United States Department of Agriculture

Conservation Security Program (CSP)

Amendment to the

Interim Final Rule

Benefit Cost Assessment

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Benefit Cost Assessment

Executive Summary

The Conservation Security Program (CSP) is a voluntary Natural Resources Conservation Service (NRCS) program that recognizes the stewardship of natural resources by farmers and ranchers on working lands. The CSP takes an innovative approach in that it rewards the best stewards of the land. Over the next 8 years, CSP will be offered to all eligible farmers and ranchers in the United States.

Discussion of the Economic Analysis Benefit Cost Model

The economic analysis is based on a model that was designed to simulate producers' willingness to participate in CSP. The model includes a number of simplifying assumptions, some of which are discussed below. Because of the assumptions used, the model should not be relied on to predict actual participation rates, tier and regional distribution, or the magnitude of payments. The model is best used to predict the direction of how participation would change if a particular program feature is changed, rather than the magnitude of the change. Because program implementation has only begun, the model has not been validated so its ability to predict program participation has not been assessed.

The model provides results reflecting total participation over the next 15 years, rather than information on any particular year's sign-up. Annualized values are also presented for informational purposes, but they represent an average over the time period covered by the model, rather than any particular year. A budget constraint has not been incorporated into the model and the results do not reflect the use of enrollment categories intended to comply with any such budget constraint.

Farms -- The model used ARMS 2002 Phase 3 data to construct 6,105 farm types representing the 2.1 million farms in the U.S.. Such farms are likely more numerous than the agricultural operations that may enroll in CSP because several "farms" may be operated by a single applicant. Additionally, the model assumes that farms as small as five acres will enroll in CSP. In reality, the cost of fulfilling the eligibility requirements and applying to the program may exceed the benefits for such small farms.

Information about each representative farm includes acreage needing treatment (from the NRCS work load assessment database), acreage already treated (from the NRCS Performance and Results Measurement System), cost of installing practices, and County rental rates. Such information represents the average for the farm type and watershed in which each farm is located, and so may differ from the characteristics of actual farms enrolled in CSP. Additionally, some the data are only available on a statewide basis, so allocations to the watershed are based on the acreage covered by each land type. To the extent that agricultural operations in a watershed may have adopted conservation practices to a higher or lower degree than average, such estimates may not be accurate.

Eligibility -- The model includes several assumptions about the treatment of natural resource concerns for CSP eligibility. Due to lack of data, the model considered up to six resource

concerns that need to be addressed and assumed that 1.5 selected practices per acre are needed to fully treat each resource concern. If different practices or combination of practices are needed to treat resource concerns in actual agricultural operations, producers may be less or more likely to sign up for CSP or they may enroll in a different tier than predicted by the model.

The model constructed a set of uniform decision rules to predict whether a producer would apply to CSP. These decision rules include:

- A return of at least seven percent on conservation costs to the producer during the contract,
- Minimum size farm of five acres,
- The cost of complying with eligibility requirements prior to enrollment cannot exceed 10 percent of annual rental rate of the land,
- A willingness to participate factor based on socioeconomic data from participation in other conservation programs,
- Tier selection that maximizes net return, and
- Producers are assumed to recognize only 25 percent of the onsite benefits derived from conservation practices.

To the extent producers use a different set of decision rules or consider additional factors in their decision to apply to CSP, the model results may differ from actual participation. Note for example that the decision rules do not include the cost of adopting practices to become eligible for any enrollment categories since the categories were not incorporated into the model.

Payments -- The model used estimated rental rates for the purpose of calculating stewardship payments. In watersheds where there was no data on rental rates, the rates had to be imputed. The model assumes that only Tier II contracts or contracts transitioning to a higher tier will receive new practice payments. In the model for Alternatives 1 and 3, enhancement payments are assumed to either equal 50 percent of the contract statutory limit or 70 percent of the contract payment, whichever is less. For the baseline and Alternative 2, enhancement payments are assumed to either equal 50 percent of the contract statutory limit or the difference between the regulatory limit and the sum of the stewardship payments and existing practice payments. These constraints differ from the limits placed by NRCS either in the rule or in the 2004 sign-up and so the model does not reflect actual contract requirements. Producer costs for enhancement activities are assumed to be 25 percent of the enhancement payments. This may be lower or higher than actual costs and so may affect producers' willingness or ability to undertake enhancement activities.

Benefits -- Due to a lack of data, no attempt was made to estimate the benefits generated by the implementation of enhancement activities. The model results therefore show a negative net benefit for the various program alternatives, because enhancements activities, which constitute a large portion of the contracts' cost, are assigned zero benefits. It is likely that enhancement activities do provide significant benefits, and therefore the results of the model should be viewed as a lower threshold of expected benefits. Tables 1a-1c provide the results of several sensitivity analyses that use different assumptions regarding enhancement activities' benefits to illustrate a range of other potential outcomes.

Discussion of Differences between Model and Other Program Estimates

The benefit-cost model results differ from the estimate of the Cost of Program (COP) model used to predict the actual number of contracts that could be funded based on the President's budget baseline. The benefit-cost model results have a much greater participation estimate and lower average acres per contract. These differences occur because the model enrolls a greater proportion of small farms than the President's budget estimate which reduces the average payments per farm and increases the number of CSP participants. The benefit-cost model predicts a larger number of enrolled small farms than the President's budget because the model assumes that farms as small as 5 acres would participate, whereas in reality transaction costs may reduce participation of such small operations. This assumption results in a prediction that the average farm size would be about 200 acres. In contrast, the COP model using 2004 sign-up data indicates that the participating farm size would be about 750 acres on average. Varying the benefit-cost model assumption of minimum farm size has a dramatic effect on the benefit–cost model results. For example, increasing the smallest farm size to 50 acres decreases the number of farms predicted to enroll in CSP by the model by 40 percent and total government costs by 20 percent, all else being equal.

In addition to different farm sizes, the COP model assumes both a constrained budget consistent with a programmatic ramp-up funding scenario and that only about five percent of the farms would meet the minimum level of treatment for CSP. These different assumptions lead the COP model to estimate CSP participation at about 89,000 over the budget cycle of ten years while the benefit cost model estimates participation to total about 990,000 over fifteen years. The results of the unconstrained benefit-cost model underscore the need to use enrollment categories or other means to comply with the program's budget.

The COP is utilized by the agency to predict CSP participation using assumed budget caps within the President's budget and calculates the number of contracts alternative budget scenarios might fund. This model has assumptions that can be easily modified to reflect ever changing programmatic data. For example, the average acreage per contract and average cost per contract by tier can be estimated based on projections and then compared with actual sign-up data. The projections for the 2005 sign-up are estimated at 520 acres for a Tier I, 850 acres for Tier II and 1,400 acres for Tier III contracts. The projections for the annual average cost per existing contract are estimated at $6,000 for a Tier I, $12,500 for Tier II, and $26,600 for Tier III in FY 2005.

Discussion of Program Alternatives and Results

Baseline – *No Action: The baseline assumes that CSP, as implemented in 2004 under the Interim Final Rule, will continue under the Interim Final Rule conditions.*

National participation in CSP under the Baseline is estimated to be a total of 989,000 farms (or about 47 percent of all "farms" across the US, as defined by the ARMS Phase 3 survey) over a fifteen year period. The Midwest leads all regions in number of participants with about 37 percent of all enrollees, followed by the Southeast (about 21 percent) and the Northern Plains (about 14 percent). Almost eighty-three percent of participation is estimated to be at the Tier I

level; 10 percent either at Tier II or Tier I transitioning into Tier II; and, about seven percent in Tier III. Over 75 percent of contract payments consist of enhancement payments. An estimate of the conservation assurance payments are found in Table 1 in the "Baseline" column of data. Eligible producers receive these payments to increase assurance that conservation measures will continue to provide a broad and ongoing stream of environmental benefits for the public. Conservation assurance payments may induce other farmers and ranchers to install additional conservation measures that further enhance environmental quality so that they can qualify for the CSP program.

Table 1. Selected Results of Modeling Alternative Program Structures, FY 2005-2020

Participation Totals – Total over entire 15 years and average annual estimates								
Tier Level	Baseline – Over 15 years	Difference from Baseline			Baseline-Average Annual 1/	Difference from Baseline		
		Alt. 1	Alt.2	Alt.3		Alt. 1	Alt.2	Alt.3
Tier 1	817,617	-83,069	4,967	-78,185	272,539	-27690	1656	-26062
Tier 2	73,958	-1,995	-1,809	-3,914	49,305	-1330	-1206	-2609
Tier 3	66,940	0	15	15	44,626	0	10	10
Tier 1 to 2	27,345	1,478	-3,538	-1,950	13,673	739	-1769	-975
Tier 2 to 3	3,520	0	-440	-440	2,347	0	-293	-293
Total	989,380	-83,586	-804	-84,474	382,490	-28281	-1602	-29929
Average Annual Payout								
Tier Level	Dollars per year on a 7% annualized rate				Dollars per year on a 3% annualized rate			
Tier 1	1,082	-672	-3	-674	1,006	-625	-1	-627
Tier 2	2,244	-331	55	-275	2,273	-327	58	-269
Tier 3	6,952	389	4	393	7,026	393	5	398
Tier 1 to 2	2,502	-1,233	1,478	15	2,432	-1,166	1,491	120
Tier 2 to 3	7,308	69	263	325	7,338	96	156	240
Benefits								
Location	Millions of dollars on a 7 % annualized rate				Millions of dollars on a 3 % annualized rate			
On-site	72	-4	-3	-7	74	-4	-3	-7
Off-site 2/	99	-9	0	-9	99	-9	0	-9
Total Benefits	171	-13	-2	-16	174	-13	-3	-17
Program Cost Information								
Costs	Millions of dollars on a 7 % annualized rate				Millions of dollars on a 3 % annualized rate			
Producer	198	-64	2	-62	127	-42	1	-41
Gov't TA	115	-32	2	-30	113	-30	2	-28
Gov't FA	767	-212	13	-199	750	-197	13	-184
Net Benefits, Net Returns, and Conservation Assurance Payment								
Net Benefits 3/	-143	82	-6	76	-66	59	-6	52
Net Returns 4/	641	-152	9	-144	697	-159	9	-150
Conservation Assurance Payments 5/	569	-148	11	-137	623	-155	12	-143

1/ Average annual participation assumes that 1/3 of all Tier 1 participants are enrolled in any one year: participants in other tiers are enrolled 2/3 of the time due to longer contract lives.
2/ Off-site benefits are environmental benefits.
3/ Net benefits are total benefits less producer conservation costs less the cost of technical assistance. Financial assistance to producers is a benefit for producers but a cost to taxpayers and, therefore cancels out of the net benefit calculation.
4/ Net returns represents the financial assistance plus on-site benefits less producer conservation costs.
5/ Conservation assurance payments are considered to be payments to producers that exceed the total cost of practice installation and adoption. Conservation assurance payments are a cost to society, and although they are a benefit to CSP participants, they are neither a net cost nor a net benefit to the economy at large.

Features Common to all Alternatives – Enhancement payments are limited to 50 percent of the tier specific statutory limit; however, the calculation of enhancement payments differs by alternatives. Existing practice payments are calculated as 25 percent of the total stewardship payments, which is consistent with the Baseline (Interim Final Rule or Baseline scenario above). Cost-share rates for new practices installed with CSP funds are assumed to be consistent with Environmental Quality Incentives Program (EQIP) cost share rates of 50 percent.

Program Alternative 1 – *This alternative is similar to the Interim Final Rule, except the enhancement payments are not calculated as the difference between the regulatory limit and the sum of the stewardship payments and existing practice payments and are instead calculated as 70 percent limit of the total contract payment. The regulatory limit is not a constraint in this alternative.*

National participation under Alternative 1 registers declines in all regions with especially large decreases shown in the Midwest and the South Central regions as compared with the Baseline. Although a small increase in participation occurs in those transitioning from Tier I to Tier II, the large declines in Tier I and II participants cause over-all participation to drop The participation changes noted above result from drops in contract payments for Tier I and II while payments for Tier III and for contracts transitioning to Tier III increase. All of the change in total payments results from changes in the benefit-cost model limits on enhancement payments. Annualized net benefits, producer net returns, and an estimate of the conservation assurance payment are found in Table 1.

Program Alternative 2 – *This alternative is the same as the Baseline except contracts that include movement between Tier I and Tier II are allowed to increase the length of the contract from a maximum of 5 years to 10 years.*

This alternative assumes that all the constraints consistent with the Interim Final Rule are in place (that is, similar to the Baseline) however it assumes that if a producer enters a contract at a Tier I level and wants to move up to a Tier II level, the contract life is extended from 5 years to 10 years. This removes the disincentive of limiting the contract life for producers willing to implement conservation plans that would yield greater potential environmental benefits.

National participation is virtually the same as under the Baseline. Slight drops in participation are registered in the Midwest and West with a slight increase in the Southeast and virtually no change in any other region. A higher participation level in Tier I is off-set by greater declines in Tier II and those transitioning from Tier I to II and from Tier II to III. Average contract payment amounts are similar in Alternative 2 as compared with the Baseline for Tier I, II, and III participants, but are lower for those participants transitioning from Tier I to II and lower for those transitioning from Tier II to III. Annualized benefits are similar to those under the Baseline while annualized government costs (FA) are slightly higher (Table 1, Alternative 2 column).

Program Alternative 3 *- This alternative combines the features of Alternatives 1 and 2: removing the regulatory limit on contract payments; calculating enhancement payments as 70 percent of total contract payments; and, allowing the length of contracts that include movement between Tier I and Tier II to increase from a maximum of 5 years to 10 years.*

This alternative combines all the assumptions included in the previous alternatives. It is most similar to the Amendment to the Interim Final Rule, with the exception that the enhancement payments are limited as in Alternative 1.

National participation declines by about 8-percent compared to the Baseline – the lowest of all scenarios. Participation drops in all regions with the largest declines registered in the South Central region. As compared to the baseline, participation decreases in all tiers except Tier III. Regional and Tier level participation declines are caused by an overall drop in contract payments. The large number of Tier I participants and their lower payment rates masks the much larger payments to participants in the other tiers and the transition between tiers.

Selected Alternative

Alternative 3 is the most similar to the changes adopted by the Amendment to the Interim Final Rule. The model predicts that Alternative 3 will produce higher social net benefits than the Baseline. However, Alternative 3 results in lower net benefits than Alternative 1. There are programmatic reasons for selecting Alternative 3 (Amendment to the Interim Final Rule) over Alternative 1. In response to public comments, the agency also decided that contracts that include a transition from Tier I to Tier II should be granted the same contract length limit that is provided to Tier II contracts.

Alternative 3 provides lower net returns to producers than the Baseline (2004 Interim Final Rule). This is primarily the result of assuming more stringent limits on enhancement payments in the model than those provided either in the 2004 Interim Final Rule or in the 2005 Amendment to the Interim Final Rule. To the extent that the agency would likely select less stringent limits for the 2005 sign-up, producers' actual net returns may be higher and more comparable to those provided by the Baseline.

Results Viewed Under Varying Assumptions Concerning Enhancement Benefits and Costs

The benefit cost analysis discusses the uncertainty in calculating enhancement benefits and the interpretation of costs. The following three tables highlight some of the results as found in Table 1, but report them under different assumptions regarding the annualized benefits and costs of enhancement activities. As would be expected, these assumptions have a great effect on expected program net benefits. Table 1a excludes all enhancement benefits and implementation costs from producer conservation costs and government financial assistance. Thus, net benefits are higher than those found in Table 1. Table 1b reports the results after enhancement benefits are set equal to enhancement implementation costs. Table 1c summarizes the model results the same way as in Table 1, but producer net returns now reflect that the ratio of enhancement benefits and costs are assumed to be the same as the ratio of existing annualized practice benefits and costs. Under all alternatives, the calculations produce the same level of conservation assurance payment received by producers, regardless of the assumptions made.

Table 1a. Summary of Total Benefits and Costs, and Incremental Change by Alternative, Excluding Enhancement Benefits and Implementation Costs (Annualized at 7 Percent, FY 2005-2020)[1]

Alternative	Benefits			Producer Conser-vation Costs	Gov't Expenditure		Net Benefits[3]	Producer Net Returns[4]	Conser-vation Assurance Payment[5]
	Onsite	Offsite[2]	Total		Tech. Assist.	Fin. Assist.			
	Annual Payment Value, $ Millions								
Baseline	$72	$99	$171	$53	$28	$185	$90	$204	$132
1	-$4	-$9	-$13	-$11	$0	-$2	-$2	$5	$9
2	-$3	$0	-$2	$4	$3	$22	-$10	$16	$18
3	-$7	-$9	-$16	-$12	$0	$2	-$4	$7	$14

Table 1b. Summary of Total Benefits and Costs, and Incremental Change by Alternative, with Enhancement Benefits Equal to Enhancement Implementation Costs (Annualized at 7 percent, FY 2005-2020)[1]

Alternative	Benefits			Producer Conser-vation Costs	Gov't Expenditure		Net Benefits[3]	Producer Net Returns[4]	Conser-vation Assurance Payment[5]
	Onsite	Offsite[2]	Total		Tech. Assist.	Fin. Assist.			
	Annual Payment Value, $ Millions								
Baseline	$319	$434	$753	$198	$115	$767	$439	$887	$569
1	-$25	-$40	-$66	-$64	-$32	-$212	$30	-$173	-$148
2	-$5	$0	-$5	$2	$2	$13	-$8	$6	$11
3	-$28	-$38	-$66	-$62	-$30	-$199	$26	-$165	-$137

Table 1c. Summary of Total Benefits and Costs with Enhancements Benefits Using Same Ratio as New Practice and Existing Practice Benefits and Costs (Annualized at 7 percent, FY 2005-2020)[1]

Alternative	Benefits			Producer Conser-vation Costs	Gov't Expenditure		Net Benefits[3]	Producer Net Returns[4]	Conser-vation Assurance Payment[5]
	Onsite	Offsite[2]	Total		TA	FA			
	Annual Payment Value, $ Millions								
Baseline	$343	$1,182	$1,525	$198	$115	$767	$1,211	$912	$569
1	-$75	-$292	-$367	-$64	-$32	-$212	-$271	-$223	-$148
2	-$3	-$1	-$4	$2	$2	$13	-$8	$8	$11
3	-$70	-$260	-$330	-$62	-$30	-$199	-$238	-$206	-$137

[1] Annual Payment over 15 years at 7% interest.
[2] Offsite Benefits are environmental benefits.
[3] Net Benefits are total benefits less producer conservation costs (i.e., the cost of installing and maintaining conservation practices) and the cost of technical assistance that accompanies those activities. Financial assistance to producers is a benefit for producers but a cost to taxpayers and, therefore, cancels out of the net

benefit calculation.

[4] Producer net returns is financial assistance plus on-site benefits less producer conservation cost.

[5] Conservation Assurance Payments, in this case, are considered to be payments to producers that exceed the total cost of practice installation/adoption. Conservation Assurance Payments are a cost to society, and although they are a benefit to CSP participants, therefore are neither a net cost nor net benefit to the economy at large.

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Legislative Authority

Conservation Security Program (CSP) assistance is authorized under the provisions of Title II, Subtitle A, of the Farm Security and Rural Investment Act of 2002, Public Law 107-171. Section 2001 amends Subtitle D of Title XII of the Food Security Act of 1985 (16 U.S.C. 3830 et seq.) by adding Chapter 2, Conservation Security and Farmland Protection, Subchapter A, Conservation Security Program. The Secretary of Agriculture acting through the Chief of the Natural Resources Conservation Service (NRCS) will administer the program.

Purpose and Need for Action

This action fulfills the need to implement the CSP as authorized and funded by Congress. As stated in the legislation, the purpose of CSP is to assist producers of agricultural operations in promoting conservation, and improvement in the quality of soil, water, air, energy, plant and animal life, and any other conservation purposes, as determined by the Secretary.

In reviewing the Conference Report accompanying the 2002 Farm Bill, it becomes clear that Congress intends CSP to achieve the following additional purposes:

- Secure agricultural producers' ongoing stewardship of America's lands by providing incentive payments for producers to maintain and enhance conservation practices to a quality criteria level.

- Assist agricultural producers to increase their current level of conservation by providing financial and technical assistance to promote conservation and improvement of soil, water, air, energy, plant and animal life, and to achieve other conservation purposes on working lands.

- Reward producers who support conservation in a manner that goes beyond the minimum requirements of the program.

The CSP statutory framework, requires that NRCS implement CSP with flexibility to address differences in State, Tribal and local situations. Thus, State Conservationists must have some flexibility concerning new activities funded by CSP. At the same time, there is also a need for NRCS to maintain program integrity by ensuring a level of consistency in the way States carry out the CSP.

In addition to meeting these needs, there is also a need to ensure the rule has enough flexibility to be implemented within both the technical assistance cap and funding levels that may vary from year to year. Though the 2002 Farm Bill does not limit CSP funding, Congress limited the funds in FY 2004. In addition, Congress has limited the funding available for technical assistance to develop and implement CSP contracts for technical assistance to 15 percent of annual expenditures. This limit effectively constrains the amount of conservation planning and administrative time that NRCS and technical service providers can work with agricultural operators to develop and execute CSP contracts in the early years.

There is a continued need for action even in cases where conservation practices stand to produce on-site benefits greater than the cost of implementing that practice. Many agricultural enterprises survive on very small profit margins, therefore these enterprises may lack sufficient capital to implement many practices. Additionally, many practices provide benefits that increase slowly over time and may not achieve a payback until far into the future. For various reasons, many producers' planning horizon may not account for these long-term benefits, therefore they heavily discount the long-term benefits. Risk, or perceived risk is another impediment to implementation. Agricultural productivity is highly variable to climatic and other conditions that are out of the producer's control. Actual savings in soil, nutrients and other benefits are also subject to these same risks, therefore a producer may not perceive the potential on-site benefits with certainty.

Precedents and Context

Current Land Use

The Nation's private lands constitute a unique resource that produces food and fiber as well as environmental, social and economic benefits.

Table 2. Major agricultural land uses in the U.S.[1]

Cropland - Total	377 million acres
Pastureland	120 million acres
Rangeland	406 million acres
Hayland	Included in cropland
Forestland	407 million acres
Other lands (homesteads, feedlots, etc.)	84 million acres[2]

Many of these land uses have resource concerns and limitations that decrease their productive use, cause damages, and reduce efficiency in the agricultural sector. While natural resource concerns on private lands are well documented elsewhere, the following three cases illustrate the current problem.

The 1997 National Resources Inventory (USDA, 2000a) indicates that a total of 115.5 million acres of cropland, pastureland, and rangeland have annual rates of soil erosion that exceed "T", the soil loss tolerance rate at which the productivity of a soil can be maintained indefinitely. Of this total 4.8 million acres have both sheet and rill (water induced) and wind erosion rates individually exceeding T, 67.2 million acres have only sheet and rill erosion exceeding T and 43.5 million have only wind erosion exceeding T. As a separate calculation, there are 130.5 million acres where the sum of wind and water erosion exceeds T.

[1] USDA-NRCS, 1997 National Resources Inventory; Revised December 2000
[2] Includes lands in the CRP that are not cropped and currently under vegetative cover.

The 2000 EPA Assessment of the Nation's surface water quality indicates that 39 percent of river and stream miles, 45 percent of lake areas, and 51 percent of estuaries area had water quality impairment relative to one or more designated uses (USEPA, 2002). Of these impaired waters, approximately 50 percent were listed as having agricultural non-point source pollution as a major problem.

Significant public policy advancements have been made for the control of agricultural non-point source pollution arising from animal feeding operations (AFOs). Although basic assistance will be provided through the EQIP program, and through the general conservation technical assistance program of the NRCS, it is expected that CSP will assist in this effort by providing incentives to enhance these activities on the land. State and local agencies are also expected to provide assistance to producers.

CSP Description and Features

Overview

The Conservation Security Program (CSP) is a voluntary program that provides financial and technical assistance for the conservation, protection, and improvement of soil, water, air, energy, plant and animal life, and other conservation purposes on Tribal and private working lands. The program provides payments for producers who practice good stewardship on their agricultural lands and incentives for those who want to do more. In short, the intent of CSP is to "reward the best and motivate the rest."

Eligible producers who own or control agricultural land may participate by entering into an agreement with USDA. The participant must maintain or establish conservation treatment to specific levels of natural resource conservation protection on their land in exchange for annual and other payments. Under certain conditions, participants would be eligible for renewal of the agreement in subsequent years. NRCS, or any other USDA-approved source, will provide technical assistance to the participant on the required conservation measures. Innovation and the use of new technologies are to be encouraged.

Conservation achieved through the CSP will help increase environmental sustainability by ensuring non-degradation of natural resources, and improvement in the condition of natural resources on the CSP participating farms and ranches.

CSP may provide technical assistance, stewardship payments, cost share payments, existing practice payments, and enhancement payments to producers who enter into 5 to10-year contracts based on a CSP inventory and/or a conservation plan. The program is available to all eligible producers in the United States, Puerto Rico, the Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Marianna Islands. The program provides equitable access to benefits to all producers regardless of size of operation, crops produced, or geographic location.

NRCS has overall leadership for the program and is responsible for establishing policies, priorities, and guidelines for CSP.

Eligible Producer

An eligible producer is an owner, operator, landlord, tenant, or sharecropper who shares in the risk of producing any crop or livestock and is entitled to share in the crop or livestock available for marketing from a farm/ranch (or would have shared had the crop or livestock been produced).

Eligible Land

Private agricultural land (including cropland, grassland, prairie land, improved pasture land, and rangeland), agricultural land under the jurisdiction of an Indian tribe, and forested land that is an incidental part of the agricultural operation is eligible for enrollment in CSP. Land enrolled in the Conservation Reserve Program, Wetlands Reserve Program, Grassland Reserve Program, and land converted to cropland (cropped less than four of six years prior to 2001) after the enactment of the CSP legislation (May 13, 2002) is not eligible.

Baseline Conditions

Although resource degradation associated with agricultural operations on most lands used for agricultural purposes has generally slowed or improved as a result of conservation programs and the efforts of individual agricultural producers, more progress is needed to ensure long term productivity. A summary of current conditions and trends follows.[3] The following discussion does not reflect benefits estimated in other conservation programs (see pp.19-24 for discussion of other programs). If other programs have already achieved benefits in the same geographic area where CSP contracts are located, economic theory suggests the marginal benefit of CSP may be lower than the benefit of previously implemented programs, particularly EQIP.

Soil Quality

Over the years, the level of organic matter in agricultural soils has declined as a consequence of conventional tillage methods. A natural consequence of cultivating soil is decomposition of soil organic matter. The use of the land and its cultivation management are key determinants of: the soil's overall tilth (or workability); its fertility and biological activity; and, its ability to store adequate water for plant growth. Widespread U.S. soil cultivation began in about 1907 with the conversion of native grasslands and forest lands to cropland. By the 1950's, soil organic matter was approximately 53 percent of the 1907 level. Conservation tillage systems began being adopted in the 1970's and since that time, soil organic matter has increased so it is now at about 61 percent of the 1907 level (Lal, 1998).

Data from the Conservation Technology Information Center show that in 2000, some form of conservation tillage was practiced on about 37 percent of cropland in the United States, meaning that those lands had more than 30 percent residue cover on the ground after planting (NACD 2001). This use of conservation tillage has mostly occurred since the early 1980s, when farmers began widely adopting the practice.

[3] The information in this section is based on or directly excerpted from "A Resources Conservation Act Report: Interim Appraisal and Analysis of Conservation Alternatives."

Adoption of no-till practices has risen significantly in recent years. No-till is a form of conservation tillage where a new crop is planted directly into the residue-covered soil from the previous crop; there is no additional tillage or seedbed preparation. In 1990, about 16.8 million acres were being managed with no-till systems. By 2000, that number had increased to 50.8 million acres (NACD 2001).

Despite these gains, NRCS estimates that about one-third of the approximately 269 million acres of U.S. cropland not experiencing excessive (greater than "T") erosion might benefit from management systems aimed at enhancing soil quality.[4]

"Soil quality is the capacity of a specific kind of soil to function, within natural or managed ecosystem boundaries, to sustain plant and animal productivity, maintain or enhance water and air quality, and support human health and habitation."[5] Healthy soil gives us clean air and water, bountiful crops and forests, productive rangeland, diverse wildlife, and beautiful landscapes. Soil does all this by performing five essential functions:

- Regulating water. Soil helps control where rain, snowmelt, and irrigation water goes. Water and dissolved solutes flow over the land or into and through the soil.
- Sustaining plant and animal life. The diversity and productivity of living things depends on soil.
- Filtering potential pollutants. The minerals and microbes in soil are responsible for filtering, buffering, degrading, immobilizing, and detoxifying organic and inorganic materials, including industrial and municipal by-products and atmospheric deposits.
- Cycling nutrients. Carbon, nitrogen, phosphorus, and many other nutrients are stored, transformed, and cycled through soil.
- Supporting structures. Buildings need stable soil for support, and archeological treasures associated with human habitation are protected in soils."[6]

The potential for decline in the health or overall quality of the soil resource is an issue because it can reduce crop production and require producers to use more inputs, such as nutrients and labor, to produce an acceptable crop. Because soil quality can affect producers in a number of ways, it is difficult to measure its impact completely on individual production units and over extensive areas. A natural consequence of cultivating soil is decomposition of the soil organic matter. Depending on the use of the land and its management, cultivation may impact the soil's overall tilth (or workability); its fertility and biological activity and its ability to store adequate water for plant growth.

Soil Erosion

Soil erosion by water and wind is an aspect of soil quality and is one of the major processes that can lead to environmental degradation. Soil erosion and accelerated sedimentation, often brought about by cultivating or unwisely managing marginal soils or soils with high erosion potential, are degrading soil and water quality on a global scale. Sheet and rill erosion is caused

[4] *Interim Appraisal and Analysis of Conservation Alternatives,* p. 21.
[5] What is Soil Quality? Soil Quality -- Managing soil for today and tomorrow. NRCS Soil Quality Institute. December 2001. Available at http://soils.usda.gov/sqi/soil_quality/what_is/index.html.
[6] Ibid.

by rainfall and water run off from large surface areas or specific localized areas in fields, respectively. However, wind erosion is also a concern and in extreme cases, wind erosion can create huge dust clouds that suspend unacceptable levels of particulate in the air, in addition to damaging the soil.

Erosion caused by water and wind will always occur as part of the natural cycle, but the natural process of soil development can renew and sustain the soil if demands on the soil resource do not exceed its regenerative capabilities. For most soils, an erosion rate less than four to five tons per acre per year is considered "acceptable" from a soil-quality standpoint. This level is termed the soil loss tolerance, or "T" value. Even at such rates, however, sediment from eroding lands may lead to decreased water quality in some areas.

Over the past several decades, U.S. agriculture has made significant strides in reducing soil erosion on cropland through conservation practices such as conservation tillage, crop rotations, grassed waterways and contour-strip cropping. Many landowners also participate in USDA easement and reserve programs that target lands most susceptible to erosion, provide incentives for conservation and help offset costs associated with such measures. According to data from the National Resources Inventory (NRCS 2000), approximately 170 million acres, or 40 percent of all cropland, were eroding at greater than acceptable ("T") levels in 1982. By 1997, that amount had been reduced to about 108 million acres, 28 percent of total cropland acreage at that time. However, despite these gains, 28 percent of cropland continues to erode at rates great enough to have adverse impacts on long-term soil productivity and overall soil quality. [7]

Soil erosion also results in more than just the removal of topsoil. About three-quarters of the soil eroded by water in a typical farm field is deposited as sediment in the same field from which it eroded. Upon deposition, the eroded soil material causes the soil surface to crust and seal in low areas of the field, resulting in ponding and irregular distribution of nutrients. Uneven crop productivity in the field leads to inefficient water and nutrient use, which causes excessive soil nutrient buildup, runoff or deep percolation, all of which can adversely impact water quality.

Of the approximately one-quarter of soil material eroded by water that actually leaves farm fields, most — about 60 million tons annually — is deposited in local streams and waterways of small watersheds. There, it disrupts streamflow, affects streambank stability and accelerates siltation of lakes, reservoirs, ponds and wetlands. The relatively small proportion of eroded soil that eventually leaves watershed outlets, estimated at about 14 million tons a year, carries excessive levels of nutrients and pesticides to larger water bodies such as the Gulf of Mexico and the Chesapeake Bay, contributing to regional water quality problems.

It is difficult to quantify the off-site fate of soil material lost through wind erosion. However, in severe cases blowing soil contributes to the level of particulate matter in the air, damages fences and other infrastructure through abrasion, and drifts over roads where it increases maintenance costs and poses a travel hazard.

[7] Estimates of sedimentation are from a broad-scale national analysis using National Resource Inventory-derived sheet and rill water erosion data coupled with NRCS-assigned sediment delivery ratios for areas in the conterminous U.S. approximating 2nd-code hydrologic units.

Water Quality

There are no reports or studies that fully describe the health of all waters in the United States. The U.S. Environmental Protection Agency makes periodic reports to Congress based on assessment reports from states, territories, tribes and interstate commissions. Findings from EPA's 1998 report (USEPA 2000) indicate the following:

- Of the 23 percent of the nation's rivers and streams that were assessed, 35 percent were impaired for one or more of three primary uses (drinking, fishing and swimming).
- Of the 42 percent of lakes, reservoirs and ponds that were assessed, 45 percent were impaired.
- Of the 32 percent of the country's estuaries that were assessed, 44 percent were impaired.

According to EPA, more than 20,000 individual river segments; lakes and estuaries are impaired with one or more pollutants from all sources including farm runoff.

Sediment. EPA reports that sediment is the most common pollutant affecting assessed rivers and streams and that agriculture is the leading source. However, the impact of agriculture on water quality should be considered in the context of the amount of land supporting agricultural activities. About 900 million acres, or 41 percent of the continental United States, are on farms and ranches.

As documented in local soil surveys, soils have varying degrees of erosion potential and capacity to allow sediment movement in streams. Based on soil information, reducing soil erosion through on-farm conservation practices can improve the condition of surface and ground waters in many of these instances.

Nutrients. In agriculture, nutrients – mainly nitrogen, phosphorus and potassium – are applied to promote plant growth by the application of material, either from chemical or animal origin and the growing of legumes. In addition, plants receive nutrients from atmospheric deposition. Nutrients that are applied inappropriately or in excessive amounts can be transported to surface or ground waters.

For example, nitrogen is added to soils from commercial fertilizers, animal manure, legumes such as alfalfa and soybeans and from atmospheric deposition. Some soils with sufficient clay content slow down leaching of nitrates through the soil enough to retain nitrogen near the surface and keep it available for plant uptake. Other soils, particularly sandy ones, allow for rapid leaching and in some cases provide a pathway for excess nitrogen movement into stream systems and groundwater.

Nitrogen compounds in excessive amounts accelerate eutrophication in surface waters, which depletes oxygen, kills fish and results in cloudy water with an unpleasant smell. Elevated concentrations of nitrate in drinking water pose a potential threat to human health, particularly among infants.

The phosphorus compound phosphate, while not as mobile as nitrate, tends to be carried on soil particles that move off the land. Recent studies show that phosphate can also leach to ground waters, especially where commercial fertilizers or manure have been applied to the land over many years. Phosphate can also contribute to eutrophication in fresh surface waters.

Pesticides. Pesticides are used to control harmful insects, rodents, molds and other fungi that may reduce production of agricultural commodities. Since 1979, according to NASS surveys (USDA 2000), the agricultural sector in this country has accounted for about 80 percent of all pesticide use each year.

Pesticides may contaminate water by leaching through the soil or as a result of being washed from the field surface into nearby water bodies. Only small proportions of pesticides migrate from farm fields, however. In general, monitoring results show that most agricultural pesticides occur in low concentrations in surface and ground waters, even in regions where agricultural use is high.

Farmers and ranchers are modifying their management practices by using more environmentally friendly pesticides, applying pesticides only when the pest is likely to cause economic damage to crop production, and reducing their reliance on agricultural pesticides through integrated pest management techniques.

By practicing prevention, avoidance, monitoring and suppression of pests – either through cultural, physical or biological means – dependence on chemicals has decreased. Insecticide use per acre on corn dropped 52 percent from 1991 to 1999. Also by 1999, more than half of the corn and 80 percent of all cotton grown in the United States were produced using integrated pest management techniques.

Irrigation**.** Irrigation-induced erosion creates a sedimentation problem in some areas. There is also concern that deep-water aquifers will become contaminated with agricultural chemicals as the water used for irrigation percolates down and carries chemical residuals to aquifers.

Irrigation accounts for 37 percent of the elevated salinity concentrations in the lower Colorado River. Irrigation water's natural base load of dissolved mineral salts become concentrated as the water is consumed by plants or evaporated. Deep percolating irrigation water may also become contaminated through contact with shale or highly saline aquifers and the return flows convey the salts to the receiving streams or ground water. As the same water is used over and over again and more water evaporates, the salinity level increases, and that can impair water quality and long term soil productivity.

Water Quantity

Drought. Every year some parts of the country experience water shortages. When drought occurs, water shortages may become critical. The more severe consequences of drought include huge economic losses to agriculture, shipping and other water-dependent businesses; drinking water shortages, particularly in small rural communities; and environmental stresses, including loss of or damage to wildlife habitat and declines in wildlife populations. Prolonged drought

may also mean we have to make tough decisions in regard to water allocations among competing interests such as fisheries, agriculture and communities.

In years when drought has occurred, USDA programs have helped farmers who irrigate their crops to achieve a savings of 4.7 million acre-feet of water each year (enough to cover the nearly 700,000 acres of Rhode Island with seven feet of water), primarily through adoption of management practices that conserve water and reduce the potential for soil salinity.

Such conservation practices reduce the risk associated with drought, especially if improvement in soil quality has been a primary objective. Healthy soils absorb and store more water than do degraded soils.

Irrigation. According to NASS (USDA 1998), irrigated crops, while raised on only 16 percent of all harvested cropland in the country, account for 49 percent of total value of U.S. crop sales. In the West (including the 17 western contiguous states, Hawaii and Alaska), irrigated crops make up 72 percent of all crop sales.

For the past 20 years, approximately 43 million acres of cropland land have been irrigated in the western states. While that figure has remained fairly constant, there has been a shift of about three million irrigated acres from the more arid Southwest and southern plains primarily to the less arid and more abundant groundwater areas of central and eastern Nebraska. Irrigation withdrawals as a share of total freshwater withdrawals in this country declined from 46 percent in 1960 to 40 percent in 1995, where they remain today.

Throughout the United States, irrigation for crops may have significant environmental impacts, including:

- Diversions from some streams impair aquatic communities and migration of anadromous fish.
- Return flows from irrigated areas may contain biocide residues, nutrients (phosphates and nitrates), total dissolved solids (salinity) and sediment and may reduce the quality of ground and surface waters.
- Seepage from irrigation systems creates fish and wildlife habitat and recharges aquifers.

Irrigators continue to adopt and apply water management practices based on on-site soil information that allow for more efficient use of water and a reduction in the magnitude of adverse environmental impacts. Since 1979, use of gravity systems decreased by 20 percent, while use of sprinkler and drip/trickle systems increased by 25 percent and more than 500 percent, respectively.

These and other practices, along with shifts in irrigation to less arid climates, are having an impact. Since 1969, the national average irrigation rate declined by 4.5 inches, or 20 percent. That is enough to offset the increase in irrigated acreage and maintain the total water applied near the level of 25 years ago. Farmers are simultaneously increasing yields of irrigated crops (for example, rice yields increased 1.2 percent per year over the last 30 years), making the conservation results in relation to water use per unit of agricultural product even more dramatic.

However, water shortages, subsidence, saltwater intrusion and other effects continue to occur in some areas, making further water conservation efforts necessary.

Air

EPA estimates that fugitive dust from crop production totals 3.3 million tons annually and that, under current controls, these emissions will increase to about 3.8 million tons by 2005. EPA also projects that fugitive dust from livestock operations, now contributing an estimated 181,400 tons every year to the atmosphere, will rise to 193,400 tons a year by 2005.

Grazing Lands

While range and grazing lands are managed as natural ecosystems while pastures are managed more intensely, it is not uncommon to see producers applying fertilization and irrigation to attain maximum forage production on range and grazing lands. For example, USDA technical assistance programs have helped to improve nearly 20 million acres of grazing land (Grazing Lands Conservation Initiative data). However, a number of critical resource concerns must still be addressed so that grazing lands can continue to provide diverse benefits.

Maintenance of appropriate plant cover (including natural plant communities) is a primary resource concern on grazing land in this country (Grazing Lands Conservation Initiative data). Over-use of grazing lands and concentrated livestock numbers place stress on vegetation on grazing lands, particularly in riparian areas or during times of drought. Without proper grazing management — in addition to proper nutrient management on pastures — the quality and quantity of plant cover declines. This causes productivity losses, exposes the soil to damaging wind and water erosion and impairs water quality.

Because grazing land occupies such a large portion of the landscape, degradation of the vegetative cover on grazing lands can have a potentially significant impact on U.S. soil and water resources. It is estimated that about 280 million acres — more than 50 percent — of U.S. grazing lands may be susceptible to such degradation and in need of some form of conservation management (SRM 2000 and Smith and Koala 1999). Approximately 50 percent of U.S. pastureland, or 60 million acres, is on land that is subject to erosion and other soil limitations if adequate ground cover is not maintained (National Resources Inventory 1997).

Establishment of invasive plant species on grazing lands is another resource concern, and it is gaining increased attention. Productivity of grazing lands declines and management becomes more difficult upon the invasion of non-native woody shrubs and trees, noxious weeds and plant species of low forage value. As invasive species take over a site and displace native or introduced forage species, the landscape hydrology is altered. This can adversely affect water quality and quantity, which increases the potential for soil erosion and the risk of damaging floods.

Other important aspects in this area include the loss of critical wildlife habitat and a reduction in the natural diversity of the landscape. Natural diversity is crucial to an ecosystem's ability to recover from stresses such as fire, drought or flooding.

Proposed Action

Under the amendment to the Interim Final Rule actions, NRCS plans to implement CSP taking into consideration the public comments received. This approach uses periodic sign-ups to enroll current farmers and ranchers who are willing to implement enhancements in priority watersheds. NRCS will periodically publish announcements identifying the sign-up period and the priority watersheds in which producers would be eligible to submit CSP applications. NRCS would prioritize watersheds using a nationally consistent process based on existing natural resource, environmental quality, and agricultural activity data along with other information that may be necessary to efficiently operate the program. The watershed prioritization and identification process considers several factors, including but not limited to:

1. Potential of surface and ground water quality for degradation;
2. Potential of soil for degradation;
3. Potential of grazing land for degradation; and,
4. State or national conservation and environmental issues, such as location of air quality non-attainment zones or at-risk species habitat.

To be eligible to participate in CSP, a benchmark inventory must indicate that at least the two nationally significant resource concerns of soil and water quality have been addressed on at least part of the agricultural operation (Table 3). It also allows the Chief, NRCS, to identify in sign-up announcements additional nationally significant resource concerns.

Table 3: Minimum Soil and Water Quality Criteria for CSP Eligibility

<table>
<tr><td colspan="3">On Cropland</td><td colspan="2">On Rangeland/Pastureland</td></tr>
<tr><td>Soil Quality</td><td colspan="2">Water Quality</td><td>Soil Quality</td><td>Water Quality</td></tr>
<tr><td>Soil Conditioning Index[8] is positive</td><td colspan="2">Current treatment level meets or exceeds quality criteria for:
<u>Surface Water</u>: nutrients, pesticides, salinity and sediment for surface waters
<u>Groundwater</u>: nutrients, pesticides, and salinity</td><td colspan="2">Vegetation management through a grazing management plan that provides a forage animal balance, proper livestock distribution and timing of use, and managing livestock access to water.</td></tr>
</table>

To be eligible for Tier I, the benchmark inventory must indicate that the soil and water quality resource concerns have been addressed on part of the agricultural operation enrolled in CSP. For Tier II, these concerns must have been addressed for all land uses on the entire agricultural

[8] "The Soil Conditioning Index (SCI) is a tool that can predict the consequences of cropping systems and tillage practices on the trend of soil organic matter. Organic matter is a primary indicator of soil quality and an important factor in carbon sequestration and global climate change. The Soil Conditioning Index has three main components: 1) the amount of organic material returned to or removed from the soil; 2) the effects of tillage and field operations on organic matter decomposition; and 3) the effect of predicted soil erosion associated with the management system. The SCI gives an overall rating based on these components. If the rating is a negative value, the system is predicted to have declining soil organic matter. If the rating is a positive value, the system is predicted to have increasing soil organic matter…. The model was developed by personnel at the NRCS National Soil Survey Center in Lincoln, Nebraska." Soil Conditioning Index for Cropland Management Systems. NRCS National Soil Survey Center, Lincoln, Nebraska. Available at http://soils.usda.gov/sqi/soil_quality/land_managment/sci.html.

operation and address one additional resource concern specific to the watershed. To be eligible for enrollment in Tier III, the benchmark condition inventory must indicate that the applicant has addressed not only the two resource concerns above, but has treated all the applicable resource concerns to an RMS level on the entire agricultural operation. In addition, all riparian corridors, including streams and natural drainages, within the agricultural operation are buffered to restore, protect, or enhance riparian resources. Riparian corridors, as appropriate, will be managed or designed to intercept sediment, nutrients, pesticides, and other materials in surface runoff; reduce nutrients and other pollutants in shallow subsurface water flow; lower water temperature; and provide litter fall or structural components for habitat complexity or to slow out-of-bank floods.[9]

CSP contracts will be for the period set forth in the authorizing legislation—5 years for Tier I, and 5 to 10 years for Tier II and Tier III. If a contract transition from Tier I to a higher Tier, the contract length can be extended to up to ten years from the original contract length.

Conservation Security Program Payments

CSP payments may consist of up to four components:

- Stewardship payments;
- Existing practice payments;
- One-time new practice payments; and,
- Enhancement payments.

The amendment to the Interim Final Rule states that the Chief, NRCS, will provide a list of structural and land management practices and activities eligible for each CSP payment component. When determining the lists of practices and activities and their associated rates, the Chief will consider:

- The cost and potential conservation benefits;
- The degree of treatment of significant resource concerns;
- The number of resource concerns the practice will address;
- Locally available technology;
- New and emerging conservation technology;
- Ability to address the resource concern based on site specific conditions; and,
- The need for cost-share assistance for specific practices and activities to help producers achieve higher management intensity levels or to advance in tiers of eligibility.

To address unique resource conditions in a State or region, the Chief may make additional conservation practices, measures, and enhancement activities eligible that are not included in the national list of eligible CSP practices. NRCS will make the list of eligible practices and their individual cost-share payment rates available to the public. Where new technologies or conservation practices that show high potential for optimizing environmental benefits are available, NRCS may approve interim conservation practice standards and financial assistance for pilot work to evaluate and assess the effectiveness of the technology or conservation practices.

[9] A list of all potential resource concerns are identified in Section III of the NRCS Field Office Technical Guide.

Stewardship Payments (Annual)

NRCS will determine stewardship payments using an appropriate rate that ensures regional equity. Separate rates will be established for each land use category based on the Agricultural Foreign Investment Disclosure Act (AFIDA) Land Value Survey, the NASS land rental data and CRP rental rates as outlined in Appendix 3. Where typical rental rates for a given land use vary widely within a State or between adjacent States, NRCS will adjust the county-level rates to ensure local and regional consistency. The regionally adjusted rates may be adjusted over the life of the program, but will not be reduced during the life of the CSP contract. The final stewardship payment rate will be the adjusted regional rates multiplied by a factor of 0.25 for Tier I, 0.50 for Tier II, and 0.75 for Tier III. NRCS will compute the stewardship component of a participant's CSP payment as the product of: the number of acres in each land use category multiplied by the corresponding stewardship payment rate for the applicable acreage adjusted by a reduction factor and a tier-specific percentage established in the CSP authorizing legislation of 5 percent for Tier I, 10 percent for Tier II, and 15 percent for Tier III. The statutory language has an additional limit on stewardship payments of: $5,000 for Tier I; $10,500 for Tier II; and $13,500 for Tier III.

Existing Practice Payments (Annual)

In addition to the conservation stewardship payments, NRCS may provide CSP participants with existing practice payments based on twenty-five percent of the stewardship payment, as calculated above. These payments are designed to ensure proper maintenance of the conservation practice.

One-Time New Practice Payments

If a participant's CSP contract requires the participant to implement a new structural, vegetative, or management practice, NRCS may also pay the participant a percentage of the cost of installing the new practice. In no case will the payment exceed 50 percent (or, in the case of a beginning and limited resource farmer or rancher, 65 percent) of the average county costs of installing the practice in the 2001 crop year. NRCS will provide the list of approved practices and the percentage cost-share payment rate for each practice at the time of each CSP sign-up announcement. NRCS will not make new practice payments for a conservation practice that producers have established prior to application for the program. New practice installation payments also will not be made to a participant who has implemented or initiated the implementation of a conservation practice after submitting an application but before contract approval unless a waiver was granted by the State Conservationist or the Designated Conservationist before the installation of the practice.

Enhancement Payments (Annual)

State Conservationists, with advice from the State Technical Committees, will develop and submit for concurrence to the Chief a proposed list of conservation activities that are eligible for enhancement payments. NRCS may pay an enhancement component of a CSP payment if a conservation stewardship plan demonstrates to the satisfaction of NRCS that the plan's activities

will increase conservation performance--including activities related to energy conservation--as a result of additional effort by the participant and result in:

- The improvement of a resource concern by implementing or maintaining multiple conservation practices or measures that exceed the minimum eligibility requirements for the participant's Tier of participation and the contract requirements; or
- An improvement in a local resource concern based on local priorities and in addition to the national significant resource concerns, as determined by NRCS.

NRCS may also pay an enhancement component of a CSP payment if a participant:

- Participates in an on-farm conservation research, demonstration, or pilot project as outlined in the sign-up announcement; or
- Cooperates with other producers to implement watershed or regional resource conservation plans that involve at least 75 percent of the producers in the targeted area; or
- Carries out assessment and evaluation activities relating to practices included in the conservation stewardship plan as outlined in the sign-up announcement.

NRCS will not pay the enhancement component of a CSP payment for any practice that is included in a participant's Highly Erodible Land and Wetland Conservation Compliance plan as required by the Food Security Act of 1985.

State Conservationists, with advice from the State Technical Committees, will develop proposed enhancement payment amounts for each activity. Enhancement payments will be determined based on a given activity's cost and expected net conservation (social) benefits, and the payment amount will be an amount and at a rate necessary to encourage a participant to perform a management practice or measure, resource assessment and evaluation project, or a field-test research, demonstration, or pilot project, that would not otherwise be initiated without government assistance. This amount will not exceed the participant's estimated cost of undertaking the activity or the expected environmental benefit value. NRCS will provide the list of approved enhancement activities and payment amounts for each activity prior to the CSP sign-up announcements.

Annual Payment Limitations

The per year contract limitations for any one producer, regardless of total acreage in operation, are $20,000 for Tier I; $35,000 for Tier II; and $45,000 for Tier III. The stewardship payment portion cannot exceed $5,000 for Tier I; $10,500 for Tier II; and $13,500 for Tier III. Additional regulatory constraints in the sign-up notice state that the enhancement payment cannot exceed: $13,750 for Tier I; $21,875 for Tier II; and, $28,125 for Tier III.

Enrollment Categories

Eligible producers will be placed in one of five enrollment categories. The enrollment categories will be defined by criteria related to resource concerns and levels of treatment already documented in the benchmark inventory, as well as willingness to achieve additional environmental performance or conduct enhancement activities. Each enrollment category will include sub-categories, such as:

1. Willingness of the applicant to participate in local conservation enhancement activities;

2. Targeting program participation for Limited Resource Producers;
3. Targeting program participation to water quality priority areas for nutrient or pest management;
4. Targeting program for locally important wildlife/fisheries habitat creation and protection; and,
5. Other priorities as determined by the Secretary.

Table 4 is an example of enrollment categories that may be used to prioritize enrollment of CSP applicants within priority watersheds.

Table 4: Sample CSP Enrollment Categories for Cropland Stewards

	Category	Criteria	
		Soil Conditioning Index (SCI) or Soil Tillage Intensity Rating (STIR)[10]	Stewardship Practices and Activities from list(**) in place for two or more years
CROPLAND	A	SCI of > or = to 0.30 or STIR rating of < or = 15	At least 2 unique practices or activities from each area of Soil Quality, Water Quality and Wildlife Habitat
	B	SCI of > or = to 0.20 or STIR rating of < or = 30	At least 1 unique practice or activity from each area of Soil Quality, Water Quality and Wildlife Habitat plus one more
	C	SCI of > or = to 0.10 or STIR rating of < or = 60	At least 1 unique practice or activity from each area of Soil Quality, Water Quality and Wildlife Habitat
	D	SCI of > or = to 0.10 or STIR rating of < or = 100	At least 2 unique practices or activities from any of the areas
	E	Must meet minimum program eligibility requirements as defined in the amendment to the Interim Final Rule.	

* Stewardship Practice List for Cropland in this example:[11] Contour Buffer Strips, Cover Crop, Grade Stabilization Structure, Irrigation Water Management.
** Stewardship Activity List for Cropland in this example:[12] Test soil and/or plant tissue on annual basis, precision application of nutrients such as banding, side dressing, injection, fertigation, irrigation system efficiency evaluations and adjustments.

CSP Signup

Before each CSP sign-up, NRCS will announce information about the priority watersheds in which the program will be available; nationally significant resource concerns; the sign-up schedule and time periods; enrollment categories; additional program eligibility criteria not listed in the rule; additional requirements that participants must include in their CSP applications and contracts not listed in the rule; payment rates, practices and enhancement activities; specific information on the share of funding that NRCS estimates will go toward stewardship, existing practice, and enhancement payments; an estimate of the total funds NRCS expects to obligate

[10] STIR is an index used to evaluate the kind, severity and number of ground disturbing passes on soil quality. High STIR numbers indicate more disturbance
[11] The list would contain some conservation practices identified in the Field Office Technical Guide for application to cropland to improve soil and/or water quality.
[12] The list would contain applicable stewardship activities which, when applied to a cropland field, mitigate off-site resource damage or improve soil and/or water quality.

under new contracts during a given sign-up; and an estimate for the number of enrollment categories and contracts NRCS expects to be able to fund.

After the sign-up period has ended, NRCS will place applications into the appropriate enrollment category based on the specified criteria and then determine the number of categories that can be funded. NRCS will notify applicants of the tier(s) in which they are eligible to participate and schedule a follow-up interview with the applicant to verify the benchmark condition inventory and assist producers that agree to enter into conservation stewardship contracts in developing a conservation stewardship plan that provides specific information and identifies specific commitments for improving and maintaining the natural resources of the agricultural operation.

Technical Service Providers

NRCS may use the services of NRCS-approved or certified Technical Service Providers in performing its responsibilities for technical assistance. Technical assistance may include, but is not limited to:

- assisting applicants during sign-up;
- processing and assessing applications;
- assisting the participant in developing the conservation stewardship plan;
- conservation practice survey, layout, design, installation, and certification;
- information, education, and training for producers; and,
- training, certification, and quality assurance for professional conservationists.

NRCS retains approval authority over the certification of technical assistance done by non-NRCS personnel and also retains approval authority of the CSP contracts and contract payments. Conservation stewardship plans will be developed only by NRCS-certified conservation planners.

Conservation Stewardship Plan

All participants in CSP are required to have a conservation stewardship plan. The conservation stewardship plan may be developed with assistance from NRCS or NRCS-certified Technical Service Providers. All additional conservation practices which are the basis for any new practice payments must be described in the conservation stewardship plan and carried out in accordance with the applicable NRCS Field Office Technical Guide.

For contracts which involve the transition from one tier to another, an agreement by NRCS and the participant must specify (in the conservation stewardship contract) provisions that allow the tier of participation to increase over the term of the contract period. Such a transition does not require a contract modification providing that the transition is laid out in the schedule of contract activities. In the event that such a transition initiates with Tier I, only the land area in the agricultural operation that meets the requirements for enrollment in Tier I can be enrolled in the contract until the transition occurs. Upon transition from Tier I to a higher tier of participation, the entire agricultural operation must be incorporated into the contract. All requirements applicable to the higher tier of participation would then apply. NRCS will calculate all

stewardship, existing practice, new practice one-time payments, and enhancement payments using the applicable enrolled acreage at the time of the payment.

When a CSP contract provides for a participant to transition to a higher tier of participation, the contract must include:

- A schedule for the activities associated with the transition(s);
- A date certain by which time the transition(s) must occur; and,
- A specification that the CSP payment will be based on the current Tier of participation and may change over the life of the contract.

The amendment to the Interim Final Rule removed the requirement that payments at a higher tier rate will not be made until the participant has demonstrated that the new level of stewardship has been in place for a period of at least 12 months. However in practicality, it would take a couple of years for any additional conservation measures needed to be installed and functioning: therefore, the model assumes that a higher tier payment will be made in the third year of the contract.

Beginning Farmers and Ranchers

For purposes of this rule, the definition of a beginning farmer or rancher is the same as under the EQIP program. The "Beginning Farmer and Rancher" definition as stated in the final EQIP rule is an individual or entity who:

(a) Has not operated a farm or ranch, or who has operated a farm or ranch for not more than 10 consecutive years. This requirement applies to all members of an entity, and
(b) Will materially and substantially participate in the operation of the farm or ranch.
    (i) In the case of an EQIP contract with an individual, individually or with the immediate family, material and substantial participation requires that the individual provide substantial day-to-day labor and management of the farm or ranch, consistent with the practices in the county or State where the farm is located
    (ii) In the case of a contract made to an entity, all members must materially and substantially participate in the operation of the farm or ranch. Material and substantial participation requires that each of the members provide some amount of the management, or labor and management necessary for day-to-day activities, such that if each of the members did not provide these inputs, operation of the farm or ranch would be seriously impaired.

It is widely recognized that many beginning farmers and ranchers have financial limitations of low cash reserves and low equity positions. This lack of financial resources prevents many of them to make expenditures on conservation practices, despite the fact that many have the education and technology available to practice good conservation. NRCS recognized that a higher cost-share may be necessary to assist qualified beginning farmers and ranchers in making the needed modifications to ensure more conservation on the ground. At the same time, NRCS recognizes that beginning farmers and ranchers in long established operations may not have these same constraints. For example, present rules state that 'all members of the entity' in subsection (2) disallows younger farmers being brought up within well-establish extended family farms, whether in partnerships or family corporations. This follows long-term 'beginning

farmer' program rules in other USDA programs. It is likely that the extended family farms have enough resources to meet their necessary cost share for these conservation practices. These multi-generation family farms also tend to already provide better conservation on their lands because of their extended planning horizon.

The CSP Amendment to the Interim Final Rule limits cost sharing to up to 50 percent nationally, except it allows States the flexibility to cost share up to 65 percent for limited resource and beginning farmers and ranchers.

Quality Assurance

Quality assurance for all activities that involve technical assistance is mandatory and will be performed by the State or District Conservationist as a part of the on-going quality assurance program. The State Conservationist, with advice from the State Technical Committee, shall develop a long-term monitoring program that includes the development of a CSP assessment procedure for the State. The monitoring information shall be used to:

- Assess workload conditions;
- Streamline contracting procedures;
- Streamline program delivery;
- Compile baseline data from states;
- Compile program accomplishments; and,
- Provide information to the Secretary to report to Congress no later than December 31, 2005.

Expanded Participation

At all levels, program managers will compile information concerning the outreach to, and participation of, producers by ethnic background and gender. This information will be used to assess whether satisfactory efforts have been made to ensure that limited resource producers, minorities, and others who may not have historically participated in previous conservation programs are being served in the CSP.

Relationship of CSP to Other Farm Bill Conservation Programs

The CSP is expected to complement existing conservation programs administered by the Federal and local governments and more recent programs contained in the 2002 Farm Bill. Many of the conservation programs contained in the new Farm Bill are essentially land idling programs. This group of programs include: the Conservation Reserve Program (CRP) and Conservation Reserve Enhancement Program (CREP), the Wetlands Reserve Program (WRP), and to a lesser extent, the Wildlife Habitat Incentives Program (WHIP). These programs are discussed below. Other newly authorized programs, more oriented towards improving working agricultural lands and more closely related to CSP, are then discussed. These programs include: Environmental Quality Incentives Program (EQIP); the Farm and Ranchland Protection Program (FRPP), the Grassland Reserve Program (GRP), and the Forest Lands Enhancement Program (FLEP).

I. Programs Oriented Towards Primarily Retiring Agricultural Lands

Conservation Reserve Program/Conservation Reserve Enhancement Program

The CRP and CREP programs are land retirement programs, designed to idle existing cropland for varying amounts of time. The intent of the programs are to retire marginally productive lands that also contribute significant amounts of pollutants to surface waters or could provide significant wildlife benefits, or both.

The actual direct and indirect impacts of these programs are (1) a slight reduction in the amount of crops produced in the United States, (2) a more steady source of reliable income to owners of the enrolled cropland, (3) a reduction in agricultural non-point source pollution, and (4) improved habitat for wildlife species.

Land enrolled in CRP/CREP will not be eligible for CSP until after the CRP/CREP contract expires.

Wetlands Reserve Program (WRP)

This program offers incentives to landowners to enhance and restore wetlands by retiring marginal land from agricultural production. A limited amount of adjacent land can be included as a buffer.

This program offers landowners three options: (1) a permanent easement; (2) a 30-year easement; and, (3) a restoration cost share agreement only. The financial assistance offered to landowners varies with each of the options. A permanent easement provides an easement payment based on the agriculture or other raw land value (development rights are not included in the valuation of the easements) and 100 percent of the restoration costs. A 30-year easement offers 75 percent of the value determined for a permanent easement and up to 75 percent of the restoration costs. A cost share agreement only provides up to 75 percent of the costs of restoration and is normally for a period of ten years.

Impacts of the program include financial assistance to the participating landowner, improving water quality, reducing the impact of flood events, and developing high quality wildlife habitat, especially for those species specifically associated with wetland environments.

Land enrolled in WRP will not be eligible for CSP until after the WRP contract expires.

Wildlife Habitat Incentives Program (WHIP)

The purpose of WHIP is to create high quality wildlife habitats. Special priority is given to projects that support wildlife species of Federal, state, local, or tribal importance.

All types of land are eligible. Although the primary purpose of the program is wildlife habitat development and enhancement, the benefits are not limited to wildlife. The practices are often compatible with and beneficial to farming and ranching enterprises.

The major impact of the program is the creation of habitat for species of importance in each state. The majority of projects have been involved with improving upland wildlife habitats. It is not expected that CSP funds will be used in addition to WHIP funds on the same acreage.

II. Programs Oriented Towards Working Agricultural Lands

Environmental Quality Incentives Program (EQIP)

The Environmental Quality Incentives Program (EQIP) is a voluntary conservation program that promotes agricultural production and environmental quality as compatible National goals. Through EQIP, farmers and ranchers may receive financial and technical assistance to install or implement structural and management conservation practices on eligible agricultural land. EQIP was reauthorized in the Farm Security and Rural Investment Act of 2002 (Farm Bill) and is administered by the Natural Resources Conservation Service (NRCS). CSP is expected to have the highest interaction with the EQIP as compared to any other program authorized under the 2002 Farm Bill, particularly in the calculation of benefits accruing to the CSP.

State Technical Committees, Tribal representatives, and local working groups convened by the conservation district advise NRCS on implementation of the program to address identified resource needs and concerns. NRCS evaluates each producer's EQIP application using a state and locally developed evaluation process. Higher priorities are given to applications that encourage the use of cost-effective conservation practices, address National conservation priorities, and optimize environmental benefits.

EQIP may pay up to 75 percent of the costs of certain conservation practices important to improving and maintaining the health of natural resources in the area. Incentive payments may be made to encourage a producer to adopt land management practices, such as nutrient management, manure management, integrated pest management, irrigation water management, and wildlife habitat management, or to develop a complete or partial Comprehensive Nutrient Management Plan (CNMP). Both beginning farmers (like CSP) and limited resource farmers (unlike CSP) may be eligible for up to 90 percent of the cost of conservation practices. Efforts will be made between the EQIP and CSP programs to insure the cost share structures complement each other.

EQIP offers contracts with a minimum term of one year after implementation of the last scheduled practice and a maximum term of ten years. These contracts provide incentive payments and cost share payments for implementing conservation practices.

EQIP may be used by some producers to enable them to move to greater levels of resource protection, and allow the producers to receive greater payments under the CSP program. Since the rules of CSP were not written, the EQIP Cost/Benefit analysis did not consider any impacts of the CSP. In particular, the environmental and economic benefits of EQIP are based on the longer of either the particular conservation practice life or 10 years. The EQIP rule states "The participant shall operate and maintain the conservation practice for its intended purpose for the life span of the conservation practice(s) installed with the program, as determined by CCC."

The CSP Benefit Cost Analysis was written after and in relation to the *Environmental Quality Incentive Program Benefit Cost Analysis, Final Report, May 9, 2003.* This CSP analysis takes a similar approach to the EQIP analysis for those practices installed with CSP-funded technical or financial assistance. It claims benefits for environmental and economic benefits from continuing conservation practices over a longer term. In particular, if the practices are installed with EQIP funds, benefits from these particular EQIP funded practices are considered to accrue to EQIP and thus are not counted in the CSP analysis unless payments on maintenance effectively extend the benefits beyond the benefits claimed in the *Environmental Quality Incentive Program Benefit Cost Analysis, Final Report, May 9, 2003.* This interaction is further discussed in the benefits section.

Farm and Ranchland Protection Program (FPP)

The intent of the FPP is to help farmers keep their land in agricultural production. The program achieves this aim by purchasing conservation easements that essentially buy up development rights from the landowners. The landowners also agree to implement a conservation plan for any highly erodible land contained in the easement area. Landowners needing assistance to address specific practice needs and maintain conservation on these lands could potentially use CSP.

Eligible lands are currently part of a farm or ranch that is large enough to be a viable agricultural enterprise, include prime, unique, or other productive soil, and be under threat of development for non-agricultural uses.

This program not only retains farmland in agricultural uses, but also maintains green space in areas subject to development pressures.

Grassland Reserve Program (GRP)

The GRP is a new program authorized under the Farm Bill. NRCS and FSA will be responsible for administering the program, in cooperation with the USDA Forest Service.

The GRP is targeted towards protecting grassland and shrub land under threat of conversion to other uses. Landowners may enroll in permanent or 30-year (or the maximum allowed under state law if different) easements or the landowner may enroll in a rental agreement for 10, 15, 20, or 30 years. With a permanent easement, the landowner is offered the appraised value of the land, less the grazing value. Thirty-year easements, or the maximum allowed under state law, receive 30 percent of the appraised value, less the grazing value. The rental agreements receive up to 75 percent of the grazing value in an annual payment for the length of the contract.

The program does provide for the installation of conservation practices as needed, however the available funding is such that the program will focus on preservation rather than restoration. However, in situations where restoration is necessary, other programs may be looked to in order to fulfill any needs for additional conservation practices providing the other program regulations permit such an arrangement.

Eligible lands may be in any current land use, if the land was historically grassland, and capable of being restored to a grassland use. Grasslands may be grazed and participants may make other

use of the forage, such as haying or harvesting for seed production, subject to appropriate restrictions during the nesting season for birds in the local area that are in significant decline or are conserved in accordance with Federal or State Law. As such, this is not primarily a land idling program.

The GRP statute limits funds used for easements and rental agreements: not more than 40 percent of the funds shall be used for 10, 15, and 20 year rental agreements and not more than 60 percent of the funds shall be used for 30 year rental agreements and easements.

Forest Lands Enhancement Program (FLEP)

Another new program with the 2002 Farm Bill, the FLEP is to be administered by the U.S.D.A. Forest Service. Landholders of private, non industrial forestlands are eligible to use FLEP to assist them in enhancing timber production in a sustainable manner and provide additional residual benefits to water quality and wildlife.

Primary practices included in the program are expected to be tree planting, site preparation, timber stand improvement, as well as forest riparian buffers and other practices suitable for providing resource benefits and improving overall forest health and resource management. Eligible practices may receive up to 75-percent cost share under this program.

In order to receive cost sharing, the landowner must have a forest management plan. These plans can be developed under the program's 75-percent cost share. The plan must, at a minimum, address the site enrolled in the program, but may treat additional acreage on the tract as well.

CSP is allowed on 'forested land that is an incidental part of an agricultural operation'. It is expected that CSP (the 2002 Farm Bill also allows EQIP to address private non-industrial forest lands) will have little or no overlap with the FLEP program. Most of the landholders with primarily forested tracts will tend to enroll in FLEP. Farmers and ranchers with a portion of their lands in forested uses will be more likely to enroll in CSP.

Analytical Model

Overview

CSP benefits and costs are modeled using a database of 6,105 representative farms reflecting a wide diversity of farm types and resource conditions in U.S. agriculture. Each representative farm has multiple CSP participation options based on tier level, resource concerns to be addressed, and the portion of the farm to be enrolled (Tier 1 only). Each unique combination of a representative farm and participation option is one record in the database. Potential payments, costs, on-site benefits and off-site (environmental) benefits are assigned to each participation option for each representative farm. An expansion factor is associated with each representative farm so that model results can be expanded to describe the roughly two million U.S. farms.

The "modeling" of CSP benefits and costs is carried out through a series of database queries designed to select likely participants and participation options. For eligible watersheds, using a new set of watersheds for each program year in a multi-year rotation, the queries are used to

select producers who are likely to apply for CSP participation and select the most likely participation option for each applicant, based on a set of producer decisions rules that account for the expected net return to participation, demographic data believed to be relevant to the participation decisions, and participation history for a given farm type.

Once participants and their likely participation option are selected, data associated with these farms and options can be aggregated to produce overall estimates of key measures of program performance, including:

- environmental benefits;
- on-site benefits to producers;
- the cost of installing and maintaining conservation practices; and,
- government expenditures.

The balance of the model is organized around key aspects of database and query development:

- Development of representative farms;
- Estimating producer participation (includes development of on-site benefits and practice installation and maintenance costs);
- Estimating environmental benefits associated with that participation; and,
- Calculation of economic costs, government expenditures, and net benefits.

More detailed model description can be found in Appendix 1 of this document.

Benefits of Conservation

Environmental benefits available through CSP are, in some ways, similar to those available through the EQIP programs and detailed in *Environmental Quality Incentive Program (EQIP) Benefit Cost Analysis, Final Report, May 9, 2003.* However, CSP differs from EQIP is some key aspects. Unlike EQIP, CSP provides an existing practice payment for practices that were previously installed. If those practices are more effectively maintained, some benefits can be derived from delaying the decay in practice effectiveness that could be expected from less than fully maintained practices. CSP also provides for contract "enhancements." Enhancements can fund a number of activities but will focus on increasing conservation practice "management intensity", which are actions that improve environmental performance beyond the quality criteria level that has typically been used in NRCS programs.

It should be noted that only a small proportion of benefits likely to flow from CSP can be quantified. Consider three general types of benefits that can be obtained through CSP:

- installation or adoption of practices to meet the quality criteria level;
- installation or maintenance of practices to exceed the quality criteria level (enhancements for increasing "management intensity"); and,
- maintenance of existing practices (not otherwise covered by a maintenance agreement).

New practice payments can be made under §1469.23 of the rule. In limited instances, practices installed to address resource concerns to the quality criteria level can receive cost-sharing under CSP. For example, producers who enter Tier II contracts can receive new practice payments for

eligible practices applied in the context of addressing a third resource concern (in addition to soil and water quality) by the end of the contract. Some portion of benefits likely to flow from the application of new practices designed to meet the basic quality criteria level can be quantified. Note, however, that the benefits of addressing soil quality and water quality to the quality criteria level can never be claimed for CSP because these resource concerns must be addressed before CSP enrollment. Thus, the environmental benefits associated with soil erosion reduction (both USLE and WEQ) and nutrient management cannot be attributed to CSP. By extension, wind erosion-related air quality benefits cannot be counted, either because these benefits are largely captured by meeting the quality criteria level for soil quality (which includes reducing erosion to T).

Where new practice benefits can be quantified and credited to CSP, benefit estimates are similar to those utilized in the EQIP analysis. The CSP analysis, however, utilizes a great deal more of the spatial detail available in some more recent benefit studies. In some cases, watershed level benefits estimates are available. In other cases, benefits are estimated for NASS farm production regions. Details are provided below.

Contract enhancement payments under §1469.23 of the rule may account for a majority of CSP payments. Contract and stewardship payment limitations indicate that as much as 75 percent of funds could be devoted to Tier I contract enhancements and 70 percent of Tier II and Tier III enhancements. A similar share of the environmental benefits that can be attributed to CSP are also expected to flow from these enhancements. Unfortunately, these benefits cannot be quantified at this time. An extensive qualitative discussion of the potential for these benefits is included in Appendix 5.

Finally, some modest level of benefit is likely to be realized through funding maintenance of conservation practices. To the extent that cost-sharing of maintenance cost ensures more effective maintenance, practice life may be extended, thus increasing overall environmental benefits.

A. One-time New Practice Payments

Both on-site and environmental (off-site) benefits are quantified. On-site benefits can be captured by producers and are, at least partially, accounted for the producers' CSP application decision (see discussion in previous sections). On-site benefits that are quantified include the economic benefit of enhanced grazing productivity and irrigation water conservation.

Environmental (off-site) benefits cannot be captured by producers and, therefore, accrue to society at large. For the purpose of this analysis, the environmental (off-site) benefits that can be both quantified and attributed to CSP are wildlife-related: the value of enhanced pheasant hunting and enhanced wildlife viewing opportunities. It is important to note that this is but a fraction of the potential benefits, as complete inventories do not exist. Therefore it can be considered a lower-bound proxy for the true wildlife benefits to society.

More detailed discussion on the benefit calculations by resource concern are included in Appendix 4. The resultant benefits of treatment by region and physical effect addressed by land type reveals a wide range of potential practice benefits (Table 5).

Table 5. Annual Benefits of Treatment by Region, Resource Concern, and Land Type

	On-Site Benefits					Environmental (off-site) benefits			
Physical Effect:	**USLE Erosion**	**WEQ Erosion**	**Nutrient Management**	**Irrigation Water Conservation**	**Grazing Productivity**	**Water Quality**	**Water Quality**	**Air Quality**	**Wildlife Habitat**
Broad Land Use:	Cropland	Cropland	Cropland	Irrigated Cropland	Grazing Land	Cropland	Grazing Land	Cropland	All Land
Region	**Mean Benefit per Acre**								
Midwest	4.82	5.00	6.24	0.43	9.96	23.70	21.67	0.04	22.29
Northeast	6.76	1.59	3.94	0.00	10.78	71.83	52.39	0.00	19.20
Northern Plains	1.65	2.31	4.09	3.87	4.80	11.88	7.91	4.00	2.62
South Central	1.80	2.31	3.35	4.57	8.93	23.56	15.42	2.16	13.21
Southeast	3.21	0.31	4.07	1.81	12.62	29.09	19.82	0.00	17.34
West	2.31	1.55	5.28	19.05	4.85	40.38	9.54	3.86	0.47
	Standard Deviation								
Midwest	2.31	1.70	1.96	1.04	1.42	15.63	9.35	0.25	1.47
Northeast	4.93	2.49	2.55	0.00	0.98	54.91	26.45	0.00	0.56
Northern Plains	0.96	0.80	2.24	3.05	1.89	11.99	5.02	1.72	2.31
South Central	1.81	1.90	1.68	2.40	3.84	26.08	5.11	2.06	2.93
Southeast	2.12	0.85	1.85	2.63	1.34	18.75	6.88	0.00	0.42
West	1.96	1.34	3.37	4.67	3.52	39.98	5.49	3.21	1.21
	Minimum								
Midwest	1.52	0.00	0.00	0.00	0.00	5.29	6.88	0.00	9.49
Northeast	1.42	0.00	0.00	0.00	0.00	14.34	15.09	0.00	17.28
Northern Plains	0.21	0.60	0.00	0.00	1.71	2.28	0.00	0.39	0.23
South Central	0.18	0.00	0.00	0.00	2.76	1.92	0.00	0.00	4.10
Southeast	0.74	0.00	0.00	0.00	7.20	6.19	9.46	0.00	17.28
West	0.13	0.00	0.00	4.87	1.59	1.53	0.00	0.00	0.23
	Maximum								
Midwest	16.21	13.55	10.27	4.20	15.01	116.92	54.44	3.06	22.60
Northeast	36.32	6.10	8.24	0.00	13.11	344.32	114.08	0.00	20.27
Northern Plains	12.77	6.28	11.87	20.16	10.91	194.57	30.29	14.43	18.89
South Central	21.69	14.72	10.22	7.20	15.01	218.88	39.39	15.51	20.36
Southeast	14.87	3.80	9.14	7.20	15.01	152.37	52.55	0.00	21.13
West	8.44	6.39	13.87	30.65	15.01	159.83	28.55	14.43	7.84

B. Contract Enhancements

Previous programs, such as EQIP, have required only that producers meet a quality criteria level. Rather than simply protect resources from further degradation, intensive management activities would enhance resource quality. Thus, the estimated costs and benefits addressed in Appendix 5—which are based in large part on experience with programs like EQIP—will not capture the full costs and benefits of the new standard.

C. Existing Practice Payments

As part of eligibility requirements, CSP applicants must have addressed soil quality and water quality resource concerns at a level that meets or exceeds a quality criteria level on part (Tier I) or all (Tier II) of their agricultural operation. All resource concerns must have been addressed to a quality criteria level for participation at the Tier III level, including riparian areas. In order to ensure that existing practices provide the maximum environmental benefits throughout the contract period, CSP provides payments for maintenance of existing practices. However, benefits were reduced in proportion to the remaining practice life and expected benefit stream over time. Distribution of benefits over time for practices was adopted from the *Environmental Quality Incentive Program (EQIP) Benefit Cost Analysis, Final Report, May 9, 2003*. This distribution process applied to all previously treated acreage. Therefore, sustained beneficial efforts were not considered to be constant for the life of the CSP contract. Since each practice has a different expected life stream of benefits, a weighted average of expected practice life was calculated for each bundle of conservation practices.

As mentioned above, benefits from previously treated acreage were estimated, although at a reduced level. For purposes of this analysis, it was assumed that existing practice payments would extend the effectiveness of the practices in the CSP contract. Therefore, although full practice benefits were not credited towards CSP, partial benefits were accounted for. Partial benefits were estimated by taking the difference between the practices' normal expected effectiveness without cost shared maintenance, and the full effectiveness that would be assumed to occur as the result of a existing practice payment. This analysis did not account for benefits that would undoubtedly occur beyond the life of the CSP contract.

To qualify for existing practice payments, previously installed conservation practices must meet NRCS standards. NRCS conservation practice standards provide guidance for applying conservation technology on the land and set the minimum level for acceptable application of the technology. NRCS issues National conservation practice standards for each practice in its National Handbook of Conservation Practices (NHCP). National Conservation Practice Standards are not used to plan, design or install a conservation practice. These National standards are amended by states, thus ensuring that all state and local criteria are met, which may be more restrictive than national criteria.

Each state determines which National conservation practice standards are applicable in their state. States add the technical detail needed to effectively use the standards at the Field Office

level, and issue them as state conservation practice standards. State conservation practice standards may be found in Section IV of the Electronic Field Office Technical Guide (e-FOTG). NRCS periodically revises existing NHCP standards or develops new standards. Before revised or new conservation practice standards are added to the National Handbook of Conservation Practices, they are advertised in the Federal Register for review and comment by the general public. The conservation practice standard contains information on why and where the practice is applied, and sets forth the minimum criteria that must be met during the application of that practice in order for it to achieve its intended purpose(s).

Since eligibility qualifications require potential participants to address resource concerns to quality criteria levels, the intent of CSP is to "reward the best and motivate the rest." In other words, it is likely that bona fide "stewards of the land" will make up the bulk of CSP participants. At first glance, one could assume that stewards of the land should be held to a higher standard than other producers when dealing with maintenance issues. However, due to the nature of the farming and ranching industry, even with the best stewards there is enough uncertainty (unpredictable weather, crop and forage production variability, market variability, etc.) that the need for maintenance of conservation practices is not evenly spaced over time. Unpredictable catastrophic events (nature or man induced) could result in postponement of needed maintenance, or lack of attention to conservation practices.

Also, at times the financial ability to maintain these practices is uncertain. A regular existing practice payment would help reduce the uncertainty that annual cash flow predicaments can cause. At a minimum, if a producer is receiving existing practice payments and an unforeseen event happens that severely impacts the conservation practice(s) and repair is imperative, the producer can seek financial relief by using the scheduled existing practice payments as collateral for advanced money to repair the practice.

Regardless of the producer's adoption or lack of stewardship, requiring existing practices to meet minimum NRCS standards to be eligible for existing practice payments will ensure that existing practices will provide the maximum environmental benefits throughout the contract period.

Costs of CSP

Two cost figures are of particular interest. First, **government cost** includes all government expenditures relating directly to a specific CSP contract. These include:

- financial assistance to the producer including stewardship payments, cost sharing, and enhancement payments; and,
- technical assistance costs.

The second cost item of interest is the **net economic cost** to society. Net economic costs include:

- total practice implementation costs (cost-share and producer cost);
- total practice maintenance costs; and
- technical assistance cost.

Producer payments that exceed the total cost of practice installation/adoption and maintenance are conservation assurance payments and are not included in net economic cost. Conservation assurance payments are a cost to society but a benefit to CSP participants and, therefore, are neither a net cost nor net benefit to the economy at large[1].

Program Net Benefits

Program net benefit is the sum of all CSP-related benefits less all CSP-related costs. CSP-related benefits include:

- onsite and environmental benefits that accrue from practice installation, adoption, and maintenance; and,
- payments to producers.

CSP-related costs include:

- payments to producers
- the cost of practice installation, adoption, and maintenance; and,
- the cost of technical assistance provided to producers.

The net benefit of CSP to the overall economy is CSP-related benefits less CSP-related costs. Note that payments to producers cancel as they are a benefit to producers but a cost to taxpayers. Thus, conservation assurance payments received by producers--payment above CSP-related conservation costs-- also cancel out of the net benefit calculation.

[1] Note that costs incurred by producers in anticipation of CSP enrollment (see section on pre-enrollment costs, page 55) are not counted against CSP payments. If these costs were counted, conservation assurance payments would be lower. On the other hand, the cost of maintaining practices is counted against program payments in calculating the transfer. To the extent to the extent producers would maintain practices even without cost-sharing, conservation assurance payments may be underestimated.

Table 6. Description of Payments and Payment Options in CSP Model[1]

	Payment Rates	Payment Acreage	Frequency/Timing of Payment
Stewardship Payments	Based on county average payment rates, by land type multiplied by the statutory reduction factor of 5, 10, 15% of rental rate for Tiers I, II, III, respectively multiplied by the regulatory reduction factor of 25, 50, 75% for Tiers I, II, III respectively.	Total for all land types enrolled	Annual
Existing Practice Payment	25% of the Stewardship Payment	Previously treated acres only	Annual
One-time New Practice Payments	% of practice installation cost. Assume 50% cost share, consistent with EQIP.	Acres with practices installed under CSP contract but not cost shared from another source	Annually in the years when new practices are scheduled.
Enhancement Payments	For the Baseline and Alternative 2, the enhancement payments are the difference between the regulatory limit and the sum of the stewardship payment and existing payment. Alternative 1 and Alternative 3 assume that enhancement payments are 70% of total contract FA. The enhancement payments under the Baseline and the three alternatives area assumed to be less than $10,000 for Tier I, $17,500 for Tier II, and $22,500 for Tier III.	Acres treated for the enhancement resource concern	Annual

[1] Alternatives used in this analysis are discussed in more detail in the next section of this document.

Discussion of Alternatives

The matrix shown in Table 7 identifies general issues for analysis. The identified alternatives include:

- ***Baseline –*** *The Baseline reflects the model results of the Interim Final Rule. Enhancement payments are assumed to be the difference between the regulatory limit and sum of the stewardship payments and the existing practice payments.*

- ***Alternative 1 –*** *This alternative reflects the model results of the Interim Final Rule. However the regulatory limit is removed and enhancements are calculated as a percent of the total contract.*

- ***Alternative 2 –*** *This alternative reflects the model results of the Interim Final Rule, but length of contracts that include movement between Tier I and Tier II are allowed to increase from a maximum of 5 years to 10 years.*

- ***Alternative 3*** *- This alternative reflects the model results of the Interim Final Rule, but includes all the changes from Alternatives 1-3. These changes include:*
    - *the regulatory limit is removed and enhancements are calculated as a percent of the total contract; and,*
    - *length of contracts that include movement between Tier I and Tier II are allowed to increase from a maximum of 5 years to 10 years.*

Baseline – Interim Final Rule Scenario

If the amendment to the CSP Interim-Final Rule were not implemented, the interim final rule would likely continue.

While other conservation programs encourage implementation of basic conservation measures, they do not provide incentives to go beyond those levels. CSP assures that the off-site natural resource benefits accruing to the public through the efforts of America's farmers and ranchers would be maintained. Two non-quantitative benefits would accrue: namely, (1) the information transmitted to other producers when the Government recognizes good stewardship practices, and (2) the security of continued natural resource protection and farm supply assurance.

When the Government rewards those producers that are safeguarding our natural resources through the CSP, information is transmitted to other producers concerning the behavior that society would like to see practiced in agricultural production. In effect, the society's longer run desires are being communicated to all producers.

The baseline scenario imposes a regulatory limit on contract size. Enhancement payments must be less than or equal to the regulatory limit on contract payments, minus the stewardship payments and existing practice payments. Contracts in the initial signup indicated that producers tended to maximize enhancement payments. Therefore the model assumes that for the baseline scenario, enhancement payments are equal to the regulatory limit on contract payments, minus

the stewardship payments and existing practice payments. The total annual enhancement payment is also limited to less than or equal to $10,000 for Tier I; $17,500 for Tier II; and $22,500 for Tier III annually.

Existing practice payments are calculated as 25% of the total stewardship payments, which is consistent with the Baseline (Interim-final rule) scenario. In addition, a 50 percent cost share is assumed to be consistent with EQIP cost share rates. Fifty percent average cost share is a useful assumption because it is assumed that CSP would compete with other cost share programs such as EQIP.

Alternative 1 – This alternative reflects the model results of the Interim Final Rule. However the regulatory limit is removed and enhancements are calculated as a percent of the total contract.

This alternative includes the same assumptions as the baseline scenario, except that for this alternative, the contract statutory limit replaces the regulatory limit on total contract size. Enhancement payments for all tiers are assumed to comprise 70% of the total contract amount. The total annual enhancement payment is also limited to less than or equal to $10,000 for Tier I, $17,500 for Tier II, and $22,500 for Tier III annually. This alternative compares the Interim Final Rule's regulatory contract limits with another, more simple means of constraining total contract size of payments

Alternative 2 – Baseline scenario except length of contracts that include movement between Tier I and Tier II are allowed to increase from a maximum of 5 years to 10 years.

This alternative assumes that all the constraints consistent with the Interim Final Rule are in place, however it assumes that if a producer enters a contract at Tier I level and wants to move up to a Tier II level, his/her contract life can be extended from 5 years to 10 years. This removes the disincentive of limiting the contract life for those willing to implement more potential environmental benefits by allowing extended program payments.

Alternative 3 - This alternative includes all the changes from Alternatives 1-2. These changes include: the regulatory limit is removed and enhancements are calculated as a percent of the total contract; and the length of contracts that include movement between Tier I and Tier II are allowed to increase from a maximum of 5 years to 10 years.

This alternative combines all the assumptions included in the previous alternatives. It illustrates the expected effects of the Amendment to the Interim Final Rule.

Table 7. Policy Alternatives under analysis and their major program assumptions

Alternative	Enhancement practice payments are calculated as:	Producer contract payment limit is: 1/	Contract length for movement between Tiers I & II is: Treatment of 3rd resource concern for Tier II contracts:
Baseline, Interim Final Rule	The regulatory limit minus the stewardship payment and the existing practice payment.	Regulatory limit 2/	5 years Required
Alternative 1. Interim Final Rule without the regulatory 3/ limit	70 percent of the contract limit.	Statutory Limit 3/	5 years Required
Alternative 2. Interim Final Rule with Tier I to Tier II maximum contract life at 10 years	The regulatory limit minus the stewardship payment and the existing practice payment.	Regulatory limit	10 years Required
Alternative 3. Amendment to Interim Final Rule which include Alternative 1 – 2 assumptions.	70 percent of the contract limit.	Statutory Limit	10 years Required

1/ Total producer payment may consist of: stewardship payments, existing practice payments, one-time new practice payments, and enhancement payments. Keep in mind the following definitions:

- Annual stewardship payments (SP) component of the total maximum producer payment as calculated as: the county rental rate (RR) per acre multiplied by the tier specific percentage (TSP) multiplied by the tier specific reduction factor (TSRF) multiplied by the number of acres under contract (NAUC). The TSRF for Tier I is 25%; 50% for Tier II, and 75% for Tier III and TSP for Tier I is 5%, 10% for Tier II, and 15% for Tier III. In general, then: (1) SP = RR*TSP*TSRF*NAUC. In addition, the stewardship payments component of any contract cannot exceed the following amounts depending on the tier: $5,000 for Tier I; $10,500 for Tier II; and, $13,500 for Tier III.
- Annual existing practice (ExP) payments component of the total maximum producer payment as calculated as: 25% of the total annual stewardship payments (SP).In general, then: (2) ExP = 25% * (SP).
- New practice (NP) payments component of the total maximum producer payment as calculated as: the new practice cost (NPC) multiplied by the appropriate cost share rate (CSR) multiplied by the number of acres (NA). NP payments only pertain to producers enrolling in Tier II or those that transition from Tier I to Tier II. In general, then: (3) NP = NPC*CSR*NA. .NP cannot exceed $10,000 over the life of the contract, regardless of tier.
- Enhancement practice payments (EPP) component of the total maximum producer payment is calculated differently for specific alternatives. For the Baseline and Alternative 2, the EPP is equal to the regulatory limit (RL) minus the stewardship payment (SP) and the existing practice payment (ExP). In general, then (4) EPP = RL-SP-ExP. For Alternative 1 and Alternative 3, the EPP is equal to 70% of the total contract. For the Baseline and all Alternatives, a regulatory limit on the EPP component of the total contract amount is defined in the sign-up notice. In 2005, EPP can not exceed $13,750 for Tier I; $21,875 for Tier II; and, $28,125 for Tier III.

2/ The regulatory limit (RL) for the Interim Final Rule (unamended) is set at: county rental rate (RR) multiplied by the number of acres under contract (NAUC) multiplied by a tier factor (TF) set at: 15% for Tier I; 25% for Tier II; and, 40% for Tier III. In general, then:
RL = RR*NAUC*TF. The regulatory limit is only used in the Baseline and Alternative 2.

3/ The statutory limit (SL) is set at: $20,000 for Tier I; $35,000 for Tier II; and, $45,000 for Tier III.

Results

The following section summarizes the results of the baseline and modeled alternatives (Alternatives 1-3) for the Conservation Security Program. First, the baseline and each alternative are discussed individually. The alternatives are then compared in terms of participation, government costs, payments to producers, and net benefits. When reviewing the results, it is important to note that quantitative benefits for CSP enhancements are not included in the total for onsite and environmental benefits. Benfits are addressed qualitatively in Appendix 5.

Baseline – The CSP program as defined in the CSP Interim Final Rule.

In the baseline scenario, the effect of the Interim Final Rule is modeled with no changes, throughout the life of the Farm Bill. If continued, the baseline could provide payments large enough to induce 47 percent of all producers to participate. Model estimates, shown in Table 8, show most producers participating at the following levels by Tier:

- ❒ At the Tier I level almost 39 percent of all farms would participate in CSP, which represents about 83 percent of all CSP participants.
- ❒ At the Tier II level 3.5 percent of all farms would participate in CSP, which represents 7.5 percent of CSP participants.
- ❒ At the Tier III level about three percent of farms would participate in CSP, which represents about seven percent of CSP participants.
- ❒ A little over one percent of all producers are estimated to enter the program in Tier I and agree to transition to Tier II with less than two-thirds of a percent entering as a Tier II transitioning to Tier III.

In terms of eligible acreage, the following acres, shown in Table 10 would be enrolled in each Tier:

- ❒ Approximately18 percent in Tier I contracts (77 percent of CSP acres);
- ❒ Just over one percent in Tier II contracts (almost six percent of CSP acres);
- ❒ Almost 3 percent in Tier III contracts (about 11 percent of CSP acres);
- ❒ Over 5 percent of acreage would be contracted to move from Tier I to Tier II; and
- ❒ Under one percent contracted to move from Tier II to Tier III.

Total contract payments to participants over the life of the contract in Tier I total $5,400 per participant. Contract payment amounts for the other tiers are: $22,400 per Tier II participant; and $69,500 per Tier III participant. The average size of operations in Tier III, and those transitioning either from Tier I or Tier II to higher tiers is between 300 and 400 acres. Given these comparable sizes, the attractiveness of tier transitioning is high: Tier I producers stand to gain $8,100 in payments over the contract life (for an average payment of $11,400) while Tier II producers stand to gain almost $31,000 (for an average payment of $44,100). These payment increases drive the high rates of transitioning in the baseline, both in terms of participants and acreage.

Of the total participation across the US, the Midwest leads all other regions and comprises about 37 percent of the Nation's total participation. The Southeast region ranks second with 21 percent of the Nation's total participation. The northeast and west regions have the lowest participation

with 7.4 percent and 8.6 percent, respectively (Table 9). About 23 percent of the Nation's acreage enrolls in CSP with over a third of this total enrolled in the Northern Plains. About one-quarter of the total is enrolled in the Midwest region. Average acreage under contract varies greatly by region as well. The Northern Plains averaged just over 500 acres per contract, while the Northeast region averaged 93 acres per contract.

The amendment to the Interim Final Rule, as modeled, produces a government cost of $8 billion over a 15-year program life. Total on-site and off-site benefits are just under $1.4 billion.

Measurable off-site or environmental benefits for the baseline are $910 million, or roughly $8.00 per acre. On-site benefits, which accrue to producers, are estimated at $691 million, or about $3.50 per acre.

For the baseline, financial assistance to producers is estimated to be $7.0 billion (NPV over 15 years). Payments to producers average $7,100 (NPV over 15 years). The average payment is made up of 19 percent stewardship payments, one-third of a percent in new practice payments, almost 5 percent existing practice payments, and nearly 76 percent enhancement payments.

Producer conservation costs are roughly $1,800 per farm or $9.13 per acre (NPV over 15 years). These costs include the cost of installing or adopting and maintaining conservation practices and the cost of any enhancement activities that are specified in the CSP contracts. Because enhancements costs cannot be quantified at this time, the analysis assumes that enhancement costs represent 25 percent of the enhancement payment component of total producer payments. The cost (to the government) of technical assistance provided to producers is $1.0 billion or about $5.30 per acre.

An estimate of net benefits for the baseline scenario is obtained by subtracting conservation costs (including TA) from estimated benefits. Net benefits are negative, as the amendment to the Interim Final Rule (baseline) scenario would yield a net 'benefit' of a negative $1.3 billion or a negative $6.34 per acre. Note, however, that benefits expected to flow from contract enhancements cannot be quantified at this time. Enhancement payments of $5.3 billion are estimated.

Total conservation assurance payments are government payments to producers (financial assistance) less producer conservation costs. Because CSP is designed to reward producers for conservation stewardship, program objectives cannot be achieved without some level of conservation assurance payment. For the baseline scenario, total transfers from government to producers are about $5.2 billion (NPV over 15 years) or about $26.17 per acre. Net return to producers also includes $3.49 per acre in on-site benefits, such as nutrient savings or improved grazing. Thus, total net return to producers is about $29.66 per acre on average. These net returns can serve to reward conservation activity and support farm incomes. However, these conservation assurance payments also have the potential to be capitalized into the value of CSP-enrolled land. The extent of this land market distortion will depend on the scope of the program and how CSP payments, particularly the stewardship payment, are defined.

The benefit-cost model results are much greater than the President's budget estimate for a couple important reasons. The model results have a much greater participation estimate, and lower average acres per contract. Based on limited information, it appears that the model enrolls a greater proportion of small farms which would tend to reduce average payments and increase the number of CSP participants. This is because the model assumes that any farm could participate, regardless of the ability of the Agency to service that contract. The statutory limit of 15 percent technical assistance reimbursement limits the Agency's ability to service a large number of farms because most of the technical assistance cost per contract is fixed. It costs relatively the same amount to service a smaller farm as a larger farm. If the Agency is responsible for obligating money within a short amount of time, it benefits the Agency to service larger farms to keep within a limited technical service reimbursement amount.

The President's budget estimates are based upon contracts from the 18 watersheds in the 2004 signup. The benefit-cost model represents results at a much large scale. Since the first signup was conducted in a very short time-frame, in very limited areas, it may not be a good predictor of future program performance. The model assumes program implementation at a much greater scale, and also under very static (fixed) program rules, and under very specific participation assumptions. More actual program experience at greater numbers of watersheds (encompassing larger and more diverse areas of the country) could help to refine both the President's budget estimates and model assumptions.

Alternative 1 – The CSP program as defined in the Interim Final Rule with the regulatory limit removed.

This alternative includes the same assumptions as the baseline scenario, except that for this alternative, the contract statutory limit replaces the regulatory limit on total payments. Enhancement payments for all tiers are assumed to comprise 70% of the total contract amount. This alternative will compare the Interim Final Rule's regulatory contract limits with another, more simple means of constraining contract payments

If Alternative 1 were implemented, it could provide payments large enough to induce 43 percent of all producers to participate. Model estimates show most producers participating at a Tier I level (almost 35 percent of all farms which represents about 81 percent of all CSP participants) and much smaller numbers participating at a Tier II (3.4 percent of all farms, 8 percent of CSP participants) or a Tier III (about 3 percent of farms, about 7.5 percent of CSP participants) level (Table 8). A little over 1 percent of the producers are estimated to enter the program in Tier I and agree to transition to Tier II (and one-fifth of a percent entering as a Tier II transitioning to Tier III). In terms of eligible acreage, about 16 percent would be enrolled in Tier I contracts (76 percent of CSP acres), just over 1 percent in Tier II acres (six percent of CSP contracts), and almost 3 percent in Tier III contracts (about 12 percent of CSP acres). Over 5 percent of acreage would be contracted to move from Tier I to Tier II, with under 1 percent contracted to move from Tier II to Tier III (Table 10).

Total contract payments to participants over the life of the contract in Tier I total $2,100 per participant. Contract payment amounts for the other tiers are: $19,100 per Tier II participant; and $73,400 per Tier III participant. The average size of operations in Tier III, and those transitioning

either from Tier I or Tier II to higher tiers is between 300 and 400 acres. Given these comparable sizes, the attractiveness of tier transitioning is high: Tier I producers stand to gain $10,000 in payments over the contract life while Tier II producers stand to gain almost $54,600. These payment increases drive the high rates of transitioning in the baseline, both in terms of participants and acreage.

Of the total participation across the US, the Midwest leads all other regions and comprises about 37 percent of the nation's total participation. The Southeast region ranks second with 22% of the nation's total participation. The northeast and west regions have the lowest participation with 7.5% and 9%, respectively (Table 9). About 22 percent of the nation's acreage enrolls in CSP with over a third of this total enrolled in the Northern Plains. About one-quarter of the total is enrolled in the Midwest region. Average acreage under contract varies greatly by region as well. The Northern Plains averaged just over 530 acres per contract, while the Northeast region averaged 97 acres per contract.

Alternative 1, as modeled, produces a government cost of $5.8 billion. Total on-site and off-site benefits are just over $1.4 billion.

For Alternative 1, financial assistance to producers is estimated to be $5.1 billion (NPV over 15 years). Payments to producers average $5,600 (NPV over 15 years). The average payment is made up of 26 percent stewardship payments, half of a percent in new practice payments, 6 percent existing practice payments, and the rest in enhancement payments.

Producer conservation costs are roughly $1,800 per farm or $8.90 per acre (NPV over 15 years). These costs include the cost of installing or adopting and maintaining conservation practices and the cost of any enhancement activities that are specified in the CSP contracts. Because enhancements costs cannot be quantified at this time, the analysis assumes that enhancement costs represent 25 percent of the enhancement payment component of total producer payments. The cost (to the government) of technical assistance provided to producers is $800 million or about $5.30 per acre.

An estimate of net benefits for Alternative 1 is obtained by subtracting conservation costs (including TA) from estimated benefits. Net benefits are negative, as Alternative 1 would yield a net 'benefit' of a negative $1,112 million or a negative $5.90 per acre. Note, however, that the benefits expected to flow from contract enhancements cannot be quantified at this time.

Total conservation assurance payments are government payments to producers (financial assistance) less producer conservation costs. Because CSP is designed to reward producers for conservation stewardship, program objectives cannot be achieved without some level of conservation assurance payment. For Alternative 1, total transfers from government to producers are about $5.5 billion (NPV over 15 years). Net returns to producers can serve to reward conservation activity and support farm incomes. However, conservation assurance payments also have the potential to be capitalized into the value of CSP-enrolled land. The extent of this land market distortion will depend on the scope of the program and how CSP payments, particularly the stewardship payment, are defined.

Alternative 2 – Baseline scenario except length of contracts that include movement between Tier I and Tier II are allowed to increase from a maximum of 5 years to 10 years.

This alternative assumes that all the constraints consistent with the Interim Final Rule are in place, however it assumes that if a producer enters a contract at Tier I level and wants to move up to a Tier II level, his/her contract life can be extended from 5 years to 10 years. This removes the disincentive of limiting the contract life for those willing to implement more potential environmental benefits by allowing extended program payments.

This is most likely because of the short life of the contract, hence a shorter payback on increased contract requirements on additional acreage.

If Alternative 2 were implemented, it could provide payments large enough to induce 47 percent of all producers to participate. Model estimates show most producers participating at a Tier I level (almost 39 percent of all farms which represents about 83 percent of all CSP participants) and much smaller numbers participating at a Tier II (3.4 percent of all farms, or just over 7 percent of CSP participants) or a Tier III (about 3 percent of farms, about 6.8 percent of CSP participants) level (Table 8). About 1 percent of the producers are estimated to enter the program in Tier I and agree to transition to Tier II (and one-tenth of a percent entering as a Tier II transitioning to Tier III). In terms of eligible acreage, about 18 percent would be enrolled in Tier I contracts (78 percent of CSP acres), just over one percent in Tier II acres (6 percent of CSP contracts), and almost 3 percent in Tier III contracts (about 11 percent of CSP acres). Just under 4 percent of acreage would be contracted to move from Tier I to Tier II, with under 1 percent contracted to move from Tier II to Tier III (Table 10).

Total contract payments to participants over the life of the contract in Tier I total $5,400 per participant. Contract payment amounts for the other tiers are: $22,900 per Tier II participant; and $69,500 per Tier III participant. The average size of operations in Tier III, and those transitioning either from Tier I or Tier II to higher tiers is between 300 and 400 acres. Given these comparable sizes, the attractiveness of tier transitioning is high: Tier I producers stand to gain $17,600 in payments over the contract life while Tier II producers stand to gain almost $46,500. These payment increases drive the high rates of transitioning in the baseline, both in terms of participants and acreage.

Of the total participation across the US, the Midwest leads all other regions and comprises about 37 percent of the nation's total participation. The Southeast region ranks second with 21% of the nation's total participation. The northeast and west regions have the lowest participation with 7.4% and 8.6%, respectively (Table 9). About 23 percent of the nation's acreage enrolls in CSP with over a third of this total enrolled in the Northern Plains. About one-quarter of the total is enrolled in the Midwest region. Average acreage under contract varies greatly by region as well. The Northern Plains averaged just over 503 acres per contract, while the Northeast region averaged 93 acres per contract.

Alternative 2, as modeled, produces a government cost of $8.2 billion. Total on-site and off-site benefits are about $1.5 billion.

For Alternative 2, financial assistance to producers is estimated to be $7.1 billion (NPV over 15 years). The average payment is made up of 24 percent stewardship payments, no new practice payments, six percent existing practice payments, and the rest in enhancement payments.

Producer conservation costs are roughly $1,800 per farm or $9.29 per acre (NPV over 15 years). These costs include the cost of installing or adopting and maintaining conservation practices and the cost of any enhancement activities that are specified in the CSP contracts. Because enhancements costs cannot be quantified at this time, the analysis assumes that enhancement costs represent 25 percent of the enhancement payment component of total producer payments. The cost (to the government) of technical assistance provided to producers is $1.1 billion or about $5.44 per acre.

An estimate of net benefits for Alternative 2 is obtained by subtracting conservation costs (including TA) from estimated benefits. Net benefits are negative, as Alternative 2 would yield a net 'benefit' of a negative $1.3 billion or a negative $6.73 per acre. Note, however, that benefits expected to flow from contract enhancements cannot be quantified at this time. Enhancement payments of $5.4 billion are estimated.

Total conservation assurance payments are government payments to producers (financial assistance) less producer conservation costs. Because CSP is designed to reward producers for conservation stewardship, program objectives cannot be achieved without some level of conservation assurance payment. For Alternative 2, total transfers from government to producers are about $5.3 billion (NPV over 15 years). Net return to producers also includes $3.38 per acre in on-site benefits, such as nutrient savings or improved grazing. Thus, total net return to producers is about $30.32 per acre on average. These net returns can serve to reward conservation activity and support farm incomes. However, these conservation assurance payments also have the potential to be capitalized into the value of CSP-enrolled land. The extent of this land market distortion will depend on the scope of the program and how CSP payments, particularly the stewardship payment, are defined.

Alternative 3 – The baseline scenario with all the changes from Alternatives 1-2.

This alternative combines all the assumptions included in the previous alternatives. It illustrates the expected effects of the amendment to the Interim Final Rule.

If Alternative 3 were implemented, it could provide payments large enough to induce 43 percent of all producers to participate. Model estimates show most producers participating at a Tier I level (about 35 percent of all farms which represents about 82 percent of all CSP participants) and much smaller numbers participating at a Tier II (3.3 percent of all farms, almost 18 percent of CSP participants) or a Tier III (about 3 percent of farms, about 7.4 percent of CSP participants) level (Table 8). Almost 3 percent of the producers are estimated to enter the program in Tier I and agree to transition to Tier II (and less than one percent entering as a Tier II transitioning to Tier III). In terms of eligible acreage, 16.5 percent would be enrolled in Tier I contracts (77 percent of CSP acres), just over 1 percent in Tier II acres (six percent of CSP contracts), and almost 3 percent in Tier III contracts (about 12 percent of CSP acres). About 4

percent of acreage would be contracted to move from Tier I to Tier II, with under one percent contracted to move from Tier II to Tier III (Table 10).

Total contract payments to participants over the life of the contract in Tier I total $2,000 per participant. Contract payment amounts for the other tiers are: $19,600 per Tier II participant; and $73,500 per Tier III participant. The average size of operations in Tier III, and those transitioning either from Tier I or Tier II to higher tiers is between 300 and 400 acres. Given these comparable sizes, the attractiveness of tier transitioning continues to be high: Tier I producers stand to gain $17,600 in payments over the contract life while Tier II producers stand to gain almost $53,800. These payment increases drive the high rates of transitioning in the baseline, both in terms of participants and acreage.

Of the total participation across the US, the Midwest again leads all other regions and comprises about 37 percent of the nation's total participation. The Southeast region ranks second with 22% of the nation's total participation. The northeast and west regions have the lowest participation with 7.5% and 10%, respectively (Table 9). About 21 percent of the nation's acreage enrolls in CSP with over a third of the total enrolled acres located in the Northern Plains. About one-quarter of the total enrolled acres are located in the Midwest region. Average acreage under contract varies greatly by region as well. The Northern Plains averaged 535 acres per contract, while the Northeast and Southeast region averaged 98 acres per contract.

Alternative 3, as modeled, produces a government cost of $5.2 billion for financial assistance and $776 million for technical assistance. Total on-site and off-site benefits are just under $1.5 billion.

Producer conservation costs are roughly $1,370 per farm or $6.69 per acre (NPV over 15 years). These costs include the cost of installing or adopting and maintaining conservation practices and the cost of any enhancement activities that benefits expected to flow from contract enhancements cannot be quantified at this time, the analysis assumes that enhancement costs represent 25 percent of the enhancement payment component of total producer payments. The cost (to the government) of technical assistance provided to producers is $776 million or about $4.19 per acre.

An estimate of net benefits for Alternative 3 is obtained by subtracting conservation costs (including TA) from estimated benefits. Net benefits are negative, as Alternative 3 would yield a net 'benefit' of a negative $572 million. Note, however, that benefits expected to flow from contract enhancements cannot be quantified at this time.

Total conservation assurance payments are government payments to producers (financial assistance) less producer conservation costs. Because CSP is designed to reward producers for conservation stewardship, program objectives again cannot be achieved without some level of conservation assurance payment. For Alternative 3, total conservation assurance payments from government to producers are about $3.9 billion (NPV over 15 years). Net return to producers also includes $3.36 per acre in on-site benefits, such as nutrient savings or improved grazing. Thus, total net return to producers is about $21.00 per acre on average. These net returns can serve to reward conservation activity and support farm incomes. However, these conservation

assurance payments continue to have the potential to be capitalized into the value of CSP-enrolled land. The extent of the land market distortion will depend on the scope of the program and how CSP payments, particularly the stewardship payment, are defined.

Comparison of Alternatives - Introduction

The CSP model indicates that that there is relatively little variation among the alternatives evaluated with respect to participation and acres enrolled. Participation as a percent of total farms ranges from 47 percent in the Baseline alternative and Alternatives 2 and 3 to 43 percent in Alternative 1. The lower participation rates in Alternative 1 are due to the removal of the Interim Final Rule's regulatory limit on enhancement payments and the inclusion of a requirement that enhancement payments be limited to 70 percent of total payments. This change in constraints has the effect of reducing average total enhancement payments per farm. The lower enhancement payments have the effect of reducing the number of farms participating by 8 percent and dropping the number of acres enrolled by 5 percent. Total acreage enrolled varies from 198 million acres in the Baseline to a low of 185 million acres in Alternative 3. Program costs show a greater variability across alternatives. The highest financial assistance costs are in Alternative 3. The lowest financial assistance costs are associated with Alternative 1, which reflects the lower enhancement payments associated with the 70 percent limit.

Alternative 1 removes the Interim Final Rule Regulatory limit on contracts, however doing so leaves the enhancement payment calculation open-ended. Since 2004 CSP contract enhancement payments averaged roughly 70% of the contract, Alternative 1 replaces the Interim Final Rule's regulatory limit on contracts and replaces that requirement with the constraint of limiting enhancement payments to 70 percent of total CSP payments. This change has a dramatic effect on CSP costs lowering them from $8.0 billion in the Baseline to $5.8 in Alternative 1. This is a 28 percent reduction in cost, but only lowers participation levels by 8 percent and acreage enrolled by 5 percent. These results indicate that capping the CSP program by limiting county payment parameters is not the most efficient means for assuring the program remains within budgetary constraints as compared with the 70 percent enhancement payment limitation.

The effect of extending the contract length from 5 to 10 years (Alternative 2) for those moving from Tier I to Tier II is minimal. Compared to the baseline, total CSP program costs go up by 2 percent and the number of farms enrolled is essentially unchanged. Although the acreage enrolled falls by about 1 percent compared to the baseline, the estimated benefits fall by 8 percent.

Alternative 3 combines the changes in Alternatives 1 and 2: it removes the regulatory contract limits in the Interim Final Rule; limits enhancement payments at 70 percent of total contract payments; and it allows farmers and ranchers to extend the contract period to 10 years if they move from Tier I to Tier II. Compared to the Baseline, Alternative 3 reduces CSP costs by about 2.0 billion while reducing participation by only 9 percent and acreage enrolled by 6.4 percent. Total estimated benefits are reduced by almost 10 percent.

The alternative with the lowest Government cost is Alternative 1 at $5.9 billion over 15 years. The alternative produces a level of benefits estimated at $1.5 billion. This means to say that the

average cost to generate $1 of benefits is $3.93 in Government costs ($5.9/$1.5). The absolute level of benefits can be increased by moving to Alternative 2, or remaining at the Baseline, but all alternatives have higher average costs. Although Alternative 1 has the lowest Government costs, it fails to generate the highest absolute level of benefits. However, while Alternative 2 and the Baseline generate higher benefits, they do so at higher costs: the costs for each incremental dollar of benefits generated approaches over $18. The Baseline scenario and all three alternatives result in higher total government cost than outlined in the President's budget.

Participation Levels – Number of Farms Enrolled

Table 8. Number of Farms by Tier (Thousands).

		Number of Farms (Thousands)					
		Tier I	Tier I => Tier II	Tier II	Tier II=> Tier III	Tier III	Total
Alternative	Baseline	818	27	74	4	67	989
	1	735	29	72	4	67	906
	2	823	24	72	3	67	987
	3	739	25	70	3	67	905
	Incremental Effect						
Alt.	1	-83	1	-2	0	0	-84
	2	5	-4	-2	0	0	-1
	3	-78	-2	-4	0	0	-84

Table 8 displays by tier the total number of farms and ranches enrolled as well and the incremental effect of each alternative compared to the Baseline (continuation with the Interim Final Rule). As indicated in Table 8, the bulk of the farms enrolled are enrolled in Tier I (e.g., in the Baseline, 83 percent of the enrollment is in Tier I). The participation level in Tier III does not vary significantly across alternatives. This is a result of the limited number of farms and ranches in the dataset that can treat all resource concerns in a profitable manner on all acres.

Figure 1. Estimated CSP Participation by Tier, Number of Farms

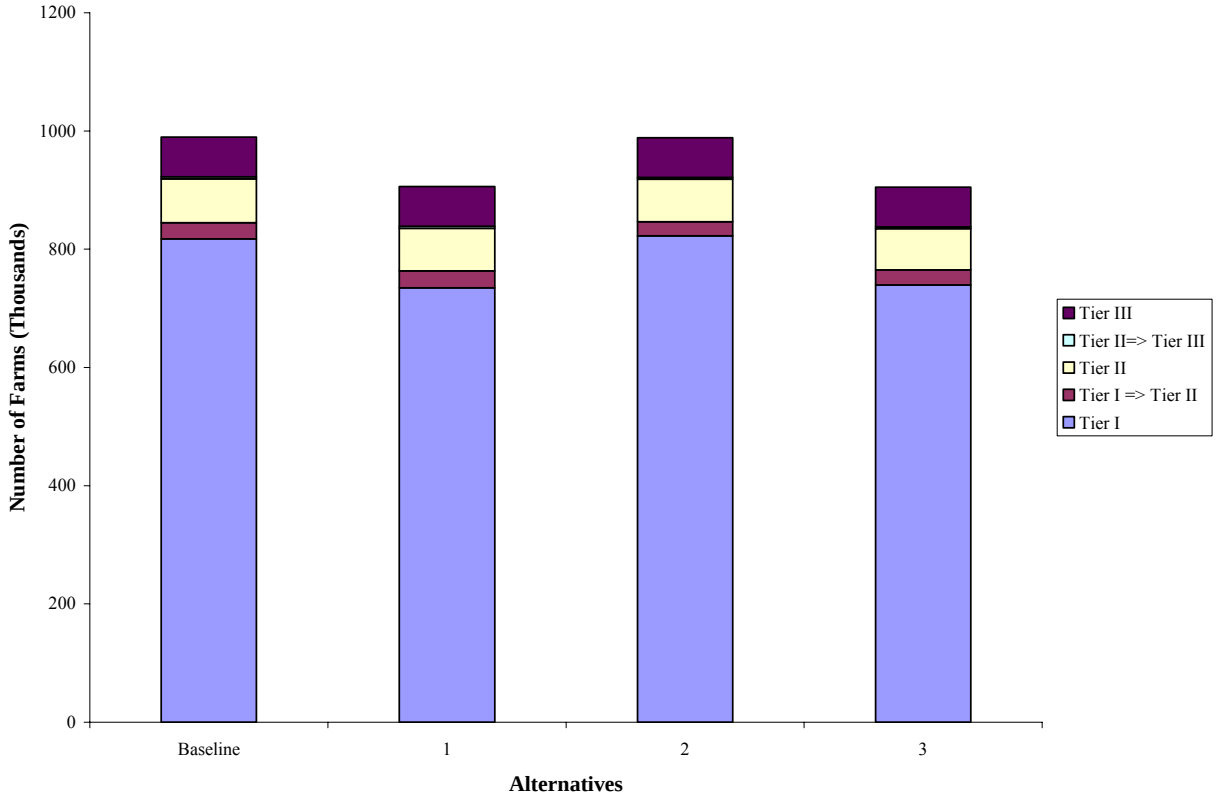


Figure 1 displays farm and ranch participation in CSP by Tier level. Like Table 8, in all Alternatives, producer participation is greatest in Tier I. Producers are more likely to enroll in Tier I because they do not have to enroll their entire operation, therefore decreasing the cost needed to ready their operation for enrollment. Secondly, in Tier I, one enrollment option is to enroll only the acres that have been previously treated. This would allow for producers to participate who have treated a small number of acres for soil quality and water quality without having to treat additional acres and incur a larger initial expense.

Table 9. Percentage of Participation as a Percent of Total Enrollees

					Difference from Baseline		
Region	**Baseline**	**A1**	**A2**	**A3**	**A1**	**A2**	**A3**
Midwest	37.1%	37.2%	37.0%	37.1%	0.1%	-0.1%	0.0%
Northeast	7.4%	7.5%	7.4%	7.5%	0.1%	0.0%	0.1%
Northern Plains	14.4%	14.3%	14.4%	14.3%	-0.1%	0.0%	-0.1%
South Central	11.3%	9.7%	11.3%	9.7%	-1.5%	0.0%	-1.5%
Southeast	21.2%	22.3%	21.3%	22.4%	1.1%	0.1%	1.1%
West	8.6%	8.9%	8.6%	8.9%	0.3%	0.0%	0.3%
Total	100.0%	100.0%	100.0%	100.0%	0.0%	0.0%	0.0%

Figure 2. Estimated CSP Participation, Percent of Farms by NRCS Region

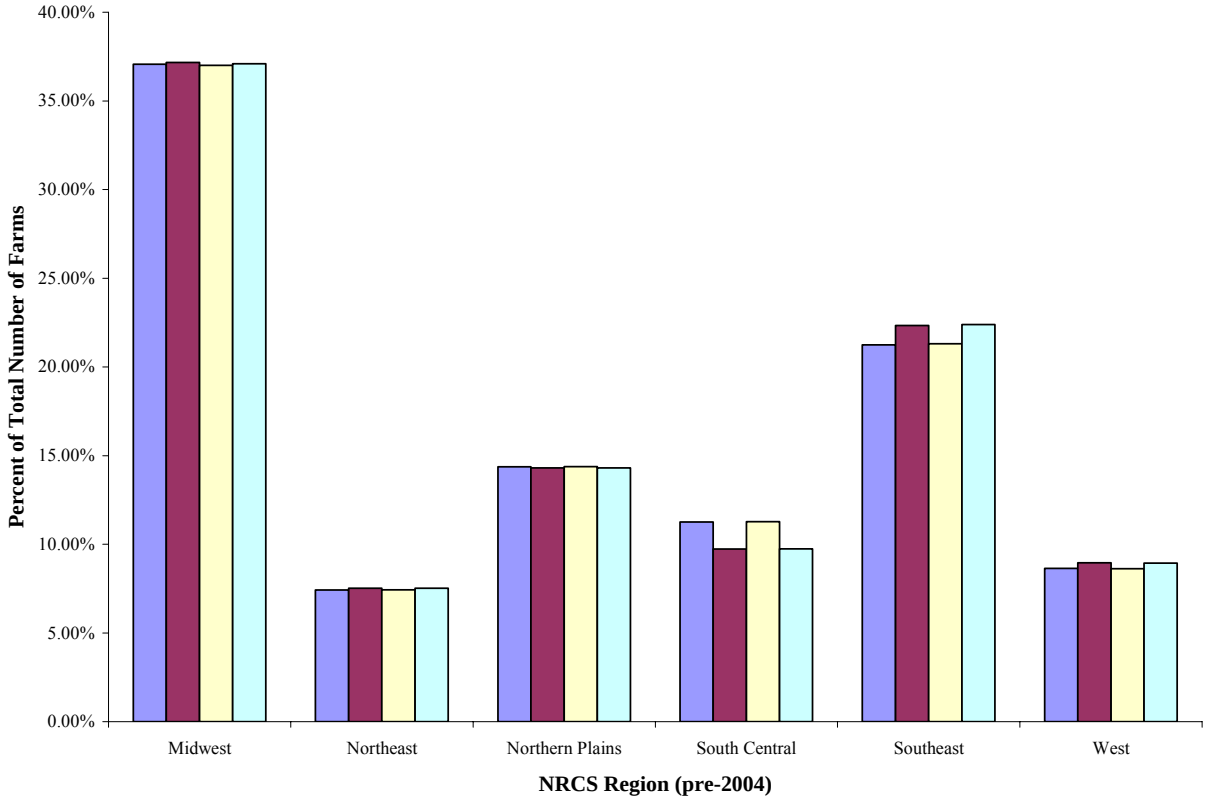


Table 9 and Figure 2 display the distribution of CSP participants by region. Note that the Midwest is dominant with over a third of the participants in all four scenarios. The high participation rates in the Midwest are due to the combination of higher rental rates and relatively large farm size. Also note that there is virtually no change in participation rates within a region across the alternatives considered except for Alternative 1 (and Alternative 3) where the South Central region participation falls by about 1.5 percent in and the Southeast participation increases by about 1.1 percent. These are not very significant changes.

Acreage Enrolled

Table 10. Number of Acres by Tier (Thousands)

	Number of Acres					
Alternative	Tier I	Tier I to Tier II	Tier II	Tier II to Tier III	Tier III	Total
Baseline	152,518	10,240	11,513	1,386	22,225	197,882
1	141,988	10,253	11,494	1,386	22,225	187,346
2	153,616	7,395	11,468	1,253	22,258	195,990
3	142,905	7,714	11,142	1,253	22,258	185,272
Incremental Effect						
1	-10,529	13	-20	0	0	-10,536
2	1,098	-2,845	-45	-133	33	-1,892
3	917	-2,539	-352	-133	33	-2,074

The display of acres enrolled in Table 10 is very similar to the display of farms and ranches enrolled in Table 8. Total acreage enrolled is maximized by Alternative 3 which not only shifts acreage from Tier I to Tier II it also provides incentives for additional land to be enrolled in CSP.

Table 11. CSP Enrolled Acreage by Region (Thousands)

	Acreage by Region				Difference from Baseline		
Region	Baseline	A1	A2	A3	A1	A2	A3
Midwest	48,208	46,450	47,094	45,337	-3.65%	-2.31%	-5.96%
Northeast	6,839	6,626	6,831	6,618	-3.11%	-0.12%	-3.22%
No. Plains	72,361	69,663	72,144	69,305	-3.73%	-0.30%	-4.22%
So. Central	22,959	18,939	22,864	18,795	-17.51%	-0.41%	-18.14%
So. East	20,993	19,936	20,921	19,871	-5.04%	-0.35%	-5.35%
West	26,522	25,731	26,137	25,346	-2.98%	-1.45%	-4.44%
Total	197,882	187,346	195,990	185,272	-5.32%	-0.96%	-6.37%

Unlike the distribution of farms and ranches enrolled in CSP, the distribution of the acreage shifts toward the Northern Plains, which is due to the larger operations (Table 11.) Also note that Alternative 1 drops the acreage enrolled in the South Central region by 17.5 percent as compared to the Baseline. This reduction in acreage enrolled is a result of the 70 percent enhancement requirement being more restrictive that the regulatory limit in the Interim Final Rule. The same holds for Alternative 3.

Acreage Enrolled by Land Type

Table 12. Estimated National Acreage by Land Type.

Land Type	Baseline	Alt 1	Alt 2	Alt 3
	Thousand Acres			
Non-Irrigated Cropland	90,296	85,997	88,514	84,056
Irrigated Cropland	12,224	11,609	12,259	11,640
Grazing Land	95,362	89,740	95,217	89,576
Total	197,882	187,346	195,990	185,272

As Table 12 indicates, the acreage of non-irrigated cropland and the acreage of grazing land enrolled are roughly equal with a far smaller acreage of irrigated cropland enrolled.

Table 13. Estimated Acreage by Region and Land Type.

Region and Land Type	Baseline	Alt 1	Alt 2	Alt 3
Midwest				
Non-Irrigated Cropland	37,437,459	36,110,947	36,264,859	32,268,011
Irrigated Cropland	1,114,214	1,096,588	1,172,819	982,719
Grazing Land	9,655,945	9,242,704	9,656,748	7,861,735
Total	48,207,618	46,450,239	47,094,426	41,112,465
Northeast				
Non-Irrigated Cropland	4,240,194	4,049,016	4,235,591	3,303,120
Irrigated Cropland	126,693	105,196	126,110	102,291
Grazing Land	2,471,792	2,471,966	2,468,979	1,905,279
Total	6,838,678	6,626,178	6,830,679	5,310,690
Northern Plains				
Non-Irrigated Cropland	29,523,092	28,664,874	29,381,827	23,141,933
Irrigated Cropland	3,217,801	3,107,199	3,186,658	2,767,869
Grazing Land	39,620,067	37,891,375	39,575,189	33,856,634
Total	72,360,959	69,663,447	72,143,673	59,766,436
South Central				
Non-Irrigated Cropland	5,078,834	4,109,535	5,035,311	4,836,463
Irrigated Cropland	1,571,794	1,343,317	1,556,861	1,147,523
Grazing Land	16,308,491	13,486,592	16,271,902	17,022,829
Total	22,959,119	18,939,444	22,864,075	23,006,815
Southeast				
Non-Irrigated Cropland	9,348,628	8,783,727	9,341,599	8,026,292
Irrigated Cropland	907,236	813,239	908,092	781,121
Grazing Land	10,737,595	10,338,737	10,670,903	8,886,349
Total	20,993,459	19,935,703	20,920,594	17,693,761
West				
Non-Irrigated Cropland	4,668,261	4,279,248	4,254,682	3,612,624
Irrigated Cropland	5,286,029	5,143,293	5,308,578	4,910,417
Grazing Land	16,568,165	16,308,813	16,573,407	14,313,133
Total	26,522,455	25,731,355	26,136,668	22,836,175
Nation				
Non-Irrigated Cropland	90,296,468	85,997,347	88,513,869	75,188,443
Irrigated Cropland	12,223,766	11,608,832	12,259,117	10,691,940
Grazing Land	95,362,056	89,740,187	95,217,129	83,845,959
Total	197,882,289	187,346,366	195,990,115	169,726,342

Table 13 summarizes the distribution of acres enrolled by alternative, region, and land type. Within a region, there is relatively little variation in acres enrolled across the alternatives.

National CSP Costs

Table 14. Annual Government Costs and President's Budget over 8 Years

(Nominal Terms, Millions $)

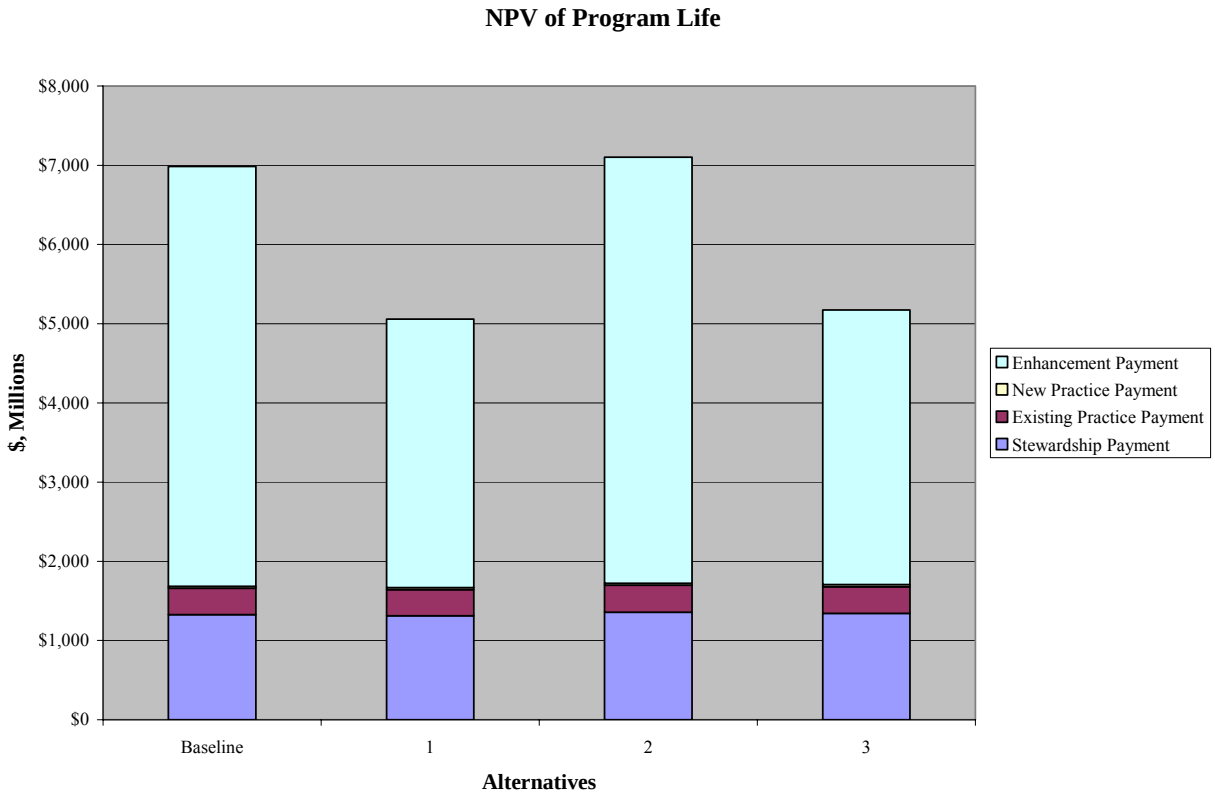
	Year								Total Government Cost
Alternative	1	2	3	4	5	6	7	8	(FA+ TA)
Baseline	$175	$367	$567	$867	$1,050	$1,135	$1,298	$1,592	$7,051
1	$102	$215	$339	$562	$668	$731	$896	$1,168	$4,681
2	$175	$368	$567	$868	$1,053	$1,151	$1,329	$1,631	$7,142
3	$102	$215	$339	$562	$673	$746	$923	$1,218	$4,778
Pres. Budget	$202	$202	$274	$430	$519	$608	$653	$720	$4,104

In the baseline and the three alternatives analyzed, total government expenditures for CSP over eight years are estimated to vary from $4.7 billion to just over $7.1 billion (Table 14). The lowest expenditure is for Alternative 1, where enhancement payments are assumed to account for 70-percent of financial assistance. Payments are lower because the 70 percent share is an effective limit on the total payment to producers and is more restrictive than the regulatory limits that govern the payment for other alternatives. The model results indicate that the baseline and all four alternatives produce higher total government cost than the President's budget. It is important to note that these results are based upon a static model, which may or may not reflect actual program performance. Additional programmatic considerations, such as actual program signup data should confirm or improve the performance of the model. Nevertheless, these results suggest that enrollment categories will likely be necessary to restrict the CSP program in order to meet the President's budget constraints.

Table 14 compares the total CSP costs per year from 2005 to 2012 for the CSP Benefit Cost Assessment model and the President's budget estimates. No effort was made to align the CSP Benefit Cost Assessment model cost estimates with the President's budget because of the differences in their bases for projections and their intended use. While the model is based on a host of participation rules and behavioral relationships, the President's Budget estimates are based on data from the FY-2004 CSP enrollment. The enrollment data reflects the policy in place in 2004 and is affected by the Agency's initial experience in implementing CSP variations in implementation strategies, and the public's limited understanding of a new conservation program like CSP. Although using 2004 enrollment data may be an appropriate way to project Budget needs in FY-2005, the model projections are based on assumptions that reflect long-studied relationships in past NRCS program participation and experience. As the program matures, the Agency may up-date the President's budget with data from future enrollments. More importantly, the CSP Benefit Cost Assessment model is an analysis tool that provides relative measures of the effects of policy options on a range of factors such as participation levels, payment levels, and the distribution of acres enrolled across regions, not a definitive forecast of future budget needs.

Distribution of CSP Payments by Payment Type

Figure 3. Estimated National CSP Outlays by Payment Type.

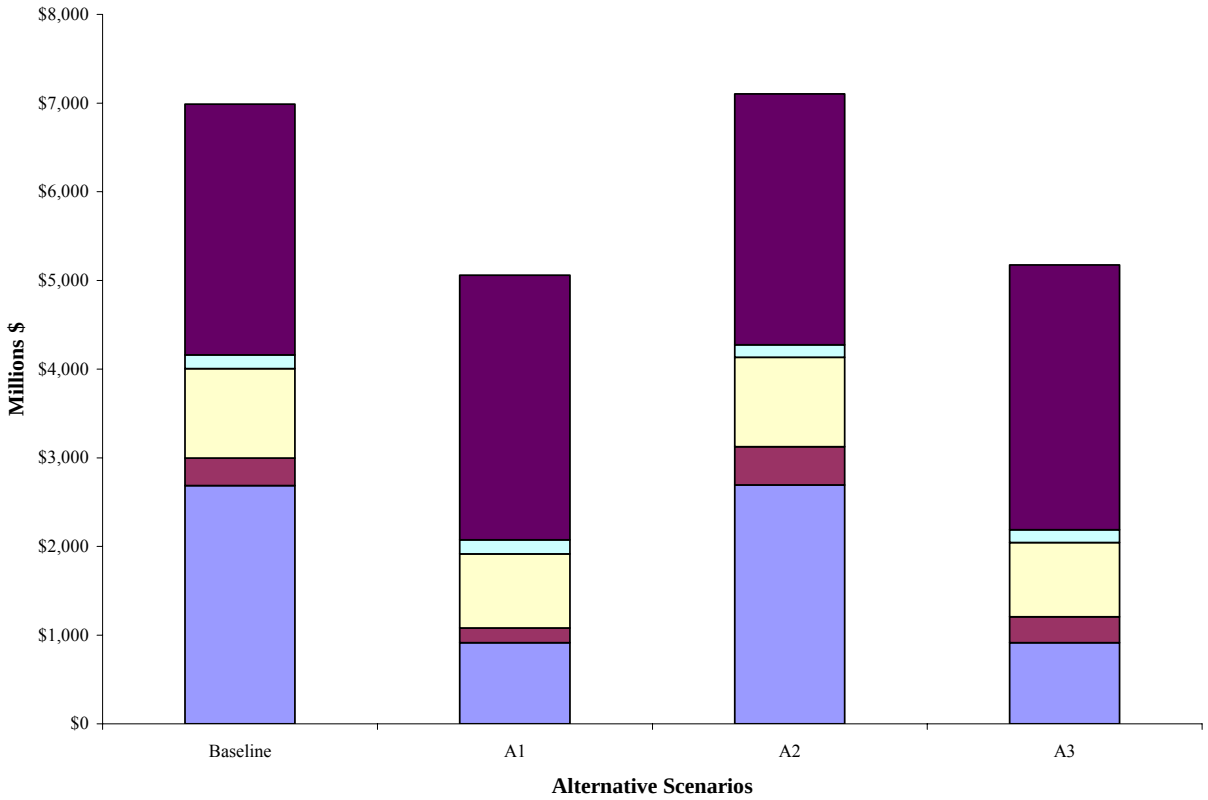


As CSP is structured, enhancement payments are intended to be the largest share of financial assistance. Enhancement payments are the largest share of total CSP payments in the baseline scenario and every alternative, varying from 67 percent in Alternatives 1 and 3, to 76 percent in the Baseline and Alternative 2. Model estimates are driven by one of two assumptions. In the baseline and Alternative 2, producers take on enhancements to reach the payment limitation. In Alternatives 1 and 3, enhancements are allowed to reach either 70 percent of the overall CSP contract or the enhancement payment constraint, whichever is most limiting. Since the model results indicated a lower proportion of enhancement payments, the enhancement payment constraint did come into play with some farms.

Stewardship payments are the next largest component. Stewardship payments are 26 percent of total CSP payments in Alternatives 1 and 3, and 19 percent in the Baseline and Alternative 2. New practice payments are the smallest payments amounting to $25 million (about one third of one percent of total payments) or less in each of the alternatives. The remaining payments are for maintenance of existing practices. Figure 3 illustrates the distribution of payment types by alternative.

Estimated Payments by Tier

Figure 4. Estimated National CSP Outlays by Tier



Total estimated CSP payments by Tier level are displayed in Figure 4. Tier I payments are minimized by adopting the 70 percent constraint on enhancement payments. Allowing contracts to be extended from five to 10 years for those farmers and ranchers shifting from Tier I to Tier II increases Tier II payments (see Alternative 2). Compared to the Baseline, Alternative 2 increases Tier II payments from 19 to 20 percent.

Although 83 percent of the participants are enrolled in Tier I in the Baseline, only 38 percent of the total payments are made to Tier I participants. This is due to larger payments per contract made in Tier's II and III. The elimination of the regulatory cap and the addition of the requirement that enhancement payments are limited to 70 percent of total payments (Alternative 1) reduces the proportion of Tier I payments from 45 percent in the Baseline to 19 percent in Alternative 1.

Alternative 3 has the following effect on Tier payments (as compared to the Baseline):

- Tier I payments decrease from 38 to 18 percent
- Tier II payments increase from 18 to 22 percent
- Tier III payments increase from 42 to 61 percent

Average Contract Payment Size by Region

Figure 5. Average Contract Payment Size by NRCS Region

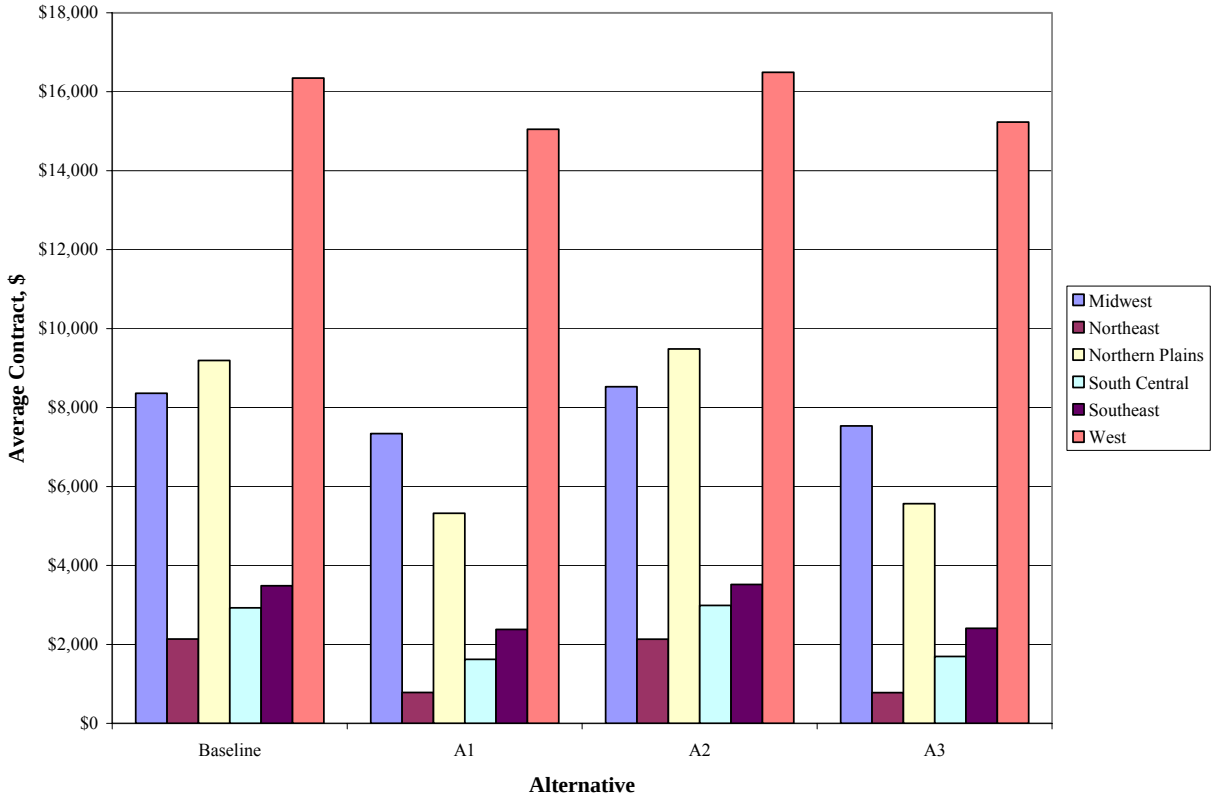


Figure 5 displays the average contract payment by NRCS region. The average contract payment is the total contract payments per region divided by the number of farms participating in CSP per region. In each alternative, the Western region has the highest average contract payment. This is due to larger farm size, higher county payment rates, hence higher stewardship payments for irrigated cropland, and a larger quantity of grazing land. The smallest average contract payment is found in the Northeast as is due to the smaller operations and lower average county payment rates, resulting in lower stewardship payments.

Per Acre Costs

Table 15. Average Number of Acres per Farm and Per Acre Costs in Net Present Value Terms (15 years, 7% Interest)

Alternative	Average Number of Acres Per Farm	Cost per Acre		
		Technical Assistance	Financial Assistance	Total
Baseline	200	$5.30	$35.30	$40.60
1	207	$5.32	$35.44	$40.76
2	198	$5.44	$36.24	$41.67
3	205	$4.19	$27.92	$32.11

Table 15 summarizes the per acre costs by alternative. These costs are total costs over 15 years discounted by 7 percent. The lowest cost per acre is achieved by Alternative 3 and the highest costs per acre are associated with Alternative 2, which extends the contract life for those farms moving from Tier I to Tier II.

Producer Costs

Table 16. Per Acre Producer Costs and Benefits in Net Present Value Terms (15 years, 7% Interest)

Alternative	Average Acres Per Farm	Producer Conservation Costs per Acre	Net Benefits[1]	Producer Net Return[2]
Baseline	200	$9.13	-$6.34	$29.66
1	207	$8.88	-$5.94	$30.17
2	198	$9.29	-$6.73	$30.32
3	205	$6.69	-$3.09	$24.59

[1] Net Benefits are total benefits less producer conservation costs (i.e., the cost of installing and maintaining conservation practices) and the cost of technical assistance that accompanies those activities. Financial assistance to producers is a benefit for producer but a cost to taxpayers and, therefore, cancels out of the net benefit calculation.
[2] Producer net return is financial assistance plus on-site benefits less producer conservation cost

Table 16 provides a summary of expected producer costs associated with enrolling in CSP. The lowest producer costs occur when enhancement payments are limited to 70 percent of the total CSP payments and the regulatory constraint is removed.

Benefits

Table 17. Per Acre Benefits in Net Present Value Terms (15 years, 7% Interest)

Alternative	Average Acres Per Farm	Benefits		
		Onsite	Offsite	Total
Baseline	200	$3.49	$4.60	$8.09
1	207	$3.60	$4.65	$8.26
2	198	$3.38	$4.62	$8.00
3	205	$3.36	$4.44	$7.80

Table 17 summarizes the per acre benefits in present value terms. Offsite benefits are slightly higher than onsite benefits and since the acreage enrolled does not vary a great deal from alternative to alternative the per-acre benefits are similar across alternatives.

Net Benefits

Table 18. Benefits and Costs by Alternative (NPV, 15 years, 7% Interest)

Alternative	Net Economic Cost[1]	Total Environmental (off-site) benefits	Total Onsite Benefits	Net Benefits
	(Net Present Value, Million $)			
Baseline	$2,855	$910	$691	-$1,254
1	$2,659	$872	$675	-$1,112
2	$2,887	$906	$662	-$1,319
3	$2,016	$822	$623	-$572

[1]Net economic costs include:

- total practice implementation costs (cost-share and producer cost);
- total practice maintenance costs; and
- technical assistance cost.

Based on net benefits, the alternative with the highest net benefits (or, more accurately, the smallest benefit deficit) is Alternative 3, the alternative that most closely reflects the Amendment to the Interim Final Rule, with a net benefit of -$.57 billion. (See Table 18) It is important to note that enhancement benefits cannot be quantified at this time, and are not included in this table. Based on the discussion in Appendix 5, significant benefits are likely to result from contract enhancements. For Alternative 3, enhancement payments are projected to be $3.5 billion. Benefits of roughly $0.17 per dollar of enhancement spending would erase the benefit deficit for Alternative 3. Benefits of $1 per dollar of enhancement spending would yield net benefits in the neighborhood of $2.9 billion. As expected, net economic costs and government costs are highest for Alternative 2. The net economic cost follows the same trend as the total government cost. The environmental (off-site) benefits also follows a similar trend with the highest environmental (off-site) benefits estimated under Alternative 2 and the lowest under Alternative 3, which also has the lowest total government cost.

Both offsite and onsite benefits depend solely upon the type of resource concern addressed by the producers enrolling in the alternative. The resource concerns addressed are also dependent on the tier level of enrollment. Benefits from maintenance of existing practices are the only benefits realized from enrollment in Tier I and Tier III, excluding benefits from enhancements.

Table 19. Per Acre Costs, Benefits and Payments in Net Present Value Terms (15 years, 7% Interest)

Alternative	Average Acres Per Farm	Benefits			Producer Conservation Costs	Gov't Expenditure		Net Benefits[1]	Producer Net Return[2]	Conservation Assurance Payment[3]
		Onsite	Offsite	Total		Technical Assistance	Financial Assistance			
Baseline	200	$3.49	$4.60	$8.09	$9.13	$5.30	$35.30	-$6.34	$29.66	$26.17
1	207	$3.60	$4.65	$8.26	$8.88	$5.32	$35.44	-$5.94	$30.17	$26.56
2	198	$3.38	$4.62	$8.00	$9.29	$5.44	$36.24	-$6.73	$30.32	$26.94
3	205	$3.36	$4.44	$7.80	$6.69	$4.19	$27.92	-$3.09	$24.59	$21.23

[1] Net Benefits are total benefits less producer conservation costs (i.e., the cost of installing and maintaining conservation practices) and the cost of technical assistance that accompanies those activities. Financial assistance to producers is a benefi

[2] Producer net return is financial assistance plus on-site benefits less producer conservation cost

[3] Transfer payments are equal to financial assistance less producer conservation costs

Table 20. Per Farm Costs, Benefits and Payments in Net Present Value Terms (15 years, 7% Interest)

Alter-native	Av. No. of Acres Per Farm	Benefits			Producer Conservation Costs	Gov't Expenditure		Net Benefits[1]	Producer Net Return[2]	Conservation Assurance Payment[3]
		On-site	Off-site	Total		Technical Assistance	Financial Assistance			
Baseline	200	$698	$920	$1,618	$1,827	$1,059	$7,061	-$1,268	$5,933	$5,234
1	207	$745	$963	$1,708	$1,836	$1,100	$7,330	-$1,228	$6,239	$5,494
2	198	$669	$917	$1,586	$1,843	$1,078	$7,184	-$1,334	$6,011	$5,341
3	205	$688	$908	$1,596	$1,370	$857	$5,716	-$632	$5,034	$4,346

[1] Net Benefits are total benefits less producer conservation costs (i.e., the cost of installing and maintaining conservation practices) and the cost of technical assistance that accompanies those activities. Financial assistance to producers is a benefit for producer but a cost to taxpayers and, therefore, cancels out of the net benefit calculation.
[2] Producer net return is financial assistance plus on-site benefits less producer conservation cost
[3] Conservation assurance payments are equal to financial assistance less producer conservation costs

Tables 19 and 20 list the per-acre onsite and environmental (off-site) benefits, net economic and government costs, net benefits, and conservation assurance payments for each alternative.

Sensitivity Analysis – Effect of Farm Size on Model Results

The model assesses the impact of various program parameters on the nation's 2.1 million farms. However, CSP producer transaction costs can provide disincentives for some producers to apply for the program. As these transaction costs increase, the likelihood that it becomes unprofitable for smaller producers to apply increases.

A sensitivity analysis was conducted to determine what the effect of assuming minimal acreage would be required for applying for CSP would have on model output. For this analysis, a minimum farm size of 50 acres was assumed. Based upon these assumptions, the model indicates that while overall farm participation would decrease by almost 40% over the 15 year analysis period, total acreage enrolled would drop by just four percent. This assumption had significant regional effects however. As a percent of the total farms enrolled under this scenario, the Midwest, Northern Plains and South Central regions would increase their share of participation, while the Northeast, Southeast and West regions would decrease participation. This can be expected as these regions have a higher proportion of small farms relative to the other regions.

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Appendix 1. Analytical Model Development

Development of Representative Farms

As noted in the body of the report, 6,105 representative farms were developed for the CSP database. These farms reflect the diversity of U.S. agriculture in terms of farm size (acreage), broad land use patterns, and resource conditions. The representative farms vary in terms of:

- Overall acreage;
- Composition of land by broad use category (non-irrigated cropland, irrigated cropland, and grazing land);
- Resource concerns that need treatment;
- The extent of acreage that needs treatment for any given resource concern;
- Acres that are already treated for any given resource concern;
- The cost of installing or maintaining practices for treating resource concerns;
- Potential benefits of treating resource concerns; and,
- County Payment Rates (based on land rental rates).

Development of the representative farms is discussed in two sections: (1) acreages and broad land use (non-irrigated cropland, irrigated cropland, and grazing land) and (2) resource-related farm characteristics.

A. Acreages and Broad Land Use

Acreage and broad land uses for the representative farms were developed using a three-step process. In the **first step**, farm-specific data from Phase 3 of the 2002 Agricultural Resources Management Survey (ARMS) was used to develop 119 basic farm types. In the **second step** representative farms are formed by associating each farm type with one or more watersheds (8-digit hydrologic cataloging units) where ARMS data indicate that the farm type is known to exist. For example, if the ARMS observations (farms) that make up a single farm type are spread across 10 watersheds, a total of 10 representative farms were formed—one for each unique combination of farm type and watershed. The 10 representative farms vary in terms of resource treatment needs, treatment costs, and potential environmental and economic benefits of resource treatment. Resource treatment needs, treatment costs, and potential benefits are defined at the watershed level using methods and data detailed in the next section. Finally, in the **third step**, expansion factors are devised to expand model results based on 6,105 representative farms to the full set of roughly 2 million U.S. farms.

Step one: Farm types. Each observation (farm) in the ARMS database was assigned to one of 119 farm types based on the location of the farm (in one of 6 NRCS historic administrative regions), the types of land present in the farm (non-irrigated cropland, irrigated cropland, or grazing land), and the overall acreage in the farm (sum of all acreage).

Within each NRCS region, ARMS farms were grouped according to the broad land use patterns on the farm. Non-irrigated cropland, irrigated cropland, and grazing land were considered. Each farm was placed in one of 7 groups:

- Farms with non-irrigated cropland only;
- Farms with irrigated cropland only;
- Farms with grazing land only;
- Farms with non-irrigated and irrigated cropland;
- Farms with non-irrigated cropland and grazing land;
- Farms with irrigated cropland and grazing land;
- Farms with all three land types.

This process resulted in 42 *initial* farm types (7 farm types for each of 6 regions). Some of these initial farm types were sub-divided by size (farm types by total acreage). Because 30 ARMS observations (farms) was considered a minimum number for definition of any single farm type, farm types that included less than 60 ARMS farms were not considered for further division. The number of subdivisions by size for each initial farm type and the acreage at which divisions were made was determined on a case-by-case basis because farms vary so widely in terms of acreage and other attributes. This made a set of uniform farm-size (acreage) breaks infeasible. For example, Midwestern farms with only non-irrigated cropland are divided into four farm types: farms with less than 200 acres, farms with 200-1,000 acres, farms with 1000-3000 acres and farms with more than 3000 acres. In contrast, Southeastern farms with non-irrigated cropland and grazing land were divided into five farm types: farms with less than 50 acres, farms with 50-100 acres, farms with 100-300 acres, farms with 300-1,000 acres, and farms with more than 1,000 acres. The process of dividing initial farm types by overall farm acreage resulted in the creation of the 119 farm types used in the analysis. See Appendix 2 for a full listing of farm types.

Table A1. Number of Farm Types in the Model for Analysis 1/.

Region	Types of Farms				
	Non-irrigated	Irrigated	Grazing	"Mixed" 2/	Total
Northeast	2	1	1	8	12
Southeast	3	3	3	12	21
Midwest	4	1	2	10	17
Northern Plains	4	1	3	15	23
South Central	4	2	4	10	20
West	3	4	4	15	26
Total US	20	12	17	70	119

1/ See Appendix 2 for further detail.
2/ "Mixed" represents farms with combinations of two or more land types.

Acreages, by farm type and broad land use, are estimated as follows: Non-irrigated cropland, irrigated cropland, and grazing land acreages for each farm type are the average of non-irrigated cropland, irrigated cropland, and grazing land acreages, respectively, within the ARMS farms that are represented by the farm type. If a given farm type represented 50 ARMS observations (farms), for example, the estimated acreage of non-irrigated cropland for the farm type was the average acreage of non-irrigated cropland acreage over all 50 farms.

In the **second step**, representative farms are formed by associating each farm type with one or more watersheds (8-digit hydrologic cataloging units). There are 2,100 of these hydrologic

cataloguing units (HUCs) in the U.S. A specific farm type is associated with a specific watershed if one or more of the ARMS observations (farms) that make up the farm type are located in the watershed. In other words, each unique combination of farm type and watershed forms one representative farm. For example, the farm-type comprised of Midwestern farms with 200-1000 acres of non-irrigated cropland contains 661 ARMS farms located in 185 different watersheds. Thus, a total of 185 representative farms are formed from the intersection of the farm type 'Midwestern farm with non-irrigated cropland, 200-1,000 acres' and watershed from which these farms are drawn.

Since ARMS observations (farms) are identified by county rather than watershed, and many counties encompass portions of more than one watershed, the following procedure was used to link ARMS observations with watersheds. ARMS observations located in a given county were linked to the watershed that encompassed the largest share of the county's total agricultural land. For example, if a county is split among three watersheds with 60 percent of agricultural land in watershed A, 30 percent in watershed B, and 10 percent in watershed C, the farms are assigned to watershed A. The proportion of agricultural land in each county that falls within a single watershed was estimated from the National Resources Inventory (NRI) data.

In the **third step**, each representative farm is assigned an expansion factor that is used to expand results obtained from analysis of the representative farms to the full farm population. Using the procedures outlined above, a total of 6,105 representative farms (unique combinations of farm type and watershed) were identified. Each of these representative farms represents a number of farms in the overall population. The number of farms represented depends on the number of ARMS farms represented and the number of actual farms each of the ARMS farms represents. The farms in the CSP database represent all 2.1 million farms represented by the ARMS data Phase 3 data for 2002.

B. Resource-Related Farm Characteristics

Resource-related farm characteristics are critical to analyzing CSP. A detailed set of resource-related profiles is developed for each watershed (8-digit HUC). The watershed-specific profile of information for each watershed is assigned to each representative farm associated with that watershed. Following the example of the last section, the 185 representative farms in the Midwest defined by the intersection of the farm type 'Midwestern farm with non-irrigated cropland, 200-1,000 acres' and watersheds boundaries will each reflect the resource concerns and other characteristics of the watershed it represents. These watershed-specific, resource-related characteristics include:

- The extent of acreage that needs conservation treatment, by broad land use and resource concern;
- Acres that are already treated, by broad land use and resource concern;
- The cost of installing or maintaining practices for treating resource concerns; and,
- County Payment Rates (based on land rental rates) for calculating stewardship payments.

CSP participation is based on addressing resource concerns. In the economic analysis, six general resource concerns are considered: soil quality, water quality, water quantity, air quality, grazing land productivity, and wildlife. However, data on treatment needs, costs, and benefits is

typically associated with addressing physical processes such as soil erosion, nutrient management, or water conservation. To bring data from various sources together for the purpose of modeling CSP benefits and costs, each of the six resource concerns is associated with the physical effect(s) that must be addressed to address the resource concern (Table A2). For example, addressing a water quality resource concern can entail control of water-induced (USLE) soil erosion to reduce sediment loads, nutrient management to reduce nutrient runoff, and integrated pest management to reduce pesticide runoff. Most resource concerns, however, map directly to a single physical effect.

In the following discussion, data is typically mapped to a consistent set of physical effects which can then be associated with CSP resource concerns as in Table A2. In the modeling, addressing a resource concern involves addressing one or more physical effects. Thus the benefits and costs that flow from addressing a resource concern are those that flow from addressing the physical effect(s) of addressing in order to address the resource concern. Hence, the discussion is couched in terms of these physical effects, rather than resource concerns.

Table A2. CSP Analysis Resource Concerns and Physical Effects

CSP Resource Concern	Physical Effects
Soil quality	Control soil erosion (water and wind)
Water quality	Control soil erosion due to water (USLE) Nutrient and pest management
Water quantity	Irrigation water conservation
Air quality (dust)	Control wind erosion
Plant (grazing productivity)	Enhance grazing productivity
Animal (wildlife habitat)	Enhance wildlife habitat

Estimating acreage that needs conservation treatment, by broad land use and physical effect. Data on acres needing treatment is from the NRCS work load assessment (WLA). For each county, the WLA provides the acreage of various land types (e.g., cropland, pasture) that need conservation treatment for various physical effects.

Excluding forested land and livestock waste-related practices that are specifically excluded from CSP, a total of 573 million acres of cropland and pastureland require some type of conservation treatment (Table A3). This compares to a total of roughly 860 million acres of cropland and grazing land (excluding CRP and WRP acreage) in the U.S. Grazing land accounts for 325 million acres needing treatment, of which 235 million acres are identified as needing treatment to enhance grazing productivity. Soil erosion and sediment are a primary concern on 55 million acres while wildlife concerns are predominant on just less than 19 million acres. A total of 248 million acres of cropland (both non-irrigated and irrigated) need conservation treatment. Soil erosion and sediment account for 162 million acres, followed by irrigation-related concerns (42 million acres), nutrient management (36 million acres) and wildlife (6.0 million acres).

Table A3. Summary of WLA Data on Acres Needing Treatment (Millions)

By Land Type and Resource Concern

	Soil Erosion	Nutrient & Pest Mgmt	Irrigation Water	Grazing	Wildlife	Totals
	----------million acres----------					
Cropland	162	35.8	42.6	1.4	6	247.8
Grazing land	55.8	12.9	2.1	235.6	18.8	325.2
Totals	217.8	48.7	44.7	237	24.8	573

While WLA is the best available source of data on conservation treatment needs, it does not provide sufficient information to fully assess resource treatment needs in the CSP context. Specifically, WLA data is limited in at least two ways. First, data on soil erosion treatment need is not specific to water-based (USLE) or wind (WEQ) erosion. For the purpose of assigning water quality and air quality benefits, acreage identified in WLA as having a soil erosion concern must be differentiated by erosion type. Shares are defined as the portion of cropland or grazing land acres in each county where the 1997 NRI shows erosion greater than the soil tolerance level "T" ("T" is a measure of the ability of the soil to withstand erosion without loss of soil productivity). The proportion of land that has both USLE and WEQ is also defined, as some practices can address both USLE and WEQ erosion.

Second, cropland is not delineated by irrigated and non-irrigated practice. Because stewardship payments depend on land rental rates which vary with irrigation practice, assessment of CSP costs and benefits requires that resource concerns be identified in terms of whether they occur on non-irrigated or irrigated cropland. While irrigation-related problems can be assumed to occur on irrigated land, other physical effects of concern could occur on either non-irrigated or irrigated land. To allocate other treatment needs among non-irrigated and irrigated cropland, it is assumed that resource concerns are distributed evenly among irrigated and non-irrigated cropland within each county. In other words, the acres listed as needing treatment for a given physical effect on cropland are allocated proportionately to non-irrigated and irrigated cropland within each county.

The WLA data adjusted for erosion type and irrigation was then linked to the representative farms using the following method. Acreages, by broad land use, were estimated for each representative farm using procedures described above. A portion of each land type in each representative farm is considered to need treatment for each relevant resource concern (proportions may be zero or one in some cases). To estimate these proportions, WLA county data is re-scaled to the watershed level. Where a county is included in more than one watershed, the acres needing treatment are split among watersheds using acreage weights. For example, acres needing treatment for resource concerns associated with non-irrigated cropland are divided among watersheds according to the proportion of non-irrigated cropland in each watershed in the county. Acreage data for the weights is derived from the National Resources Inventory (NRI).

To estimate the acreage needing treatment in each of the representative farms, the representative farm acreages, by broad land use, are multiplied by the proportion of acreage needing treatment, by broad land use, in the watershed from which the representative farm is drawn. For example, consider a farm with 500 non-irrigated cropland acres, drawn from a watershed where 50 percent

of non-irrigated cropland acres are estimated to require treatment of soil erosion. On that farm, 250 non-irrigated cropland acres are estimated to require treatment for soil erosion. On a farm with 200 acres of non-irrigated cropland, located in the same watershed, 100 acres would require treatment for soil erosion, etc. It is important to note that although the data is broken down to specific farm types, they still compromise a uniform distribution of average acres over a larger area. Therefore, these farms may be representative of farms in that area but may not reflect actual farms.

Estimating acreage that is already treated, by broad land use and physical effect. The acreages within each representative farm that are already treated, by broad land use and physical effect are estimated using data from the NRCS Performance and Results Measurement System (PRMS). Estimates of the life span of various structural practices, and historical funding for conservation cost-sharing on working agricultural lands (i.e., the land targeted by CSP) are also described below.

Data on historical acres treated is based on the NRCS Performance and Results Measurement System (PRMS) for fiscal year 2003. PRMS provides Resource Management System (RMS) applied acreage for all USDA programs (not just NRCS programs) by resource concern by state. Implementation of conservation practices/systems to an RMS level results in treatment to the quality criteria level of the affected resource concern. Since PRMS includes resource concerns other than those identified in the CSP statute (i.e. flood damage reduction, forestland, and wetlands to name a few), only data that the CSP program could address, and data from which benefits could be derived for was used; dealing with air, animal, plant, soil, water quality, and water quantity resource concerns.

To estimate historical treated acreage, acreage was first sorted in each state by PRMS land use (cultivated cropland, non-cultivated cropland, and grazing land). After deducting WRP, CRP, and GRP acreage, 1997 Agricultural Census data was utilized to sort land uses into dryland and irrigated acreage by resource concern by state. Then, since PRMS is a rather new reporting system and historical PRMS data is limited, the apportionment of USDA funding over a 21-year period (annual sum of technical and financial assistance from 1983-2003, excluding CRP, GRP, and WRP funding data) compared to fiscal year 2003 as the baseline was used as a basis to account for historical treatment. Funding that only affected conservation treatment to private land was included. In order to account for practices re-applied, the weighted structural practice life of bundled conservation practices used in the *Environmental Quality Incentive Program (EQIP) Benefit Cost Analysis, Final Report, May 9, 2003* was taken into consideration (annual practices excluded). After applying weighted practice life to account for re-application, historical treated acres by land use by resource concern by state were obtained.

Finally, the data on treated acreage is linked to the representative farms using procedures similar to those used to link WLA data on acres needing treatment to the representative farms. Unlike WLA, however, data on treated acreage is aggregated to the state level. Acreage treated by land type and resource concern is allocated to watersheds within the state based on the proportion of the state's total acreage, for the appropriate land type, included in the watershed. For example, if a specific watershed accounts for 5 percent of a given state's non-irrigated cropland acreage, then 5 percent of treated non-irrigated cropland acres are assigned to the watershed. Taking the

example a bit farther, if 500,000 non-irrigated acres are treated for soil erosion within the state, 25,000 acres would be assigned to the watershed containing 5 percent of non-irrigated acreage. Dividing the watershed-specific treated acreage by total non-irrigated cropland acreage within the watershed yields the proportion of acres needed to estimate farm-specific acreages.

Estimating the cost of installing or adopting practices to treat physical effects. The costs of addressing various physical effects—and, by extension, the resource concerns associated with these physical effects (see Table A2)—are estimated from EQIP contract data for 1996-2003. EQIP funded a broad range of conservation practices, even broader than the range of practices to be funded under CSP, making EQIP an obvious source of data on conservation practice costs. For the purpose of developing the costs, 33 core practices are used. These practices are widely used and reliable data can be obtained from the EQIP database[1].

The expected changes in producer behavior needed to address the physical effects described above were derived from Agency expertise and recent experience with the Environmental Quality Incentive Program (EQIP). Table A4 shows the "suite" or "bundle" of practices (from the 33 practices for which EQIP data is available) that could be used to address each physical effect. For example, erosion control may involve conservation tillage, terraces, wind brakes, and other common practices. The practice/physical effect associations are based largely on similar associations made in the *Environmental Quality Incentive Program (EQIP) Benefit Cost Analysis, Final Report, May 9, 2003*. In some cases, the bundle of practices is specific to a specific broad land use. For example, it is assumed that irrigation water conservation does not take place on non-irrigated land. Likewise, actions to increase grazing land productivity are reserved for grazing land. Water-based (USLE) erosion reduction bundles are delineated by cropland and grazing land to reflect the likelihood that different practices are used in conjunction with these different land uses.

Table A4 needs to be considered in the context of Table A2 in that it is a logical extension of it. That is, it lists those practices that are typically used to address the physical effects (and in turn affect resource concerns listed in Table A2). One can see this by looking at any practice and looking at the physical effects that they may address by going in a counter-clockwise direction from the bottom of the table. Tracing the physical effect(s) up from the bottom of the page, one can identify the resource concern affected. In 21 out of 30 cases, practices are specific to a resource concern and/or land types, i.e. windbreak establishment on WEQ and irrigation water conservation only on irrigated cropland. Likewise, actions to increase grazing land productivity are reserved for grazing land only. There are 9 instances where producer adjustments in their practices affect more than one resource concern. In these instances, special treatment is applied to avoid double accounting (described below). Erosion reduction costs (USLE and WEQ) are delineated by cropland and grazing land to reflect the likelihood that different practices are used.

[1] Obtaining these data required tracking and correcting mistaken entries in the database. The large size of the database precluded hand-cleaning of data for all EQIP-eligible practices.

Table A4. Matrix of Resource Concerns, Observed Physical Consequences, and Recommended Practices

		Observed Physical Effect(s) on Land									
		Water Erosion		Wind Erosion		Nutrient Management	Water Quantity	Grazing Productivity	Wildlife Habitat		
		USLE		WEQ		NM	IW	GRAZING	WILDLIFE	Is this resource concern affected by more than one physical effect?	What physical effects(s) affect this resource concern?
		Type of Land		Type of Land				Grazing Land			
Resources Concerns		Crop	Grazing	Crop	Grazing	Regardless of Land Type	Irrigated Cropland		Regardless of Land Type		
SQ--Soil Quality		X	X	X	X					Yes	USLE; WEQ
WQ--Water Quality		X	X			X				Yes	USLE; NM
AQ—Air Quality				X	X					No	WEQ
IW--Water Quantity							X			No	IW
GR--Plant (grazing productivity)								X		No	GRAZING
WL--Animal (wildlife)									X	No	WILDLIFE
Practices that affect observed physical effects										Does this practice affect more than one consequence?	What consequence(s) are affected by this practice?
Code	Description										
328	Conservation Crop Rotation	X		X						Yes (2)	USLE;WEQ
329A	Residue Management, No-Till and Strip Till	X		X						Yes (2)	USLE;WEQ
329B	Residue Management, Mulch Till	X		X						Yes (2)	USLE;WEQ
340	Cover Crop	X		X						Yes (2)	USLE;WEQ
342	Critical Area Planting1	X		X						Yes (2)	USLE;WEQ
344	Residue Management, Seasonal	X		X						Yes (2)	USLE;WEQ
410	Grade Stabilization Structure	X								No	USLE
412	Grassed Waterway	X								No	USLE
561	Heavy Use Area Protection	X								No	USLE
587	Structure for Water Containment	X								No	USLE
600	Terrace1	X								No	USLE
638	Windbreak/Shelterbelt Establishment	X								No	USLE
528A	Prescribed Grazing		X					X		Yes (2)	USLE;GRAZING
550	Range Planting		X		X			X		Yes (3)	USLE;WEQ;GRAZING

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		Observed Physical Effect(s) on Land									
		Water Erosion		Wind Erosion		Nutrient Management	Water Quantity	Grazing Productivity	Wildlife Habitat		
		USLE		WEQ		NM	IW	GRAZING	WILDLIFE		
		Type of Land		Type of Land							
Resources Concerns (continued)		Crop	Grazing	Crop	Grazing	Regardless of Land Type	Irrigated Cropland	Grazing Land	Regardless of Land Type	Is this resource concern affected by more than one physical effect?	What physical effects(s) affect this resource concern?
380	Windbreak/Shelterbelt Establishment			X	X					No (2)	WEQ
590	Nutrient Management					X				No	NM
595	Pest Management					X				No	NM
633	Waste Utilization					X				No	NM
430D	Irr. Wat Convey. Pipeline, High-Press.						X			No	IW
430E	Irr. Wat Convey. Pipeline, Low-						X			No	IW
430H	Irr. Wat Convey. Pipeline, Rigid Gated P						X			No	IW
449	Irr. Wat Management						X			No	IW
464	Irr. Land Leveling						X			No	IW
640	Water spreading						X			No	IW
314	Brush Management							X	X	Yes (2)	GRAZING;WILDLIFE
382	Fence							X		No	GRAZING
512	Pasture and Hay Planting							X		No	GRAZING
516	Pipeline							X		No	GRAZING
614	Trough or Tank							X		No	GRAZING
645	Upland Wildlife Habitat Management								X	No	WILDLIFE

Key to Codes of Physical Activities and Resource Concerns listed above.

Code	Resource Concern
SQ	The measure of quality of the soil to produce crops (soil productivity or quality)
WQ	The measure of quality of water for human use.
AQ	The measure of the quality of the air.
IW	The measure of the quantity of water available
GR	The measure of the carrying capacity of the land with respect to animal production.
WL	The measure of the carrying capacity of the land with respect to wildlife production (food and habitat).

Code	Physical Effects
USLE	The loss of soil by the action of water on soil surfaces (rill, sheet erosion)
WEQ	The loss of soil by air (wind erosion)
NM	The ability to utilize available nutrients in the soil
IW	The amount of water used for agricultural uses (irrigation)
GR	The ability of the land for grazing purposed in animal production
WL	The ability of the land to sustain wildlife populations (food and habitat)

For those 9 instances out of 30, the practice used addresses more than one physical process. For example, six practices can be used to address USLE erosion or WEQ erosion or both. Where both processes are to be addressed, the total cost of addressing both is less than the sum of addressing each individually. To avoid double counting, the cost must be calculated as the sum of the cost to address both concerns, less the cost of practices that address both resource concerns. Toward that end, a separate cost estimate is derived for practices that address more than one physical process. (The extent of overlap is defined by treatment needs data, based on WLA and NRI.)

Once the bundles are established, the cost of addressing each physical effect can be estimated. The per-acre costs of addressing each physical effect is an acre-weighted average of the cost of installing the practices in the "bundle" practices associated with the physical effect (Table 21) within the each of the 306 NASS Agricultural Statistics Districts (ASDs). Use of ASDs is designed to capture spatial variation in (1) the practices (within the bundle) that are actually used to address the physical effect within a specific area and (2) variation in the cost of applying specific practices. For example, the cost of reducing USLE erosion is relatively low where the soil and topography are conducive to the use of management practices rather than the more expensive structural practices.

Estimates are based on total practice cost, not the cost-share actually paid. For structural practices, total cost is the cost-share paid divided by the cost-share rate. For management practices, total cost is estimated as the maximum allowed incentive payments, obtained by dividing payment amount by the proportion of the maximum that is actually paid to the producer. While the maximum payment rates are designed to approximate costs, there remains considerable uncertainty about the actual costs of applying management practices. Nonetheless, these rates are the best available proxy for the cost of applying management practices.

For some practices, the extent of application is described in units other than acres. For example, the extent of terraces cost-shared is described in terms of linear feet. For these practices, conversion factors developed for the *Environmental Quality Incentive Program (EQIP) Benefit Cost Analysis, Final Report, May 9, 2003* analysis are used to convert units into acres treated so that they can be included in the development of estimates of per-acre cost.

For example, some practices used to prevent soil eroded from a land area from leaving the area were not reported in acreage units, therefore assumptions were used to convert the units of treatment (generally linear feet, as in feet of terraces) to acres treated. In the example of irrigation water management, a large set of practices were reported in units rather than by acres, but it can be assumed that these practices were "associated" with the per-acre practices. Therefore, their costs were added to the sum of costs across treated acres.

Finally, fully addressing any specific resource concern will typically require the application of more than one practice. The number of practices can vary depending on the broad land use, characteristics of the soil and climate, and the specific practices actually used. Unfortunately, there is no data on the number of practices that would typically be applied in the context of addressing one or more resource concerns. Consistent with the *Environmental Quality Incentive*

Program (EQIP) Benefit Cost Analysis, Final Report, May 9, 2003 analysis assumptions, it is assumed that 1.5 practices per acre are applied per resource concern.

The resultant cost of treatment by region and physical effect addressed by land type reveals a wide range of potential practice installation and adoption costs (Table A5). In most cases, the difference between high and low costs is largely a function of the proportion of relatively inexpensive management practices used.

Table A5. Annual Cost of Treatment by Region, Resource Concern, and Land Type (dollars/acre)

Physical Effect:	**USLE erosion**		**WEQ erosion**		**Nutrient Management**	**Irrigation Water Conservation**	**Grazing Productivity**	**Wildlife Habitat**
Land Type:	Cropland	Grazing land	Cropland	Grazing land	All Land Types	Irrigated Cropland	Grazing land	All Land Types
Region	**Mean Cost**							
Midwest	116.15	26.31	59.99	93.58	12.31	58.22	78.43	122.59
Northeast	438.98	26.54			13.95	92.56	107.07	115.12
Northern Plains	169.96	18.17	65.50	60.17	9.06	91.64	65.84	39.86
South Central	195.11	24.33	278.07	43.91	14.42	170.57	57.41	47.28
Southeast	272.19	21.08			15.51	140.82	105.89	60.95
West	93.93	27.93	103.43	81.41	13.91	170.87	84.41	64.36
	Standard Deviation of Cost							
Midwest	87.60	18.08	103.60	87.72	5.18	100.98	39.43	84.12
Northeast	391.50	19.06			3.50	78.19	35.12	97.40
Northern Plains	219.24	19.34	122.17	25.09	5.04	99.81	40.07	30.33
South Central	172.91	18.73	261.09	25.87	5.94	128.71	23.35	16.82
Southeast	445.24	15.70			2.96	133.97	53.87	44.03
West	91.39	22.10	174.84	69.56	5.85	132.62	50.45	55.39
	Minimum Cost							
Midwest	13.50	6.07	5.72	9.14	5.27	2.25	21.16	15.00
Northeast	16.34	1.87			7.46	12.39	9.34	7.16
Northern Plains	10.75	1.50	7.82	17.49	0.76	3.00	7.74	5.93
South Central	10.01	4.06	5.48	11.06	2.66	9.00	10.18	17.43
Southeast	14.71	1.48			7.21	15.00	38.54	15.00
West	8.16	1.50	7.59	4.34	1.78	13.41	3.48	17.67
	Maximum Cost							
Midwest	472.08	100.00	720.00	376.20	39.13	353.20	225.88	399.19
Northeast	2214.76	75.00			31.45	256.15	180.40	439.90
Northern Plains	2191.27	91.80	986.69	197.93	23.94	779.92	246.02	151.04
South Central	1157.13	67.88	825.18	174.03	38.99	996.75	130.18	90.78
Southeast	2237.69	75.00			24.45	456.14	501.32	208.95
West	521.74	73.60	887.50	440.00	27.58	665.62	196.04	305.86

Watershed-specific estimates were developed by taking an acreage-weighted average of the ASD-specific costs for all ASDs located, at least in part, within a specific watershed. Estimates are weighted by the proportion of the appropriate HUC acreage that falls in each ASD that is at least partially located within the HUC. The appropriate acreage depends on the type of land most often associated with the practices in question. In most cases cropland acreage is used. In some cases, grazing land (e.g., grazing productivity) and irrigated cropland (e.g., irrigation water conservation) are also used.

Maintenance costs are assumed to be equal to the depreciation of conservation practices over time. Practice life was obtained from the *Environmental Quality Incentive Program Manual, Review Draft Version 4, May 22, 2003*. For purposes of CSP, maintenance costs were calculated based on the 2001 county level average practice costs. Since each practice has a different expected life, a weighted average of expected practice life was calculated for each suite (bundle) of conservation practices.

County Level Payment Rates (based on land rental rates) for calculating stewardship payments.

Per acre stewardship payments in the Conservation Security Program (CSP) are specified as a fixed tier-specific percentage of a national average land rental rate by land use for the 2001 crop year. The Secretary may use another appropriate rate in establishing stewardship payments, so long as "regional equity" is ensured.

CSP could increase land values through capitalization of payments. CSP payments exhibit a number of basic characteristics that are likely to result in capitalization:

- *Payments are tied to the land*. Only individuals who own or lease agricultural land can receive payments. Moreover, payments are tied directly to land-based actions (the installation, use, and maintenance of conservation practices) and are to be made on a per-acre basis.

- *Payments are likely to exceed participation costs*. CSP payments have four components: the stewardship payment linked to land rental rates; the existing practice payment linked to the stewardship payment, one-time new practice payment for practice installation; and payments for enhancements that exceed the minimum tier requirements. The *net* cost of CSP participation is likely to be covered by the cost share and enhancement payments. Although cost sharing is limited to a maximum of 75 percent of practice costs, most participants will receive tangible benefits from practice adoption and maintenance that will help defray landowner/producer costs. For example:
  - soil erosion control measures can maintain future productivity, enhancing the value of the land;
  - nutrient management could reduce overall fertilizer expense;
  - conservation tillage can reduce fuel and labor costs and may provide a yield boost in some areas;
  - water conservation in irrigation could reduce groundwater pumping costs.

Actions covered by the enhancement payment will be optional, so landowners and producers are likely to undertake these actions only if the payment and related benefits cover the full cost. The remaining payment component -- the stewardship payment -- is not related to the adoption and use of conservation practices. Given that other payment components are likely to cover net program participation costs, the producer's net income--or at least some portion of it depending upon the size of the stewardship payment component--would be available for capitalization.

The statute allows use of an alternative to national average rental rates in setting stewardship payments so long as "regional equity" is maintained. The amended rule sets out a procedure to use county payment rates to establish stewardship payments.

Since CSP will operate throughout the nation, it is important to develop county payment rates for every county, and for every land type for which the program will operate. However, no national database exists for all counties or the land types that CSP will offer payments on. NRCS identified several sources of data and developed a methodology for utilizing these data sources do develop consistent county level payment rates for all of the US and territories.

The following steps were used to create a County Level Rental Rates database for the Conservation Security Program (CSP):

1. Review available data and create a baseline database,
2. Use available data to impute values to counties with missing rental rates and make adjustments for outliers, and
3. Use GRID Smoothing techniques in ArcGIS to ensure that rental rates do not vary greatly between adjacent counties.
4. Release County Level Payment Rates to NRCS State Offices for review and comment.

The database includes rates for Irrigated and Non-Irrigated Cropland, Pastureland, and Rangeland.

Step 1. Review Available Data. Three main data sources were used for the development of the county payment rates:

1. 2001 Land Value Survey – Farm Service Agency (FSA)
    - The Land Value Survey is related to the Agricultural Foreign Investment Disclosure Act of 1979 (AFIDA) which requires "foreign persons who hold, acquire, or dispose of any interest in U.S. agricultural land to report the transactions to the FSA" The information is available to States and is used to prepare an annual report to Congress and the President concerning the effect of foreign investment upon family farms and rural communities.
2. Agricultural Cash Rents 2001 Summary –National Agricultural Statistics Service (NASS)
3. Conservation Reserve Program (CRP) General Signup rates – Farm Service Agency (FSA)

Step 2. Rate Imputation and Data Adjustments. After creating the baseline database, rental rates were imputed for counties with missing data and additional data adjustments were made as

needed. After the imputations were made, descriptive statistics were run on the baseline database to calculate an average, variance, and standard deviation.

Step 3. Smoothing Rental Rates. The ArcGIS GRID procedure was used to "smooth" rental rates across geographically adjacent counties. An area was created by imposing a grid panel over the geographic surface of the US, which was used to adjust huge variations between rental rates within the grid.

Step 4. Review Period. The county level payment rates were released to State Conservationists through a secure web site for review and comment.

Estimating CSP Participation

CSP participation is determined through a series of steps including both USDA and producer decisions. USDA determines:

- Eligible watersheds;
- Participation options available to producers; and,
- Payments associated with each option.

Producers then decide whether to apply for participation in CSP. Potential application is estimated based on

- participation costs and on-site benefits relative to payments associated with each option
- socio-economic factors known to influence producer conservation program participation decisions; and,
- historical participation rates derived from ARMS data.

Finally, if applications exceed available budget, USDA will decide which contracts to accept based on a system of enrollment categories such as those illustrated in Table 4. The model analysis can not estimate final participation, rather participation that would be expected before implementing any enrollment category criteria.

A. Signup Eligibility – Selected Watersheds

This analysis uses an approach that relies on four elements for estimating watershed signup participation:

- a composite analysis of national agricultural datasets consisting of eligible land uses, input intensities and stewardship;
- weighting factors that place greater emphasis on input intensities and stewardship categories;
- an analysis of NRCS' technical and staff capacity to ensure effective and efficient delivery of the program in selected watersheds; and
- recognition of certain local resource issues to enhance the program's environmental goals.

NRCS compiled the quantitative data for conformance with criteria 1) and 2) using National Resource Inventory (NRI) and Census of Agricultural data. This data was aggregated to the U.S. Geological Survey's 8-digit Hydrologic Unit Code (HUC) and arrayed within the Economic Research Service's Farm Production Regions according to quartile distribution.

B. Participation Options available to Eligible Producers

Most producers will have a range of CSP participation options, based on tier, resource concerns that have been, or are to be addressed, and the proportion of the farm enrolled (Tier I only). The same six resource concerns discussed in the previous discussions are considered here: soil quality, water quality, water quantity (management of irrigation water), air quality (reduction of air quality damage due to wind erosion), management of grazing land productivity, and wildlife habitat. Specific resource concerns are included in the development of options for a specific farm only if the farm contains acres that need treatment or that have already been treated for the resource concern. Participation options require treatment for soil quality and water quality before producers are eligible for CSP enrollment. Payments can be extended on the basis of other resource concerns in Tier II and Tier III contracts.

A maximum of 12 options are considered for each representative farm:

- Option 1: The farm is a Tier I farm that plans to enroll a portion of the farm (that portion has already been treated for soil quality (SQ) and water quality (WQ)), regardless of land use;
- Options 2, 3 and 4: The farm is a Tier I farm that plans to enroll all of one type of land (that land which the producer has already addressed SQ and WQ concerns). Option 2 pertains to farms enrolling only its non-irrigated cropland; Option 3, only its irrigated cropland; and Option 4, only its grazing land);
- Option 5, 6 and 7: A producer who enters CSP in Tier I may transition to Tier II during the life of the contract. Because of the great likelihood that it will take time to implement additional practices on the rest of the operation's acreage, the cost of addressing soil and water quality on acres not enrolled under Tier I are accrued to the first two years of the contract while it is assumed that Tier II payments are made in the fourth and fifth year of the contract only. An additional resource concern must be addressed on the entire farm by the end of the contract, per Tier II requirements. Option 5 pertains to similar farms, but planning to address water quantity; Option 6 pertains to similar farms, but planning to address grazing productivity; and, Option 7 pertains to similar farms, but planning to address wildlife habitat concerns;
- Option 8, 9 and 10: The farm is a Tier II farm that plans to enroll all land that the farm has already addressed for SQ and WQ concerns on all acreages before enrollment and plans to address at least one other resource concern by the end of the contract period. Option 8 pertains to those Tier II farms that enroll and plan to address (as its' third resource concern) water quantity. Option 9 pertains to similar farms, but planning to address grazing productivity; and, Option 10 pertains to similar farms, but planning to address wildlife habitat concerns;
- Option 11: A producer who enters CSP in Tier II may transition to Tier III during the life of the contract. Because of the great likelihood that it will take time to implement

additional practices on the rest of the operation's acreage before Tier III payments can begin, the cost of addressing soil and water quality on acres not enrolled under Tier II are accrued to the first three years of the contract while Tier III payments are made in the fourth through tenth years of the contract. An additional resource concern must be addressed on the entire farm by the end of the contract, per Tier II requirements. However, since all resource concerns must be addressed for Tier III, it is assumed that the third resource concern is addressed along to move to Tier III;

- Option 12: The farm is a Tier III farm with all land enrolled and all resource concerns addressed prior to enrollment.

C. Payments and Participation Costs

CSP payments are calculated for each participation option on each representative farm based on:

1. the type and extent of land enrolled;
2. the rental rates associated with that land;
3. the cost of installing, adopting, or maintaining practices; and,
4. types of enhancements undertaken.

The four types of payments allocated to each participation option consist of:

1. stewardship payments;
2. existing practice payments;
3. new practice cost share payments; and,
4. enhancement payments.

Each payment type estimation will be discussed in detail in the following paragraphs.

In the Economic Analysis, the following payment limitations are placed on CSP payments:

1. the statutory limit;
2. the regulatory limit, for the Baseline, Alternative 2
3. the stewardship payment limit;
4. the new practice cost share payment limit; and,
5. the enhancement payment limit.

The statutory limit constrains the total annual CSP payment to $20,000 for Tier I; $35,000 for Tier II; and $45,000 for Tier III. The sum of all four payment types make up the payment amount subject to the statutory limit.

For the Baseline and Alternative 2, the regulatory limit goes beyond the statutory limit and further limits the annual CSP payment. The following formula defines the regulatory limit:

*Regulatory Limit per Acre = (County Payment Rate Per Acre) * (Tier Specific Factor)*

For Tier I, the tier specific factor is fifteen percent; for Tier II, it is 25 percent; and for Tier III, it is 40 percent. The per acre regulatory limit is multiplied by the number of acres enrolled. The sum of the stewardship payments, existing practice payments, and enhancement payments must

be equal to or less then the regulatory limit. The new practice payments are above and beyond the regulatory limit. If the regulatory limit exceeds the statutory limit, the statutory limit becomes the limiting factor.

For the Baseline and all alternatives, the annual stewardship payment cannot exceed $5,000 for Tier I, $10,500 for Tier II or $13,500 for Tier III. New practice payments are limited to $10,000 over the life of the contract, regardless of Tier. The model assumes the annual enhancement payments cannot exceed 50 percent of the statutory limit, which is $10,000 for Tier I; $17,500 for Tier II; and $22,500 for Tier III.

Stewardship Payments

The magnitude of the total stewardship payment is dependent upon the type and extent of land enrolled in CSP for each participation option and the county payment rate (based upon rental rates) associated with the specific land type. The methodology used to calculate the county payment rate is discussed earlier in this document. It is important to note that stewardship payments vary by tier of enrollment (i.e., the Tier I specific percentage is 5 percent, Tier II is 10 percent and Tier III is 15 percent) as outlined in the statute and by a tier specific reduction factor. The stewardship payment is calculated using the following equation:

*Stewardship Payment per Acre = (County Payment Rate per Acre) * (Tier Specific Percentage) * (Tier Specific Reduction Factor)*

The acres used to calculate the stewardship payment are the total acres enrolled and are based on the 12 enrollment options listed under "Participation Options." For transition from Tier I to Tier II, the acres eligible for stewardship payments includes only those acres previously treated for the first three years of the contract and then increased to include the entire operation in years four and five of the contract (for the baseline and Alternative 1 scenarios). For Alternative 2 and 3, the increased acreage pertains to years four through ten of the contract. For producers enrolling in Tier I, Tier II, or Tier III, the acres used to calculate the stewardship payment remain constant over the contract.

Existing Practice Payments

It is assumed producers receive 25% of the stewardship payment. The existing practice payment is tier neutral and producers receive annual existing practice payments. The existing practice payment is calculated using the following equation:

Existing Practice Payment per Acre = (Stewardship Payment per Acre)(25%)*

One-time New Practice Payments

The third type of CSP payment is the one-time new practice payment which is a cost-share. It is assumed producers will only receive new practice payments if they transition from Tier I to Tier II or transition from Tiers I or II to Tier III. The new practice payment is calculated using the following equation:

One-time New Practice Payment per Acre = (Cost to Implement Bundle of Management Practices per Acre)(Appropriate Cost Share Rate)*

Producers enrolling in a Tier II contract must address a third resource concern by the end of the contract. A Tier II contract is assumed to be eight years, therefore the producer addresses an equal portion of the third resource concern in years two through eight of the contract. Since it is difficult to estimate the year in which the producer will address the third resource concern, this process allows a means to represent an equal likelihood that the producer will address the third resource concern between years two and five. The cost to the producer and to the government, along with the benefits, is equally distributed between years two and eight.

In practical terms, it takes time after a contract is signed, for the design and installation of new practices that may be needed in order to move up tiers, therefore the model uses the following assumptions. For transition from Tier I to Tier II in the Baseline and Alternative 1,assuming a five year contract, producers receive new practice payments for those practices needed to transition to Tier II in year two and three of the contract. It is assumed that producers must have the new practices installed by the end of year three in order to receive Tier II stewardship payments in the last two years of the contract. For transition from Tier I to Tier II in the Alternative 2 and Alternative 3, assuming an eight year contract, producers receive new practice payments for those practices needed to transition to Tier II in year two and three of the contract. It is assumed that producers must have the new practices installed by the end of year three in order to receive Tier II stewardship payments in the last five years of the contract.

Producers must also address a third resource concern, for Tier II and movement from Tier I to Tier II, before the end of the contract. It is assumed that producers receive cost-share for these practices in years two through five of the contract for the Baseline and Alternative 1 and in years two through eight of the contract for Alternative 2 and Alternative 3.

For transition from Tier II to Tier III, assuming a ten year contract, producers receive new practice payments for those practices needed to transition to Tier III in year two and three of the contract. Since practices have to be installed for twelve months prior to movement to Tier III, it is assumed that producers must have the new practices installed by the end of year three in order to receive Tier III stewardship payments in years four through eight of the contract. Producers must also address a third resource concern, as required by Tier II, before the end of the contract. It is assumed that producers address the third resource concern as part of addressing the remaining resource concerns on the operation for movement to Tier III.

Enhancement Payments

Due to the complexity and site specific nature of enhancements, it is difficult to estimate the cost of the enhancements to the producer and to the government. In the Preamble of the Amended Interim Final Rule, it states that "NRCS is seeking to encourage primary participants to further improve their environmental performance through CSP" by including a gradual reduction of payments for enhancement activities that are part of the initial contract in the 2005 signup. During the CSP signup in 2004, the number of enhancement activities producers could schedule

and/or receive payment for in year one were constrained by limited funding, even though they qualified for additional enhancement payments. By allowing for the gradual decrease in enhancement payments for the initial enhancements, producers may add additional new or existing enhancement activities to their contract maintaining the original level of payments. The economic model does not include enhancement payments for specific activities, therefore the impact of the gradual reduction of enhancement payments is not included in the model. It is assumed that producers strive to maximize profits; therefore the total payments for enhancement activities will not decline because producers will add new enhancement activities to stay at the original level of payment.

The following equation is used to estimate the effect of enhancement payments on the total contract for the Baseline and Alternative 2 based on the assumption that producers, when limited by the regulatory limit, will attempt to maximize their enhancement payments.

Enhancement Payment per Acre = Regulatory Limit – Stewardship Payment – Existing Practice Payment.

Calculating the enhancement payments using the above formula allows for the enhancement payments to differ by tier and by landuse. The magnitude of the enhancement is dependent upon the number of acres enrolled and the county payment rate. For example, for operations with large numbers of enrolled acres and high county payment rates, enhancement payments will be larger.

For Alternative 1 and 3, the following equation is used to estimate the enhancement payments, based on the assumption that enhancement payments will make up a specific percent of the contract, depending on the tier of participation and the size of the contract:

*Enhancement Payment per Acre = ((Stewardship Payment + Existing Practice Payment + New Practice Payment) * (2.333333333)).*

The maximum percentage of enhancement per contract is 70 percent for all Tiers. The assumption that 70 percent of the contract is comprised of enhancement payments is reflective of the average portion of enhancement payments in actual CSP contracts during the Fiscal Year 2004 CSP signup. For modeling purposes, it is also assumed that the regulatory limit is lifted and contracts are only subject to the statutory limit. Enhancement payments are also subject to an annual limit of $10,000 for Tier I, $17,500 for Tier II, and $22,500 for Tier III.

Total Government Cost (FA)

The total government cost or financial assistance (FA) represents the cost in financial assistance to the government for contracted participants in CSP. The following calculation is used to estimate the total government cost (FA):

Total Government Financial Assistance Cost (FA) per Acre = Stewardship Payment per Acre + Existing Practice Payment per Acre + One-time New Practice Payment per Acre + Enhancement Payment per Acre.

The total government cost (FA) is then used to estimate the technical assistance (TA), which is estimated at 15 percent of the total contract.

CSP Participation Costs

Existing Practice Costs to Producers

Participating producers are required to maintain their existing practices at the level required by NRCS standards for operation and maintenance. Existing practice costs to producers are calculated as follows: *25 percent of the calculated stewardship payment*.

Pre-enrollment Implementation Cost to Producers

Due to the nature of CSP, an operation must be at a specific level of conservation before they are eligible to enroll in CSP. In order to be able to analyze a full range of producer options, the model assumes that the producer will implement the necessary practices prior to enrollment. Therefore, these practices are assumed to have been installed in "Year 0" (Y). The pre-enrollment implementation cost to producers is calculated as follows:

Pre-enrollment Implementation Cost to Producers in Y0 per acre = Cost to Implement Bundle of All Practices per Acre.

The number of acres and the resource concerns addressed prior to enrollment depends on the tier of enrollment. For Tier I, those practices needed to address soil quality and water quality on one land type are implemented prior to enrollment and for Tier II, those practices needed to address soil and water quality on the entire operation are implemented prior to enrollment. Tier III is different from Tier I and Tier II in that all resource concerns must be addressed on the entire operation before enrollment. The pre-enrollment implementation cost to producer is included in the producer net return and the return on investment, since the magnitude of the pre-enrollment implementation costs to producer may influence a producer's participation decision. Therefore, the conservation assurance payment may be slightly overestimated.

The pre-enrollment implementation cost to producers is an influencing factor in the analysis because a producer has a number of different enrollment options and the number of acres needing to be addressed prior to enrollment change with each option. This in turn changes the net return realized by the producer and the return a producer expects on their investment.

New Practice Cost to Producers

The new practice cost to producers' calculation is similar to the calculation of the new practice payment. The calculation is as follows:

New Practice Cost to Producers per Acre = (Cost to Implement Bundle of Management Practices per Acre)+(Cost to Implement Bundle of Structural Practices per Acre).

As with new practice payments, for the Baseline and all Alternatives, producers only install new practices if they enroll in Tier II or they transition from Tier I to Tier II, or from Tier II to Tier III. New practice payments cover a percentage of the cost to implement the structural practices, while a producer is expected to implement management practices, if needed, and the required structural practices depending on the resource concern being addressed as part of the contract.

Enhancement Costs to Producers

As discussed above, enhancement payments and costs are difficult to estimate. In the Fiscal Year 2004 CSP Signup, enhancement payments were made for practices and activities that were previously implemented by the producer; therefore the producers did not incur additional costs related to enhancements. It is clear that for future signups it is NRCS's intent to provide enhancement payments for new and previously implemented enhancement practices and activities; therefore enhancement producer costs are assumed to be 25 percent of the enhancement payment. For the Baseline and Alternative 2, the calculation for enhancement producer costs is as follows:

*Enhancement Cost per Acre = (Regulatory Limit – Stewardship Payment – Existing Practice Payment) * 25%.*

For Alternative 1 and Alternative 3, the calculation for enhancement producer costs is as follows:

*Enhancement Cost to Producers per Acre = ((Stewardship Payment + Existing Practice Payment + New Practice Payment) * 2.333333333) * 25%.*

Total Producer Cost

The total cost to producers represents the cost to the producer to participate in CSP before receiving cost share for existing practices or new practices. It does not include the pre-enrollment implementation cost to producers, since this is a cost incurred before enrollment in the program. The following calculation is used to estimate the total producer cost:

Total Producer Cost per Acre = Existing Practice Cost to Producers per Acre + New Practice Cost to Producers per Acre + Enhancement Cost to Producers per Acre.

Technical Assistance (TA)

Due to the complexity of TA and the cap set by legislation, the model assumes that TA is capped at 15 percent of the total government cost (FA). The formula used to calculate TA is as follows:

*Technical Assistance Cost (TA) = Total Government Cost (FA) * 15-percent.*

The TA assumption is tier neutral, however it does account for differing contract sizes.

D. Decision Rules: Benefits recognized by the Producer

For purposes of this analysis, it is assumed that CSP's minimum level of treatment would be at the quality criteria level. This would be consistent with the assumption used to derive benefits in the *Environmental Quality Incentive Program Benefit Cost Analysis, Final Report, May 9, 2003.* However, in order to facilitate estimating participation rates within the model, the benefits derived in EQIP were further categorized into onsite and environmental (offsite) benefits. For purposes of this analysis, it is assumed that the producer would recognize a portion of the onsite benefits when considering his/her program options. The remaining portion of the on-site benefits are assumed to be either not a consideration to the producer, or overshadowed by risk and uncertainty the producer may associate with the adoption of new, unknown practices.

Even if soil conservation helps producers to retain nutrients, however, producers may be reluctant to reduce fertilizer application. Producers may be uncertain about the level of nutrients actually retained with soil particles. Moreover, the rate of soil erosion and associated nutrient loss will vary from year-to-year depending on weather conditions. Over a period of years, a significant portion of soil erosion can occur during a relatively few major rainfall events. It is assumed that producers consider 25 percent of the onsite benefit in calculating returns to CSP participation. Because producers addressing the soil concern will not necessarily be undertaking nutrient management as well, it can not be assumed that producers will actually achieve more fertilizer use reduction than they expect when signing up for CSP.

Producers may be uncertain about the yield effects of reducing fertilizer application, and may factor risk into fertilizer application decisions. Research shows that assumptions about the relationship between nutrient uptake and crop yields can significantly affect calculation of an optimal fertilizer application rate (Grimm *et. al.,* 1987; Larsen *et. al.*, 1996), possibly leading to over fertilization or lower than expected crop yields. Even if nutrient application could be reduced without reducing crop yields, producers may be unaware of the level of nutrient application at which yield would begin to decline. Year-to-year variation in growing conditions may also encourage over application of nutrients. Because crop nutrient needs are higher in years with good growing conditions, it may be profitable to use more fertilizer in anticipation of getting peak yields in particularly good years (Babcock, 1982; Dai *et. al.*, 1993). In short, producers may view over application of fertilizer as cheap insurance against yield loss in both average and peak years.

Limited adoption of nutrient management practices tends to support the view that producers significantly discount potential cost savings. Use of annual soil tests and post-planting nutrient applications (split application) are modest (Padgett *et al*.). To the extent that risk aversion explains producer behavior, they may be reluctant to adopt nutrient management practices, even though cost savings from adoption would be realized. To account for these issues, it is assumed that producers' *a priori expected* benefit to application of nutrient management is 25 percent of the benefit defined above. Once nutrient management practices are adopted and outcomes are observed, however, producers will achieve full benefits of fertilizer savings. Thus, 100 percent of onsite benefits were used in program benefits calculations.

Producers may assume that they may receive a greater or lesser amount of on-site benefits than was assumed in this model. If a producer realizes greater on-site benefits, then the model underestimates participation. Conversely if the producer realizes less on-site benefits, the model overestimates participation.

E. Decision Rules: Producer CSP Application

A set of decision rules was developed to determine which producers, from among those located in eligible watersheds, would be likely to apply for CSP participation. For each representative farm, a series of decisions rules were used. The first set of rules ensures that CSP participation is financially feasible. These include a minimum rate of return on conservation investments required by the CSP, a minimum CSP-enrolled acreage rule, and a limit on expenditures designed to make the farm ready for CSP participation. The second is designed to capture farm and farmer characteristics not otherwise captured by estimated costs and benefits of participation. The third set of rules demonstrates the producer's choice of enrollment options (i.e. whether or not to enroll in Tier I, Tier II, Tier III, transition from Tier I to Tier II or transition from Tier II to Tier III).

Decision Rule One: Financial Feasibility. In terms of financial feasibility, producers are assumed to be interested in CSP participation only if the proposed contract:

- returns at least 7 percent on conservation investment (total conservation costs in the context of the program);
- enrolls at least 5 acres (transaction cost) ;
- the cost of making the farm ready for CSP participation (the cost addressing soil and water quality for Tier I and Tier II and the cost of addressing all resource concerns for Tier III where they are not already addressed), per enrolled acre, is less than ten percent of the annual rental rate of the land (weighted average of all land uses enrolled).

Decision Rule Two: Socioeconomic Factors. The second decision rule combines data on economic and socio-economic factors that are difficult to build directly into estimates of return to program participation.

A model developed by the NRCS Social Sciences Institute was used to account for farm and farmer characteristics not otherwise captured by estimated costs and benefits. Although the full model accounts for dozens of farm, farmer, and community characteristics that would affect participation in conservation programs, a small number of the most important variables, for which data is available in ARMS, were chosen for use. A total of 5 factors are included: education, financial solvency, proportion of land owned, off-farm work, and size of farm in acres.

Willingness to participate is estimated as a proportion of farms willing to participate in CSP within each of the 119 farm groups previously defined. For each ARMS farm within each group, each factor is scored on a scale of 0 to 2. Table A6 provides details on factor-by-factor scoring. These scores are then summed over all factors within each farm and overall all ARMS farms within each group. The proportion willing to participate is estimated as the ratio of the group score to the maximum possible score. The maximum possible score depends on the number of

factors used and the number of farms. For example, using 5 factors in a group of 50 farms yields a maximum score of 500 (2 points/factor * 5 factors/farm * 50 farms).

Data on past program participation was also used. While CSP is designed to reach out to producers beyond those served by existing programs, participation in existing programs is an indicator of willingness to participate in government programs. Data on 2002 program participation is available from the ARMS database. For each of the 119 ARMS-based farm groups, the proportion of farms participating in commodity and conservation programs is calculated. This rate is used as a floor on the participation rate devised from the socio-economic model described above.

Table A6. Socio-Economic Factors Used to Estimate Willingness to Participate in CSP

Points:	0	1	2
Factor:			
Education	Did not finish high school	high school graduate	at least some college
Solvency	net income < 0 AND debt to asset ratio > 3	(net income > 0 and debt to asset ratio > 3) OR (net income <= 0 and debt to asset ratio > 3)	net income > 0 AND debt to asset ratio <= 3
Ownership	rented acres > 50% of total acres	Rented acres 20-50 percent of total acres	rented acres <= 20% of total acres
Off-farm Work	200 or more days worked off farm	50-199 days worked off farm	less than 50 days worked off farm
Size of Farm (acreage)	less than 40 percent of county average	40-60 percent of county average	more than 60 percent of county average

Decision Rule Three: Enrollment Option Selection

In terms of enrollment option selection, producers are assumed to enroll in a CSP contract if the enrollment option:

- has a positive Producer Net Return (PNR)
    - Producer Net Return (PNR) =Total Government Payments – Total Cost to the Producers - Pre-enrollment Implementation Cost to Producers + Total Onsite Benefits Realized by Producers
- has the greatest Producer Net Return as compared to the producer's other enrollment options.

Appendix 2. Model Farm Types and Acreages

NRCS Region	Farm Type	Number of ARMS farms	Non-irrigated Cropland	Irrigated Cropland	Grazing Land
Northeast	Non-irrigated Cropland, < 1000 acres	178	89	0	0
	Non-irrigated Cropland, >= 1000 acres	30	2,478	0	0
	Irrigated Cropland, all acres	40	0	16	0
	Grazing land, all acres	43	0	0	16
	Non-irrigated and Irrigated Cropland, <= 199 acres	50	29	18	0
	Non-irrigated and Irrigated Cropland, > 199 acres	44	615	434	0
	Non-irrigated Cropland and Grazing Land, <= 99 acres	129	30	0	17
	Non-irrigated Cropland and Grazing Land, 99-198 acres	84	84	0	54
	Non-irrigated Cropland and Grazing Land, 198-998 acres	204	223	0	100
	Non-irrigated Cropland and Grazing Land, > 998 acres	47	989	0	470
	Non-irrigated and Irrigated Cropland and Grazing Land, all acres	32	56	14	35
	Non-irrigated Cropland, <= 70 acres	188	26	0	0
Southeast	Non-irrigated Cropland, 70-196 acres	68	111	0	0
	Non-irrigated Cropland, 196-960 acres	117	403	0	0
	Non-irrigated Cropland, > 960 acres	133	1,884	0	0
	Irrigated Cropland, <= 99 acres	122	0	15	0
	Irrigated Cropland, 99-436 acres	31	0	211	0
	Irrigated Cropland, > 436 acres	33	0	1,007	0
	Grazing land, <= 49 acres	194	0	0	19
	Grazing land, 49-144 acres	78	0	0	78
	Grazing land, > 144 acres	36	0	0	353
	Non-irrigated and Irrigated Cropland, <= 137 acres	47	22	19	0
	Non-irrigated and Irrigated Cropland, 137-993 acres	61	243	93	0
	Non-irrigated and Irrigated Cropland, > 993 acres	105	1,379	804	0
	Non-irrigated Cropland and Grazing Land, <= 49 acres	134	11	0	18
	Non-irrigated Cropland and Grazing Land, 49-99 acres	191	27	0	44
	Non-irrigated Cropland and Grazing Land, 99-299 acres	346	63	0	102
	Non-irrigated Cropland and Grazing Land, 299-995 acres	266	203	0	290
	Non-irrigated Cropland and Grazing Land, > 995 acres	116	790	0	658
	Irrigated Cropland and Grazing Land, all acres	44	0	36	74
	Non-irrigated and Irrigated Cropland and Grazing Land, <= 197 acres	39	36	9	30
	Non-irrigated and Irrigated Cropland and Grazing Land, 197-991 acres	71	184	43	208
	Non-irrigated and Irrigated Cropland and Grazing Land, > 991 acres	57	972	479	617
Midwest	Non-irrigated Cropland, <= 200 acres	473	65	0	0
	Non-irrigated Cropland, 200-998 acres	661	454	0	0
	Non-irrigated Cropland, 988-3000 acres	406	1,507	0	0
	Non-irrigated Cropland, > 3000 acres	65	3,996	0	0
	Irrigated Cropland, all acres	44	0	84	0
	Grazing land, <= 74 acres	87	0	0	16
	Grazing land, > 74 acres	31	0	0	148
	Non-irrigated and Irrigated Cropland, <= 180 acres	34	29	28	0
	Non-irrigated and Irrigated Cropland, 180-999 acres	51	252	282	0
	Non-irrigated and Irrigated Cropland, 999-3000 acres	70	1,081	480	0

	Non-irrigated and Irrigated Cropland, > 3000 acres	34	2,670	1,504	0
	Non-irrigated Cropland and Grazing Land, <= 150 acres	339	36	0	26
	Non-irrigated Cropland and Grazing Land, 150-750 acres	609	225	0	95
	Non-irrigated Cropland and Grazing Land, 750-1989 acres	309	880	0	242
	Non-irrigated Cropland and Grazing Land, > 1989 acres	92	2,084	0	554
	Non-irrigated and Irrigated Cropland and Grazing Land, <= 1301 acres	32	184	59	89
	Non-irrigated and Irrigated Cropland and Grazing Land, > 1301 acres	35	1,958	511	203
Northern Plains	Non-irrigated Cropland, <= 197 acres	95	81	0	0
	Non-irrigated Cropland, 197-999 acres	125	477	0	0
	Non-irrigated Cropland, 999-1980 acres	58	1,469	0	0
	Non-irrigated Cropland, > 1980 acres	108	3,476	0	0
	Irrigated Cropland	53	0	217	0
	Grazing land, <= 96 acres	57	0	0	34
	Grazing land, 96-1990 acres	42	0	0	364
	Grazing land, > 1990 acres	36	0	0	10,257
	Non-irrigated and Irrigated Cropland, <= 500 acres	47	93	101	0
	Non-irrigated and Irrigated Cropland, 500-1990 acres	82	381	565	0
	Non-irrigated and Irrigated Cropland, > 1990 acres	42	2,077	1,052	0
	Non-irrigated Cropland and Grazing Land, <= 198 acres	70	58	0	53
	Non-irrigated Cropland and Grazing Land, 198-999 acres	211	313	0	212
	Non-irrigated Cropland and Grazing Land, 999-3980 acres	318	996	0	991
	Non-irrigated Cropland and Grazing Land, 3980-9990 acres	128	1,955	0	4,069
	Non-irrigated Cropland and Grazing Land, > 9990 acres	37	2,289	0	13,429
	Irrigated Cropland and Grazing Land, <= 650 acres	33	0	79	86
	Irrigated Cropland and Grazing Land, 650-3310 acres	30	0	296	1,575
	Irrigated Cropland and Grazing Land, > 3310 acres	31	0	544	8,920
	Non-irrigated and Irrigated Cropland and Grazing Land, <= 987 acres	78	145	187	178
	Non-irrigated and Irrigated Cropland and Grazing Land, 987-3975 acres	139	606	443	886
	Non-irrigated and Irrigated Cropland and Grazing Land, 3975-9936 acres	73	1,540	650	3,899
	Non-irrigated and Irrigated Cropland and Grazing Land, > 9936 acres	41	1,862	614	19,250
South Central	Non-irrigated Cropland, <= 199 acres	94	57	0	0
	Non-irrigated Cropland, 199-998 acres	61	465	0	0
	Non-irrigated Cropland, 998-1946 acres	35	1,421	0	0
	Non-irrigated Cropland, > 1946 acres	43	3,190	0	0
	Irrigated Cropland, <= 956 acres	41	0	171	0
	Irrigated Cropland, > 956 acres	39	0	1,661	0
	Grazing land, <= 100 acres	150	0	0	44
	Grazing land, 100-399 acres	70	0	0	187
	Grazing land, 399-1697 acres	36	0	0	893
	Grazing land, > 1697 acres	40	0	0	12,757
	Non-irrigated and Irrigated Cropland, <= 998 acres	62	257	302	0
	Non-irrigated and Irrigated Cropland, 998-1997 acres	57	604	780	0
	Non-irrigated and Irrigated Cropland, 997-3998 acres	64	1,429	1,364	0
	Non-irrigated and Irrigated Cropland, > 3998 acres	34	2,176	3,226	0

	Non-irrigated Cropland and Grazing Land, <= 998 acres	525	63	0	145
	Non-irrigated Cropland and Grazing Land, 998-2980 acres	129	516	0	1,028
	Non-irrigated Cropland and Grazing Land, > 2980 acres	74	919	0	5,405
	Non-irrigated and Irrigated Cropland and Grazing Land, <= 995 acres	31	120	232	198
	Non-irrigated and Irrigated Cropland and Grazing Land, 995-3749 acres	62	725	549	585
	Non-irrigated and Irrigated Cropland and Grazing Land, > 3749 acres	31	1,491	1,213	7,668
West	Non-irrigated Cropland, <= 119 acres	59	24	0	0
	Non-irrigated Cropland, 119-1844 acres	51	557	0	0
	Non-irrigated Cropland, > 1844 acres	45	3,464	0	0
	Irrigated Cropland, <= 99 acres	284	0	22	0
	Irrigated Cropland, 99-490 acres	191	0	235	0
	Irrigated Cropland, 490-1945 acres	99	0	871	0
	Irrigated Cropland, > 1945 acres	33	0	3,678	0
	Grazing land, <= 97 acres	131	0	0	21
	Grazing land, 97-960 acres	51	0	0	250
	Grazing land, 960-4850 acres	31	0	0	2,260
	Grazing land, > 4850 acres	36	0	0	23,976
	Non-irrigated and Irrigated Cropland, <= 96 acres	46	11	19	0
	Non-irrigated and Irrigated Cropland, 96-786 acres	70	114	276	0
	Non-irrigated and Irrigated Cropland, 786-1950 acres	33	549	835	0
	Non-irrigated and Irrigated Cropland, > 1950 acres	31	2,991	3,052	0
	Non-irrigated Cropland and Grazing Land, <= 98 acres	39	15	0	15
	Non-irrigated Cropland and Grazing Land, 98-710 acres	35	123	0	219
	Non-irrigated Cropland and Grazing Land, 710-2966 acres	31	717	0	891
	Non-irrigated Cropland and Grazing Land, > 2966 acres	31	1,632	0	4,182
	Irrigated Cropland and Grazing Land, <= 96 acres	52	0	13	15
	Irrigated Cropland and Grazing Land, 96-954 acres	98	0	186	194
	Irrigated Cropland and Grazing Land, 954-3987 acres	49	0	665	1,525
	Irrigated Cropland and Grazing Land, > 3987 acres	30	0	830	25,484
	Non-irrigated and Irrigated Cropland and Grazing Land, <= 445 acres	56	42	45	50
	Non-irrigated and Irrigated Cropland and Grazing Land, 445-1767 acres	31	101	207	742
	Non-irrigated and Irrigated Cropland and Grazing Land, > 1767 acres	36	736	588	5,940

Appendix 3. County Level Payment Rate Database Development

The following steps were used to create a County Level Rental Rates database for the Conservation Security Program (CSP):

1. Review available data and create a baseline database,
2. Use available data to impute values to counties with missing rental rates and make adjustments for outliers. and
3. Use GRID Smoothing techniques in ArcGIS to ensure that rental rates do not vary greatly between adjacent counties.
4. Release County Level Payment Rates to NRCS State Offices for review and comment.

The database includes rates for Irrigated and Non-Irrigated Cropland, Pastureland, and Rangeland.

Step 1. Review Available Data.

Three main data sources were used for the development of the county payment rates:
2001 Land Value Survey – Farm Service Agency (FSA). The LVS is related to the Agricultural Foreign Investment Disclosure Act of 1979 (AFIDA) which requires "foreign persons who hold, acquire, or dispose of any interest in U.S. agricultural land to report the transactions to the FSA" The information is available to States and is used to prepare an annual report to Congress and the President concerning the effect of foreign investment upon family farms and rural communities.

1. Agricultural Cash Rents 2001 Summary –National Agricultural Statistics Service (NASS)
2. General Cropland Reserve Program (CRP) – Farm Service Agency (FSA)

Step 2. Rate Imputation and Data Adjustments.

After creating the baseline database, rental rates were imputed for counties with missing data and additional data adjustments were made as needed. After the imputations were made, descriptive statistics were run on the baseline database to calculate an average, variance, and standard deviation.

Step 3. Smoothing Rental Rates.

The ArcGIS GRID procedure was used to "smooth" rental rates across geographically adjacent counties. An area was created by imposing a grid panel of 100,000 x 100,000 meters over the geographic surface of the US. An average rental rate was calculated from rental rates for counties that fall within the grid. This average rental rate is then assigned to all the counties within the grid -- thereby using the grid average and removing huge variations between rental rates within the grid.

Step 4. Review Period.

The county level payment rates were released to State Conservationists through a secure web site for review and comment.

Appendix 4. Benefits of Conservation

Benefits of Soil Conservation. Soil erosion can be caused by water or wind. Some soils are susceptible to both types of erosion. It is important to differentiate because benefits flowing from control of water erosion are generally different from those due to control of wind erosion.

Control of USLE erosion can result in preservation of agricultural production and/or improved water quality. Benefits generally grouped under the rubric "water quality" actually represent a wide range of distinct benefits. A sampling of these benefits includes enhancement of water-based recreation, preservation of reservoir storage capacity due reduced silt buildup, lower dredging costs for navigation, and reduced water treatment costs for both drinking and industrial use. For the CSP cost-benefit analysis, numerical estimates are limited to on-site productivity gains and environmental (off-site) benefits flowing from water-based recreation and reduced dredging costs for navigation.

Increased benefits to water-based recreation from reduced soil erosion are based on estimates by Feather and Hellerstein (1997). Travel cost and benefit function transfer techniques were used. Data on trips for water-based recreation was obtained from the National Survey of Recreation and the Environment (NSRE). On component of the NSRE is a survey of water-based recreational activities in four study areas, located in Pennsylvania, Indiana, Nebraska, and Washington. A travel cost model that also accounts for environmental variables (including local levels of soil erosion) and demographics was estimated.

Next, the benefit function was transferred to other areas of the country. Rather than simply transferring point estimates from one area to another, the benefit function that accounted for variation in travel cost, environmental characteristics and demographics was used to estimate benefits in other areas, given the environmental and other characteristics of those areas. The basic "area" is smaller than a county and is formed by the intersection of counties, 8-digit HUCs, and major land resource areas. In more technical terms, these polygons are the smallest area that can be identified in the National Resource Inventory (NRI) data which is the source of most of the environmental data used in the study.

Because the original study produced benefit estimates based on the large erosion reductions that can be achieved through land retirement, the models outlined above were used to estimate the effect of erosion reductions that could expect from a working land program (like CSP). For this study, a 10 percent reduction in erosion was used to estimate the marginal (per ton) benefit of reducing soil erosion. Across the 2111 HUCs, a one-ton of erosion can increase societal benefits of water-based recreation from zero to $8.81.

Hansen and others (2002) estimate the cost of soil erosion within a HUC based on the cost of sediment to downstream navigation. They develop a hydrologic model that accounts for the hydrology and the subsequent flow of sediment within and across watersheds. Their hydrologic model links erosion within a watershed to the downstream cost of dredging harbors and shipping channels. The hydrologic data are from the Environmental Protection Agency's River Reach File, which interconnects 3.2 million miles of streams. Estimates of agricultural erosion by HUCs are based on data from the NRI. Dredging-cost data are from the U.S. Army Corps of

Engineers (1999a; 1999b). Results show that, across HUCs, a one-ton reduction in soil erosion can reduce dredging costs from zero to $5.00.

Control of wind erosion can help preserve soil productivity and improve air quality. Numerical estimates of both are available for both soil productivity and air quality.

Ribaudo and others (1990) developed FPR measures of the cost of particulate pollution caused by wind erosion. Wind-born dust costs include cleaning and maintenance of businesses and households, damage to non-farm machinery, and adverse effects on human health. Cost per household is modeled as a function of the wind-erosion rate, income, and other household characteristics. The cost model is estimated using contingent valuation techniques and data from a survey of households in New Mexico (Huszar and Piper, 1986). The cost model is applied to households west of the Mississippi River using Census data and wind erosion estimates. Results are aggregated across households within FPRs. Benefits (damage) estimates are provided per ton of soil (conserved) eroded. Per ton estimated are converted to a per-acre basis using procedures analogous to those outlined above.

Reductions in soil erosion will increase the future productivity of farmland and reduce the loss of soil nutrients that can be washed away with the soil. For this study, average losses in soil productivity and nutrients per ton of soil erosion are derived from Ribaudo et al. (1990). In the Ribuado study, yield losses and production-cost increases due to erosion are estimated using the Erosion Productivity Impact Model (Williams et al., 1985). The economic value of the gain in productivity is estimated as the net present value of the increase in productivity (including the value of nutrients) resulting from a marginal reduction in soil erosion. Benefits are attributed to cropland but not grazing land. Soil conservation benefits on grazing land are typically lower than on cropland and have not been previously estimated.

Soil Erosion reduction benefit estimates are adjusted in two ways. First, benefit estimates are adjusted to 2004 dollars using the GDP deflator. Second, benefit (damage) estimates are in dollars per ton of soil conserved (eroded) but are needed on a per acre basis to match data on costs. To convert per-ton benefit estimates to per acre estimates, likely erosion reductions (water, wind, or both as appropriate to the HUC) were estimated from the National Resources Inventory (NRI) data. Within each 8-digit HUC, expected erosion reduction per acre due to practice application is estimated as the acre-weighted average erosion reduction on NRI points where: (1) erosion was above the soil loss tolerance (T) level in 1992; (2) was reduced by 25 percent or more between 1992 and 1997; and (3) the erosion rate was below 1.25*T in 1997[15]. These NRI points represent past experience with reducing erosion to the quality criteria level, accounting for climactic, soil, topographical factors that are likely to affect the amount of erosion reduction (and, therefore, benefit) that can achieved through the application of conservation practices. The same procedure is used to estimate erosion reductions for both cropland and grazing land, although productivity benefits are not attributed to grazing land.

Water Quantity. Conservation of irrigation water can (1) reduce producer costs of water purchase, (2) reduce the cost of delivering water from its source to agricultural areas and (3) increase the availability of water to maintain stream flow to address aquatic habitat and other

[15] The factor of 1.25 accounts for the tolerance allowed producers.

environmental concerns. Of these benefits, only the cost reduction to producers is quantified and thus, this estimate may understate potential benefits.

We assume that improved water management will reduce water use, on average, by about 13 percent. Gollehon et al. shows total irrigation water withdrawals of 149.8 million acre-ft on 55.3 million acres, an average of 2.71 acre-ft per acre per year. NRCS PRMS data show an average reduction of 5.41 acre inches (.451 acre-ft) on irrigated land treated with irrigation management practices (EQIP). On average then, irrigation water withdrawals are reduced by about 16 percent (.451/2.71≈0.16). Assuming 20 percent loss in storage and transmission yields a 13 percent annual water savings due to practice application. Potential savings are calculated using data on water irrigation water use, water sources, and irrigation water costs found in Gollehon, et al. and irrigated crop acreage from the Agriculture Census:

$$watersavings(\$/acre) = 0.13 * \frac{withdrawals(acreft)}{irr.\ acres} * \left(cost\ of\ \ water(\$/acreft)\right)$$

Water costs depend on the source. For groundwater, withdrawal cost is pumping cost. For surface water, withdrawal cost is the cost of delivery. Where surface water runs through the farm, withdrawal costs can be quite low. Where water must be delivered to the farm through water projects, costs are much higher. In the West, we assume that water must be delivered to the farm, while surface water in other areas of the country is assumed to flow through the farm.

CSP Nutrient Management Planning Benefit Determination by County. Annual per-acre benefits for nutrient management planning (NMP) were estimated at the 8-digit watershed level. These NMP benefits were based on the $6.70 per-acre national EQIP Benefit Cost Analysis estimate for non-animal waste nutrient management planning and vary across watersheds according to crop productivity variation. The crop productivity variation across watersheds was based on 2002 county level crop yields for corn, sorghum, soybeans, and potatoes. The county level results were then converted to the spatial 8-digit hydrologic unit accounting code watershed level using GIS techniques.

Total production level and harvested acres for the five crops were taken from the 2002 NASS county level crop survey. The NASS county level production estimates were first converted to dry matter equivalents using 13 percent moisture for all crops except potatoes, for which a value of 80 percent moisture was used, and then secondly, multiplying by the ratio of yield reporting units, in lbs, of the crop to corn, e.g., 1.07 for wheat, representing the ratio of 60 lbs to 56 lbs. For each county the total corn equivalent dry matter of the five crops was divided by the total harvested acreage of the same crops to produce county level per-acre corn equivalent dry matter estimates.

The $6.70 annual per acre benefit from EQIP was assumed to apply primarily to Midwestern crop production; consequently the average per-acre corn equivalent dry matter for the region constituting IA, IL, and IN was calculated and used as the denominator in an index where for each county the numerator was the county's county corn dry matter equivalent. The county NMP indexed benefit values were calculated specifically according to equations 1) and 2) below.

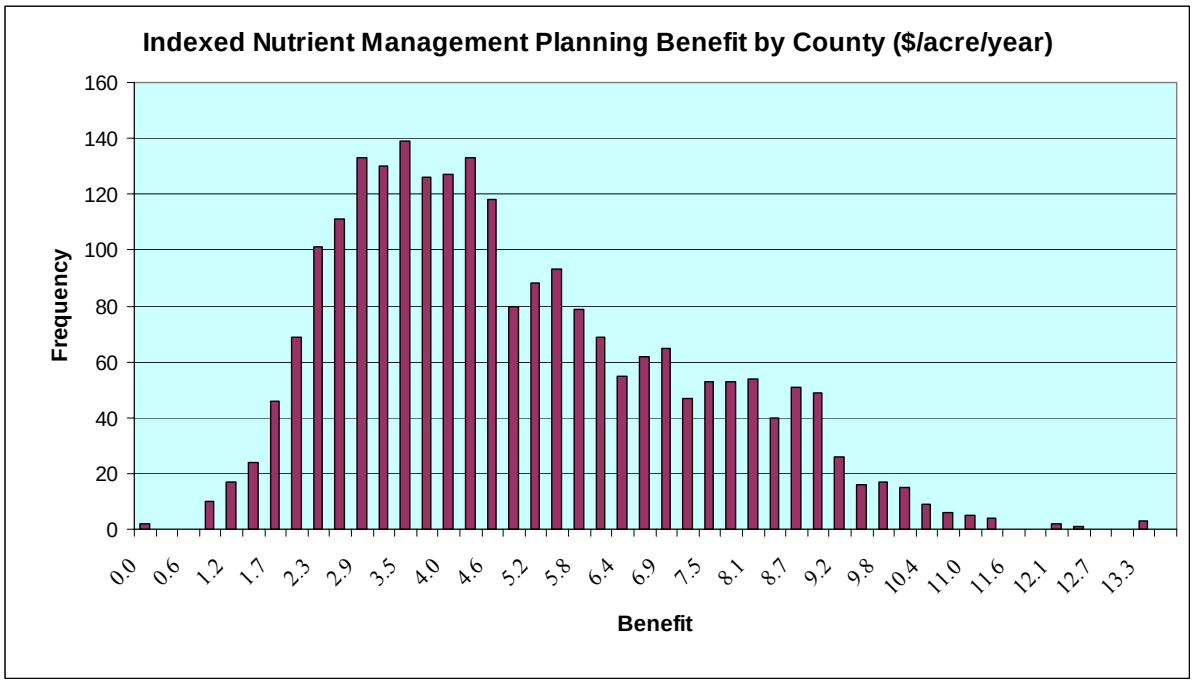
Figure 1 shows a frequency histogram with the counties grouped according to the estimated per-acre NMP benefit.

1) $DryMatter_i = \sum_j (Production_{ij}/HarvestedAcres_{ij})*Moisture_j*CornEquiv_j$

2) $NMP_i^{Benefit} = (DryMatter_i/AveDryMatter)*\$6.70$

where i is the index for counties
j is the index for crops
$Moisture_j$ is the percent dry matter for crop j
$CornEquiv_j$ is the ratio of lbs per unit for $crop_j$ to lbs per bu for corn
AveDryMatter is the average $DryMatter_i$ across IA, IL, and IN.

Figure A1. Indexed Nutrient Management Planning Benefit by County.



Grazing productivity. The CSP Benefit Cost Assessment (BCA) model is based on per-acre cost and benefit values at the 8-digit watershed level scale. Grazing land conservation improvement benefits for the CSP BCA were developed by varying the national EQIP per-acre benefit value ($15.01) across the watersheds, based on relative soil productivity. However, for purposes of analysis, grazing land was divided into two major classes, consistent with available databases and past of programs providing grazing land improvements analyses, pasture and rangeland. For these two types of grazing land, separate benefits were determined by watershed based on productivity using data from the NRI (Goebel, 1998; and Nusser and Goebel, 1997) as explained below.

The NRI reports up to approximately 200 attributes for each survey point, including land use in both the survey year and prior years, estimates of water and wind erosion and the factors for the

erosion equations, treatment needs, ownership, and use of conservation practices, depending on year of the survey. In addition, each NRI point is linked to a digitized soil survey database that includes soil taxonomy, soil condition, soil layer attributes, potential crop yields (including yields of forage species commonly used for pasture), and a range site productivity index expressed in terms of potential vegetative dry matter production. The most recent full survey, prior to migration of the survey process to an annual rotation partial sample process, was for the 1997 crop year, which was the data used here.

Within each 8-digit watershed, NRI points classified as either pasture or range were linked to the soil survey database and potential forage yields for pasture and the "normal" range site productivity index (lbs of dry matter) were extracted, along with the acreage weight for each NRI point. While the range site productivity index is a single number for each NRI point, for pasture, yields are given for each of a mix of species that could be grown at the site. Within each watershed, for pasture the acreage weighted average yield across NRI survey points and the potential forage species of the points in the watershed was calculated; an equal probability of occurrence was assumed for each species since there was no data on species mix. For range, the acreage weighted average range site productivity index was calculated by watershed.

Once the average pasture yields and range site productivity values were calculated by watershed, equations 1) and 2) were used to estimate the watershed level specific grazing improvement benefit values, under the assumption that the EQIP grazing improvement benefit value of $15.01 would be the maximum pasture benefit, and that the maximum range benefit should be somewhere between one-third and one-half of the EQIP value.

1) $PastureB_i = ((PastureY_i/(Ave\_PastureY + 2.0*STD\_PastureY))^{(1/2)} * \$15.01$
2) $RangeB_i = ((RangeY_i/(Ave\_RangeY + 2.0*STD\_RangeY))^{(1/3)} * \$5.00$

Where:
$PastureB_i$ and $RangeB_i$ are the annual per-acre benefits for watershed
Ave_PastureY and Ave_RangeY are the average yield values across watersheds
STD_PastureY and STD_RangeY are the standard deviation of yields across watersheds.

The (1/2) and (1/3) exponents are factors derived specifically for this assessment for the affect of shifting the lower portion of distribution of benefit values away from zero and closer to the maximum of $15.01.

For about 35 watersheds where the pasture benefit estimate was in the range of $15.02 to $22.00, the benefit was manually set at $15.01. Figure A2a shows a frequency histogram with the watersheds grouped according to the estimated per-acre pasture benefits and Figure A2b shows a frequency histogram with the watersheds grouped according to the estimated per-acre range benefits.

Figure A2a. Pasture Benefits by Hydrologic Unit.

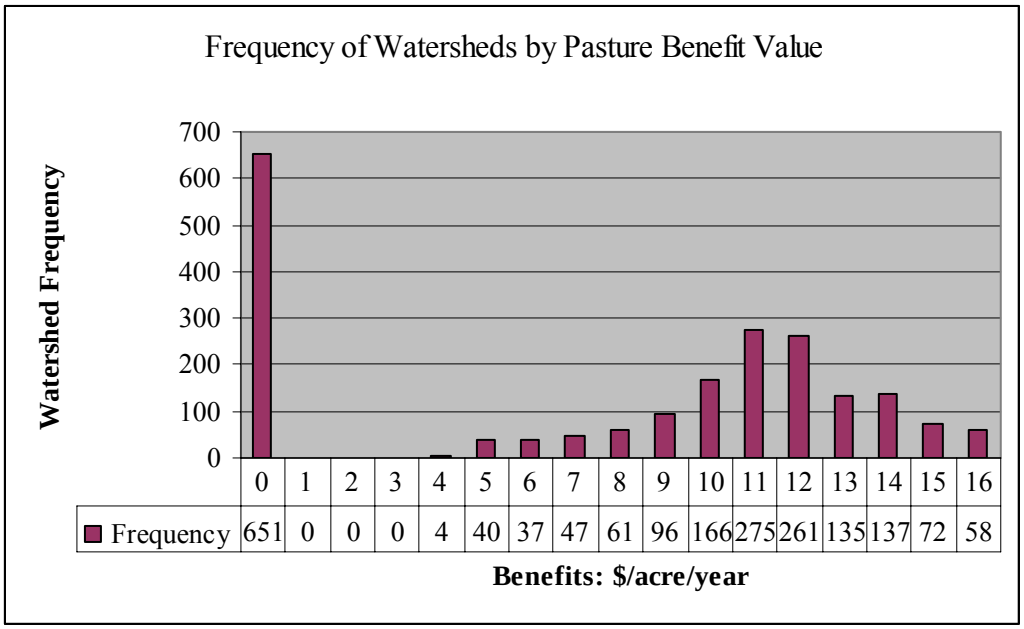
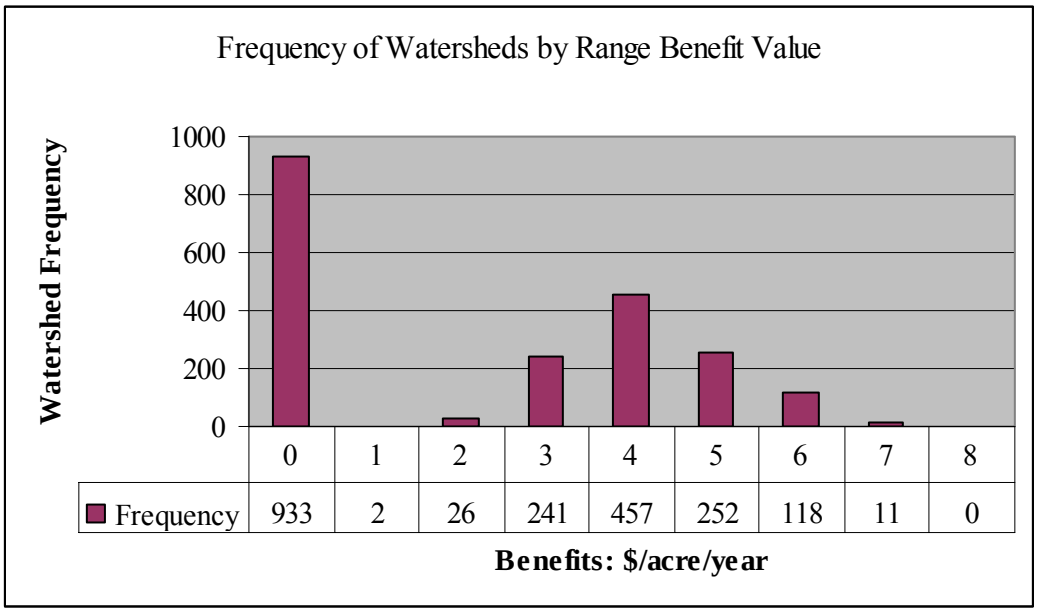


Figure A2b. Range Benefits by Hydrologic Unit.



For each watershed, a single grazing improvement benefit value was then constructed as the weighted average of pasture and range, with the weights being the NRI acreage of pasture and range.

Wildlife habitat. A review of available literature indicates that a great deal has been written about the values of wildlife conservation (Heard, et al and Gibilisco, Chuck and Gregory Filipek, Washington Dept. of Fish and Wildlife). The National Survey of Fishing, Hunting, and Wildlife

Associated Recreation conducted by the U.S. Dept. of the Interior, Fish and Wildlife Service contains extensive data on expenditures relating to the availability of wildlife-based activities.

For the purpose of this analysis, benefits are calculated based on results from an ERS study described in Feather, et al. (1999). Benefits are based on use values, or the value derived from directly using the resource. Specifically, benefits are calculated for wildlife viewing and pheasant hunting. Although improvements in wildlife habitat benefit a number of avian species, the demand for pheasant hunting was easier to quantify based on existing recreational data. The ERS model evaluates the quantity and quality of the cover available for specific avian species, then estimates the surplus resulting from converting land to CRP. Since establishing grassland or forest cover creates suitable habitat for birds, small game, and large game, hunters and wildlife viewers then benefit from these increased populations (Feather, p.10). The model also incorporates travel costs, landscape diversity, and population density.

However, there are limitations associated with calculating benefits for CSP based on the CRP. CRP land retirement program which focuses largely on economically marginal land while CSP land remains in production and is could be highly productive. However, note that most of the practices that generate wildlife benefits produce wildlife cover similar to that CRP land. Grassed waterways, windbreaks, and similar practices generate wildlife benefits in much the same way CRP would. Nonetheless, we address the differences between CSP and CRP by reducing the wildlife benefits estimated to be generated through CRP by 50 percent before applying them to CSP. Note that because of unresolved methodological issues, the estimates of the benefits of enhanced wildlife habitat used in this study may be adjusted in the final version of this analysis.

A number of practices benefit wildlife populations by reducing soil erosion and improving aquatic habitat, however these benefits are already quantified in the water quality section of the analysis. Impacts of many other practices that may be managed for wildlife are not included. These include pasture and hay land planting, fencing, ponds. Other recreational activities are not covered such as nature walking, or big game hunting. In addition, nonuse values are not quantified, nor were values given to the existence of an environmental resource even though it is not currently used, such as existence value, bequest value, or option value (Smith, 1996).

The net economic benefit an individual receives from consuming a market good is defined as the excess, over and above the market price, that an individual would pay to consume the good. This net benefit is referred to as "consumer surplus" (Deaton and Muelbauer, 1980). For purposes of this analysis, benefits accruing to wildlife purposes are calculated for three specifically defined uses. Although the resulting benefits are high, they are based on actual expenditure or use data for the identified recreational purposes, and the surplus resulting from EQIP. There are significant benefits for other uses that are not quantified, such as small and large game hunting, for example. Benefits that are more difficult to quantify are also not included. The benefits are non-monetary and include values given to existence of resources not currently used.

Table 5 gives a summary of the benefits used in this analysis.

Appendix 5. Contract Enhancement Through Management Intensity

Due to eligibility requirements of CSP, producers must have addressed soil and water quality resource concerns to a quality criteria level on part or all of their land prior to program application. One of the payment levels of CSP deals with enhancing the quality criteria of resource concerns above and beyond the quality criteria level (i.e. management intensity). However, the NRCS field office technical guide (FOTG) does not currently address the application of conservation practices to such a level. Therefore, NRCS specialists have proposed to initiate new and innovative techniques and tools to identify and evaluate enhancement costs and benefits (on and off-site). The following takes a look at how some of these could be evaluated.

A. Irrigation Water Management (Water Quantity). For irrigated land (crop or grazing), issues dealing with the efficient use of water is addressed by applying irrigation water management (IWM). IWM involves the managed allocation of water and related inputs in irrigated crop and forage production, such that economic returns are enhanced relative to available water. Conservation and allocation of limited water supplies are central to irrigation management decisions.

Farm Irrigation Rating Index. In order to estimate the effects of management intensities dealing with irrigation water management, the NRCS National Water Management Center proposes to utilize the Farm Irrigation Rating Index (FIRI) as the primary evaluation tool. FIRI is an on-farm irrigation efficiency estimating program which specializes in estimating seasonal farm irrigation efficiency on a field by field basis. FIRI provides a uniform and objective evaluation method for planning irrigation water conservation. It provides good documentation of the effects of improvements in irrigation management and system changes. FIRI analyzes seasonal irrigation efficiencies to take into account scheduling, water measurement, irrigation water delivery methods, and other factors that will impact irrigation water use efficiency over an entire irrigation season.

By using FIRI an effort will commence to:

- Develop a method for identifying, displaying, and evaluating management intensity activities dealing with irrigation;
- Interpret management intensity activities into costs and benefits:
  - Cost of implementing (annual and long-term)
  - Benefits (on and off-site)
- Quantify economic impacts of management intensities; and
- Evaluate typical operations to identify regional issues.

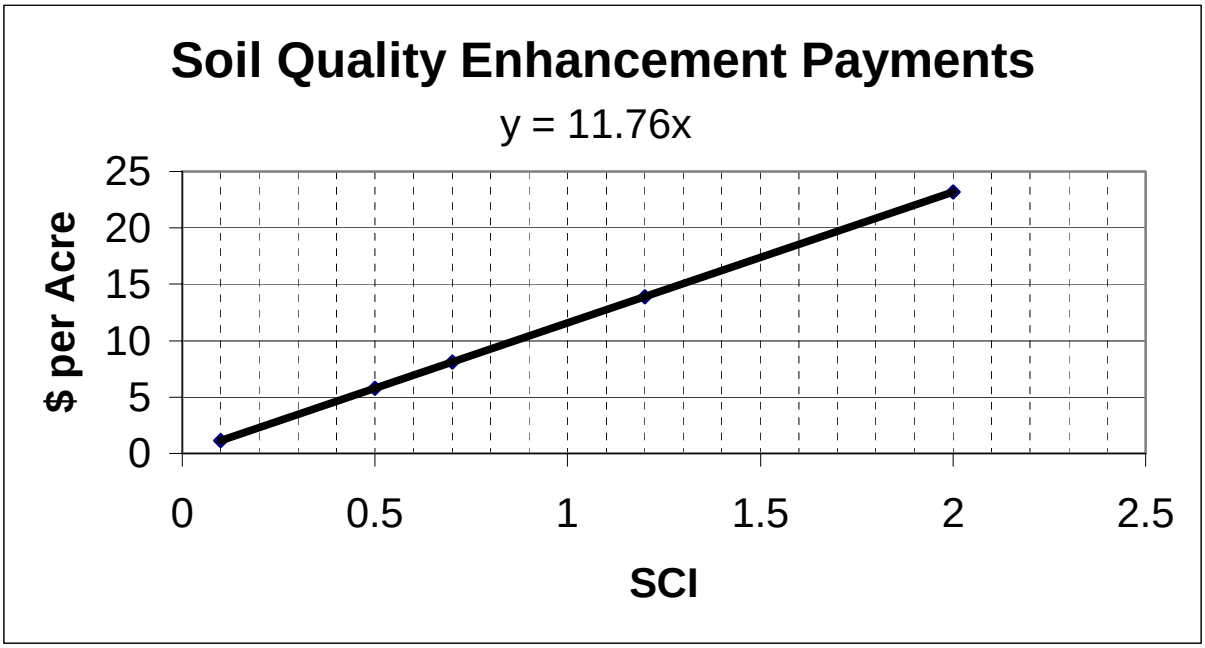
The procedure would be similar to the following. First, a resource evaluation is conducted to estimate the current level of efficiency of the on-farm system (i.e. 55 percent efficiency). Then, management intensity activities are identified that would elevate the system to the desired level of efficiency (i.e. 75 percent). Each activity is assigned a value that reflects its anticipated impact above and beyond a system meeting minimum quality criteria (i.e. 50 percent efficiency). By inputting these values and applying them to the current system, FIRI calculates an efficiency

rating which is then compared to the beginning efficiency, the difference which represents a factor which can be use to calculate water savings and thus benefits.

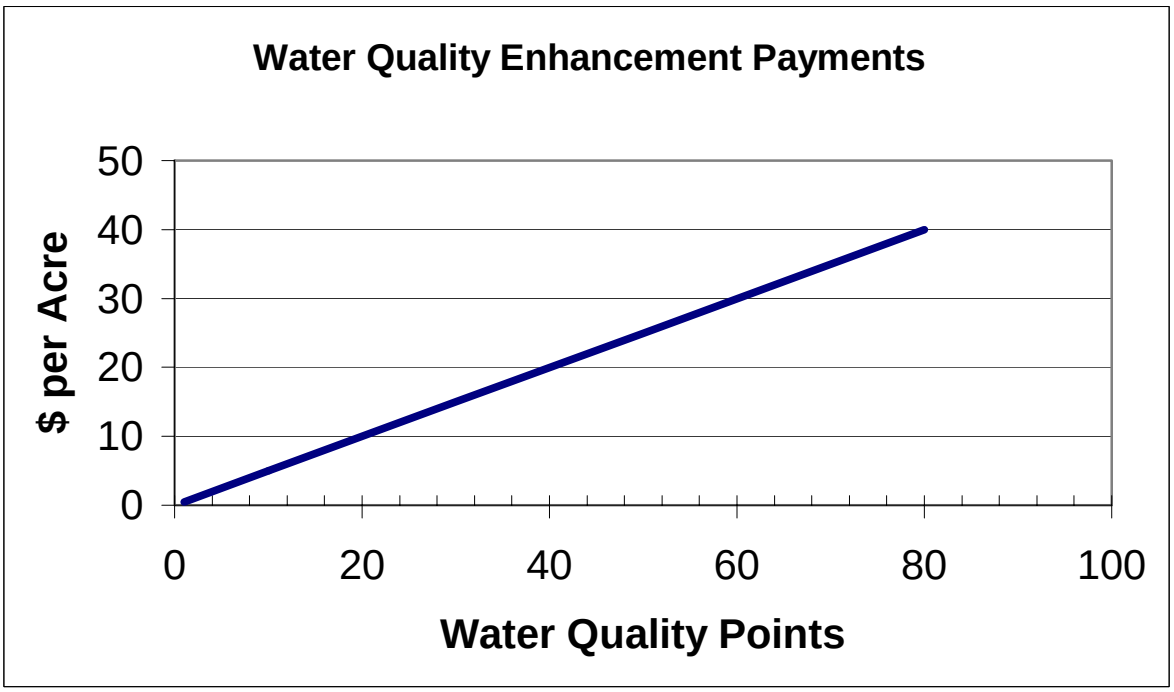
By varying the types and frequencies of management intensities, a system suitable to the producer can be identified. Because of past experience and research, on-site benefits can be quantified based on the level of efficiency (water saved) obtained due to activity implementation. Although the cost of each activity can be estimated and on-site benefits can be quantified, quantification of the environmental (off-site) benefits of the management intensity is very elusive. Therefore, using FIRI, efforts to identify and demonstrate environmental (off-site) benefits will be initiated.

B. Soil Quality and Water Quality Enhancement Payment Proposal for Cropland. Using the following proposed procedures, enhancement payments for soil and water quality on cropland will be readily and easily determined at the field office. Payments will be based on scores related to the Soil Conditioning Index (SCI) and the proposed Water Quality Score. Payments for improvements in the SCI are based on estimates of the value of increased soil erosion and soil erosion control. The water quality score will be the relative estimate of protection an individual practice or activity may have on water quality with respect to nutrient and pest management. This system of scoring was designed to prevent the need for the field to have to run an array of models to get an estimate of benefits for a practice.

Soil Quality Payment Component. The basic benefit values are determined from a comprehensive accounting of the benefits of soil erosion control and soil carbon enhancement, based on information from the publication "Is Topsoil Dirt Cheap?" (Soil Quality Institute – Agronomy Technical Note No. 18). The following chart illustrates the calculation of the payment for a 0.l improvement in the Soil Conditioning Index (SCI), given the assumption that the payment would constitute 80 percent of the value of the estimated benefits, reflecting an estimate of 0.8 tons of erosion reduced per 0.1 improvement in SCI, for a total of $11.76 per acre per year. This value of 80 percent would obviously vary from situation to situation.



Water Quality Payment Component. Points will be assigned to each practice and activity that would benefit water quality. This assignment is done independent of the benefits assigned above for increases in SCI. Nutrient and Pest management practices and activities can be rated separately according to their effect on source and transport relative score for each practice and totaled and then paid on the total score. Following chart shows a proposed relationship between per acre payment levels and water quality point totals, i.e., $0.50 per point.



C. Wildlife Enhancement – Biodiversity Protection Conservation practices and activities and environmental initiatives that focus on protection of biodiversity, locally important wildlife species, and their associated habitats are difficult to quantify, if not nearly impossible. Measures of economic value of biodiversity bring into play the value judgment of individuals and the public as a whole which vary tremendously with respect to biodiversity. While it is difficult to put a dollar value on a single bog turtle on a single piece of property, it is possible to qualify the indicators of expected benefits for managing spending on the bog turtle to achieve the greatest environmental and economic payoff.

Costs of waiting to protect biodiversity. A component of the Conservation Security Program is a focus on locally important wildlife. Proactively working to protect biodiversity brings into light the enormous cost savings of avoiding listing species on the Endangered Species Act. It is estimated that it costs the federal government and taxpayers on average:

- $68,000 to list a single species as threatened or endangered;
- $2.76 million to recover the same single species; and
- $39,000 to delist the species

In effect, it costs on average nearly $3 million to restore a single species. Some of the most expensive species recovery efforts have cost anywhere from $29 million to $88 million for the swamp pink and Atlantic green turtle, respectively.

Biodiversity protection measures yield other quantifiable resource benefits. The benefits of habitat restoration and creation for wildlife and biodiversity protection result in holistic benefits for all resources on multiple landscape scales. For example, a 300 foot buffer installed on a stream for songbird habitat results in

- soil erosion reduction
- nutrient and pesticide reduction
- stream water quality enhancement – temperature, dissolved oxygen, turbidity reduction, etc.
- flood control –
- benefits to other on-site species – aquatic insects, amphibians and herps, other birds, fish and mammals
- benefits to other downstream species – anadramous fish, shore birds, salt and brackish fish, mollusks, even coral reefs.

D. Grazing Land Enhancements

Grazing lands provide a diverse array of environmental benefits through management of vegetation with livestock. Vegetation health and/or conditions are primary indicators of soil and water quality on grazing lands. Grazing land owners and managers must balance the lands production capabilities with livestock needs in a manner that provides for sustainability of the resource and provide economic stability.

Private grazing land includes private, State, Tribal, and any other non-federally owned land managed for the production of livestock and/or wildlife. Non-federal, privately owned pasture

and rangeland is found in every state and territory, and the kind, amount, productivity, use, products, and value of grazing land varies greatly from place to place. More than 1 million farms and ranches (over half the farms and ranches) in the U.S. have grazing land on which livestock production is the major use. Private grazing land also provides important habitat, food, water, and cover for wildlife. Many species of the Nation's wildlife spend part or all of their lives on grazing land. The existence of wildlife, including some rare and endangered species, is dependent upon these lands.

Private grazing lands are the single largest watershed vegetative cover type in the country and are the cornerstone for environmental quality. Vast amounts of precipitation fall on these lands each year. On well-managed grazing land, more of this water infiltrates into the soil and is used for plant growth, is stored in underground aquifers, or flows through the soil to replenish streams, riparian areas, wetlands, and lakes. People use this water for agricultural, domestic, and industrial purposes. Society benefits from this supply of food and fiber, clean air, healthy wildlife populations and habitat, improved fisheries and aquatic systems, and healthy riparian areas. Grazing lands are the foundation of many rural communities and the core of social and economic stability for sustaining long-term economic viability in many rural areas. In turn, the beneficial products and services from these lands help sustain the urban population centers.

Through CSP, NRCS will be able to encourage landowners and managers of grazing land to increase environmental benefits beyond what it currently provides. The Conservation Security Program (CSP) on grazing lands can assist producers in:

- Using and improving energy-efficient ways to produce food and fiber;
- Improving the dependability and consistency in water supplies;
- Improving and conserving fish habitat and aquatic systems;
- Protecting and improving water quality;
- Conserving and improving habitat for wildlife;
- Sustaining forage and grazing plants;
- Using plants to sequester green house gases;
- Improving recreational activities;
- Maintaining or reducing weed, noxious weed, and brush encroachment;
- Improving long-term economic opportunities;
- Providing opportunities for improved nutrient management from land application of animal manure and other by-product nutrient sources;
- Improving the quality of animals that are produced on these lands; and
- Producing food and fiber from lands that will not support cultivated crop production.

Change or improvement in one of these areas can also cause changes and improvements in many of the others. For instance, an improvement in the health of rangeland by control of invasive species can lead to better quality and quantity forage, wildlife habitat and water. Improvements in forage quantity and quality can lead to improvements in economic opportunities.

Forage Production Increase. Over the last 50 years, considerable research has gone into the study of range improvements and in particular, grazing management systems. Simple

modification of grazing practice behaviors are now recognized as one of the most energy-efficient ways of improving the production of food and fiber while minimizing costs.

Other On-Site Non-Dollar Benefits. In order for grassland to show improvements in forage production, other functions, attributes, and processes, such as water infiltration, soil erosion, carbon sequestration and soil nutrients must first improve. The grassland environment is dynamic because of the complex interactions between plants, soil, management, hydrology, climate, and animals. Improvements in one of these areas results in improvements in other areas. How much improvement takes place and how to value them individually is a key research area in ecology. These benefits are important to the continued well being of the environment that society values, but are not tangible items that can be traded in the marketplace. However, recognition of these environmental benefits and the beneficial significance of conservation assistance and application of practices must be made in judging the value of the CSP.

Infiltration. The increase in the rate of water infiltration, and the reduction of runoff and erosion are important benefits from conservation on grazing lands. It is determined by soil structure, amount and type of cover, soil organic matter, and above and below ground productivity (Thurow 1991). Management intensity can be directed to improve these characteristics. The importance of maximizing infiltration is expressed in the amount of additional forage production that takes place as a result of a rainfall event. More infiltration of water means more forage production. Besides improving production, a higher water infiltration rate can improve the ecological dynamics of a site. Water infiltration is also important for the recharge of underground aquifers and above ground springs.

Wildlife, Fishing, and Recreation. Besides providing forage for livestock, grazing lands generate income for private grazing land owners who lease their acreage for wildlife, fish, and recreation activities. Depending on a number of factors, the total dollar value can be quite large when multiplied by the total acres involved. In some states, some grazing land values are driven by recreation lease rates rather than by livestock prices. Many private grazing lands are leased out for wildlife, fishing or recreation. Management intensity can improve existing forage production, habitat and water quality, further benefiting wildlife, fishing, and recreational activities.

Use of Plants to Sequester Green House Gases. Sequestering soil carbon (C) in grazing lands is important for enhancing soil and water quality and reducing the rate of emissions of active greenhouse gases to the atmosphere. In contrast to most cropland, grazing lands can sequester soil C both as soil organic C (SOC) and soil inorganic C (SIC). The potential for grazing lands soils to store significant amounts of C is high because:

- Grazing lands have comparatively low current rates of management inputs, but high potential rates of Soil Organic Carbon sequestration where such management inputs as fertilizer, pesticides, improved species, etc., can be justified economically (especially for pasture lands).
- Arid and semi-arid grazing lands have positive potential to sequester Soil Inorganic Carbon.
- Grazing lands involve an extremely large land area (Follett 2000).

Using data supplied in the paper by Follett, et. al. (2000), an average of 0.04 ton per acre on rangeland and 0.13 ton per acre on pastureland of carbon can be sequestered on grazing land. The CSP program has the potential to impact 8.8 million acres of rangeland and 2.1 million acres of pastureland. Multiplying the acreages by the tons per acres totals approximately 625,000 tons of carbon. This represents the additional amount of SOC that could be sequestered as a result of management intensity.

Improved Nutrient Management. The primary emphasis of nutrient management is on pastureland. Nutrient management is an essential part of resource management on pastureland. Nutrient management may be viewed in two ways. First, is the issue of fertilizer to be added to increase forage production. The sources of fertilizer may be from commercial fertilizer, or by adding a legume to the mixture to fix nitrogen, and by utilizing manure from the grazing animal or manure from other sources. Second, the nutrients can be redistributed on pasture by preferential animal movement. Shady areas, watering sites, laneways, salt blocks, rubbing areas, natural water bodies, windbreaks, buildings, and sunning areas can cause a disproportionate amount of dung and urine spots to be deposited in localized areas. This redistribution of nutrients can cause plant nutrient deficiencies in some areas and excess nutrients in other areas.

One of the most important components of forage production is proper soil fertility. Plants require substantial amounts of nitrogen (N) for photosynthesis. When adequate water is available, nitrogen is typically the nutrient that most limits plant production. A study that was completed on a variety of pasture species showed that by applying 67 lbs. of nitrogen per acre increased production by 0.9 tons per acre, a 118 percent increase (Soil Conservation Society of America 1986). The benefit of nutrient management of fertilizers and manure has a significant impact on forage productivity and is considered in conservation application.

Environmental (off-site) benefits-Runoff. The amount of runoff that takes place as part of a precipitation event is an important characteristic of grazing lands. Less runoff means more water infiltration into the soil. More infiltration means more forage production, aquifer recharge and spring-water production. Less runoff means less erosion and sediment in the rivers and streams. Less sediment in streams means enhanced recreation opportunities downstream, improved water quality, less reservoir silting, and less dredging. Besides improving production, a lower runoff rate can improve the ecology of a site while improving downstream conditions.

Pastureland Payment Proposal. The NRCS *Pasture Condition Score Sheet* (USDA, 2001) will be utilized to determine management intensity benefits from enhancing the pastureland grazing resource. Pasture condition scoring involves the visual evaluation of 10 indicators which rate pasture condition. The 10 indicators are percent desirable plants, plant cover, plant diversity, plant residue, plant vigor, percent legume, uniformity of use, livestock concentration areas, soil compaction and erosion. The erosion indicator takes into account sheet and rill, wind, gully, and stream-bank or shoreline erosion. Each indicator or factor has five conditions described for it, ranging from lowest (1) to highest (5). Each indicator will be evaluated separately and then summed for a total score for each pasture. Enhancement payments will then be based on the beneficial effects (described above) of applying management intensity practices and activities and the resultant score of the pasture. This score will be used to denote which enrollment category that the producer will fall into. Depending on the enrollment category, enhancement

payments will then be based on the beneficial effects (described above) of applying designated management intensity practices and activities.

Rangeland Payment Proposal. Indicators of rangeland health will be utilized to determine management intensity benefits from enhancing the rangeland grazing resource. These indicators are explained in great detail in the publication *Interpreting Indicators of Rangeland Health* (USDA, USDI, 2000). Ecological processes functioning within a normal range of variation will support specific plant and animal communities. Direct measures of site integrity and status of ecological processes are difficult or expensive to measure due to the complexity of the processes and their interrelationships. Therefore, biological and physical attributes are often used as indicators of the functional status of ecological processes and site integrity.

The product of this qualitative assessment is not a single rating of rangeland health, but and assessment of three components called attributes: Soil/Site Stability, Hydrologic Function, and Integrity of the Biotic Community. Attribute ratings are based upon "departure from ecological site description/ecological reference area(s)" in these categories: extreme, moderate to extreme, moderate, slight to moderate, and none to slight. Indicators include:

- rills,
- water flow patterns,
- pedestals and/or terracettes,
- bare ground,
- gullies,
- wind-scoured blowouts and/or deposition areas,
- litter movement,
- soil surface resistance to erosion,
- soil surface loss or degradation,
- plant community composition and distribution relative to infiltration and runoff,
- compaction layer,
- functional/structural groups,
- plant mortality/decadence,
- litter amount,
- annual production,
- invasive plants, and
- reproductive capability of perennial plants.

The user will select the category that best fits the "preponderance of evidence" for each of the three attributes relative to the distribution of indicator ratings. Based upon the numerical value of the summed ratings, the producer will be placed into an enrollment category. Depending on the enrollment category, enhancement payments will then be based on the beneficial effects of applying designated management intensity practices and activities.

Energy Enhancement Program. The first signup under the interim final rule indicates that over $14 million of the roughly $41 million allocated to the CSP was spent on enhancement program items. Leading the list of enhancements were: soil management program outlays of over $4.3 million, followed closely by pest and nutrient management program outlays of $3.8 and $3.5 million,

respectively. Over 80 percent of all enhancements were spent in these three enhancement program areas.

2004 CSP Enhancement Outlays		
Enhancement Management Program	Total Payments	Percent of Total
Air Resources	$215,387	1.5
Energy	$707,070	5.0
Grazing	$346,986	2.5
Habitat	$946,689	6.7
Nutrient	$3,500,337	24.7
Pest	$3,822,518	27.0
Soil	$4,320,757	30.5
Water	$318,479	2.2
Total	$14,178,245	100.0
Source: PRS Report, Fall 2004		

Energy Enhancement Program: Roughly $707,600 to energy enhancements was obligated in the initial sign-up of eligible producers in 15 of the 18 designated watersheds in FY2004 (See Table 2 below). This total amount of money represented about 5 percent of all enhancement programs and nearly 2% of the total amount of monies obligated under the CSP program in 2004. About 2/3 of all CSP contracts provided monies obligated under the energy enhancement program provision.

CSP Energy Enhancements by Watershed: Number of Contracts, Monies Obligated, an Tiers where recipients received enhancements.							
Watershed	States Covered	Number o Contracts	Monies in Energ Enhancements	Average Amount	Tiers Present: 1	2	3
Auglaize	OH/IN	186	122,349	658	X	X	X
Blue Earth	MN/IA	208	89,419	430	X	X	X
East Nishnabotna	IA	136	19,561	144	X	X	X
Hondo	TX	2	473	237			X
Kishwaukee	IL/WI	186	121,902	655	X	X	X
Lemhi	ID	10	2,330	233		X	X
Little	GA	4	1,256	314		X	
Little River Ditches	MO/AR	17	4,350	256	X	X	X
Lower Chippewa	WI	204	58,022	284	X	X	X
Lower Little Blue	NE/KS	89	28,440	320	X	X	X
Lower Salt Fork Arkansas	KS/OK	146	92,952	637	X	X	X
Lower Yellowstone	MT/ND	None	None				
Moses Coulee	WA	17	8,828	519	X	X	X
Punta de Agua	NM/TX	6	2,181	363	X		X
Raystown	PA	None	None				
Saluda	SC	None	None				
St. Joseph	IN/MI/OH	215	130,183	606	X	X	X
Umatilla	OR	51	25,349	497	X	X	X
Total Energy Enha.	NA	1477	707,594	479	12/15	13/15	14/15
Grand Total all CSP	NA	2188	41,000,000	18,740	NA	NA	NA
% (EE/Total CSP)	NA	67%	1.7%	2.5%	NA	NA	NA
Source: Data file provided by Programs group.							

By Tier: The distribution of number of contracts containing energy enhancement incentives and monies received under these provisions by tier is provided below (Table 3). The 2004 experience shows that Tier 3 energy enhancement contracts were relatively larger than either Tier 1 or Tier 2 contracts. As a percent of total contracts in each tier, Tier 3 had the highest proportion of contracts involving energy enhancements at 77 percent compared with 67 percent for all CSP contracts with energy enhancements.

CSP Energy Enhancements by Tier: Number of Contracts, Monies Obligated, and Average Amount received.

Tier	Number of Contracts		EE Contracts as a percent of:		Monies in Energy Enhancements	Percent of total EE monies by tier	Average Amount
	CSP	w/ Energy Enhance-ments (EE)	All CSP Contracts by tier 1/	EE Contracts By tier			
1	800	540	67.5	37	$186,962	26	$346
2	883	548	62.1	37	$293,771	42	$536
3	505	389	77.0	26	$226,862	32	$583
Total	2,188	1,477	67.5	100	$707,594	100	$479

1/ Column three (contracts with energy enhancements) divided by the total number of contracts.

Source: Data file provided by Program group.