

# Landowner views of obstacles to wider participation in the conservation reserve program

J. Dixon Esseks and Steven E. Kraft

**ABSTRACT:** *The new conservation reserve program invites owners or qualified operators of highly erodible cropland to convert that land to vegetative cover for a 10-year period in exchange for annual rents paid by the U.S. Department of Agriculture. The American Farmland Trust commissioned a survey of representative samples of participants and nonparticipants in this program as of the summer of 1986. The total of 1,173 respondents came from 59 counties in 23 states. Counties were selected randomly from nationwide pools of counties with relatively large quantities of CRP-eligible land. Among the interviewed nonparticipants, the three most frequently cited reasons for not applying to the program were the perceptions that their land was not eroding badly enough to be eligible, that the compensation expected from USDA was too low, and that the 10-year period was too long. According to the members of both samples, the three program reforms most likely to attract new land into the CRP were permitting enrolled land to be grazed or hayed, allowing CRP acres to be used to meet set-aside requirements, and increasing the annual program rents paid by USDA.*

**T**HE conservation reserve program provides for a contractual relationship between the U.S. Department of Agriculture and owners of "highly erodible cropland"<sup>1</sup> or operators of such land who can demonstrate that their tenure will extend for at least 10 years. Under the contract, the landowner or eligible operator agrees to convert the erodible land from annual crop production to grass, trees, or some other vegetative cover for 10 years. In exchange, USDA pays the owner a fixed rent per acre for each of those years and provides technical and financial assistance for establishing cover crops (2). After three signups for the program, in March, May, and August 1986, USDA had agreed to a total of 69,135 contracts covering 8.9 million acres.

A coalition of conservation groups, including the Sierra Club, National Audubon Society, National Association of Conservation Districts, and Soil Conservation Society of America (1), supported the program in the legislative hearings and lobbying that led to the 1985 farm bill. With a 1990 target of converting 45 million acres of the country's most erodible cropland to long-term vegetative cover, the program gives promise of substantial savings of topsoil, reductions in agriculturally derived water pollution, and enhancement of wild-

life habitats, among other benefits valued by conservationists.

The American Farmland Trust was among the recognized leaders of the conservation coalition (6). Concerned about serious obstacles to the program's success, AFT commissioned a telephone survey of representative samples of program participants and nonparticipants after the first two signups and just before the third. Here we report the survey's findings regarding obstacles to wider participation in the program and the interviewees' reactions to proposed program modifications intended to attract more land into the CRP.

## The survey samples

Cropland owners or eligible operators apply for the program by submitting bids on specific parcels of land. The bids are the per-acre annual rent that the applicant wants in exchange for committing the land to the program for 10 years. We drew two samples from the same 59 counties in 23 states: 684 bidders, cropland owners or operators who submitted bids in either the March and/or May signup, and 489 nonbidders, owners or operators who did not submit bids in either of those signups but who likely controlled land that was eligible for the program. Almost all persons in the two samples were owners; only 37 of the 1,173 people surveyed were managers.

We chose nonbidders randomly from farm-owner files of the Agricultural Sta-

<sup>1</sup>In the first three signups USDA defined "highly erodible land" as land in capability classes VI-VIII or land in classes II-V with an average annual erosion rate exceeding 3T.

bilization and Conservation Service in the 59 counties. The counties themselves were random samples from two pools of counties that, according to the 1982 National Resources Inventory, included large quantities of land eligible for the CRP. The first pool consisted of 120 counties, each of which was estimated to have at least 100,000 eligible acres; 29 counties were drawn from that pool. The second pool consisted of counties with an estimated 20,000 to 100,000 eligible acres and where the eligible acres comprised at least 20 percent of the county's total cropland; 30 counties were selected from that pool. Each of the two pools accounted for about one-third of all the estimated CRP-eligible land nationwide.

Within every selected county, Soil Conservation Service personnel identified the townships or other geographic units in which most of the CRP-eligible land was concentrated. We drew the sample of nonbidders from those units to maximize the probability that the interviewees had land eligible for the program.

The 684 interviewed bidders came from the same 59 counties, with the starting sample being drawn at random from lists of all the March and May bidders in those counties. The interview completion rates were 86 percent for bidders and 71 percent for nonbidders. Conducted by the Public Opinion Laboratory of Northern Illinois University, the interviews averaged 21 minutes and consisted of multiple-choice and open-ended questions.

## Obstacles to bidding

An open-ended question posed to the nonbidders was: "What is there about the Conservation Reserve Program that has made you unwilling to bid land in [the particular] county for it?" The most often cited obstacle was that many cropland owners believed that none of their land was eligible for the program—41% of the nonbidders gave this reason for not participating. However, 4 of 10 of those respondents owned land in areas where, according to SCS personnel, more than 75% of the cropland was eligible. Another third of the respondents were from areas where 51% to 75% of the land was eligible. Although many of these owners who claimed noneligibility may indeed have had land only in the minority segments of their areas that were not eligible, it seems unlikely that all or even a major fraction of them had land so situated. More probable is that, like farmers surveyed in other studies (3, 5), they did not appreciate the extent of soil erosion on their land.

Improving the accuracy of their percep-

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tions might not be easy, but USDA should make some serious effort to do so. Answers to another survey question indicated a strong relationship between bidding and the extent to which owners thought their land had erosion problems. For example, respondents who believed that a majority of their land had erosion problems were more than two times more likely to have bid than those who perceived their farmland to be problem-free. Using multivariate analysis (log-linear modeling), this perception-of-problems variable emerged as the single most important influence on whether cropland owners submitted bids. Second in significance was the owner's age; the older the person, the less likely he or she was to bid. Owners of retirement age were the least likely to have submitted bids, perhaps out of concern that the land enrolled in the program would be harder to sell or to transfer to heirs. The third most important explanatory variable was whether the owner currently farmed the land. Operators were more likely to have bid than nonoperators, perhaps in part because they had a better grasp of the land's earning capacity relative to what the CRP offered in rents.

Because local SCS offices tend to have the most convincing data on erosion, SCS staff members are probably the best means for reaching out to educate the apparently many cropland owners who perceive that their land is ineligible for the CRP. Although SCS may lack the staff for such outreach programs in all or most counties with CRP-eligible land, hopefully the agency can muster the resources for vigorous efforts in counties with large quantities of eligible acreage, such as those with 100,000 acres or more.

The survey showed that the second most serious obstacle to bidding, as of mid-summer 1986, was the perception that USDA would not pay adequate rents—25% of the nonbidders gave this reason for not bidding. Of those who explained why they felt the rents were too low, the largest subgroup said that the payments expected would not allow them to meet costs. Whether USDA was miserly or the landowners were bad managers, these respondents generally felt the rental levels would not cover mortgages, taxes, and other costs. The next largest subgroup consisted of those respondents who, rather than focusing on the cost issue, simply said that they could earn more from cropping the land. They calculated that net income from market sales and/or government commodity program payments would exceed net income from CRP rents.

To remove this rental-price obstacle,

landowners must scale down their rent expectations or USDA must modify its pricing policy for the CRP. In the first three signups USDA divided the country into bidding pools consisting of regions in which cropland was at least roughly similar in quality and earning capacity. Some states had only one pool each, while others, such as Minnesota, Texas, and Wisconsin, had seven or more. USDA assigned each pool a per-acre "maximum acceptable rent rate," above which bids were rejected. Program officials said they based these ceilings on average cash rents in the counties comprising the pools.

USDA might consider revising the ceilings upward or creating new pools within a state to reflect more accurately the diversity in the productivity of CRP-eligible land. For example, Illinois included only three pools in the first two signups. But in the August bidding, USDA added a fourth pool for counties where, on average, eligible farmland was too productive for the \$60-per-acre ceiling offered in pool 3 but not so productive as to merit the \$80 maximum of pool 1. Depending on location, newly formed pools need not increase the program's overall cost. In some counties the maximum rents will increase, while in others the ceilings may decline but still remain high enough to attract bids. In the latter cases, the previous maximums would have been significantly above the level justifying bids because productivity of land in those areas tended to be relatively low but the land had been pooled with areas that had high averages.

There is an alternative to creating more pools or raising the rents in existing pools. USDA could count on continued poor market prices and the scheduled decreases in commodity program benefits to make the current CRP ceilings more attractive. Such a scenario would hurt the many potential bidders who, according to our survey, have fixed costs that are too high for the current payment ceilings.

The third most frequently given reason for not bidding—reported by 13% of the nonbidders—was the required 10-year agreement period. Landowners preferred fewer years. Among their concerns was the perceived risk that, over the 10 years, the land's earning capacity would increase beyond the fixed CRP rents and/or that the use limitations imposed by the CRP contract would discourage buyers if they chose to sell the land.

### Reasons for not rebidding

In addition to previous nonbidders with eligible land, the other source of new bids is the pool of previous bidders. Those land-

owners may rebid land on which a previous bid was rejected, or they may have other eligible land to enroll in the CRP. Almost all bids rejected in the first three signups were rejected because they exceeded the pool ceilings. In our survey 46% of the March bidders rebid in May. The majority of these rebidders, 81%, were rebidding after having been rejected in March. Thirty-two percent of the March and/or May bidders said they would bid again in August. And most of those persons, 77%, had bids rejected in previous signups. However, as these figures show, 19% of the May rebidders and 23% of those planning to rebid in August had bids accepted in previous signups and were, therefore, offering new land to the program when they rebid. These landowners were pleased enough with the rental prices and other conditions of the CRP contracts to enroll additional acres in the program.

Of the 68% of the March and May bidders who did not plan to rebid in August, 22% said they had no land left to bid; all eligible land had been accepted in a previous signup. Another 9% said that they might rebid; they were undecided or leaning toward rebidding. However, 25% were not uncertain; they would not rebid because of the low rental prices. And almost all of those persons (91%) were discouraged apparently only by the rents. They did not give second reasons, such as being deterred by the length of the contract, the prohibition on grazing or haying CRP land, or other program regulations. Presumably, they had reconciled themselves to those features of the program when they initially bid in March or May. Only 9% of the respondents cited some program regulation as their reason for not rebidding. No other reason was cited by as many as 10%. Thus, the only obstacle to rebidding given by a fairly sizeable group was the perceived inadequacy of rents.

### Ignorance of conservation compliance

The 1985 farm bill also includes a potentially strong negative incentive to bid land into the CRP. Sodbuster regulations provide that owners or operators who, after the bill's enactment, break out and plant highly erodible land to an annual crop may lose federal farm benefits, including price supports, farm storage facility loans, crop insurance, and disaster payments. The same vulnerability applies to users of highly erodible land who cultivated land for annual crops in any year between 1981 and 1985 and then continue to crop it or resume cropping. In either case, these landowners can receive USDA benefits only if they apply conservation measures to

the land according to a plan approved by the local conservation district or, in its absence, SCS. If the land had been cropped between 1981 and 1985 the landowner has until 1990, or 2 years after SCS completes a soil map for the land, whichever is later, to begin implementing the plan.

Because cropland subject to conservation compliance tends also to be eligible for the CRP, the regulations should compel many landowners to take the affected land out of crop production through the CRP. On some of that land, relatively inexpensive practices, such as no-till and minimum tillage, can reduce erosion sufficiently to keep the land in production. But steep-sloped land may require very costly structural practices, such as terraces and water control basins. Alternatively, landowners can establish permanent vegetative cover. And rather than doing that on their own, they could enroll the land in the CRP and receive free technical assistance and 50% cost-sharing to establish pasture, trees, or some other income-earning cover.

However, for conservation compliance to be a negative incentive for the CRP, landowners must be aware of their land's vulnerability to the compliance regulations. As discussed above, 41% of the non-bidders believed their land was not eroding badly enough to be eligible for the CRP. Moreover, when we asked both bidders and nonbidders if they had heard of the conservation compliance provisions of the farm bill—and those provisions were defined for them when this question was posed—40% of the March and May bidders and 55% of the nonbidders reported that they were not aware of the provisions.

We were surprised that so many bidders were unaware of those provisions. To submit bids, landowners have to deal personally with ASCS and SCS staff. Perhaps those field staff people were reluctant to discuss conservation compliance because they themselves were uncertain as to how the provisions would be implemented. USDA did not publish the interim rules on conservation compliance until June 27, 1986, just two weeks before our survey began. To maximize the incentive effect of conservation compliance for the CRP, the former's provisions must be disseminated more widely. And informational materials on conservation compliance should present the CRP as an attractive mechanism for converting land that, under the compliance regulations, would be too expensive to retain in crops.

### Reputational obstacles

As with virtually any program, participants can attract or repel other potential

**Table 1. Degree to which landowners with accepted bids were satisfied with treatment received from USDA.**

Degree of Satisfaction	Number	Percent
Very satisfied	120	44.4
Somewhat satisfied	92	34.1
Somewhat dissatisfied	18	6.7
Very dissatisfied	11	4.1
Don't know or did not answer	29	10.7
Totals	270	100.0

clients by what they, the current clients, say about the program. We tested for the possibility of such a discouragement effect by asking respondents with accepted bids whether they were satisfied with the program-related treatment they received from USDA. The question specified technical and cost-sharing assistance as among the relevant kinds of treatment. Of the 270 successful bidders who were surveyed, 44% reported that they were "very satisfied," 34% said they were "somewhat satisfied," 7% reported being "somewhat dissatisfied" and 4% said they were "very dissatisfied" (Table 1). Thus, it appears that there is an impressive degree of satisfaction with the program's implementation.

Another question asked of both successful and unsuccessful bidders also tested for the discouragement effect: Would they recommend that other owners of eligible land submit bids? Of those who made successful bids, there was relatively strong endorsement of the program. A third of this group said they would "strongly recommend" others to participate and another 40% said they would recommend the program "with some caution" (Table 2). About 8% said they would "recommend with a lot of caution" and another 8% would "not recommend at all."

Not surprisingly, the unsuccessful bidders were less likely to recommend that others participate. Of those unsuccessful bidders—17% said they would not recommend the program at all. However, a majority of the unsuccessful bidders selected from the two most positive response options rather than from the two most negative: 17% chose "strongly recommend" and 40% chose "recommend with some caution" (Table 2). From this pattern, it seems unlikely that unsuccessful bidders caused a serious reputational problem for the CRP.

### Reforms to attract new bids

In marketing any service or product, survey research may identify design modifications that may attract significantly more clients. We asked respondents to

react to five reforms proposed for the CRP: (1) lowering the current eligibility standard that the land "has to be losing at least three times as much soil as is tolerable if that land is to retain its normal productivity" to "two times," (2) shortening the contract period from 10 years to 7 years, (3) permitting the use of CRP-enrolled land to meet the set-aside requirements of government commodity programs, (4) allowing commercial grazing or haying on CRP land, and (5) changing the CRP pricing policies. This fifth proposal read as follows: USDA would "announce fixed dollar amounts per acre that it would accept in each region of the country. There would be a different rent amount according to each class of eligible land's productivity, and the figure for each class would be the average cash rent that class had earned the previous three years."

For each proposal, we asked the respondents if they would be "any more willing to bid land" in that county if the reform were implemented. If the respondent said yes, we asked a follow-up question about the strength of that influence: "If this change were made in the program, would you say that the likelihood of you bidding land you own in a future signup period would be 75% or higher, between 50 and 74%, or less than 50%?"

The proposal to drop the threshold of land eligibility from 3T to 2T attracted interest from moderate proportions of both samples; 39% of the bidders and 34% of the nonbidders said that they would be more willing to bid if that change were made (Table 3). However, in response to the follow-up question, only 14% of the bidders and 7% of the nonbidders reported that this change would make them very likely to bid, that is, with an estimated likelihood of 75% or higher. Adding the respondents who answered in the 50 to 74% range, the proportions of the two groups with at least a 50% self-reported probability of bidding because of this reform were still low: 25% and 18%, respectively.

The proposal to shorten the contract period to 7 years elicited largely the same pattern of responses: reasonably high percentages of bidders and nonbidders were interested in it (42% and 37%, respectively), but relatively few in both groups (15% and 7%) said this proposed reform was important enough that their estimated likelihood of bidding because of it was as high as 75%. The combined totals with at least a 50% probability of bidding were only 28% and 19%, respectively.

In contrast, use of CRP land to meet set-aside requirements attracted interest from

a majority of both groups—57% and 52%. Moreover, 30% of the bidders said that this reform would make them very likely to bid. Among nonbidders, though, only 15% showed that level of interest. The corresponding figures for a 50% chance of bidding were 44% and 31%.

The single most attractive reform for both groups was to permit grazing or haying on CRP land. Two-thirds of the bidders and 62% of the nonbidders reported such a change would increase their willingness to bid. Aside from having the widest appeal, the grazing and haying reform ranked first also in its influence on the likelihood of bidding. Forty-two percent of the bidders and 30% of the nonbidders said that, if they were free to graze or hay, their probability of bidding in a future signup would be 75% or higher.

Like the set-aside reform, the ability to graze or hay land could increase the economic value of the CRP contract. In this case land could earn revenue in addition to the CRP rents. CRP acres used for set-aside could generate additional income indirectly because that land would free up other

land for crop production. During congressional deliberations on the CRP, cattle industry representatives strongly opposed use of CRP land for livestock purposes, fearing impacts on this already depressed sector of agriculture. However, as Ervin and Blase argued, these use restrictions limit the permanent transition of CRP acres to noncrop uses (2). Rather than being able to integrate that land into farm operations, for example, using it to provide forage for their own livestock or to raise hay for sale, farmers must wait 10 years for their contracts to expire.

A possible solution is to permit haying or grazing beginning in the sixth or seventh year of the contract. This would be late enough to allow the cattle industry to adjust to whatever changes such an option would cause, but not so late that the CRP participants would not have planned for such uses—and perhaps have developed and maintained better vegetative cover because of them. Moreover, landowners who hesitated to bid because of the length of the contract and their tendency to discount the value of the fixed rents to be received in the

contract's later years should regard the opportunity to graze or hay in those years as helping to offset the diminishing relative value of the rents.

The proposed pricing policies for the CRP also attracted considerable interest from both bidders and nonbidders. Fifty-nine percent and 57%, respectively, said that the proposed changes would increase their willingness to bid. And the respondents who reported the highest likelihood of bidding (75% or higher) accounted for substantial proportions of all bidders and nonbidders: 30% and 21%. Presumably, the respondents saw the changes as leading to higher rental payments. If a bidding pool offered several prices, for example, one for each relevant land capability class or group of classes, rather than a single ceiling price, land whose productivity exceeded the average for its pool could receive better rents but not necessarily at the expense of higher overall costs to USDA. Savings would be realized by offering lower rents to land of lower-than-average productivity.

With ceilings having been announced, bidders probably would bid at or near the maximums. Thus, the program would lose the savings that result from owners bidding low to increase their chances of acceptance. In the first three signups, however, USDA unofficially tended to accept all bids that were at or under the ceilings. Many or most prospective bidders have learned of that policy through the media (5) and other sources and have been advised to find out what the ceilings are in their bidding pools. But the maximum ceilings of the last signup may not continue into the next. For example, between the March and May signups, ceiling changes affected at least 42% of the original bid pools.<sup>2</sup> Given USDA's tendency to accept all bids up to the ceilings, potential bidders understandably want those bid ceilings announced.

## Conclusions

Our survey identified three CRP modifications that interested majorities of both past bidders and nonbidders and that, therefore, might generate significant numbers of new bids: freedom to graze or hay CRP land, rental prices based more so on the land's productivity, and use of CRP acres to meet set-aside requirements. In follow-up questions the grazing or haying reform showed the greatest influence on the likelihood of bidding. We also found

<sup>2</sup>We compared the pool ceilings listed in "Approved Maximum Acceptable Rental Rate for Second CRP Signup Period," a notice issued by ASCS, May 28, 1986, with the ceilings given in "Bid Pools for 1st Signup & Rates," a map compiled by ASCS, no date.

**Table 2. The extent to which successful and unsuccessful bidders would recommend the program to other landowners with eligible land.**

Response	March and May 1986 Bidders by Bid Acceptance			
	Accepted		Not Accepted	
	Number	Percent	Number	Percent
Strongly recommend bidding	90	33.3	69	16.7
Recommend with some caution	107	39.6	164	39.6
Recommend with a lot of caution	16	5.9	75	18.1
Not recommend it at all	21	7.8	71	17.1
Don't know or did not answer	36	13.4	35	8.5
Totals	270	100.0	414	100.0

**Table 3. Bidders' and nonbidders' reactions to proposed CRP modifications.**

Proposed Changes	Change Would Make Them More Willing to Bid		Change Would Make Likelihood of Their Bidding 75% or Higher		Change Would Make Likelihood of Their Bidding at Least 50%	
	Bidders	Nonbidders	Bidders	Nonbidders	Bidders	Nonbidders
%						
Drop threshold of eligibility from 3T to 2T	38.5	33.5	13.9	7.2	25.2	17.6
Shorten the contract period from 10 to 7 years	42.1	36.6	15.1	7.2	28.4	19.1
Permit CRP land to be used to meet set-aside requirements	56.7	52.1	30.3	15.1	43.9	30.6
Permit grazing and/or haying on CRP land	66.2	62.2	42.4	30.1	56.4	45.6
Announce levels of acceptable bids ahead of time, by class of land, and base levels on 3-year average of cash rents per class	58.9	57.3	30.4	21.1	44.6	39.1
Number of respondents	(684)	(489)	(684)	(489)	(684)	(489)

that past bidders consistently were more likely to bid in future signups if a reform were implemented. If changes are made, USDA should be sure not to miss this source of new bids when promoting the program.

We found three significant obstacles to wider participation in the CRP. A sizeable percentage of nonbidders (41%) believed their land was ineligible for the program because it was not eroding badly enough. Given how we drew the sample, many or most of these self-reported ineligible could not have been correct. Some agency, most likely SCS, should reach out to educate these people about their land's erosion problems and the benefits of participation in CRP.

A related obstacle was that a majority of nonbidders (55%) and many bidders (40%) did not know about the farm bill's conservation compliance provision. This potentially influential incentive for participating in the CRP was lost on the many landowners who were ignorant of it. Here is another serious information gap to justify greater outreach efforts by USDA agencies.

The third major obstacle to bidding in future signups was the rather widely reported perception (by 25% of both the nonbidders and the nonrebidders) that the CRP rental payments offered by USDA were too low. Outreach may clear up some misconceptions about the fairness of the current price ceilings. However, as our poll about program modifications indicated, many landowners would be more willing to bid if the acceptable rental prices per pool varied according to the land's productivity. Alternatively, there could be more separate pools that better reflected the diversity of land eligible for the program within a state.

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# Estimating the off-site costs of wind erosion in New Mexico

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**ABSTRACT:** Millions of acres of land in the United States are damaged annually by wind erosion. While some researchers have tried to measure the on-site economic costs of wind erosion, there have been virtually no studies of the off-site economic costs. An empirical study of the off-site costs of wind erosion was conducted in New Mexico. Off-site wind erosion costs were estimated to average \$466 million per year, dwarfing the \$10 million per year on-site costs estimated in another study.

**W**IND erosion damaged 857,800 acres of land in New Mexico between November 1983 and May 1984, according to Soil Conservation Service officials. That damage estimate was nine times the previous year's total and represented the sharpest increase in wind erosion damages in the country during that period.

Wind erosion was not confined to New Mexico. An estimated 12.3 million acres were damaged in the 10-state Great Plains area during 1983-1984. This is compared with 5.5 million acres in 1982-1983 and 5.1 million acres in 1981-1982. Only twice in the previous 49 years, did damages exceed the 1983-1984 level: 15.8 million acres in 1954-1955 and 12.5 million acres in 1980-1981, according to SCS officials.

But gross measures of the acreage damaged or tons of soil displaced provide only a proxy measure of the real economic costs of wind erosion. Wind erosion costs are incurred both on and off the farm. On-site, wind erosion primarily reduces production and increases operating costs. Off-site costs are felt by households, private firms, and government agencies in the form of increased cleaning, maintenance and replacement expenditures, and reduced consumption and production opportunities.

Evaluations of soil conservation programs typically assess only on-site benefits and costs. Off-site costs of wind erosion, however, likely dwarf on-site costs.

To confirm that hypothesis, we conducted an empirical study of the off-site costs of wind erosion in New Mexico. To our knowledge, this was the first study that

attempted to measure the off-site costs of wind erosion.

#### Study methods

New Mexico is divided into nine major land resource areas, each of which has similar soil and climate characteristics (Figure 1). Table 1 shows the population and estimated wind erosion in each MLRA (6, 7, 8). In our study we combined MLRA 39 with MLRA 36 and MLRA 51 with MLRA 48. In both cases the smaller MLRAs were similar to the larger MLRAs.

We estimated off-site wind erosion costs for the household and business sectors by using a mail survey (5). We asked respondents to estimate average costs by category. We derived off-site costs for the government sector from data provided by government agencies.

A random sample of households and businesses was selected from a complete set of 1984 New Mexico telephone directories using standard mail survey procedures (2). Questionnaires were sent to 900 households and 600 businesses in February 1985. A reminder postcard was sent two weeks later. Respondents who had not returned a questionnaire by mid-March were sent a second questionnaire.

#### Survey results

The total number of households responding was 224, a response rate of 25%. The total number of businesses responding was 173, a response rate of 29%. Given the difficulty of the questionnaires and the time required to complete them, we believe the response rates were good.

**Household sector.** On average, more than 50% of the survey respondents reported some negative impacts from blowing sand and dust. The impacts varied by the type of activity affected and the area of the state surveyed. For the state as a whole, 71% of the respondents indicated that blowing sand and dust increased the need for interior cleaning and laundry, 67% reported negative impacts to landscaping, 54% said recreation activities were affect-

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