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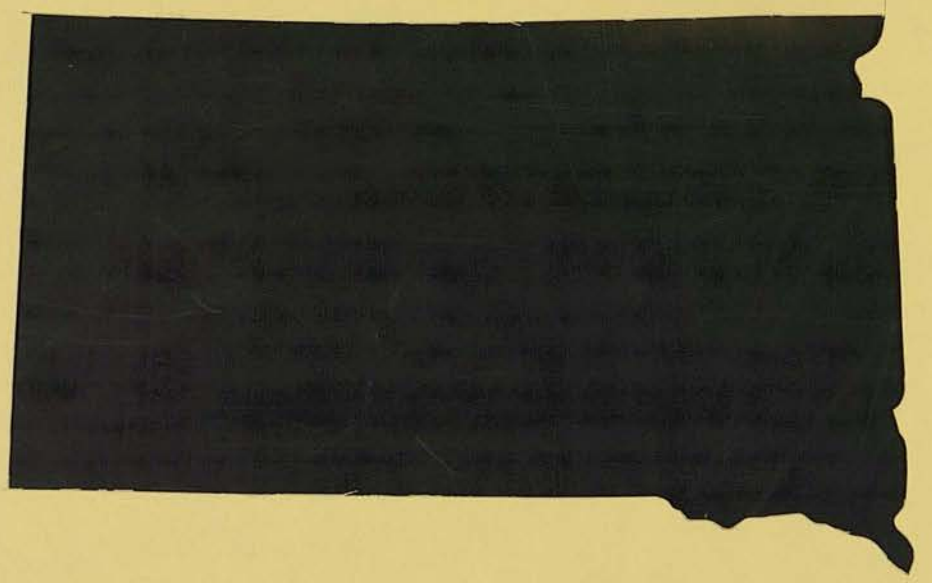

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FACTORS INFLUENCING POST-CONTRACT CRP LAND USE DECISIONS IN SOUTH DAKOTA

by

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& Mr. Tecleberhan Ghebremicael**

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ABSTRACT

The major objective is to determine the most important factors that affect contract holders post-CRP land use decisions in South Dakota. The major data source is a 1993 CRP survey sent to a random sample of 8.33% of South Dakota CRP contract holders and completed by 556 of 1133 persons contacted. Management, socio-economic, and land use intentions data are combined with their CRP contract file from USDA. Respondents are classified into major categories based on their post-contract CRP land use intentions. Descriptive statistics are used to compare physical, management, economic, and demographic characteristics by respondent land use intentions. Logistic regression models are used to assess the relative influence of selected factors on contract holders' expected post-CRP land use intention. Separate models are developed for the cropland use decision and for the grassland use decision.

FACTORS INFLUENCING POST-CONTRACT CRP LAND USE DECISIONS IN SOUTH DAKOTA

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Presented at the 1994 Annual Meeting of the Society for Range Management
Colorado Springs, CO.

Major questions surround post-contract land use decisions of land managers controlling 34 million acres of Conservation Reserve Program (CRP) lands in the United States during the 1996 - 1999 release dates. The decisions of CRP contract holders will impact various crop and livestock commodity markets, farm-level cost and returns, environmental (soil erosion and water) quality, wildlife habitat, as well as the overall economic well being of local communities. The greatest regional impacts will occur in the Great Plains states, where most of the CRP land acres are located (Joyce, Mitchell, and Skold. 1991).

This report is focused on post-CRP land use intentions of contract holders in South Dakota, a Great Plains state with 10% of the State's cropland acres (2.1 million acres) enrolled in CRP. The major objectives of this study are:

(1) to identify South Dakota CRP contract holders future plans concerning land use and land management practices of their CRP lands after contract expiration;

(2) to identify the relative importance of public policy and economic factors that could influence or CHANGE future land use decisions of South Dakota CRP contract holders; and

(3) to estimate the relative importance of socio-economic, management, and other factors affecting contract holders post-CRP land use intentions.

DATA SOURCES AND RESPONDENT / CRP CONTRACT CHARACTERISTICS

The major data source is a 1993 CRP survey mailed to a random sample of 8.33% of South Dakota CRP contract holders and completed by 556 of 1133 persons contacted during March and April 1993. Management, socio-economic and land use data from the 1993 CRP survey are combined with their CRP contract file data from USDA. Statistical analysis of CRP contracts held by respondents and nonrespondents to the 1993 CRP survey indicated no significant differences ($p <= 0.05$) in the mean level or distribution of CRP acres by regional location, land capability class, pre-contract erosion level, crop base acre reduction, or contract bid

period, and other major characteristics. Based on similarity of CRP contract characteristics, we conclude that the sample respondents are representative of the CRP contract holder population in South Dakota (Ghebremicael, 1993).

Land under CRP Contracts

Respondents owned or leased an average of 2007 acres of South Dakota farm/ranch land, including 326 acres of CRP lands, 680 acres of other cropland, and nearly 1000 acres of pasture, range, or other land uses. Respondents controlled 181,000 acres of CRP land, or nearly 9% of South Dakota's CRP acres. The Southwest region of the State (Figure 1), has the largest average number of CRP acres (895) per respondent, followed by the northwest region (605 ares); the southeast region has the smallest average number of CRP acres (105 acres) per respondent (Table 1.). The largest portion of CRP acres (43%) are located in the northeast and north central regions of South Dakota. More than 40% of the CRP acres are located in western South Dakota regions (northwest, southwest, and south central regions).

The largest portion of South Dakota CRP acres (57%) are owned and operated by respondents with more than 500 CRP acres, followed by 27% of the state's CRP acres held by respondents with 200-499 acres (Table 2).

Land Capability Class of CRP Contracts

With respect to the ease of converting respondents' CRP acres back to cropland, 64% (98,101 acres) are classified as Land Capability Class I-III. Land Capability Class (LCC) is a measure of land quality and a determinant of the agricultural uses that can be soundly applied to the land. Class I-III lands are generally considered to be easily converted to cropland. The remaining CRP contracts reported include land that has severe limitations as cropland (22.8% or 35,181 acres in LCC IV) and land that should not be used as cropland (13.2% or 21,211 acres) (Table 3).

SCS computed reduction in soil erosion is an average of 10.63 tons/acre/year (USDS file of SD CRP contract holders). The most highly erodible land is located in the southwest region, with 13.74 tons/acre/year net erosion reduction, followed by the southeast region with 12.98 tons/acre/year net erosion reduction.

Conservation Practices

There are four major conservation practices that were adopted and cost-shared on South Dakota CRP acres. These practices are: (1) permanent and introduced grasses, (2) native grasses, (3) permanent wildlife habitat, and (4) vegetative cover. The predominant conservation practices

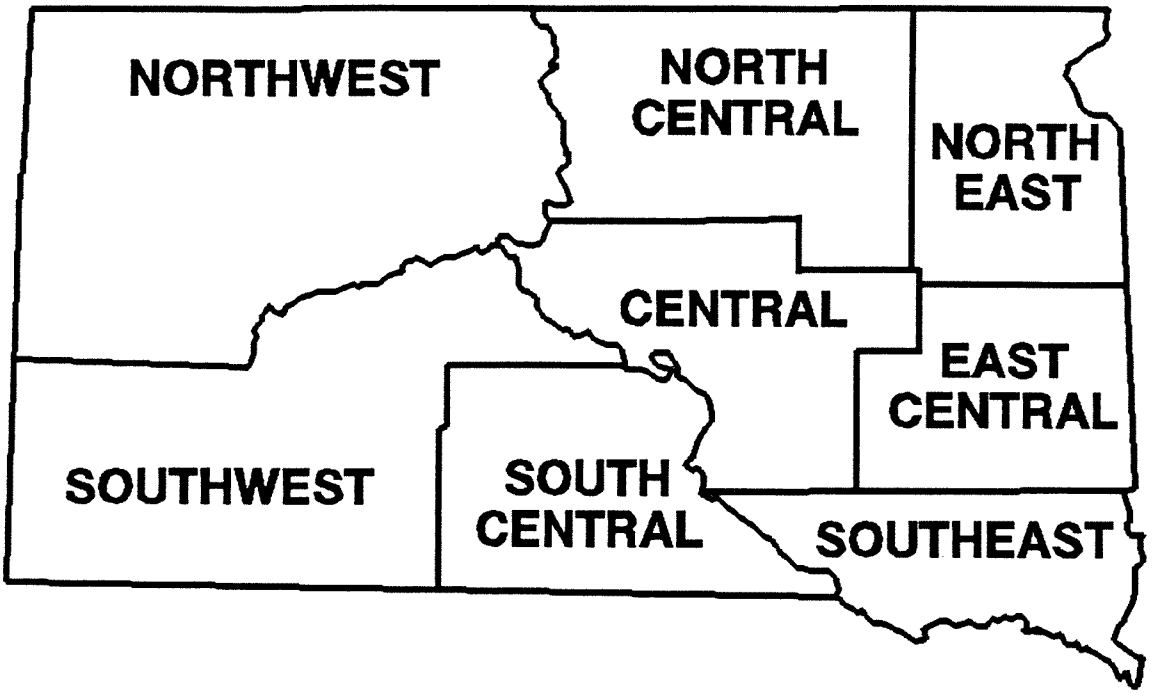

Figure 1. State of South Dakota and its agricultural regions.

Table 1. Distribution of CRP respondents and CRP acres enrolled in South Dakota.

State, Region	Number of respondents	Number of CRP acres	Percent of CRP acres	Mean of CRP acres
State Totals	555	181,005	100.0%	326
Region				
Southeast	45	4,709	2.6%	105
East Central	71	9,540	5.3%	134
Northeast	126	33,450	18.5%	266
North Central	126	43,693	24.1%	346
Central	48	15,725	8.7%	328
South Central	67	20,520	11.3%	306
Southwest	34	30,440	16.8%	895
Northwest	38	22,982	12.7%	605

Source: 1993 South Dakota CRP Survey

Table 2. Range of CRP contract size (acreage) by CRP respondent.

Contract size	N	Total No. of acres	Ave. No. of acres	Contract size as % of CRP acres
Less than 100 acres	157	8,780	56	5%
100 - 199 acres	143	20,056	140	11%
200 - 499 acres	157	48,901	311	27%
500 or more acres	98	103,268	1,054	57%
Total	555	181,005	326	100%

Source: 1993 South Dakota CRP Survey
N = Number of respondents.

Table 3. Statewide and regional distribution of land capability classes of CRP contracts by number in South Dakota.

			Land Capability Classes				
Region	N		I & II	III	IV	V - VIII	Total
Southeast	45	Acres	1,275	457	1,142	1,109	3,983
		Percent	32.0%	11.5%	28.7%	27.8%	100.0%
East Central	72	Acres	2,456	3,730	1,143	428	7,757
		Percent	31.7%	48.1%	14.7%	5.5%	100.0%
Northeast	126	Acres	7,539	13,757	4,216	1,743	27,255
		Percent	27.6%	50.5%	15.5%	6.4%	100.0%
North Central	126	Acres	11,027	10,604	8,241	3,702	33,574
		Percent	32.8%	31.6%	24.5%	11.1%	100.0%
Central	48	Acres	6,705	1,256	2,477	996	11,434
		Percent	58.6%	11.0%	21.7%	8.7%	100.0%
South Central	67	Acres	233	18,078	4,339	2,342	24,992
		Percent	0.9%	72.4%	17.4%	9.4%	100.0%
Southwest	34	Acres	93	12,815	6,884	4,465	24,257
		Percent	0.4%	52.8%	28.4%	18.4%	100.0%
Northwest	38	Acres	3,228	3,692	6,739	6,426	20,685
		Percent	18.5%	17.8%	32.6%	31.1%	100.0%
State Total	556	Acres	33,712	64,389	35,181	21,211	153,937
		Percent	21.8%	41.7%	22.8%	13.7%	100.0%

Source: 1993 South Dakota CRP Survey
N = Number of respondents.

in South Dakota are permanent and introduced grass and wildlife habitat (85% of the total CRP acres with conservation practices). Most CRP acres covered with permanent and introduced grasses (89%) are found in the northeast, north central, south central, southwest, and northwest South Dakota, while 74% of CRP acres left for wildlife habitat are found in the northeast, north central and central regions of the state. The regions where CRP lands are covered with introduced grasses are predominantly used for cropland. This implies that CRP lands with introduced grasses are more likely to be converted to cropland instead of remaining as grassland upon contract expiration.

Federal Program Crop Base Acres

Fifty eight percent of respondent CRP acres (105,106 of 181,005) are crop base reduction acreage, while 42% of their CRP acres were not associated with a program crop base acreage. Forty percent of CRP crop base acres are wheat base acres, followed by 19% oats base acres and 18% barley base acres.

Vegetation Establishment on CRP Acreage

A total of 543 of 556 people responded to a question concerning what type of vegetation is established on their CRP acreage. Eighty one percent indicated that alfalfa grass mixtures were used on some or all of their CRP lands. One fourth (25%) responded that introduced (tame) grass mixtures were utilized on some CRP acres and 24% reported using native grass mixtures. Since many respondents have more than one CRP contract, the above percentages do not add to 100%.

Existing Improvements on CRP Contract Lands

Respondents were asked concerning the existence of fences, water sources, and other improvements on their CRP contract acres. A total of 453 of 556 respondents answered this question. More than half indicated that they have fences on their CRP lands. Another 34% said they have waterways, followed by 29% reporting shelterbelts/windbreaks and 28% reported having livestock water sources.

A chi-square analysis showed that there is a statistically significant ($p <= .05$) regional difference in fencing, livestock water sources, and terraces on CRP lands. A higher proportion of respondents in the southwest, south central, northwest, north central and central regions of South Dakota vs. a lower proportion of respondents in all other regions. More than 60% of respondents indicating that they have livestock water sources on CRP lands are from the northeast, north central and south central regions of the state. Terraces that have been constructed are primarily concentrated in the northeast, east central, and southwest regions of South Dakota.

CRP Rental Rates

The statewide average CRP rental rate is $44.00 per acre, as compared to an average cash rental rate on non-CRP cropland of $30.50 in 1993. The eastern regions of South Dakota have the highest average CRP rental rates ($45.00 or more), followed by the central ($42.00 or more) and western ($33.00 or more) regions. Across the various regions, the minimum CRP rental rates range from $40.00 to $23.00 per acre and the maximum rates range from $60.00 to $35.00 per acre (Table 4).

There is a narrow range between the maximum and minimum CRP rental rates between regions, and 90% of CRP rental rates fall below the mean rental rate. This reflects the regional pool maximum bid rate caps.

CRP payments per acre greatly exceed cash rental rates for cropland in western and central regions of South Dakota (Table 4). If cropland cash rental rates at the time of CRP contract expiration are close to 1993 cropland cash rental rates, either of two cases may result: (1) CRP contract holders may prefer to extend their CRP contracts, if this option is available, or (2) if they return their CRP acres to cropland, cash rental rates for cropland will be further depressed, which may cause a fall in cropland values.

In eastern regions of South Dakota, CRP average rental rates are at least two and a half times greater than cash rental rates for pasture; in central regions CRP average rental rates are three or more times greater than cash rental rates and in western regions CRP average rental rates are six times greater than rangeland cash rental rates. If 1993 cash rental rates (or similar rate levels) prevail at the time CRP contracts expire, returning CRP acres to pasture/rangeland may cause cash rental rates for pasture to decline with a subsequent fall in rangeland values.

Characteristics of Respondents

An examination of interrelationships among socio-economic characteristics reveals the following profile of South Dakota CRP survey respondents. Forty percent of CRP respondents are commercial farmers with annual gross farm income exceeding $50,000 and control 55% of CRP acreage. Another 26% of respondents have a nonfarm principal occupation or are retired and control 12% of CRP acres. Another 11% of respondents operate small farms with gross farm income of less than $50,000 and control 7% of CRP acres. The remaining 23% of respondents controlling 25% of CRP acres are other combinations of age, principal occupation, farm size, and major source of income.

Table 4. Range of rental rates by region for CRP acreages

Region	Average CRP rental rate[a] $/acre	Range of CRP rental rates[a] Minimum	Median	Maximum	Average cash rental rate, 1993[b] Cropland $/acre	Pasture $/acre
		- - - - - - - - - $/acre - - - - - - - - -				
Southeast	51.55	40.00	50.00	60.00	51.80	20.30
East Central	50.17	38.50	50.00	60.00	47.14	20.10
Northeast	44.95	39.93	45.00	57.25	40.30	17.00
North Central	43.50	35.00	45.00	45.00	26.60	12.70
Central	43.32	29.95	45.00	45.00	24.20	15.20
South Central	41.83	30.00	43.93	45.00	22.80	10.10
Southwest	37.42	26.00	40.00	40.00	16.60	5.60
Northwest	33.06	23.00	35.00	35.00	14.60	5.10

Source: [a]1993 South Dakota CRP Survey

[b]Table 4, Janssen and Pfluger 1993, South Dakota Agricultural Experiment Station Circular 216, Brookings, SD.

South Dakota CRP contract holders are well educated with 89% having complete high school or above. Less than 15% of respondents have not completed high school, while 50% indicated some post-high school education. The percentage of respondents who completed college is 29.4%.

Respondents were asked concerning the reasons they entered land into the CRP (Table 5). About two-thirds of the respondents said that enrolling land into the CRP program was the most profitable use of the land while the associated risk of receiving CRP payments was low. This was expected because of the low gross farm incomes of some respondents and the fact that CRP rental payments are above cash rental rates in many regions of the state. Environmental factors were the second most influential factor for entering into the CRP program. These factors included reducing soil erosion, improving wildlife habitat and water quality. Enrolling land in the CRP in order to retire was the least important factor to the respondents.

Table 5. Relative importance of some economic and environmental factors that influenced CRP contract holders' decisions to enroll land in CRP.

Factor	N	Relative importance of the factors (as % of response)		
		Very Important	Somewhat Important	Not Important
Most profitable use of land	530	68.6%	21.5%	8.9%
Low risk associated with CRP payments	527	65.3%	24.4%	10.2%
Provide wildlife habitat	536	57.8%	31.1%	11.0%
Concern for soil erosion	525	55.0%	32.3%	12.6%
Concern for water quality	498	35.0%	38.8%	26.3%
Easiest way to meet conservation compliance	514	31.7%	40.0%	28.2%
Able to reduce labor	505	24.8%	34.8%	40.4%
Able to retire	512	18.0%	22.6%	59.4%

Source: 1993 South Dakota CRP Survey
N = number of responses

POST-CRP LAND USE AND MANAGEMENT PLANS

A summary of post-CRP land use intentions of 556 respondents controlling 181,000 CRP acres indicates 52% of CRP acres will be converted to cropland, 29% of CRP acres will remain as grassland, and projected land use of 19% of CRP acres is uncertain (Table 6). For the 496 respondents with specific intentions, 32% plan to convert all of their CRP lands to cropland, 28% plan to keep all CRP land as grassland, while 40% plan to use about three-fifths of their CRP acres for cropland and retain two-fifths of their CRP acres in grassland.

There are major regional differences in the distribution of acres and respondents by CRP land use intentions. The highest relative proportion of CRP acres intended for cropland are in the north central and northeast regions, while the highest relative proportion of CRP acres intended for grassland are located in the western regions of the State.

There are modest differences in CRP land use intentions by land capability class. Sixty nine percent of CRP acres intended for cropland use are in land capability classes I-III, compared to 57% of CRP acres intended for grassland use. Thirty one percent of CRP acres intended for cropland use and 43% of CRP acres intended for grassland use are in land capability classes IV-VII.

Table 6. Regional distribution of CRP acres by intended land uses.

Region	CRP acres	%	CRP acres intended for cropland	%	CRP acres intended for grasslands	%	CRP acres for uncertain uses	%
Southeast	4,709	3%	2,425	2%	1,435	3%	849	2%
East Central	9,540	5%	5,583	6%	2,740	5%	1,217	4%
Northeast	33,450	18%	23,238	25%	6,629	13%	3,383	10%
North Central	43,639	24%	27,092	29%	9,696	18%	6,851	20%
Central	15,725	9%	8,655	9%	5,546	10%	1,524	4%
South Central	20,520	11%	9,933	11%	9,005	17%	1,582	5%
Southwest	30,440	17%	8,999	10%	11,305	21%	10,136	30%
Northwest	22,982	13%	7,757	8%	6,797	13%	8,428	25%
State total	181,005	100%	93,682	100%	53,353	100%	33,970	100

Source: 1993 South Dakota CRP survey
Uncertain = CRP acres - CRP acres for cropland - CRP acres for grassland

Cropland Use and Management Considerations

Cropland tillage practices intended for post-CRP cropland include chisel plow tillage (61% of cropland use respondents), some no-till farming (26%), other conservation tillage methods (12%) and moldboard plow tillage (30%). Moldboard plow use is favored in much of eastern South Dakota.

One-half of 370 CRP respondents with cropland use intentions plan to annually use commercial fertilizer and herbicides, 20% plan to annually apply insecticides, and only 3% plan to use no-chemical farming methods. Incidence of fertilizer and herbicide use is highest in the corn-small grain regions of central and eastern South Dakota.

Conservation practices expected to be used by more than one-fourth of cropland use respondents include crop rotations (28%) and grass waterways (32%). Another 12% of these respondents, located in central and western regions, plan to use windstrip cropping practices. Very few cropland use respondents plan to use contour farming (7%) or terraces (3%).

Respondents controlling three-fourths of CRP acres intended for cropland indicated their cropland planting intentions. A majority (51%) of these 69400 acres are expected to be planted to wheat, 16% are planned for corn, and 33% are planned for barley, oats, soybeans, sunflowers, sorghum, and alfalfa.

Almost all respondents have some Federal crop program base acres on their CRP lands, with crop base acres totaling 58% of the sample total CRP acres. Thirty one percent of respondents with 45% of the crop base acres on CRP lands intend to return most of their CRP acres to crop production to maintain their total farm program crop base. Another 10% of respondents with 8% of CRP crop base acres intend to use all of their crop base acres to meet set aside and/or normal flexible acres requirements, if permitted. The remaining 59% of respondents did not relate their CRP land use intentions to their CRP crop base acres status.

Overall, the extent of crop base acres on CRP lands is an important consideration to a majority of respondents intending to return some of their CRP acres to crop production.

Grassland Use and Management Considerations

Two-thirds (334 of 496) of respondents with post-CRP land use intentions plan to keep some of their CRP acres in grass production. Grassland is the intended post-contract use of 29% of respondent CRP acres, with 51% of the planned grassland acres located in western South Dakota. Most of these respondents, intend to use the grassland for livestock grazing and/or hay production. Nearly 45% plan to manage some of their grassland acres for improving wildlife habitat (Table 7).

All respondents were asked to evaluate the suitability of their CRP lands for livestock grazing. Nearly 30% of the 536 respondents answering these questions indicated their CRP land is ready for grazing. Almost 65% of respondents said fences need to be built and 40% indicated existing fences need repair before their CRP lands would be suitable for livestock grazing. Nearly 48% stated that a livestock water source needs to be established, while 18% indicated an existing water source needs repair before their CRP lands would be suitable for livestock grazing (Table 8).

Results from various chi-square analyses indicate that respondents post-CRP grassland use decision is significantly ($p <= 0.05$) related to their assessment of suitability of CRP lands for livestock grazing. Five-sixths (84%) of respondents reporting their CRP lands are ready for grazing intend to use their CRP lands for livestock grazing. Three-fourths (76%) of those indicating existing fences need repair plan to use their CRP lands for pasture. Nearly three-fifths of contract holders reporting fences need to be built or water sources need to be established plan to use some of their CRP land for pasture after contract expiration.

Table 7. Regional distribution of South Dakota 1993 CRP survey respondents by intended use of CRP acres that will be kept in grass.

Region	N	Hay production (% of responses)	Livestock grazing (% of responses)	Wildlife habitat (% of responses)
Southeast	30	42%	73%	46%
East Central	35	68%	66%	46%
Northeast	65	69%	63%	31%
North Central	67	68%	63%	48%
Central	25	70%	80%	67%
South Central	52	67%	73%	54%
Southwest	24	87%	67%	53%
Northwest	30	76%	93%	28%

Source: 1993 South Dakota CRP Survey
N = number of respondents

Table 8. Percent of respondents that indicated improvements needed to make their CRP lands suitable for livestock grazing.

Improvements needed	N	Percent[a]
CRP land is ready for grazing	159	29.7%
Fences need repair	214	39.9%
Fences need to be built	347	64.7%
Noxious weeds are major problems	36	6.7%
Other problems	6	1.1%
Livestock water source needs repair	96	17.9%
Water source needs to be established	256	47.9%
Grass needs to be reseeded	35	6.5%

Source: 1993 South Dakota CRP Survey

[a]Percent of 536 respondents that reported the improvements needed to make their CRP lands suitable for livestock grazing.

IMPORTANT FACTORS THAT MAY INFLUENCE OR CHANGE POST-CRP LAND USE INTENTIONS

Respondent contract holders indicated that several economic and public policy factors will influence and may possibly CHANGE their post-CRP land use decisions from their current intentions. The most important factors influencing respondent's actual land use decisions are: (1) market prices of crops vs. livestock (62% stated this factor was very important), (2) expected costs of crop production on CRP lands (56%), (2) cost of soil conservation practices (46%), and Federal crop program provisions (45%). Availability of cost-sharing programs for soil conservation compliance, promoting wildlife habitat, or making CRP lands suitable for livestock grazing were "very important" factors to 40%, 38% and 41% respectively of respondents (Table 9). This implies that Congress may choose government cost-sharing policy(s) to achieve specific post-CRP land use goals.

A major implication is that contract holders post-CRP land use decisions will be greatly influenced by economic considerations that will prevail at the time their CRP contracts expire. However, public policy considerations related to CRP lands are also important to many respondents.

Table 9. Relative importance of some factors that are expected to influence CRP contract holders' future decisions about their CRP lands.

Factor	N	Relative importance (% of responses)		
		Very important	Somewhat important	Not important
Market prices for crops/livestock after CRP contracts expire	524	62.2%	27.5%	10.3%
Expected costs of growing crops	520	51.7%	33.3%	15.0%
Cost of soil conservation practices	526	46.0%	37.4%	16.5%
Government price supports for crops	527	44.8%	38.9%	16.3%
Availability of cost-sharing for livestock	521	41.3%	35.1%	23.6%
Availability of cost-sharing for crops	524	40.1%	40.3%	19.6%
Availability of cost-sharing for wildlife habitat	517	37.5%	40.1%	22.4%
Expected selling prices for the land	518	27.2%	32.4%	40.3%
Retirement from farming/ranching	518	26.4%	27.8%	45.8%

Source: 1993 South Dakota CRP Survey
N = number of respondents

There are major regional and socio-economic differences in respondent assessment of specific public policy options. A majority of respondents in the central, north central, and northeast regions indicate the level of government price/income support for crops will be a very important factor in their post-CRP land use decision. These three regions are the transitional regions for corn, small grain and range production in South Dakota, and agricultural land use decisions are highly sensitive to Federal farm program provisions.

A majority of central, north central and northeast respondents indicated availability of cost-sharing for wildlife habitat is a very important factor, compared to substantially lower percentages of respondents in other regions. Contract holders in these regions made the greatest use of wildlife habitat (CP4) conservation practices when they enrolled in the Conservation Reserve Program.

Availability of cost sharing programs for conservation practices to convert CRP land to cropland or to establish livestock production are most important to commercial farmer respondents.

Given a choice between policy options of (a) permanently retiring commodity base acres in exchange of a "lump sum" or annual rental payment(s) and (b) keeping commodity base acres that could be sued for annual set-aside or flexible acres requirements, without an annual rental payment, 37% of 522 respondents strongly favored permanently retiring the commodity base acres, while 30% strongly opposed and 33% were neutral. Only 26% of 496 respondents strongly agreed to keep commodity base acres and use them for annual set-aside or flexible acres requirements, while 34% strongly disagreed and 40% were neutral. This indicates that neither policy option has much support.

Contract holders were also asked to express their opinions on four alternative policy directions concerning CRP contract extensions. From 532 respondents, 62% strongly agreed with continuing the CRP contracts at current rental rates without haying or grazing; 31% strongly agreed to extend CRP contracts with the highest environmental benefits beyond the current expiration date; 31% also strongly agreed to extend CRP contracts at lower rental rates with haying and grazing privileges and 16% strongly agreed not to extend CRP contracts beyond the current expiration date.

Respondents willing to extend CRP contracts by five years would do so at higher rental rates with no haying or grazing and at lower rental rates if haying and grazing were allowed. The necessary difference in rental rates between these two options is an average of $14.91 per acre.

ECONOMETRIC MODELING OF FACTORS INFLUENCING POST-CRP LAND USE DECISIONS

In economic modeling, rational decisions on land use alternatives are usually based on expected profitability of each alternative, subject to risk preferences and other constraints imposed by the decision maker, available technology and legal environment. In this study, expected profits of post-CRP land use alternatives were not directly estimated. However, explanatory variables are selected on the basis that they are related to increasing (decreasing) revenues (costs) or are related to respondent preferences.

The logistic regression procedure is used to predict the likelihood of respondents returning their CRP land to cropland or grassland, after contract expiration. Logistic regression analysis is often used to investigate the relationship between the response probability and the explanatory variables. The response, Y, is a binary (0,1) variable representing the land use decision. Let X denote a vector of explanatory variables and $p = pr(Y = 1/X)$ is the response probability to be modeled. The linear logistic model has the form: Logit $(p) = \ln(p/(1-p)) = a + b'X$, where 'a' is the intercept parameter and 'b' is the vector of slope parameters (Gujarati, 1988, McCullagh and Nelder, 1989)

The dependent (response) variable is the post-CRP land use decision. The two models estimated are the cropland use decision and the grassland use decision. The explanatory variables included in each model are respondent demographic and farm business characteristics, CRP land characteristics, management variables, and respondent assessment of economic/public policy factors.

Demographic variables of principal occupation, age and education level (WORK, AGE, and EDUCATION) are included in both land use models because these factors influence many types of economic decisions. Business factors of gross farm income (GFI) and major source of farm income (SCROP or SLVST) are included because existing business size and income source are often related to unit costs of added crop or livestock production. If the major farm income source is crop (livestock), the expected post-CRP land use decision is cropland (grassland). Physical and location characteristics of CRP lands are often related to relative profitability of each land use decision. For example, CRP land in land capability classes (LCC) I-III may be more likely to convert to crop production, while CRP land in LCC IV-VII may remain in grass production due to severe limitation and rising costs associated with cropland conversion. As pre-contract erosion level (EROSION) increases, conservation compliance costs should increase and respondents may be less likely to convert their CRP land to cropland. The pre-contract erosion level is the predicted erosion

level (USLE) under cropland conditions prior to the CRP contract, and is used as an estimate of post-contract erosion level if CRP land use is changed to crop production.

Regional location in South Dakota reflects geographical differences in profitability and production risk of cropland and grassland due to climatic influences on land productivity. CRP lands in eastern and central South Dakota are more likely to convert to cropland based on relative profit and less production risk considerations.

Past or present management practices can greatly influence land use decisions. For example, crop base acres resulting from past management decisions and Federal commodity program rules, are expected to be positively related to a cropland use decision. Most of the other management practice variables on CRP lands (suitability for grazing, existing improvements, fence conditions, and native grasses) are expected to be positively related to a grassland use decision. Also ownership and presence of hay equipment and grazing livestock on the respondents' farm/ranch are also expected to be positively related to a grassland use decision.

Respondent assessment of the relative importance of market prices, crop production costs, Federal commodity programs, and various cost-sharing programs are also expected to be related to their land use decision.

The dataset used to empirically estimate the model coefficients are the 496 of 556 South Dakota CRP survey respondents providing information on their land use decision. Due to missing values for various explanatory variables, only 427 respondents are included in the cropland decision model and 417 respondents are included in the grassland decision model.

A stepwise logistic regression procedure (PROC LOGISTIC in SAS/STAT, Version 6) was used to estimate the coefficients of the cropland decision model and the grassland decision model. The variable names, definition, and simple statistics are reported in Table 10. The stepwise model results are shown in Table 11. A 0.10 probability level cutoff was used for entering and exiting variables and maximum likelihood estimation procedures were employed.

The stepwise model for the cropland use decision includes a statistically significant intercept term and seven explanatory variables: respondent education level (EDUCATION), regional location (REGEAST and REGCENT), number of crop base acres (BASEACRE), and respondent assessment variables for Federal price/income supports (FED SUPPORT), cost of growing crops (CROPCOST) and conservation cost sharing (COST-SHARE CROP). Coefficients of all explanatory variables, except for COST-SHARE CROP, had the expected positive sign. Thus respondents with a post-high school education, with CRP lands in eastern or central South Dakota, with a greater number of CRP crop base acres, and indicating Federal farm programs and crop production costs

Table 10 Variable Name, Definition, and Simple Statistics-
Stepwise Logistic Regression Models

A. Cropland Decision Model

Dependent Variable	Definition	Mean	Standard Deviation
y_c = cropland	y_c = 1 if CRP land use intention is cropland, = 0 otherwise.	0.728	0.445
Explanatory Variables			
Education	= 1 if respondent has post-high school education, = 0 otherwise.	0.553	0.498
RegCent	= 1 if CRP land is in central SD, = 0 otherwise.	0.426	0.474
RegEast	= 1 if CRP land is in eastern SD, = 0 otherwise	0.429	0.495
BaseAcre	Number of base acres	196.83	290.15
FedSupport	Relative importance of Federal price/income supports (1 to 5); =1 not important, =5 very important	3.29	1.33
Cost-Share Crop	Relative importance of conservation cost sharing programs (1 to 5); =1 not important, =5 very important	3.08	1.35
CropCost	Relative importance of crop production costs (1 to 5); =1 not important, =5 very important	3.40	1.32

B. Grassland Decision Model

Response Variable	Definition	Mean	Standard Deviation
y_g = grassland	y_g = 1 if CRP land use intention is grassland, = 0 otherwise	0.676	0.468
Explanatory Variables			
Age	Respondent age in years	53.85	13.42
RegCent	= 1 if CRP land in central SD, = 0 otherwise	0.432	0.495
RegEast	= 1 if CRP land in eastern SD, = 0 otherwise	0.424	0.500
Grazing	= 1 if CRP land is suitable for grazing, = 0 otherwise	0.292	0.455
HayEquip	= 1 is respondent owns hay harvesting equipment, = 0 otherwise	0.662	0.472
MktPrice	Relative importance of crop/livestock market prices (1 to 5); = 1 not important,=5 very important	3.78	1.29
Cost-Share Lvstk	Relative importance of cost-sharing programs for livestock-related improvements (1 to 5); = 1 not important, = 5 very important	2.89	1.38

Source: 1993 South Dakota CRP Survey

Table 11 Stepwise Logistic Regression Model Results for Post-CRP Land Use Decision.

A. Cropland Decision Model

Variable	Parameter Estimate	Standard Error	Wald Chi-Square	Probability Significance Level	Odds Ratio
Intercept	-1.860	0.486	14.62	0.0001	0.156
Education	0.431	0.240	3.24	0.072	1.539
RegCent	0.641	0.361	3.16	0.076	1.898
RegEast	1.249	0.379	10.88	0.001	3.487
Baseacre	0.003	0.001	11.02	0.001	1.003
FedSupport	0.396	0.109	13.21	0.0003	1.486
Cost-Share Crop	-0.250	0.113	4.95	0.026	0.779
CropCost	0.276	0.111	6.19	0.013	1.317

N = 427 C-Index = 0.756
-2 Log L = 433.641 for intercept and covariates
ChiSquare for vovariates = 65.867 with 7 D.F. (p = 0.0001)

B. Grassland Decision Model

Variable	Parameter Estimate	Standard Error	Wald Chi-Square	Probability Significance Level	Odds Ratio
Intercept	1.697	0.727	5.44	0.020	5.459
Age	-0.015	0.009	3.01	0.082	0.985
RegCent	-0.927	0.440	4.44	0.035	0.396
RegEast	-1.334	0.437	9.31	0.002	0.263
Grazing	1.226	0.306	16.07	0.0001	3.409
HayEquip	0.576	0.244	5.60	0.018	1.779
MktPrice	-0.242	0.095	6.54	0.010	0.785
Cost-Share Lvstk	0.386	0.087	19.75	0.0001	1.471

N = 417 C-Index = 0.752
-2 Log L = 450.96 for intercept and covariate
Chi-Square for covariate = 74.177 with 7 D.F. (p = 0.0001)

Source: 1993 South Dakota CRP Survey

are important decision criteria are more likely to have post-CRP cropland use intentions. Respondents indicating conservation cost-sharing programs are important considerations are less likely to indicate a post-CRP cropland use decision.

The stepwise model for the grassland use decision includes a statistically significant intercept term and seven explanatory variables: respondent age (AGE), regional location of CRP lands (REGCENT and REGEAST), suitability of CRP land for grazing (GRAZING), presence of hay harvesting equipment (HAYEQUIP), and respondent assessment variables for crop/livestock market prices (MKTPRICE) and cost-sharing practices (COST-SHARE LVSTK) for livestock-related improvements on CRP lands. The coefficients for GRAZING, HAYEQUIP, and COST-SHARE LVSTK have the a priori expected positive signs, while the coefficients for age and regional location variables have the a priori expected negative signs. The significant negative coefficient for MKTPRICE was unexpected.

The C index of rank correlation, which assumes a value between 0 and 1, is used for assessing the predictive ability of a model. The closer the C index value is to 1.0 the better the predictive ability. The stepwise cropland model has a C index value of 0.746, while the stepwise grassland model has a C index of 0.752. Based on the -2 LOG likelihood statistics and chi-square tests for covariates for both models, the combined effect of all explanatory variables are significantly different from zero with a p-value of 0.0001.

It is interesting to note that farm business size, major source of farm income, predicted erosion level (EROSION) and land capability classes of CRP lands are not included as statistically significant explanatory variables in either land use decision model.

Overall, this preliminary investigation indicates respondents' post-CRP land use intentions are related to regional location of CRP lands, selected management variables, and respondent assessment of the relative importance of economic and public policy factors. Age or education level are the only significant demographic variables in either model.

SELECTED IMPLICATIONS

Respondents' post-CRP land use intentions are not significantly related to pre-contract erosion level or the land capability classes of the soil types on their CRP lands. However, their land use intentions are related to their existing management practices on their farm/ranch. This implies that conservation compliance requirements will likely assume a major role in minimizing environmental hazards of returning highly erodible lands to crop production. It also explains why respondents intending to return CRP lands to cropland are concerned about conservation cost-sharing programs.

Two of the most important explanatory variables in the cropland decision model are the extent of crop base acres and respondent assessment of the relative importance of Federal price/income supports for crops. Respondents are clearly indicating that Federal farm program incentives for crop base acres will have a substantial impact on their decision, if their enrolled CRP lands have a relatively large crop base. Public policy modifications that change incentives for using CRP crop base acres could alter many post-CRP land use decisions.

Cost sharing can be an effective policy instrument to influence post-CRP land use decisions. For example, if Federal policy makers want to encourage grassland use, cost sharing policies for livestock-related improvements and for wildlife habitat could become important to many respondents. Conservation compliance requirements and cost-sharing for conservation practices are important policy instruments in the cropland use decision.

A major implication for agriculturalists, conservationists, and educators is the importance of management variables in the decision making process. Applied farm management research/education programs targeted to CRP land use decisions in the next 5 - 7 years, should have high payoffs to society.

References Cited

Ghebremicael, Tecleberhan H. 1993. Analysis of Conservation Reserve Program Contracts, CRP Contract Holders' Characteristics, and Post-CRP Land Use Intentions in South Dakota, Masters Thesis, Economics Dept., South Dakota State University, Brookings, SD. December.

Gujarati, Damodar N. 1988. Basic Econometrics, 2d edition, City University of New York, McGraw-Hill Inc., New York, NY.

Joyce, Linda A., J.E. Mitchell, and Melvin D. Skold, ed. 1991 The Conservation Reserve - Yesterday, Today and Tomorrow: Symposium Proceedings, RM-203, USDA Forest Service, Fort Collins, CO.

McCullagh, P. and Nelder, J. A. 1989. Generalized Linear Models, second edition, New York: Chapman Hall.

SAS Institute Inc. 1990. SAS/STAT Users' Guide, version 6, fourth edition, volume 2, SAS Institute Inc., Cary, NC.