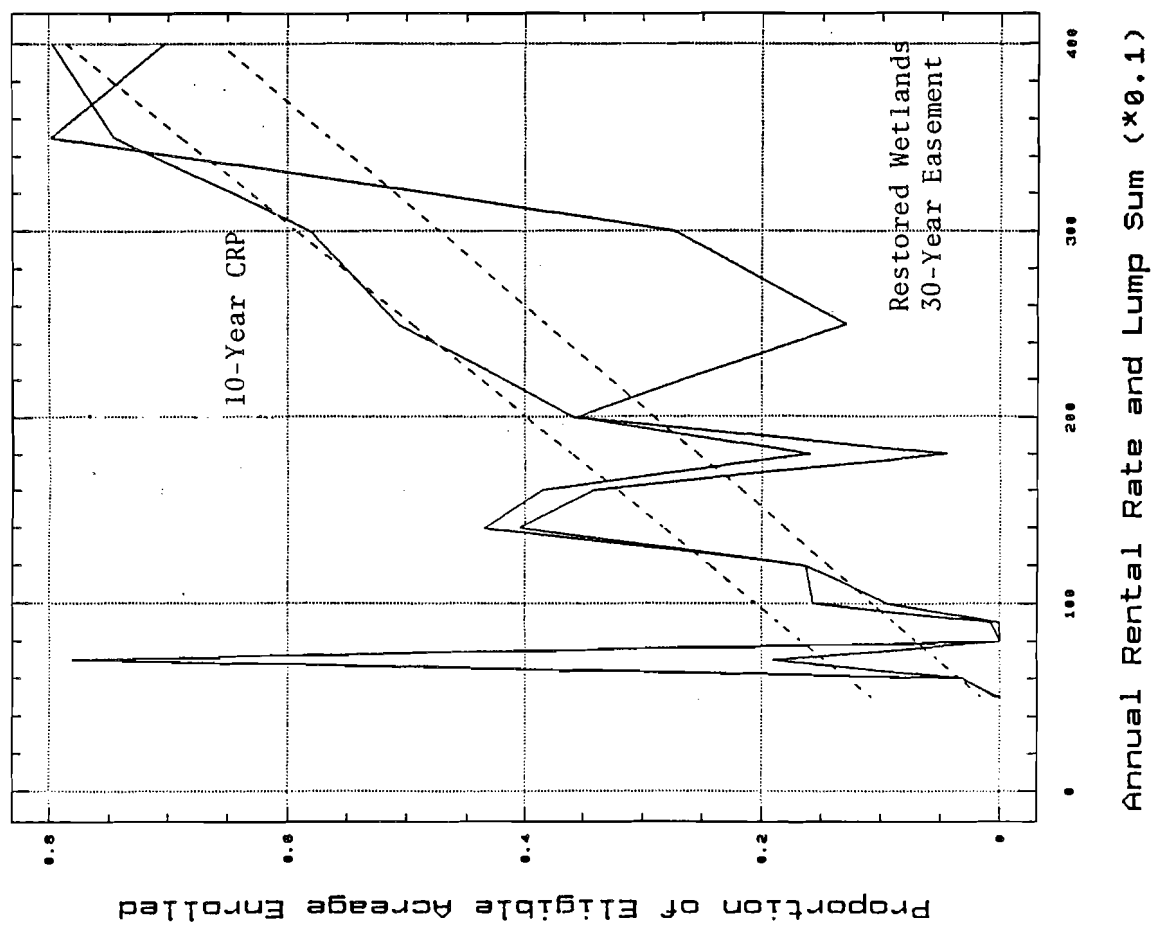
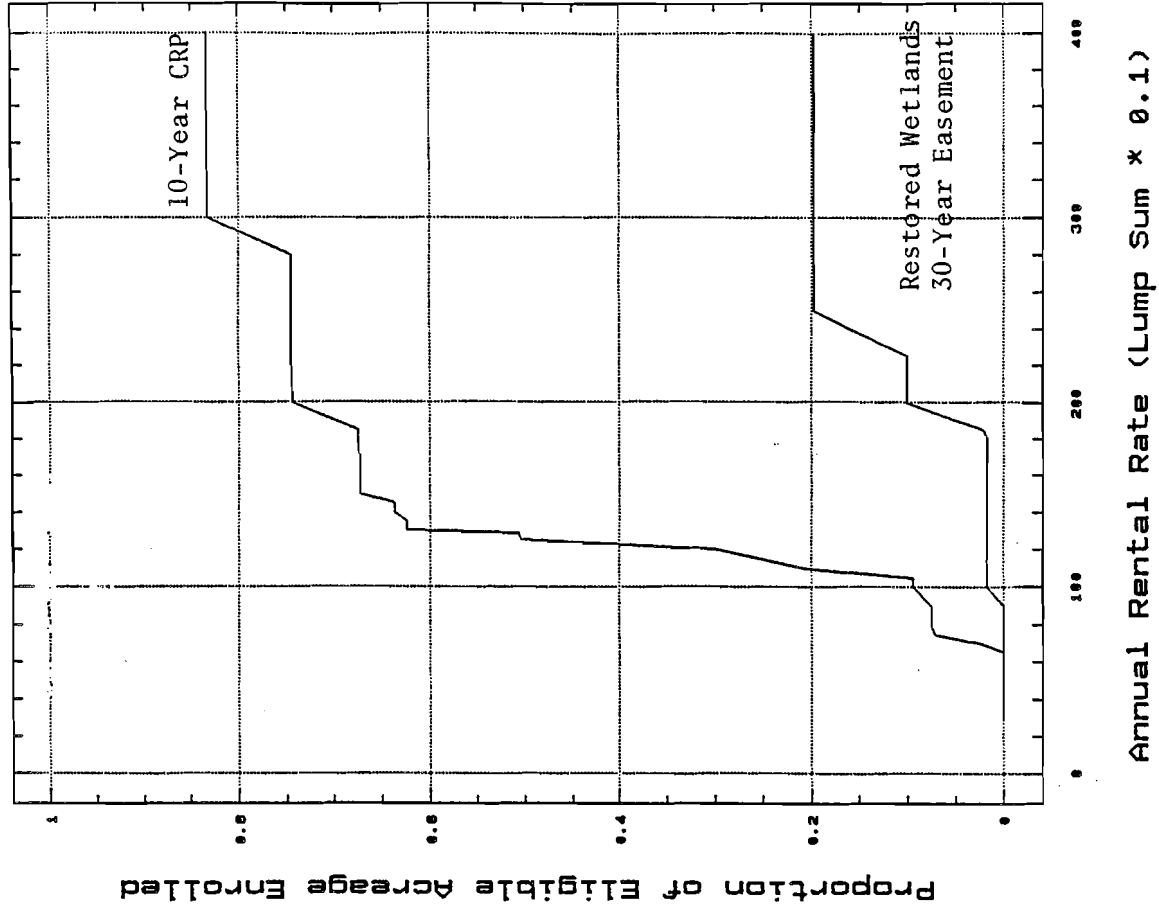
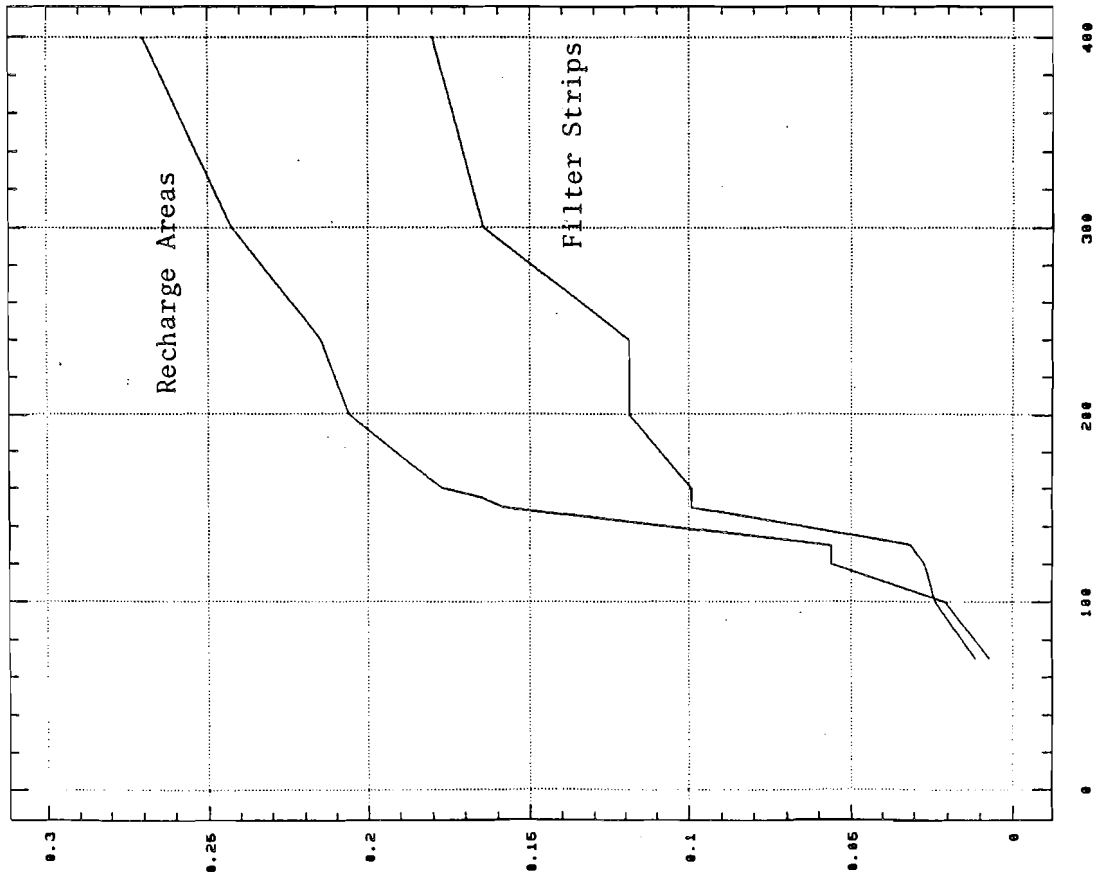
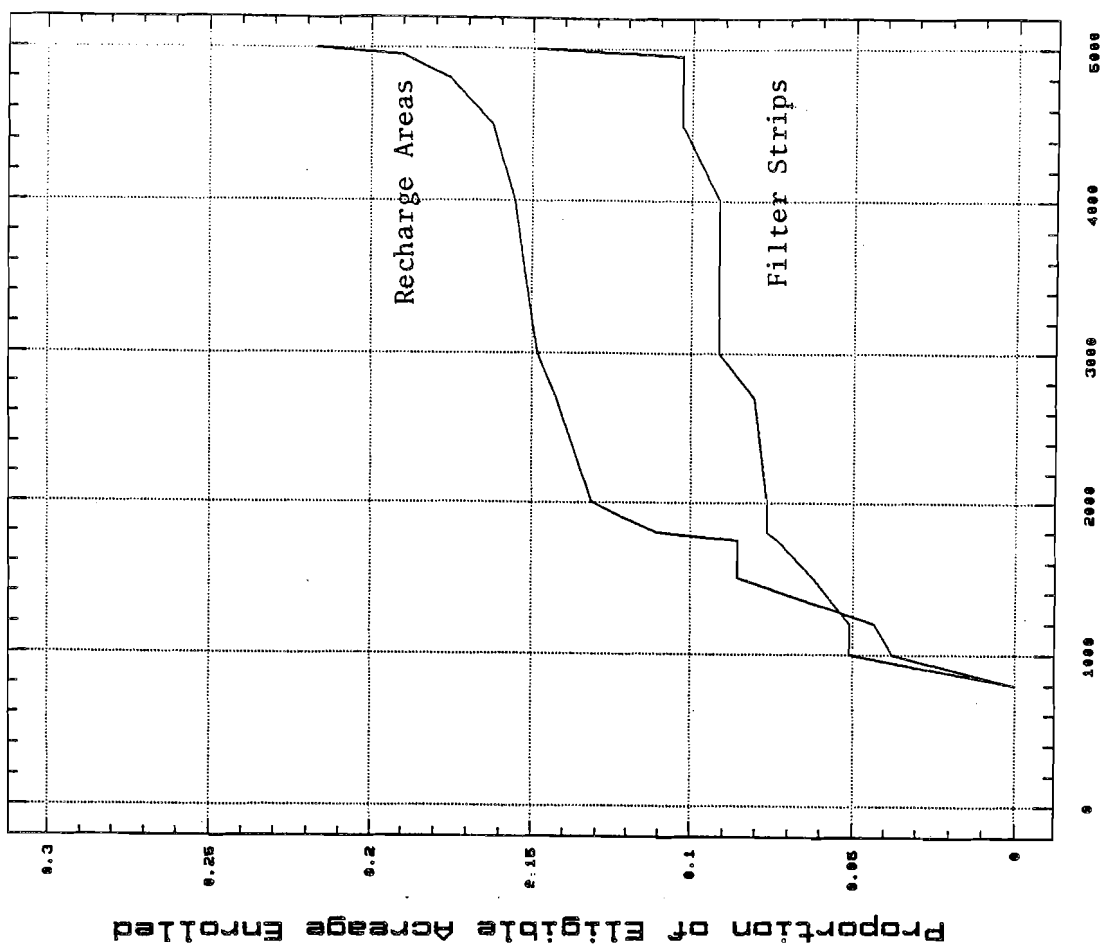


Figure 3. Enrollment of Farmed Wetlands in the 10-Year CRP as a Function of Annual Rental Rates and Wetland Restoration in the 30-Year Easement Program as a Function of Lump Sum Payment. A. From 770 Mail Surveys with Simple Linear Regression Lines B. From 157 Personal Interviews as a Cumulative Frequency Distribution of Bids.



Note: Y-axis Expanded



Note: Y-axis Expanded

Figure 4. Cumulative Frequency Distribution of Tree Planting Enrollments on Filter Strips and Recharge Areas from 157 Personal Interviews A. For the 10-Year CRP as a Function of Annual Rental Rate. B. For the 30-Year Easement Program as a Function of Lump Sum Payment.

Table 3. Tree Planting as a Percentage of Eligible Acreage and Total Potential Enrollment for Filter Strips and Recharge Areas as a Function of Price.

Price	<u>Filter Strips</u>				<u>Recharge Areas</u>			
	<u>10-Year CRP</u>		<u>30-Year Easement</u>		<u>10-Year CRP</u>		<u>30-Year Easement</u>	
	<u>% of Eligible Acreage</u>	<u>% of Total Enrollment</u>	<u>% of Eligible Acreage</u>	<u>% of Total Enrollment</u>	<u>% of Eligible Acreage</u>	<u>% of Total Enrollment</u>	<u>% of Eligible Acreage</u>	<u>% of Total Enrollment</u>
50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
60	0.8	2.5	23.9	58.8	0.0	0.0	0.0	0.0
70	0.0	0.0	2.7	6.8	0.2	8.8	0.9	32.5
80	1.4	5.9	0.0	0.0	0.3	3.7	0.0	0.0
90	9.0	20.3	9.0	25.4	0.3	1.4	0.0	0.0
100	0.0	0.0	0.0	0.0	2.1	6.5	1.7	25.2
120	0.0	0.0	0.0	0.0	1.6	6.0	0.1	0.8
140	0.0	0.0	0.0	0.0	1.1	1.5	2.0	6.7
160	6.1	11.6	4.1	13.9	0.3	0.3	0.2	1.6
180	0.0	0.0	0.0	0.0	0.3	0.4	0.0	0.0
200	0.0	0.0	5.0	34.4	2.0	5.3	3.2	19.7
250	0.0	0.0	5.2	9.9	2.5	5.7	3.4	15.8
300	0.0	0.0	6.4	17.5	1.9	2.5	3.1	12.2
350	2.5	5.9	2.5	20.7	8.6	18.3	1.2	6.4
400	0.0	0.0	0.0	0.0	8.1	10.5	8.3	18.7
Total	1.5	2.8	4.4	13.0	2.0	5.0	1.7	10.2
Corr. ^a	-.13	-.19	-.06	-.06	.85	.59	.75	.22
Sign.	.649	.500	.839	.839	.0001	.021	.001	.433

^a Correlation coefficient (Pearson's R) of enrollment variable with price.

in the range \$100-160/acre/year from 2% to 10% of eligible acreage for filter strips and from 2% to 17% of eligible acreage for recharge areas. Similarly in the 30-year easement program, enrollment climbs from 0% at \$800/acre to 7% at \$1800/acre for filter strips and from 0% at \$800/acre to 13% at \$2000/acre for recharge areas. While these proportions are fairly low, it should be anticipated that tree planting would not be as popular in prime Midwestern grain-growing areas as it is elsewhere, such as the southeastern states where the bulk of tree planting occurred during CRP sign-ups from 1986-1990 (USDA, 1992).

BARRIERS TO ENROLLMENT

Table 4 provides results from 360 respondents to the mail survey who chose not to enroll indicating the reasons for this decision. The primary reasons some farmland owners were not willing to enroll their eligible acreages are economic. Statements A and J, taken together, show that 77.4% of non-enrolling respondents made their decision at least partly on the basis of relative flows of income from the specified cropland when comparing the CRP with crop production (if they operate the farm) or renting (if they do not). Responses to statements H and I further indicate that other economic considerations, such as efficient utilization of purchased farm machinery and future eligibility for commodity programs, are also important to farmers and farmland owners. However, responses to statements C, D, and E indicate that at least 50% are opposed to getting involved in these programs on either ideological grounds (D) or due to an aversion to the administrative process (C,E). Finally, while less important in most instances, participation in the CRP or easement programs can interfere

Table 4. Barriers to CRP and Easement Enrollments.

% of Respondents Indicating	Reason for Not Enrolling
56.8	A. I expect to earn more producing on the eligible land than the amount proposed as a yearly payment.
52.8	B. The long-term nature of the programs reduces my flexibility to adjust land uses to changing economic circumstances.
49.9	C. I do not like the hassle of government programs.
41.9	D. I consider government control over the uses to which I put my land to be a violation of my property rights.
40.3	E. Too few acres would be eligible to make it worth my while.
38.3	F. Enrolling in the CRP would decrease the sale value of the farmland involved.
35.1	G. Enrolling in the CRP places too many restrictions on the operator who inherits the farm.
33.1	H. I would lose base acres for commodity programs.
26.8	I. Enrolling in the CRP would adversely affect the financial status of my farm.
20.8	J. I expect to earn more from renting out the eligible land than than amount proposed as a yearly payment.
16.7	K. Enrolling in the CRP would interfere with my relationship with the farm tenant.

N = 360

Note: Numbers add to greater than 100% because respondents could indicate more than one reason.

with relationships between the farmland owner and tenants (16.7%), inheritors (35.1%) or potential purchasers (38.3%) of the farmland.

In addition to the financial difficulties some farmers have with the decision to enroll in the CRP or easement program, they face additional barriers to planting trees (Table 5) and restoring functional wetlands on eligible farmed wetlands (Table 6). Planting trees, even more than planting grass (75.7% vs. 52.8%), reduces a farmers' flexibility to change land uses as economic conditions warrant. They can also divide up fields awkwardly or plug tiles, especially in the case of filter strips. However, only 25.9% felt that they could not sell timber products profitably and less than 1% had a problem with the availability of tree seedlings.

A majority of respondents who had eligible farmed wetlands, but indicated they would not enroll them in the AWR Program, responded that the restored wetlands could have negative effects on farming beyond the wetland site due to a change in the overall drainage characteristics on other croplands, inconveniences with utilizing machinery around the wetland (Table 6, statement B), or drainage district obligations (G). A minority, but still substantial percentage of farmers, also felt that rendering current drainage facilities (tiles and ditches) inoperative would be problematic (Table 6, statements E,H) or that establishing and maintain-

Table 5. Barriers to Tree Planting.

% of Respondents Indicating Filter Recharge Strips Areas Total			Reason for Not Planting Trees
75.7	80.3	77.6	A. Planting trees reduces my flexibility to change land uses as economic conditions warrant.
52.4	24.2	40.7	B. Trees cost too much to maintain and interfere with my other farm operations
29.0	25.0	27.1	C. Planting trees reduces my base acreage for commodity programs
47.9	11.4	26.5	D. Tree roots would plug tile drains
23.2	29.5	25.9	E. don't think that I could profitably sell the timber products when the trees are ready for harvest.
14.9	11.4	12.8	F. Other
0.5	0.8	0.6	G. Tree seedlings are often unavailable in my area.

Note: Numbers add to greater than 100% because respondents could indicate more than one reason.

Table 6. Barriers to Wetland Restoration.

% of Farmers Responding*	Reason for Not Enrolling Eligible Farmed Wetlands in CRP or AWR
76.8	A. These lands are too productive as cropland to convert to wetlands.
57.4	B. Restoring wetlands on these lands would interfere with activities on other croplands.
50.7	C. Restoring wetlands reduces my flexibility to change land uses as economic conditions warrant.
38.5	D. Restoring wetlands would reduce my base acreage for commodity programs.
28.2	E. It would be too expensive and time consuming to plug the tiles and/or fill in the ditches that now drain the wetlands.
18.3	F. It would be too expensive and time consuming to establish marsh plants or trees on the restored wetlands.
14.8	G. My obligations to the drainage district I belong to prevent my alteration of drainage tiles and ditches.
9.9	H. I would find it very difficult to find the tiles on the wetlands in order to plug them.
9.8	I. Wetlands would cost too much to maintain.

N = 143

Note: Numbers add to greater than 100% because respondents could indicate more than one reason.

ing wetlands would be too time consuming and/or expensive (Table 6, statements F,I). What these data indicate is that in many circumstances wetland restoration is a more difficult matter than simply retiring cropland to grass and that it therefore requires additional economic incentives and technical support. However, even if only a small percentage of eligible farmed wetlands were to be enrolled, the AWR would constitute the largest wetland restoration program in the history of the U.S. Moreover, even at the higher end of our price range (\$2000-4000/acre for a 30-year easement) the per acre costs are low compared to mitigation projects currently conducted under the Clean Water Act Section 404 Program, and in fact the AWR Program could be used as a form of mitigation banking for that program. From an ecological as well as a water quality perspective, the problems with implementing the AWR Program described here are worth making an effort to overcome.

RESPONSE TO SUGGESTED CHANGES IN THE CRP

Six (A-F) of seven suggested changes in the CRP were viewed favorably by a majority (53.3% - 74.2%) of 672 respondents with the last (G) favored by 45% (Table 7). None of the seven were viewed unfavorably by more than 30.9% of respondents, with only 5.1% against increased farmer input into conservation programs. These results indicate that the maximum acceptable CRP rental rate should be publicized for each county, and that a range of rental periods should be offered. While it adds to the expense of the program, periodic post-sign-up adjustments to the rental rates could encourage additional enrollment. Along the same lines, states or counties should consider adjusting property taxes on enrolled acreages, or USDA could reimburse counties for either lower assessed valuations or lower tax rates on CRP land. An option to hay or pasture CRP lands at a reduce rental rate was least popular, but still favored by 14.1% more farmers than were against it. None of these suggested changes would change the fundamental nature or administration of the CRP.

Table 7. Farmers' Attitudes Toward Suggested Changes in the CRP.

	No Favor	Do Not Favor	Suggested Change
74.2	20.7	5.1	A. There should be more farmer input into the design and implementation of conservation programs.
64.9	22.3	12.8	B. Maximum annual rental rates for the county would be publicized.
62.6	13.9	23.5	C. Property taxes would be reduced on enrolled acreages.
58.3	29.3	12.4	D. An option to enroll lands for various time periods from 5 years to permanently would be offered.
55.9	22.4	21.7	E. Annual rental rates would be varied to reflect inflation.
53.3	23.5	23.2	F. Annual rental rates would be varied to reflect cropland rental rates.
45.0	24.1	30.9	G. An option to use CRP lands as pasture or hay would be offered with reduced rental rates.
N = 672			

ATTITUDES TOWARD SWAMPBUSTER

Swampbuster, a provision passed as part of the conservation title of the 1985 Farm Bill and amended in the 1990 Farm Bill, denies most USDA benefits to farmers who drain wetlands on their farms. Thus the wetland preservation program creates an eligibility requirement for receipt of commodity price supports, Farmers' Home Administration loans, etc. in the same manner as set-asides and Conservation Compliance.

Table 8 provides responses from 593 farmers and farmland owners to 10 attitudinal statements regarding Swampbuster. Overall these results indicate that Swampbuster is an unpopular program with farmers, so much so that only 30.4% agreed that it is necessary and fair, 68% feel that it violates their property rights, and 44% would consider foregoing USDA benefits to avoid its restrictions. The responses to these questions fortunately also reveal some partial solutions to the controversies surrounding Swampbuster. Seventy-three percent of respondents indicated that allowing some economic use of wetlands (such as pasture or hay) would make the program more acceptable, and 75% indicated that wetlands subject to Swampbuster should be exempt from property tax. This might well be a reasonable measure given the restrictions on income generation that the program creates and the public benefits that the wetlands provide. However, property tax policies on CRP acreage are state and local

Table 8. Farmers' Attitudes Toward Swampbuster.

	No Agree	Dis- Opinion agree	Attitudinal Statement
75.1	15.4	9.4	A. Designated wetlands should be exempt from property tax.
72.9	21.4	5.7	B. Swampbuster could be made more acceptable by allowing farmers to make some limited economic use of the wetlands.
68.0	21.5	10.5	C. Swampbuster violates landowners' private property rights.
61.4	29.5	9.1	D. Wetland mapping is often arbitrary and contrary to good farming sense.
60.2	25.0	14.8	E. Swampbuster imposes unfair and unnecessary financial and regulatory burdens on farmers who are in the business of producing food, not managing wetlands.
60.0	26.3	13.7	F. While wetland protection is an important role of USDA, Swampbuster restrictions pose too great a burden on farmers.
56.4	22.2	21.5	G. While wetlands are important natural resources, the public must purchase the right to preserve them from landowners.
44.0	35.4	20.7	H. I would consider foregoing USDA benefits in order to avoid Swampbuster restrictions.
30.4	27.0	42.6	I. Swampbuster is a necessary and fair method of protecting valuable wetlands.
28.3	27.7	44.0	J. Swampbuster restrictions are unnecessary since most farmers would voluntarily preserve wetlands on their farms.

N = 593

issues. Finally, Swampbuster has suffered from the controversies and difficulties over wetland delineation, problems that need to be properly addressed by Washington.

Given the unpopularity of Swampbuster, major difficulties in enforcing it (McElfish and Adler, 1990), and the potential for a decrease in the value of USDA benefits to farmers, there is a potential that many farmers may choose to ignore it and risk loss of USDA benefits (Heimlich, 1989). If this possibility materializes, society must choose between strict regulation of wetland drainage on farms, or purchasing these wetlands through easements or other mechanisms as 56.4% of the respondents suggest (Table 8).

CONCLUSIONS

Preliminary results indicate that the contingent valuation methodologies used were successful in estimating potential enrollments of water-quality critical croplands in the CRP and a 30-year easement program. CRP enrollment rates increase strongly with price, particularly in the range \$90-140/acre/year, but enrollments in 30-year easements are considerably lower for corresponding lump sums that are 10 times greater than the annual payment. Farmers are willing to plant grass on filter strips, recharge areas, and farmed wetlands, but generally not trees; wetland restoration rates fall in between. In contrast, the WQIP, appears to be a poorly designed policy tool for controlling agri-chemical use, and opposition to Swampbuster restrictions are considerable.

Further analysis will determine the best statistical relationship between rental rates and CRP and easement enrollment, as well as discriminate between those farmers who choose to participate, and those who do not. Finally, we are beginning a spatial analysis in the four Illinois counties using pcARC/INFO to determine how the spatial pattern of potential enrollments compares to existing CRP enrollments and wetlands, and how the overall pattern of land use can be changed by these programs at the watershed scale.

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