Appendix 2: Acres Eligible for Treatment

For most physical effects modeled, land is eligible for treatment if the severity of one or more physical effects exceeds a predetermined threshold level. For example, land is eligible for soil conservation treatment where soil erosion exceeds the soil loss tolerance or "T" level.[1] Other physical effects are listed in table 1 in the main text. This appendix describes the data sources and our approach to linking data on conservation treatment needs to ARMS farms.

[1]While "T" is generally associated with soil productivity, we use it as a more general threshold for treatment. That is due to practical considerations; treatment for soil erosion concerns has typically meant treatment to the T level in USDA programs from which cost data are drawn.

Eligibility doesn't mean that the producer will undertake any specific treatment or that he/she will receive a payment for it, only that the treatment is appropriate for the land in question. Decisions about whether land will be treated depend on whether the producer is willing to accept the level of payment offered in exchange for treating the land.

Total acreage eligible for treatment is estimated to be 829 million acres (table A2.1). Because one actual acre can be eligible for more than one treatment, some acres are counted more than once. For example, if a single acre of nonirrigated cropland is eligible for nutrient management and soil erosion control, it would be counted twice in table A2.1. Thus, total actual acreage that could receive one or more treatments is less than 829 million acres.

Data and Estimation

Basic land use data, by farm, is from ARMS, phase 3, for 2002. The 2002 survey provides a full accounting of all land uses (e.g., crop production,

Table A2.1
Treatable acres by land use and treatment

Land use	Treatment	Acres (millions)[1]
Nonirrigated cropland	Water erosion control	52.00
Nonirrigated cropland	Wind erosion control	26.77
Nonirrigated cropland	Wind and water erosion control	2.51
Nonirrigated cropland	Nutrient management	280.48
Nonirrigated cropland	Pest management	109.39
Nonirrigated cropland	Wildlife habitat enhancement	4.59
Irrigated cropland	Water erosion control	2.03
Irrigated cropland	Wind erosion control	4.31
Irrigated cropland	Wind and water erosion control	0.28
Irrigated cropland	Nutrient management	49.86
Irrigated cropland	Pest management	17.27
Irrigated cropland	Wildlife habitat enhancement	0.47
Grazing land	Grazing land health enhancement	218.91
Grazing land	Nutrient management and riparian erosion control	44.62
Grazing land	Wildlife habitat enhancement	15.78
All grazing land	All	279.32
All irrigated cropland	All	74.22
All nonirrigated cropland	All	475.74
All treatable acres	All	829.27

[1]Total acres treated will be less than 829 million because some actual acres are eligible for more than one treatment.

Source: USDA, Economic Research Service.

grazing) on each farm in the survey. Data on soil erosion, potential pesticide loss, and other physical effects, however, is not collected with the ARMS data. Other data are used to estimate the proportion of acres needing treatment for a specific physical effect in the county or watershed that includes the farm (table A2.2). That information is used together with farm-specific acreages to estimate acres eligible for treatment:

$$A_{kj} = A_j P_{kj}$$

where:

A_{kj} is farm-specific acreage estimated to need treatment k on land in use j;

A_j is farm-specific acreage in land use j; and,

P_{kj} is the proportion of acres in need of treatment k on land in use j in the surrounding area.

Soil erosion (wind and water): Cropland acres are eligible for soil conservation treatment if estimated average annual erosion (wind or water) exceeds the soil loss tolerance (T) value for the land. The proportion of acres eligible for treatment, by county, is estimated from the NRI, which provides estimates of soil erosion rates, T-values, and acreage for all cropland sample points.

Nutrient runoff and leaching: All cropland acres are eligible for treatment for nutrient runoff and leaching. This assumption reflects the fact that excess nutrient balances and nutrient loss to water are widespread problems and thresholds for nutrient treatment are not clearly defined.

Pesticide runoff and leaching: Cropland acres are eligible for pesticide management if water leaving the field, either through surface or subsurface flows, is estimated to contain pesticides in concentrations that exceed standards for the protection of human health. Estimates of the number of acres by watershed (8-digit HUC) are obtained from Goss, et al.

Cropland habitat acres: Acreage eligible for habitat enhancement, by county, is from the NRCS Workload Assessment (WLA). WLA provides the acreage of various land types (e.g., cropland, grazing land) where conservation treatment for various physical effects would be appropriate. WLA estimates are based on the expert judgment of the local NRCS staff that assists farmers in determining conservation needs, devising conservation plans, and facilitating conservation practice implementation. To obtain the overall proportion of cropland acres eligible for habitat enhancement, WLA acreages are divided by the appropriate acreage (nonirrigated or irrigated cropland) obtained from the 2002 Census of Agriculture.

Grazing land grass cover, nutrient management, and habitat acres. On grazing land, county-wide estimates of acreage eligible for treatment for poor grass cover, nutrient-related issues, or habitat enhancement are from the WLA. To obtain proportions, WLA acreages are divided by grazing land acreage obtained from the 2002 Census of Agriculture.

On land that could be treated for both water and wind erosion, the cost of treating both is often less the sum of the separate treatments. That's because some practices can used for control of both water and wind erosion. A single practice can do both because wind and water erosion occur under different conditions and often at different times of the year. To avoid double counting the cost of these practices, 3 acreage variables are needed: total acres eligible for water erosion treatment, total acres eligible for wind erosion treatment, and acres eligible for both. Fortunately, the NRI data can provide these estimated. See appendix 3 for more detail on how these acreages are used in estimating treatment cost.

There is also overlap between treatment for N runoff, P runoff, and N leaching. All are addressed by nutrient management (NRCS practice code 590) but could be made up of differing components of the nutrient management practices. Although the plan is typically based on a single nutrient, all nutrients must be used at appropriate rates. So, when a producer undertakes nutrient management, we assume that all nutrients are applied at appropriate rates and otherwise managed in a way consistent with the spirit of the nutrient management plan.

Table A2.2
Definition of acres needing treatment, by physical effect

Treatment	Relevant ARMS acreage	Proportion of acres (county or HUC) needing treatment	Data Source
Wind erosion	Cropland[1]	Proportion of acres with wind erosion > T[2]	NRI
Water erosion	Cropland	Proportion of acres with water erosion > T	NRI
Nutrient management	Cropland	All acres assumed to need treatment	--
Pesticide management	Cropland	Proportion of acres for which pesticide concentration in water leaving field is estimated to exceed human health threshold	Goss et al.
Grazing land health	Grazing land	Grazing acres cited as needing treatment for grazing land health	WLA
Nutrient mgmt and riparian erosion	Grazing land	Grazing acres cited as needing treatment for nutrient-related concerns or soil erosion	WLA
Habitat restoration/ wildlife management	Cropland	Cropland acres cited as needing treatment for wildlife concerns	WLA
	Grazing land	Grazing acres cited as needing treatment for wildlife concerns	WLA

[1]Nonirrigated and irrigated cropland are treated separately in the analysis.

[2]While the T factor is based on the potential for productivity loss and not water quality, per se, it is reasonable to assume that full treatment has been achieved when soil erosion is reduced to T.

Source: USDA, Economic Research Service.