United States Department of Agriculture
Natural Resources Conservation Service

Final Benefit-Cost Analysis

for the

Environmental Quality Incentives Program (EQIP)

Food, Conservation, and Energy Act of 2008
Title II – Conservation
Subtitle F – Environmental Quality Incentives Program

May 24, 2010

Helping People Help the Land

Forward

Pursuant to Executive Order 12866, Regulatory Planning and Review, the Natural Resources Conservation Service (NRCS) has conducted a benefit-cost analysis (BCA) of the Environmental Quality Incentives Program (EQIP) as formulated for the final rule. The analysis estimates EQIP will have a beneficial impact on the adoption of conservation practices and, when installed or applied to technical standards, does so in a cost-effective manner. In addition, estimated benefits would accrue to society for long-term productivity maintenance of the resource base, non-point source pollution damage reductions, soil carbon storage, energy conservation and wildlife habitat enhancement.

The Federal Crop Insurance Reform and Department of Agriculture Reorganization Act of 1994, Title III, Section 304, requires that for each proposed major regulation with a primary purpose to regulate issues of human health, human safety, or the environment, USDA is to publish an analysis of the risks addressed by the regulation and the costs and benefits of the regulation. NRCS has determined that such a risk assessment does not apply to this final rule.

In considering alternatives for implementing EQIP, USDA followed the legislative intent to optimize environmental benefits, address natural resource problems and concerns, establish an open participatory process, and provide flexible assistance to producers who apply appropriate conservation measures that enable Federal and State environmental requirements to be satisfied.

Because EQIP is a voluntary program, it will not impose any obligation or burden upon agricultural producers who choose not to participate. The program was authorized by the Congress at $7.325 billion over the five-year period beginning in fiscal year (FY) 2008 through FY 2012, with annual amounts specified at $1.2 billion for FY 2008, $1.337 billion in FY 2009, $1.45 billion in FY 2010, $1.588 billion in FY 2011, and $1.75 billion in FY 2012.

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Executive Summary

Pursuant to Executive Order 12866, Regulatory Planning and Review, the Natural Resources Conservation Service (NRCS) has conducted a benefit-cost analysis (BCA) of the Environmental Quality Incentives Program (EQIP) as formulated for the final rule. This requirement provides decision makers with the opportunity to develop and implement a program that is beneficial, cost effective, and that minimizes negative impacts to health, human safety, and the environment.

In considering alternatives for implementing EQIP, the United States Department of Agriculture (USDA) followed the legislative intent to optimize environmental benefits, address natural resource concerns and problems, establish an open participatory process, and provide flexible assistance to producers who apply appropriate conservation measures that enable the satisfaction of Federal and State environmental requirements. Because EQIP is a voluntary program, the program will not impose any obligation or burden upon agricultural producers who choose not to participate. The program has been authorized by the Congress at $7.325 billion over the five-year period beginning in fiscal year (FY) 2008 through FY 2012, with annual amounts of $1.2 billion for FY 2008, $1.337 billion in FY 2009, $1.45 billion in FY 2010, $1.588 billion in FY 2011, and $1.75 billion in FY 2012.

The EQIP technical and financial assistance facilitates the adoption of conservation practices that mitigate degradation of the environment. These practices improve on-site resource conditions and produce significant offsite environmental benefits for the public. Water erosion conservation practices, for example reduce the flow of pollutants off of fields, thus improving freshwater and marine water quality and fish habitat, enhancing aquatic recreation opportunities, and reducing sedimentation of reservoirs, streams, and drainage channels. More efficient irrigation practices conserve scarce water, making it available for other uses. Wind erosion control practices improve air quality as do practices that increase carbon in the soil profile. Most of these on-site and off-site benefits and other benefits not mentioned are considered in this analysis.

Other significant environmental benefits have an appearance of being solely private benefits, such as maintenance of the long-term productivity of the resource base, improved grazing productivity, more efficient crop use of animal waste and fertilizer, and energy conservation. However for this analysis, these impacts are considered public benefits in that they impact input and output markets by increasing the availability of these inputs at lower prices and/or for use in other sectors of the economy. This analysis does not utilize a social welfare impact model or general equilibrium model that would show these final producer and consumer welfare changes (brought about by changes in inputs used and output levels of EQIP participants). Thus, the economic impacts estimated in this analysis by these changes should be considered as first approximations of possible social welfare gains in input and output markets.

In this analysis, the benefit categories, which could be construed as having a high component of private benefit, are clearly identified. Another group of benefits directly linked to specific EQIP conservation practices cannot be empirically estimated at this time as explained. A total of 23 practices that account for five percent of EQIP funds (over half of these remaining funds were for the Pest Management Practice–595) fall into this group. As a result, they are not included in the quantitative estimates of benefits. In addition, many other environmental impacts were not included in this economic analysis because no clear conversion methods of the environmental impacts to economic terms were available.

For additional information on these environmental impacts, see the NEPA environmental assessment for this regulation. In the future, nationally consistent estimates of beneficial environmental outcomes resulting from conservation practices and systems will be possible through the use of the results from the interagency Conservation Effects Assessment Project (CEAP). CEAP has been underway since 2003, and is composed of multiple components focusing on cropland, grazing land, wetlands, and wildlife. Initial CEAP results will be available for the cropland component in FY2009 while results from the other CEAP components will follow. These results are expected to improve the Agency's ability to report on long-term conservation benefits being delivered by programs, such as EQIP.

Despite these limitations in our ability to estimate environmental benefits, the new EQIP is expected to have a substantial positive effect on the environment due to its increased level of funding compared to the program's previous baseline roughly $1 billion annually. It is estimated that the additional dollars will contribute to reductions of sheet and rill erosion and wind erosion on an additional 3.9 million acres, improve fertilizer, irrigation, grazingland, and wildlife habitat management on 5.6, 2.0, 17.5, and 2.8 million acres, respectively. Also, the waste from an additional 1.3 million animal units[1] will be treated under the new program directly improving water quality. Using these quantity changes plus benefit transfer values derived from the literature, total benefits are estimated at $10.441 billion for EQIP with the 2008 Act and its increased funding allocation. Throughout the analysis, benefit estimates are compared to $$10,384 billion total costs which include both the EQIP funds and costs borne by participants, producing a net benefit of approximately $57 million above total costs.

Methodology

In developing the BCA for EQIP, it is necessary to identify a baseline for comparison. The baseline for this analysis is EQIP as reauthorized in the 2002 Act with FY 2007 funding levels. In the 2002 Act, EQIP funding for FY 2005 through FY 2008 was capped at roughly $1 billion per year. The actual FY 2007 funding level of $978 million is used as the baseline.

Public costs quantified in this analysis are the total TA and FA assistance funds outlined in the Congressional Budget Office's (CBO) scoring of the 2008 Act. Private costs are out-of-pocket costs paid voluntarily by participants. As stated above, the quantifiable benefits are a subset of

[1]According to the 2002 CAFO definition (EPA), an animal unit (AU) is one slaughter or feeder cattle, 0.7 mature dairy cows, 2.5 swine (other than feeder pigs), 30 laying hens or broilers (if liquid system), or 100 laying hens or broilers (if continuous overflow watering). http://www.epa.gov/npdes/pubs/cafo_econ_analysis_p1.pdf

the environmental benefits that accrue to the types of practices implemented through EQIP. Available data and literature support the estimation benefits in the following benefit categories:

- Animal waste management (leading to improved water quality through better management) 1/ [2];
- Sheet and rill water erosion (reducing soil erosion);
- Grazing land productivity (increasing yields) 1/;
- Irrigation water use (reducing quantity used);
- Air quality (through reduced wind erosion);
- Fertilizer use (reduced fertilizer expense through nutrient management not associated with animal waste) 1/;
- Wildlife habitat (enhanced wildlife viewing and hunting);
- Energy use (reduced energy consumption associated with conservation tillage practices); and,
- Carbon sequestration (higher soil carbon levels associated with conservation tillage and grassland practices).

In order to conduct the analysis, certain assumptions were made based on the available data.

- The practice mix for the current (2007 base) and the new EQIP remains the same. The new rule places additional emphasis on energy, organic, and forest management practices. The lack of benefit data for these practices precludes their use in this analysis[3].
- Quantifiable per-unit benefits are constant and based on national average estimates.
- Technical assistance costs incurred by NRCS are based on the full workload associated with implementing EQIP and take into consideration projected average contract sizes.
- Average annual and net present value calculations are based on 7 percent and 3 percent discount factors, which the Office of Management and Budget (OMB) recommended. All tables are presented using the seven percent discount rate. The analysis is also calculated using the three percent discount rate (see Appendix A, Table 9).
- Environmental benefits generated in the animal waste management benefit category were adjusted downward by 42 percent to account for mandatory regulatory requirements associated with large concentrated animal feeding operations (CAFOs). This reduction is necessary to avoid any double counting of benefits attributed to EPA's CAFO regulations. Total CAFO-related costs associated with conservation practices were reduced by 23 percent.
- Other than large CAFOs meeting EPA regulatory requirements, the adoption of conservation practices by EQIP participants is assumed to be solely attributed to their participation in EQIP.

[2]The "1/" above signifies that this benefit category could be construed as having elements of both private and public benefit impacts. More information on these distinctions is provided in the document.

[3]Additional time and resources would be necessary to modify the present model to incorporate such shifts in program emphasis.

Conclusions

This final benefit-cost analysis assumes that the basic program features of EQIP created in 2002 (the "current program") remain the same for the 2008 Act, except for funding, which was increased in the 2008 Act. The summary table below shows the estimated values of each benefit category and the estimated costs associated with EQIP for the "current" (2007-base) and "new" (with increased funding) scenario. Under the assumption that the current program continues at level funding, the expected present value of benefits over the period of FY 2007 to FY 2012 is estimated at $7.1 billion, with $0.5 billion coming from improved animal waste management and $6.6 billion from improved land treatment. Expected net benefits are estimated at $39 million above total costs, including producer costs, other non-federal costs, and federal (EQIP) costs.

With increased funding, the estimated present value of benefits over the period of FY 2007 to FY 2012 was $10.4 billion with $0.8 billion coming from improved animal waste management and $9.6 billion from land treatment. Estimated net benefits were $57 million above total costs. This provides $18 million in additional net benefits due to the expansion of EQIP funds in the 2008 Farm Bill over the roughly $1.0 billion annual baseline funding.

Table 1. Summary of cumulative 5-year EQIP benefits and costs over FY 2008–FY 2012, using a seven percent discount rate.

($ million of 2007 dollars)

Benefit Category:	Do Not Implement EQIP	2007 EQIP with $1 billion / year FY 2008 - FY 2012	2008 Act Benefits & Costs	Increases with the 2008 Act	2007 EQIP with $1 billion / year (Acres or Animal Units)	2008 Act (Acres or Animal Units)	Unit
Animal waste management[1]	$0	$ 554	$ 816	$ 262	2,724,000	4,061,000	Animal Units
Sheet and rill water erosion	$0	$1,948	$2,869	$ 920	8,019,000	11,955,000	Acres
Grazing land productivity	$0	$3,111	$4,580	$1,470	35,586,000	53,057,000	Acres
Irrigation water use	$0	$ 231	$ 341	$ 109	4,014,000	5,985,000	Acres
Air quality	$0	$ 181	$ 266	$ 85	8,039,000	11,985,000	Acres
Fertilizer use	$0	$ 601	$ 885	$ 284	11,370,000	16,953,000	Acres
Wildlife habitat	$0	$ 172	$ 254	$ 81	5,660,000	8,439,000	Acres
Energy use	$0	$ 210	$ 309	$ 99	7,446,000	11,102,000	Acres
Carbon sequestration	$0	$ 82	$ 121	$ 39	41,525,000	61,911,000	Acres
Grand Total Benefits	$0	$7,091	$10,441	$3,350			
Costs:							
Total costs[2]	$0	$7,053	$10,384	$3,332			
Net Benefits:							
Net benefits	$0	$39	$57	$18			

[1]Environmental benefits from improved animal waste management attributed to EQIP are 42 percent below the total CAFO related benefits to account for environmental benefits captured by EPA regulatory requirements on large CAFOs. Likewise, costs associated with large CAFOs represent about 23 percent of NRCS costs related to CAFOs of all sizes were deducted from the analysis.

[2]Total costs include all federal costs plus private and other non-federal costs which have historically matched federal EQIP FA funding at an overall 50 percent cost-share rate discounted at seven percent and also the CAFO adjustment above of 23 percent, discounted at seven percent..

Final Benefit-Cost Analysis
Environmental Quality Incentives Program (EQIP)

Background

Legislative Authority

NRCS is promulgating a regulation to implement the Environmental Quality Incentives Program (EQIP), authorized by 16 USC 3830aa et seq. EQIP was authorized by the Federal Agriculture Improvement and Reform Act of 1996, P.L. 104-127, April 4, 1996 ("the 1996 Act"), and was amended by the Farm Security and Rural Investment Act of 2002, P.L. 107-171, May 13, 2002 ("the 2002 Act"), and most recently by the Food, Conservation, and Energy Act of 2008, P.L. 110-246 June 18, 2008 (hereafter referred to as "the 2008 Act"). The 2008 Act resulted in minor changes to the basic program features of EQIP which are discussed in this document.

This analysis follows the rules and documentation covering the intent and design of benefit-cost analyses as described in:

- Executive Order 12866, Regulatory Planning and Review[4]
- Unfunded Mandates Reform Act of 1995[5]
- Federal Crop Insurance Reform Act of 1994[6]
- OMB Circular A-4, Regulatory Analysis[7]

Need for the Regulation and Rationale for the Rule

Based on past program experience, environmental benefits generated from conservation practices may be thought of as originating from different natural resource and the environmental situations that can lead to a market failure:

- The first type involves negative externalities or spillover effects where agricultural production generates environmental damages, and the costs of these damages are borne by third parties who did not agree to the actions causing the damages.
- The second type involves positive externalities or spillover effects where agricultural production creates environmental benefits consumed by third parties at no cost to them.

EQIP enables private landowners and society to realize benefits by overcoming these market failures. In addition, while other regulatory provisions may have addressed some of these potential market failures in the past, conservation programs may enable farmers and ranchers to meet regulatory requirements while continuing production. This is especially important for some

[4]Executive Order 12866 of September 30, 1993--Regulatory Planning and Review, available at: http://www.epa.gov/fedrgstr/eo/eo12866.htm
[5]Unfunded Mandates Reform Act of 1995, P.L.104-4, http://www.regulation.org/pl104-4.html
[6]Federal Crop Insurance Reform Act of 1994, P.L.103-354, http://www.reeusda.gov/1700/legis/agreorg.htm
[7]OMB Circular A-4, Regulatory Analysis, http://www.whitehouse.gov/omb/memoranda/m03-21.html

specialized crops and in some areas where established livestock farmers are under regulatory pressures due to increasing animal concentrations. These cases are discussed in detail below under separate subheadings.

Program Description and Features

Program Objectives

EQIP is a voluntary program providing both technical and financial assistance to agricultural producers across the nation. The purposes of EQIP, as amended by the 2008 Act, are to jointly promote agricultural production, forest management, and environmental quality. NRCS supports these objectives by:

1. Assisting producers so that they can comply with local, State and national regulatory requirements concerning soil, water, and air quality; wildlife habitat; and surface and ground water conservation.
2. Assisting producers in protecting soil, water, air, and related natural resources and meeting environmental quality criteria established by Federal, State, tribal, and local agencies to the maximum extent practical.
3. Assisting producers who install and maintain conservation practices that sustain food and fiber production and simultaneously enhancing soil, water, wildlife and other natural resources on grazing land, forestland, and cropland and conserving energy.
4. Assisting producers in making beneficial, cost effective changes to production systems (including conservation practices related to organic production), grazing management, fuels management, forest management, nutrient management associated with livestock, pest or irrigation management, or other practices on agricultural and forested land.
5. Consolidating and streamlining conservation planning and regulatory compliance processes to reduce administrative burdens on producers and the cost of achieving environmental goals.

Program Overview

The fundamental purposes of EQIP, assisting farmers and ranchers to implement conservation practices to provide environmental benefits, have not changed from the 2002 Act. Revisions to EQIP focus primarily on expanding participation among historically underserved producers and organic growers, limiting payments to $300,000 per legal entity or person, streamlining the application and ranking process, and expanding practices and activities that are eligible for payment under EQIP. Listed below are the major changes in EQIP along with a brief discussion of how they are treated in this analysis.

- NRCS is directed to provide payments up to 75 percent of the costs of applying practices. These costs include planning, design, materials, equipment, installation, labor, management, maintenance and training. NRCS is also directed to compensate participants up to 100 percent of income lost by applying particular conservation practices Prior to the 2008 Act, NRCS used incentive payments to partially reimbursed participants for foregone income. Incentive payments, however, were eliminated in the 2008 Act. This analysis assumes that the new foregone income provision in the 2008 Act

will compensate participants at levels similar to incentive payments, resulting in negligible differences in compensation payments per practice between the 2002 and 2008 farm acts.

- When determining payment rates for foregone income, the State Conservationist, as delegated by the Chief, has discretion to accord great significance to a conservation practice that the Secretary determines promotes residue management, nutrient management, air quality management, invasive species management, pollinator habitat management, animal carcass management technology, or pest management. NRCS has historically emphasized many of these conservation practices. Given the broad range of resource concerns across the United States and the use of the locally led process, this analysis assumes that this provision will have a negligible effect.

- NRCS is required to lower the payment limitation for participants from $450,000 to $300,000 during any six-year period. The exception is for projects having special environmental significance, where the payments will be limited to $450,000. NRCS requires that contracts above $300,000 be submitted to the NRCS Regional Assistant Chief for approval. An analysis of those requests in FY 2007 showed that 0.21 percent of contracts of $300,000 or greater. Based on the historic number of contracts over $300,000 this provision will have a minimal effect.

- NRCS is directed to create criteria to evaluate acceptable watershed-wide projects for the purpose of implementing water conservation or irrigation practices on newly irrigated lands. Implementation of this provision would enhance the potential benefits of water-saving projects.

- NRCS is required to include non-industrial private forest (NIPF) lands. Since this analysis is not conducted by land use, the costs and benefits of conservation practices associated with NIPF lands are analyzed in the land treatment categories such as grazing productivity and wildlife habitat. The benefits and costs of NIPF practices included in the five percent non-analyzed conservation practices are not quantified at this time.

- NRCS is directed to provide payments for conservation practices related to organic production and the transition to organic production. NRCS is also required to limit payments to $20,000 per year or $80,000 during any six-year period for persons or legal entities who receive payments for conservation practices related to organic production or the transition to organic production.

- Through EQIP, conservation practices may be applied to agriculture systems, whether they are organic or conventional. NRCS is currently providing payments for conservation practices regardless of agriculture system. At this time NRCS does not have sufficient data to distinguish the effects of conservation practices between organic and conventional agriculture systems.

- NRCS is required to prioritize applications based on each application's (1) overall cost effectiveness, (2) effectiveness and comprehensiveness in addressing the designated

resource concern or resource concerns, (3) fulfillment of EQIP's purpose, and (4) improvement of conservation practices or systems in place at the time the contract offer is accepted or practices that will complete a conservation system. NRCS currently has a rigorous system to prioritize all EQIP applications that includes cost effectiveness. Items 2 and 3 are included in the existing EQIP regulations. States currently have the option to include Item 4 in prioritization of EQIP applications, thus ensuring that conservation systems near completion have a higher priority.

- NRCS is required to group applications of similar crop or livestock operations for evaluation purposes. This item is likely to improve the overall transparency of the application process. NRCS does not have sufficient data to determine how benefits and costs will be affected.

- NRCS will require a forest management plan when an EQIP plan of operations addresses forestland. The effect of this provision is more comprehensive, higher quality plans on forestland. It is expected that NRCS and producers will incur some additional costs associated with these plans.

- NRCS will provide an increased payment rate to historically underserved producers defined as limited resource, beginning, and socially disadvantaged farmers or ranchers. NRCS is currently providing a higher payment rate to beginning and limited resource farmers and ranchers. The historically underserved producers will now include socially disadvantaged farmers and ranchers. Providing service to new producers requires more TA. The higher payment rate for the historically underserved producers will slightly decrease funding available for other producers. An example is provided in Appendix F (Table 40) that shows that the higher payment rate will reduce funding available to other participants and increase the number of historically underserved producers. This shift in funding between the two producer groups is expected to be negligible given the additional EQIP funding authorized in the 2008 Act.

- NRCS will establish a national target to set aside five percent of EQIP funds for socially disadvantaged farmers or ranchers and an additional five percent of EQIP funds for beginning farmers or ranchers. NRCS data suggest that three to seven percent of current EQIP contracts go to socially disadvantaged producers (see Appendix F, Tables 42 and 44). Any increase in participation due to this provision is expected to only change the composition of participation, not total benefits or costs.

- NRCS will provide advance payments of up to 30 percent of anticipated costs of materials or services to historically underserved producers. Installation costs for certain conservation practices can be prohibitive to many historically underserved producers. This provision provides funds at the beginning of a contract for practices to be applied instead of payment upon completion, NRCS's traditional payment method. This is expected to stimulate participation by historically underserved producers. NRCS may be exposed to some additional risk and increased administrative costs if producers do not complete their contracts.

Application Prioritization

Provisions relating to the evaluation of EQIP applications were changed by the 2008 Act. The 1996 Act required the Secretary to give a higher priority to applications located in conservation priority areas, applications that maximized environmental benefits per dollar expended, and applications located in areas where State or local governments provided financial or technical assistance to producers for the same conservation or environmental purposes.

The 2002 Act modified the evaluation process. In evaluating applications for cost-share and incentive payments, NRCS must develop criteria for evaluating applications that ensure national, State, and local conservation priorities are effectively addressed. Congress stated that NRCS shall prioritize applications using the following criteria:

- Cost effectiveness to ensure that the conservation practices and approaches proposed are the most efficient means of achieving the anticipated environmental benefits.
- Effectiveness and comprehensiveness of the application in addressing designated resource concerns.
- Fulfillment of EQIP's purposes.
- Improvement of conservation practices or systems in place on the operation at the time the contract offer is accepted or practices that will complete a conservation system.

To the greatest extent possible, NRCS is directed to group applications with similar crop and/or livestock types for evaluation purposes. Otherwise, NRCS should group applications based on similar farming operations and evaluate them using the above stated criteria.

Funding

The initial 1996 Act authorized $200,000 per year for EQIP. The 2002 Act authorized EQIP funding at $5.8 billion through FY 2007. However, the annual appropriation was capped at roughly $1 billion annually instead of growing to the $1.3 billion in FY 2007 as originally set in the 2002 Act. The 2008 Act authorized funding for EQIP at $7.325 billion, with annual appropriations reaching $1.75 billion in FY 2012. See Appendix A, Table 13, Historical and Projected EQIP Technical and Financial Assistance, FY 1996-FY 2012 for relevant historical and projected TA and FA outlays.

Participant Requirements

To achieve the purposes of EQIP, NRCS provides technical and financial assistance to producers who agree to implement one or more conservation practices. Participants in EQIP must also agree to maintain all conservation practices receiving financial assistance through EQIP for the life of the conservation practice.

Description of Baseline Conditions

Current Land Use and Resource Concern Trends

The Nation's non-federal lands constitute a tremendous resource. These privately owned lands produce food and fiber for the world, bolster rural economies, and provide recreational activities for land owners and the public (Table 2).

Table 2. Major agricultural uses of land in the United States.

Land Use	Acres (millions)
Cropland	368
Pastureland	117
Rangeland	405
Hayland (included in cropland)	--
Forestland[1]	406
Other lands (homesteads, feedlots, etc.)[2]	82

[1]Forestlands include State and County land.

[2]Includes 31.5 million acres in the Conservation Reserve Program (CRP) that are not cropped and currently under vegetative cover.

Source: USDA-NRCS, 2003 National Resources Inventory
http://www.nrcs.usda.gov/technical/NRI/2003/nri03landuse-mrb.html

Soil erosion is a natural resource concern. Soil erosion is comprised of sheet and rill water erosion as well as wind erosion. Its severity depends on climatic factors, soil characteristics, landscape features, and cropping practices.

Conservation practices and programs have proved effective in addressing soil erosion. The National Resources Inventory (NRI) estimated soil erosion on United States cropland decreased 43 percent between 1982 and 2003 (USDA, NRCS, 2007). Sheet and rill water erosion on cropland in 2003 decreased to 971 million tons per year, and erosion due to wind decreased to 776 million tons per year.

Despite these improvements, many of the Nation's lands have resource problems and limitations that impair their productive use, cause on-site and off-site (or external) damages, and reduce agricultural efficiency. The following cases illustrate the nature of the resource concerns that EQIP attempts to address.

- The 2003 Annual NRI (USDA, NRCS, 2007) indicates that a total of 102 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.

- In its 2002 National Water Quality Inventory (USEPA, 2007), EPA documented one or more water quality impairments in 45 percent of assessed river and stream miles, 47 percent of assessed lake areas, and 32 percent of assessed estuaries. Agriculture was named a top source of impairment, especially for its nonpoint source pollutant contributions.

- The 1996 revisions to Safe Drinking Water Act required states to assess contaminant threats to public water systems. Based on this assessment, agriculture was identified as one of the top potential contaminating activities in many states. In a recent survey summarized in "The State of the Industry 2008," member utilities of the American Water Works Association identified source water quality and quantity as their top near-term and future concerns.

- A significant evolution has occurred in the livestock production sector that increases the challenges for dealing with animal waste. A June 1995 briefing report by the General Accounting Office for the Senate Agriculture Committee outlines the patterns of change. Consolidation and geographical shifts in animal production are occurring in the sector, particularly for hog and turkey operations. Second, animal manures have become significant sources for nitrogen inputs to watersheds where consolidation has occurred. Some analysts suggest that risks of contamination of surface waters from fecal coliform bacteria require attention.

The global demand for food stock and biofuels will affect the natural resource base underlying agricultural production. Increased agricultural production will lead to growing demand on the Nation's natural resources. These changes support the continuation and intensification of natural resource conservation efforts.

Farm/Ranch Demographics:
The 2002 Census of Agriculture identifies 2.1 million agricultural producers in the United States. In FY 2007 eight percent of the total agricultural producers were serviced by NRCS through EQIP. The 2008 Act introduces the group, "socially disadvantaged farmer or rancher" and merges it with two existing population groups, "beginning farmers and ranchers" and "limited resource farmers and ranchers." All three groups form a new designation of participants referred to as "historically underserved producers." The introduced group, socially disadvantaged farmer or rancher, means a group whose members have been subjected to racial or ethnic prejudice because of their identity as members of a group without regard to their individual qualities.

The 2002 Census of Agriculture identified five percent of farms as minority agricultural producers. In FY 2007 3.1 percent of NRCS's EQIP customers were minority agricultural producers. Demographic data are not available for 19.8 percent of NRCS's EQIP customers. Consequently, there is uncertainty about the true demographics of EQIP participants. Appendix F further presents the farm and ranch demographics for historically underserved producers that include limited resource, beginning, and socially disadvantaged farmers and ranchers.

Analytical Model

Modeling Producer Participation

EQIP has a sizable backlog of unfunded applications. A comparison of several years of EQIP data suggests that this backlog will continue into the foreseeable future (Table 3). Given this information, it is assumed that acre allocations for EQIP will be fully utilized every year through FY 2012 (see Appendix A, "How NRCS conducts its business").

Table 3. Historical participation in EQIP.

Fiscal Year	Applications Received	Applications with Funds Obligated	Contracted Percent
2004	87,000	47,986	55%
2005	79,287	49,478	62%
2006	72,807	41,400	57%
2007	72,398	41,851	58%
Total	**311,492**	**180,715**	**58%**

Model Assumptions

The assumption of full participation made above is one of many assumptions. Other important assumptions have been categorized into groups that include program parameters, economic parameters, conservation practices, expected costs, and expected environmental benefits.

Program Parameters
The two main program parameters assumed in this analysis cover the breakdown of TA and FA available to producers and payment rates for the conservation practices. The historical proportion of EQIP funding devoted for TA, 26 percent, is assumed to hold over for FY 2009 – FY2012. The remaining 74 percent is available for FA to producers (Appendix A, Table 11)

Practice payment rates are based on FY 2007 EQIP contracts. Although this analysis recognizes that in FY 2008 NRCS adopted a Practice Payment Schedule in lieu of the traditional cost-share payments, it is assumed that these payments rates will be similar to historical cost-share rates (see Appendix A, "How NRCS conducts its business").

Economic Parameters
Two main economic assumptions were necessary in this analysis involve discount rates and inflation rates. In both cases, this analysis relies on OMB suggested rates. First, discount factors of seven and three percent are used to calculate net present values of cost and benefit streams. Second, all costs and benefits are expressed in constant 2007 dollars to remove inflation.

Conservation Practices
The three types of conservation practices are vegetative, structural, and management. The number of conservation practices to be implemented for each of these types in any year is

assumed to be proportional to the practices reported NRCS' Program Contracting System (ProTracts[8]) and Performance Reporting System (PRS[9]) databases for FY 2007.

The benefits derived from the conservation practices are divided into nine benefit categories[10]:

- Animal waste management
- Sheet and rill water erosion
- Grazing land productivity
- Irrigation water use
- Air quality
- Fertilizer use
- Wildlife habitat
- Energy use
- Carbon sequestration

Expected Costs

Only units listed in ProTracts or PRS as funded by EQIP are included. Vegetative and structural practice implementation costs and units installed are based on information stored in ProTracts for FY 2007.

Management practice treatment acres are based on FY 2007 PRS data for several reasons. Management practices in ProTracts are treated as recurring practices; treated acres may receive payments in multiple years (up to three years). This accounting procedure creates the potential for counting treated acres in multiple years. For example, the amount of acreage implemented in FY 2007 ProTracts may include acreage reported also in FY 2006 and/or FY 2005. As a result, it was decided that PRS data would be a better source to estimate acreage of management practices implemented.

Appendix A, Table 11 illustrates the cost of implementation and units implemented based on PRS and ProTracts for FY 2007. Only acreage reported for programs EQIP, EQIP-GSWC (Ground and Surface Water Conservation), and Klamath Basin were used. NRCS has limited data on conservation activities related to energy, expanded forestry and organic production and transition.

Except for animal waste practices, ProTracts data on EQIP cost and total costs of implemented (installed) practices were used to estimate costs for FY 2009-FY 2012 by benefit category. For animal waste practices, the publication, "Costs Associated with Development and Implementation of Comprehensive Nutrient Management Plans" (USDA, NRCS, 2003) was used

[8]ProTracts refers to the NRCS internal Programs and Contracting software/database system.

[9]PRS refers to the NRCS internal Performance Results software/database System, available at: http://ias.sc.egov.usda.gov/PRSHOME/

[10]Appendix A, Table 12 gives a summary of practices approved for FY 2007 EQIP and payments made during FY 2007. The practices listed in this table are then broken into the different benefit categories and are shown in the appropriate discussions to follow. This separation of practices in more than one benefit category makes the same practice cost appear under multiple categories. Later, care is taken to account for multiple counting of costs while accounting for the multiple benefits that may emanate from these practices.

to estimate costs for the development and implementation of CNMPs nationwide. Development costs relate to the technical expertise required to write a CNMP, and implementation costs relate to the actual costs of constructing and installing the conservation practices called for in a CNMP. These two costs are included in the analysis (see Appendix D, Animal Waste Management). A comparison between indexed CNMP total costs from the publication (USDA, NRCS, 2003) and CNMP total costs from ProTracts suggests the costs are similar. Total costs include producer cost as well as program cost-share.

Expected Environmental Benefits

EQIP provides funding for a wide range of conservation practices on agricultural lands and animal feeding operations, treating a wide range of resource concerns. Individual effects of conservation actions, however, on each resource unit cannot easily be linked to measurable changes in environmental attributes such as nearby water bodies (Ribaudo and Hellerstein, 1992) because pollutant emissions from the land and corresponding changes in environmental attributes complex, cumulative, and variable over both time and location. NRCS intends to use results from the Conservation Effects Assessment Project (CEAP) to strengthen this area of analysis in future studies. CEAP results may be able to be tailored to estimate expected effects by NRCS program across major US land types and major resource concern (similar to the benefit categories used in this analysis).

Given this caveat, the overall methodology to estimate benefits is to multiply each conservation units (acres or animal units) by each benefit value per unit for each of the nine benefit categories. This section deals exclusively with the calculations of benefits per unit for the nine benefit categories.

Benefit Categories

Conservation practices historically funded by EQIP are categorized according to the type of benefits they are expected to produce[11]. Benefits quantified in this analysis represent a portion of the total benefits expected to accrue due the conservation practices implemented through EQIP funding. Throughout this analysis, there are nine benefit categories (Table 4).

[11]The adoption of the conservation practices by EQIP participants is assumed to be solely attributable to their participation in EQIP. Thus, most benefits reported in this analysis accrue to EQIP and are compared to total costs (which include NRCS TA and FA as well as cost-share outlays by participants). This simplifying assumption was necessary to avoid many thorny questions beyond the scope of this analysis, including the question of what practices would have been adopted as a result of purely private actions or those motivated to comply with a range of environmental regulations. This later issue related to EPA CAFO regulatory requirements is addressed in this analysis.

Table 4. Classes of benefits and their benefit transfer values used in EQIP by source*.				
Benefit Category	**Source of Benefit**	**Benefit per unit (2007 $)**	**Benefit Unit**	**Citation for Benefit per Unit**[12]
Animal waste management	Improved water quality for recreation, reduced incidence of fish kills, improved commercial shell fishing, reduced contamination of private wells	$34.66	$/AU/year	Appendix E
	Value of nutrients for crops from animal waste	$18.80	$/AU/year	Appendix E
	Animal waste management sub-total	$53.46	$/AU/year	
Sheet and rill water erosion	Reduced loss of nutrients	$11.92	$/acre/year	Appendix E
	Improved water quality (public works cost reduction for sediment, and recreation)	$42.40	$/acre/year	Appendix E
	Sheet and rill water erosion sub-total	$54.32	$/acre/year	
Grazing land productivity	Productivity increase	$17.25	$/acre/year	Namken and Flanagan 2000
Irrigation water use	Value of water saved for competing uses	$10.30	$/acre/year	Appendix E
Air quality	Reduced cost of maintaining equipment, reduced damages to nonfarm machinery, and adverse health effects	$ 5.71	$/acre/year	Ribaudo et al. 1989
Fertilizer use	Reduced fertilizer purchases from non-animal waste sources	$17.65	$/acre/year	Christensen et al. 1998, US EPA 2003
Wildlife habitat	Use value (improved wildlife viewing, and improved pheasant hunting)	$ 7.10	$/acre/year	Feather et al. 1999
Energy use	Reduced diesel fuel usage	$7.81	$/acre/year	USDA-NRCS CEAP (not yet released)
Carbon sequestration	Additional carbon sequestered, based on CCX carbon credit values	$ 0.47	$/acre/year	Appendix E

*****NRCS recognizes that there can be great variation in the actual monetary benefits derived in each of the benefit categories in this table. The transfer benefit estimates above were taken directly (or derived) from the available literature as explained in Appendix E. The estimates used are not intended to imply certainty of their actual or average value.

Following are brief discussions of how the per-acre and per-animal unit benefits were estimated. Detailed calculations are provided to the reader in the appendices.

Animal waste management

A number of conservation practices are available to ranchers for mitigating environmental damages caused by animal waste. Ranchers, for example, may install concrete or metal structures to store animal waste until suitable conditions for proper applications, plant vegetative filter strips to treat wastewater runoff, and use manure spreading techniques to minimize impacts

[12]Detailed references are included in Appendix E: Development of Expected Benefits by Benefit Category.

to the environment. These practices involve management, construction, and cropping activities implemented in a comprehensive manner to ensure that the environmental impact is minimized while not compromising the economic viability of the farm. Comprehensive Nutrient Management Plans (CNMPs) provide a blueprint for producers on how to address animal waste management.

The previous EQIP Benefit Cost Analysis (BCA) (USDA, NRCS, 2003) calculated a $30.23(1999 dollars) benefit per animal unit (AU) per year for implementation of CNMPs and associated practices that improved water quality. NRCS used the benefit-cost analysis from the EPA (US EPA, 2001[13]) to arrive at this estimate. The $30.23 water quality benefit estimate[14] was updated from 2001 to 2007 dollars to produce a $34.66 estimate. The EPA study did include estimated national benefits in the following categories for which data and methodology were available:

- Improvements in water quality and suitability for recreational activities ($5 million to $145 million);
- Reduced incidence of fish kills (up to just over $1 million);
- Improved commercial shell fishing ($2 million to $3 million); and
- Reduced contamination of private wells ($70 million to $77 million).

The previous EQIP BCA (USDA, NRCS, 2003) also estimated an annual $16.40 per AU benefit[15] due to nutrient value for crops. This benefit was updated from 2001 to 2007 dollars to 18.80 per AU and added to the crop nutrient benefit estimate, resulting in $53.46 per AU per year benefit. Note that this latter benefit denotes an increase in the productivity of existing inputs available to the producer. Thus, the benefits derived are mainly in lower production costs. In the aggregate, output would be expected to increase, resulting in lower prices. This aggregate impact on net economic welfare is beyond the scope of this analysis.

Sheet and rill water erosion

There are many conservation practices available in EQIP for reducing sheet and rill water erosion on cropland. National Resource Inventory (NRI) data and EQIP data indicate that since 1992, several million acres of farmed cropland had erosion reductions exceeding 10 tons per acre per year. In particular, analyses of historical EQIP data indicate erosion reductions of 8.6 tons per acre per year. Internal analysis of the 1997 NRI data provides evidence that EQIP can maintain this erosion reduction of 8.6 tons per acre per year.

For the purpose of this analysis, two main subcategories of benefits are reduction of fertilizer nutrient losses, and improved water quality. The sum of per acre annual benefits for the reduction of fertilizer nutrient loss at $11.92, and improvement of water quality at $42.40

[13]Based on work underlying the EPA Environmental and Economic Benefit Analysis of Final Revisions to the National Pollutant Discharge Elimination System Regulation and the Effluent Guidelines for Concentrated Animal Feeding Operations 2002 available at: http://cfpub.epa.gov/npdes/afo/cafodocs.cfm

[14]Appendix A, Table 18, 2003 EQIP BCA (USDA, NRCS, 2003)

[15]Table 21, 2003 EQIP BCA (USDA, NRCS, 2003)

produced a total benefit of $54.32 per acre per year for sheet and rill water erosion reduction. These are further discussed below.

Reduction of Fertilizer Nutrient Loss

This analysis assumes that on average, topsoil consists of 40 pounds of organic matter of which 23.2 pounds are carbon. With an average carbon-nitrogen ratio of 10 to 1, each ton of soil eroded contains 2.32 pounds of nitrogen. The soil also contains 0.05 percent phosphorus, or one pound per ton of soil. This analysis uses 2007 USDA price data of 48¢ per pound for phosphorus, 49¢ per pound for nitrogen and 23¢ per pound for potassium. The value of lost nutrients in each ton of soil eroded is valued at $1.39. Multiplying $1.39 per ton by 8.6 ton per acre per year gives a value for this averted loss of $11.92 per acre per year.

Improved water quality

Improved water quality benefits were estimated using the results of three studies as described in the previous EQIP benefit-cost analysis (see Appendix E). A per ton benefit of $4.93 updated from year 2000 to year 2007 (USDA, NRCS, 2003) was applied to the NRCS historic estimate of 8.6 tons per acre per year erosion reduction, to arrive at $42.40 per acre per year. This major component of sheet and rill water erosion benefit is environmental in nature and produces a substantial public good.

Grazing land productivity

For grazing land, the only practices included in this analysis were those resulting in increased forage production (see Appendix E). These benefits are mainly economic in nature (accruing to the producer in higher production efficiencies thereby lowering production costs). Nonetheless, these impacts are considered representative of part or all of the possible economic benefits that ultimately accrue to consumers as the expected increased output result in lower output prices. Namken and Flanagan (2000) report that these practices resulted in an average productivity increase of 1.3 animal unit months (AUMs) per acre. The AUMs were valued at $11.10 each, resulting in a per acre value of $14.43. The $14.43 value was updated from year 2000 to year 2007, resulting in a grazing land improvement benefit of $17.25 per acre per year.

These same practices also provide benefits in other environmental areas, such as wildlife habitat and water quality. These other benefits are accounted for in the appropriate benefit category.

Irrigation water use

EQIP funds are used in certain areas to install more efficient irrigation systems, and irrigation water management plans that prescribe measures to use irrigation water more efficiently. It is assumed that farmers could achieve a net reduction in irrigation water used by any or all of the following three methods: convert from irrigation to dryland production, convert to a crop or land use requiring smaller applications of water, and improve irrigation efficiency for the current crop.

Presumably any water saved would be available for other agricultural activities, municipality water, power generation, fish habitat, or sold locally via irrigation rental markets. A value that

could be assigned to the saved water is the price that competing uses would be willing to offer. Since prices are not available, the saved water was valued conservatively at the average price that farmers have paid to obtain the water.

The 2003 Farm and Ranch Irrigation Survey reported 32.3 million acres irrigated with groundwater at $29 per acre foot, and 13.8 million acres irrigated with off-farm surface water at $18 per acre-foot, including supply cost and variable cost. The weighted average value of the water is $25.73. Updating these values from 2003 to 2007 provides an estimated value of $28.56 per acre-foot. Using the 5.41 acre-inch efficiency gain per year, and assuming a 20-percent loss in storage and transmission produces an annual per-acre benefit of $10.30.

Air quality

Data on the impact of EQIP funded conservation practices to air quality is limited. This analysis attributes any improvements in air quality to reductions in wind erosion. It should be noted that there are practices funded through EQIP outside of erosion control that are expected to improve air quality, even though these benefits could not be numerically quantified for this study. These non-quantified benefits include less chemical drift control associated with crop production, improved dust and odor control in animal feeding operations, and reductions in the emissions of nitrous oxide materials (NO_x), organic compounds, and ozone precursors and depleters through improved animal feeding practices and crop nutrient management.

Ribaudo et al. (1989) estimated that the Conservation Reserve Program (CRP) produced an average benefit of $25 per acre net present value due to reduced soil erosion by wind (wind erosion) resulting in improved air quality. The estimates ranged from zero in the Appalachia, Corn Belt, Delta States, and Lake States, up to $52 in the Mountain states.

For this analysis, it was assumed that the practices reducing wind erosion will produce the same level of benefits to air quality (same levels of erosion control and reduction in off-site damages) as did CRP. The $25 per acre value from Ribaudo et al. was updated from 1988 to 2007. Therefore, the per-acre net present value is $39.75. This figure was converted to $5.29 per acre per year, using a ten-year time period and seven percent discount rate.

Fertilizer use

Benefits in this category were calculated by estimating expenditure savings due to reduced fertilizer purchased by the producer. Two sources of information were found that indicate relative reductions in nitrogen and phosphorus applications on lands utilizing nutrient management practices.

The first source, EPA (US EPA, 2003), gathered fertilizer input data from farmers located within eight USDA Demonstration Projects and eight Hydrologic Unit Projects. Results indicated that farmers reduced nitrogen use by an average of 51 pounds per acre, and phosphorus use by 26 pounds per acre after implementing nutrient management plans. Fertilizer application rates in this study varied across the country. The nitrogen application reduction ranged from a low of 21 pounds to a high of 72 pounds. Phosphorus reduction rates ranged from six to 55 pounds.

The second source was a study completed by Christensen et al. (1998) who surveyed 890 producers in 16 states. Producers were classified as low, medium, or high adopters of nutrient management practices. For the purposes of this analysis, a weighted average of the medium and high adopters was used to approximate the number of producers who adopted the NRCS nutrient management standard. The relative amounts of nutrients applied to crops and measurement of the impacts of moving from the base condition (the low adopters in the ERS study) to fully adopting the NRCS nutrient management standard (composite of the medium and high adopters) was approximated using the values in the Christensen et al. study.

A composite application rate of those who adopt nutrient management according to NRCS standards was developed and compared to those producers who do not adopt nutrient management practices. This comparison showed that the producers who adopted nutrient management had lower application rates of 25, 5, and 13 pounds per acre, for nitrogen, phosphorous, and potash, respectively.

For the purposes of this analysis, prices of nutrients are set based on data from the USDA National Agricultural Statistics Service (NASS) published in 2007[16]. Nitrogen is valued at 49¢ per pound (based on the national average price for Urea), phosphorus at 48¢ per pound (based on the national average price for DAP), and potash at 23¢ per pound (based on the national average price for 0-0-62). Multiplying these prices by the estimated reductions in application rates resulted in $17.65 per acre per year in savings (the sum of 25 lb times 49¢, 5 lb times 48¢, and 13 lb times 23¢). This component of benefits is comparable to the case of the value of nutrients for crops found in the ERS study.

Wildlife habitat

EQIP provides assistance with wildlife habit development and management. A literature review revealed that a great deal has been written about the values of wildlife conservation (Gibilisco and Filipek, Washington Department of Fish and Wildlife). The National Survey of Fishing, Hunting, and Wildlife-Associated Recreation,[17] conducted by the U.S. Fish and Wildlife Service, contains extensive data on consumer expenditures relating to wildlife-based activities.

For this analysis, benefits are calculated based on the study "Economic Valuation of Environmental Benefits and the Targeting of Conservation Programs: The Case of the CRP" (Feather, et al. 1999). Benefits are based on *use values*, or the value derived from 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 easiest to quantify. The study evaluated the quantity and quality of the land cover available for specific avian species, and then estimated the surplus resulting from converting land to CRP. Since establishing grassland or forest cover creates suitable habitat for

[16]USDA National Agricultural Statistics Service, Agricultural Prices available at: http://www.nass.usda.gov/QuickStats

[17]2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation available at: http://www.census.gov/prod/2008pubs/fhw06-errata.pdf

birds, small and big game hunters as well as wildlife viewers then benefit from these increased populations (Feather, p. 10). The model also incorporated travel costs, landscape diversity, and population density.

There are limitations to using CRP estimated benefits as part of an assessment of EQIP benefits because the two programs are quite different. For CRP, producers remove land from agricultural production; for EQIP, producers keep land in agricultural production. The minimum contract length under CRP is ten years. EQIP's contract length varies depending on the conservation practice (average contract length has been four to six years). Producers, however, typically maintain the conservation practices after EQIP obligations have expired.

The annual benefits for improved wildlife habitat include improved wildlife viewing ($10.02 per acre) and improved pheasant hunting ($2.36 per acre). These benefit estimates were reduced 50 percent ($6.19 per acre) to account for factors such as expected lower per acre benefits on "working" lands versus retired lands, different spatial proximity of EQIP lands than CRP lands, and shorter contract length. Adjusting the value from 2002 to 2007, the resulting benefit is $7.10 per acre.

A number of practices funded by EQIP benefit wildlife populations by reducing soil erosion and therefore improve aquatic habitat. However these benefits are already quantified in the water quality section of the analysis. The impacts of many other practices for wildlife are not included such as pasture and hay land planting, fencing, and ponds and as mentioned above, nature walking and big game hunting. In addition *nonuse values,* such as existence values, bequest values, or option values, are not quantified (Smith, 1996).

Energy use

No-till and mulch-till, often referred to as reduced tillage or conservation tillage, are practices that reduce the number of passes over cropland with farm equipment. This results in fuel savings as well as time savings for the producer. Using Conservation Effects Assessment Project (CEAP) estimates of the gallons of diesel fuel saved by implementing no-till and mulch tillage practices results in a savings of 2.99 gallons per acre.
Fuel savings formed the basis for the energy reduction benefit estimates used in this analysis. Price data are expressed in 2007 dollars. The Energy Information Administration[18] reported the national average diesel price to be $3.18 per gallon in October, 2007. Deducting federal and state fuel highway taxes of $0.24 and $0.22 per gallon gives a net price of $2.61 per gallon for agricultural purposes. Taking the fuel savings of 2.99 per acre multiplied by the fuel price of $2.61 gives the benefit of $7.81 per acre per year for implementing reduced tillage practices.

Although the benefit from higher energy use efficiency would appear to fall mainly into the private economic benefit category (as did the increased efficiency in fertilizer and animal waste nutrient use), the secondary environmental and economic impacts of lower energy use are perhaps more obvious than those previously addressed. Lower energy use translates into less possible environmental spillover effects in their production and use, as well as lowering US

[18]Energy Information Administration, Office Energy Statistics from the U.S. Government, Gasoline and Diesel Fuel Update. Available at: http://tonto.eia.doe.gov/oog/info/gdu/gasdiesel.asp#

demand on imported energy supplies. Determining the most appropriate category for EQIP's impact on energy use illustrates the difficulty to categorize the nature of many of these benefit categories into definitive public/private and economic/environmental benefits. The estimate used above (as was the case for the other economic benefits above) could best be interpreted as a first-approximation or proxy for part of these possible social economic impacts.

Carbon sequestration

The value of carbon benefits are based on the discussion of the "social cost of carbon" contained in EPA's "Technical Support Document on Benefits of Reducing GHG Emissions." [19] In addition to direct effects, wildlife habitat and range improvement practices are expected to increase carbon sequestration. In addition, residue and tillage practices associated with erosion control are expected to reduce oxidation of carbon from cropland, and in some cases actually increase carbon sequestration on those lands as well.

For the purposes of this analysis, USDA utilizes the three percent discount rate midrange domestic estimate of the social cost of carbon of $2.00 per metric ton, which yields a value per acre of carbon sequestration of 47¢ per acre per year.

Discounting of the Flow of Benefits over Time

Land treatments take time to install. Furthermore, each treatment practice produces it own variable stream of benefits over its useful life. These factors are accounted for in this analysis using a benefit factor to combine a 10-year benefit stream flow at a seven percent discount factor. Table 5 illustrates the average practice life span (years), annual effectiveness (percent), and the combined 10-year benefit stream flow (factor) for each benefit category. A detailed discussion of the expected benefits generated by producers as a result of their participation in EQIP is provided in Appendix E.

[19] Available at: www.regulations.gov. Please search on the full title of the document.

Table 5. Distribution of benefits over time from year of installation related to selected practices by benefit category.

Item	Sheet and rill water erosion	Grazing land productivity	Irrigation water use	Air quality	Fertilizer use	Wildlife habitat	Energy use	Carbon sequestration
Average Practice Life Span (years)	5.4	11.6	15.9	4.5	5.0	12.8	1.0	4.7
Year 1	0%	0%	0%	0%	0%	0%	0%	0%
Year 2	98%	100%	100%	83%	100%	32%	100%	81%
Year 3	100%	100%	100%	91%	100%	54%	100%	100%
Year 4	100%	95%	100%	92%	100%	69%	100%	100%
Year 5	88%	94%	99%	83%	50%	88%	80%	88%
Year 6	77%	87%	98%	71%	30%	96%	60%	75%
Year 7	65%	85%	97%	58%	20%	94%	40%	63%
Year 8	54%	79%	95%	43%	10%	91%	20%	51%
Year 9	48%	73%	95%	36%	0%	90%	10%	45%
Year 10	42%	68%	94%	28%	0%	88%	0%	39%
Combined 10-year benefit stream flow (7% discount factor)	5.10	5.77	6.38	4.49	3.42	4.89	4.11	4.86

For the benefit categories shown in Table 5, except for animal waste management, the "approved" (or contracted) practices during FY 2007 were used to calculate total benefits of EQIP. Only the first ten years of practice benefits are being used in this analysis and assumes no benefits occur in the first year of installation since during that year the contract would likely not be finalized until mid-year. Since many practices included in each benefit category have life spans that exceed ten years, it is likely total benefit production is being underestimated in this analysis.

It is important to note that the historical PRS data used in this analysis includes acres of conservation practices applied, not of acres treated. Any particular treated acre may have had more than one conservation practice applied on it, so a given treated acre may generate benefits in several benefit categories. Consequently, for the approach in this analysis, adding up benefits across categories is appropriate. However, to calculate the individual net benefits for each benefit category, one must ignore the fact that the cost of some practices may be counted in multiple benefit categories. Thus, neither the costs nor net benefits for each individual benefit category can be summed to arrive at overall costs or net benefits. The sum of program benefits across all benefit categories minus the "actual" total costs produces the overall net benefit. Using this approach, 95 percent of overall practice expenditures were accounted for. Monetary benefit estimates were not available for "benefits from non-analyzed practices" involving five

percent of total costs. The benefits from this five percent were not quantified at this time although their costs were included in the analysis.

Conservation practice implementation costs were based on ProTracts data. Most benefit units for practices were also based on ProTracts data. However, for some management practices, benefit units were based on FY 2007 PRS data. ProTracts treats management practices as recurring practices; treated acres may receive payments in multiple years (up to three years). This creates the potential for counting treated acres in multiple years. For example, the amount of acreage implemented in FY 2007 ProTracts may include acreage reported also in FY 2006 and/or FY 2005. As a result, it was decided that PRS data would be a better source for acreage of management practices implemented.

A detailed discussion of the expected benefits generated by producers as a result of their participation in EQIP is provided in Appendix E.

Procedure to compare total Program Costs and Benefits by Benefit Category

A benefit-cost analysis model that incorporated the above assumptions was constructed and used to compare expected costs with expected benefits. The baseline is roughly $1 billion of funding annually. Policy scenario 1captures the increased funding specified in the 2008 Act. The "mix" of conservation practices and cost-share rates from FY 2007 EQIP are assumed to be adopted by producers in each year FY 2008-FY2012. The procedure for comparing the baseline and policy scenario 1is summarized in the following steps:

1. Total EQIP funding was divided into FA (74 percent) and TA (26 percent). FA dollars are used to fund conservation practices that producers have agreed to apply in their EQIP contracts. All FA was assumed to be allocated in each year and assumed to be spent within the following five years. Since EQIP was funded at roughly $1 billion annually from FY 2005 to May 2008, both allocated and actual spending were roughly the same. All costs and benefits are estimated in 2007 dollars with a seven percent discount rate.

2. The "mix" of conservation practices and cost-share rates from FY 2007 EQIP was assumed to be adopted by producers in each year FY 2008-FY2012. FA would be expended accordingly in each fiscal year, adjusting for the different cost-share rates for each practice. The list of conservation practices is continually updated by NRCS. No adjustments were made for higher numbers of energy, organic, and forest practices emphasized in the 2008 Act.

3. Total EQIP and producer costs are estimated given the distribution of expected conservation practices adopted over FY 2008-FY 2012. The adoption of these conservation practices by EQIP participants is assumed to be solely attributed to their participation in EQIP (except for the CAFO exception discussed below).

4. Monetary benefit per unit was multiplied by total units treated to calculate total benefit for each of the nine benefit categories. These estimated benefits were directly linked to conservation practices and their beneficial environmental outcomes.

5. The environmental outcome for improved animal waste management was adjusted downward by 46 percent to account for the CAFOs meeting EPA's regulatory requirements.

6. The average practice life span of each practice was estimated by the proportion of the maximum of benefits expected to occur during the practice's first ten years giving a combined 10-year benefit stream flow factor. This factor was multiplied by the annual benefit.

7. Roughly five percent of the costs were associated with practices where benefits could not be quantified. These benefits were excluded from the analysis although their costs were still considered in the total costs figures used in the analysis.

Baseline Scenario: Benefits, Costs, and Net Benefits

The baseline scenario reflects FY 2007 EQIP parameters and $1 billion funding level applied to the five year period FY 2008 to FY 2012. A summary of the parameters and yearly distribution of funds follow:

- Animal waste management – 2.7 million animal units treated, generating $960 million in water quality and crop nutrient benefits and a net benefit of $117 million over total costs. This includes 1.1 million animal units in regulated large CAFOs (over 1,000 AUs) that would be treated with or without EQIP funds and whose benefits were accounted for in the 2003 EPA CAFO regulation.

- Sheet and rill water erosion – 8.0 million acres treated, generating $1.9 billion in total benefits and $1.0 billion in net benefits over total costs.

- Grazing land productivity – 35.6 million acres treated, generating $3.1 billion in total benefits and $750 million in net benefits over total costs.

- Irrigation water use – 4.0 million acres treated, generating $231 million in total benefits and a net loss of $1.3 billion compared to total costs.

- Air Quality – wind erosion reduced on 8.0 million acres, providing air quality benefits of $181 million and a net loss of $905 million compared to total costs. Benefits are not being totally accounted for in this instance as these conservation practices also produce energy, wildlife, carbon sequestration, and other currently non-measurable onsite and offsite benefits.

- Fertilizer use (non-animal waste nutrient management) – results in total fertilizer savings valued at $601 million, and $353 million in net savings over total costs generated on 11.4 million acres through improved nutrient management.

- Wildlife habitat – generated benefits of $172 million and a net loss of $115 million compared to total costs on 5.7 million acres of crop and grazing land.

- Energy use – net benefits generated on energy savings total $210 million. The costs of these practices were accounted for in the sheet and rill water erosion and air quality benefit categories. The energy use benefits are additional benefits derived from sheet and rill water erosion reductions and air quality practices.

- Carbon sequestration – benefits total $82 million. The costs of these practices have been accounted for in several of the above benefit categories. The carbon sequestration benefits represent additional benefits related to reduced sheet and rill water erosion and grazing land productivity practices.

For the baseline scenario, estimated total benefits equal $7.09 billion, estimated total costs equal $7.05 billion. Estimated net benefits equal $39 million, the difference between total benefits and total costs.

The total share of EQIP funds exceeds 100 percent due to the fact that numerous practice costs are counted in several benefit categories as discussed beforehand. This multiple counting over estimates EQIP expenditures in any one year and produces a lower B/C ratio for EQIP as a whole.

Table 6. Calculation of benefits and costs with a continuance of 2007 EQIP budget and program parameters by benefit category, FY 2008–FY 2012, using a seven percent discount rate.

		Benefit Category									
	Fund Year	Animal Waste Mng Small CAFOs (Animal Units)	Animal Waste Mng Large CAFOs (Animal Units)	Sheet and rill water erosion (Acres)	Grazing land Productivity (Acres)	Irrigation water use (Acres)	Air quality (Acres)	Fertilizer Use (Acres)	Wildlife habitat (Acres)	Energy use (Acres)	Carbon sequestration (Acres)
Analytical Parameters											
Share of EQIP funds		0.169	0.047	0.135	0.355	0.228	0.094	0.037	0.043	0.054	0.114
Benefit per acre		53.46	$53.46	$54.32	$17.25	$10.30	$5.71	$17.65	$7.10	$7.81	$0.47
Total costs per unit		52.29	$25.14	$107.00	$62.83	$360.18	$113.44	$20.64	$48.07	$46.04	$17.57
Cost share per unit		31.38	$15.08	$61.27	$36.27	$206.10	$42.68	$11.87	$27.92	$26.16	$9.97
EQIP Cost Share Funds:	2008	74.1	26.10	$98.3	$258.2	$165.5	$68.6	$27.0	$31.6	$39.0	$82.8
($ millions)	2009	74.1	26.10	$98.3	$258.2	$165.5	$68.6	$27.0	$31.6	$39.0	$82.8
	2010	74.1	26.10	$98.3	$258.2	$165.5	$68.6	$27.0	$31.6	$39.0	$82.8
	2011	74.1	26.10	$98.3	$258.2	$165.5	$68.6	$27.0	$31.6	$39.0	$82.8
	2012	74.1	26.10	$98.3	$258.2	$165.5	$68.6	$27.0	$31.6	$39.0	$82.8
	Totals	370.5	$130.7	$491.3	$1,290.9	$827.3	$343.1	$135.0	$158.0	$194.8	$414.0
NPV (2007) FA Share		$325,087,849	$114,643,154	$431,060,576	$1,132,649,237	$725,904,269	$301,057,305	$118,454,007	$138,671,126	$170,900,565	$363,227,331
NPV (2007) TA Share		$105,416,207	$4,888,199	$151,453,716	$397,957,840	$255,047,446	$105,776,891	$41,618,975	$48,722,288	$60,046,144	$127,620,414
NPV (2007) EQIP Costs		$430,504,056	$119,531,352	$582,514,292	$1,530,607,077	$980,951,715	$406,834,196	$160,072,982	$187,393,414	$230,946,709	$490,847,745
Acres or Animal Units Treated:		Animal Units	Animal Units	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres
	2008	314,256	230,536	1,603,714	7,117,250	802,793	1,607,768	2,274,088	1,132,042	1,489,240	8,305,089
	2009	314,256	230,536	1,603,714	7,117,250	802,793	1,607,768	2,274,088	1,132,042	1,489,240	8,305,089
	2010	314,256	230,536	1,603,714	7,117,250	802,793	1,607,768	2,274,088	1,132,042	1,489,240	8,305,089
	2011	314,256	230,536	1,603,714	7,117,250	802,793	1,607,768	2,274,088	1,132,042	1,489,240	8,305,089
	2012	314,256	230,536	1,603,714	7,117,250	802,793	1,607,768	2,274,088	1,132,042	1,489,240	8,305,089
	Totals	1,571,280	1,152,682	8,018,568	35,586,250	4,013,967	8,038,840	11,370,438	5,660,211	7,446,199	41,525,445
NPV of benefits:	2008	$126,264,500	$92,626,856	$444,095,609	$709,077,083	$52,734,408	$41,202,999	$137,058,327	$39,313,699	$47,838,600	$18,769,311
(to fund year)	2009	$126,264,500	$92,626,856	$444,095,609	$709,077,083	$52,734,408	$41,202,999	$137,058,327	$39,313,699	$47,838,600	$18,769,311
	2010	$126,264,500	$92,626,856	$444,095,609	$709,077,083	$52,734,408	$41,202,999	$137,058,327	$39,313,699	$47,838,600	$18,769,311
	2011	$126,264,500	$92,626,856	$444,095,609	$709,077,083	$52,734,408	$41,202,999	$137,058,327	$39,313,699	$47,838,600	$18,769,311
	2012	$126,264,500	$92,626,856	$444,095,609	$709,077,083	$52,734,408	$41,202,999	$137,058,327	$39,313,699	$47,838,600	$18,769,311
NPV (2007) Total Benefits		$553,949,036	$406,373,587	$1,948,341,256	$3,110,870,958	$231,356,989	$180,766,261	$601,303,836	$172,477,501	$209,878,042	$82,344,930
NPV (2007) Total Costs		$647,229,288	$195,960,121	$904,287,333	$2,359,781,803	$1,523,622,001	$905,933,262	$247,578,491	$287,463,157	$360,829,666	$767,733,580
Net Benefits over Total Costs		-$93,280,252	$210,413,465	$1,044,053,923	$751,089,156	-$1,292,265,012	-$725,167,001	$353,725,345	-$114,985,656	-$150,951,624	-$685,388,650

- Large CAFOs (over 1,000 animal units) were separated out since they were covered in February 2003 EPA CAFO regulation and its Benefit Cost Analysis (is consistent with 2003 EQIP BCA.).
- Benefits may be added across columns (categories) since some practices provide benefits in several categories.
- Costs cannot be added across columns for this would result in double counting.

Policy Scenario 1: Benefits, Costs, and Net Benefits

For policy scenario 1, EQIP's yearly funding allocation is set by the 2008 Act for FY2008 to FY2012. The "mix" of conservation practices and cost-share rates from FY 2007 EQIP are assumed to be adopted by producers in each year FY 2008-FY2012. The procedure for estimating benefits and costs is the same as the baseline scenario. Additional environmental benefits are expected to be proportional to the increase in budget outlays outlined in the 2008 Act even after considering different resource concerns and a heightened emphasis on "historically underserved participants". No adverse effects are expected as a result of this policy alternative. A summary of the parameters and yearly distribution of funds follow:

- Animal waste management – 4 million animal units[20] treated, generating $1.4 billion in water quality and crop nutrient benefits. This is $172 million over total costs.

- Sheet and rill water erosion – 12 million acres treated, generating $2.9 billion in total benefits and $1.5 billion in net benefits over total costs.

- Grazing land productivity – 53 million acres treated, generating $3.5 billion in total benefits and $1.0 billion in net benefits over total costs.

- Irrigation water use – 6 million acres treated, generating $340 million in total benefits and a net loss of $1.9 billion compared to total costs.

- Air Quality – wind erosion reduced on 12 million acres, providing air quality benefits of $266 million and a net loss of $1.3 billion compared to total costs. Benefits are not being totally accounted for in this instance because these practices also produce energy, wildlife, carbon sequestration, and other non-measurable environmental benefits on and off the agricultural operations.

- Fertilizer use (non-animal waste nutrient management) –total fertilizer savings valued at $885 million and $521 million in net savings over total costs generated on 17 million acres through improved nutrient management.

- Wildlife habitat – benefits of $254 million and a net loss of $170 million compared to total costs generated on 8.4 million acres of crop and grazing land.

- Energy use –energy savings total $309 million. The costs of these practices have been accounted for in the sheet and rill water erosion and air quality benefit categories. The energy use benefits are additional benefits derived from sheet and rill water erosion reductions and air quality practices.

- Carbon sequestration – benefits total $121 million. The costs of these practices have been accounted for in several of the above benefit categories. The carbon sequestration

[20]Of the 4 million units, 1.7 million animal units are in regulated large CAFOs.

benefits are simply additional benefits related to reduced sheet and rill water erosion and grazing land productivity practices.

Table 7 below shows the Calculation of Benefit Cost for EQIP funded land treatments, by benefit category for the FY 2008 EQIP Program.

Conclusions

This final benefit-cost analysis assumes that the basic program features of EQIP created in 2002 (the "current program") remain the same for the 2008 Act, except for funding, which was increased in the 2008 Act. The summary tables (Table 8 and Table 9) below show the estimated values of each benefit category and the estimated costs associated with EQIP for the "current" 2007-baseline and policy scenario 1 at FY 2008 funding levels and discount rates. Under the assumption that the current program (baseline scenario) continues at level funding, the expected present value of benefits discounted at 7 percent over the period of FY 2007 to FY 2012 is estimated at $7.1 billion, with $0.5 billion coming from improved animal waste management and $6.6 billion from improved land treatment. Expected net benefits are estimated at $39 million above total costs, including producer costs, other non-federal costs, and federal (EQIP) costs.

With increased funding (policy scenario 1), the estimated present value of benefits discounted at 7 percent over the period of FY 2007 to FY 2012 was $10.4 billion with $0.8 billion coming from improved animal waste management and $9.6 billion from land treatment. Estimated net benefits were $57 million above total costs. This provides $18 million in additional net benefits due to the increase of EQIP funds in the 2008 Farm Bill over the roughly $1.0 billion annual baseline funding.

The entire analysis was repeated using a 3 percent discount rate (Table 9). Net benefits equaled $1.395 billion for the baseline scenario and $2.069 billion for policy scenario 1. This provides $674 million in additional net benefits due to the increase of EQIP funds in the 2008 Farm Bill over the roughly $1.0 billion annual baseline funding.

Table 7. Calculation of benefits and costs with expanded funding as authorized by 2008 Act by benefit category, FY 2008–FY 2012, using a seven percent discount rate.

		Benefit Category									
	Fund Year	Animal Waste Mng Small CAFOs (Animal Units)	Animal Waste Mng Large CAFOs (Animal Units)	Sheet and rill water erosion (Acres)	Grazing land Productivity (Acres)	Irrigation water use (Acres)	Air quality (Acres)	Fertilizer Use (Acres)	Wildlife habitat (Acres)	Energy use (Acres)	Carbon sequestration (Acres)
Analytical Parameters											
Share of EQIP funds		0.169	0.047	0.135	0.355	0.228	0.094	0.037	0.043	0.054	0.114
Benefit per acre		53.46	53.46	$54.32	$17.25	$10.30	$5.71	$17.65	$7.10	$7.81	$0.47
Total costs per unit		52.29	25.14	$107.00	$62.83	$360.18	$113.44	$20.64	$48.07	$46.04	$17.57
Cost share per unit		31.38	15.08	$61.27	$36.27	$206.10	$42.68	$11.87	$27.92	$26.16	$9.97
EQIP Cost Share Funds:	2008	90.5	31.9	$120.0	$315.3	$202.1	$83.8	$33.0	$38.6	$47.6	$101.1
($ millions)	2009	100.8	35.6	$133.7	$351.3	$225.1	$93.4	$36.7	$43.0	$53.0	$112.7
	2010	109.3	38.6	$145.0	$381.0	$244.2	$101.3	$39.8	$46.6	$57.5	$122.2
	2011	119.8	42.2	$158.8	$417.2	$267.4	$110.9	$43.6	$51.1	$63.0	$133.8
	2012	132.0	46.5	$175.0	$459.8	$294.7	$122.2	$48.1	$56.3	$69.4	$147.5
	Totals	552.4	194.8	$732.4	$1,924.6	$1,233.4	$511.5	$201.3	$235.6	$290.4	$617.2
NPV (2008) FA Share		$478,657,649	$168,799,980	$634,691,339	$1,667,706,816	$1,068,817,651	$443,275,203	$174,411,060	$204,178,642	$251,633,099	$534,814,024
NPV (2008) TA Share		$155,214,273	$7,197,358	$222,999,660	$585,951,043	$375,530,526	$155,745,341	$61,279,562	$71,738,442	$88,411,629	$187,907,630
NPV (2008) EQIP Costs		$633,871,922	$175,997,338	$857,690,999	$2,253,657,860	$1,444,348,177	$599,020,544	$235,690,622	$275,917,083	$340,044,728	$722,721,654
Acres or Animal Units Treated:		Animal Units	Animal Units	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres
	2008	383,782	281,540	1,958,517	8,691,860	980,402	1,963,468	2,777,203	1,382,494	1,818,717	10,142,494
	2009	427,597	313,682	2,182,114	9,684,180	1,092,331	2,187,631	3,094,267	1,540,328	2,026,354	11,300,429
	2010	463,736	340,194	2,366,541	10,502,664	1,184,653	2,372,524	3,355,787	1,670,513	2,197,616	12,255,514
	2011	507,871	372,571	2,591,770	11,502,228	1,297,399	2,598,323	3,675,166	1,829,500	2,406,769	13,421,901
	2012	559,682	410,579	2,856,170	12,675,629	1,429,753	2,863,391	4,050,088	2,016,136	2,652,296	14,791,138
	Totals	2,342,667	1,718,566	11,955,112	53,056,560	5,984,538	11,985,338	16,952,512	8,438,971	11,101,751	61,911,476
NPV of benefits:	2008	$154,199,068	$113,119,482	$542,346,652	$865,952,227	$64,401,289	$50,318,688	$167,380,905	$48,011,402	$58,422,339	$22,921,804
(to fund year)	2009	$171,803,461	$126,033,956	$604,264,561	$964,815,106	$71,753,769	$56,063,405	$186,490,225	$53,492,704	$65,092,223	$25,538,710
	2010	$186,323,873	$136,686,041	$655,335,538	$1,046,358,940	$77,818,224	$60,801,748	$202,251,927	$58,013,777	$70,593,660	$27,697,180
	2011	$204,056,766	$149,694,781	$717,705,403	$1,145,943,446	$85,224,372	$66,588,398	$221,500,731	$63,535,089	$77,312,229	$30,333,188
	2012	$224,873,640	$164,965,912	$790,922,201	$1,262,846,997	$93,918,546	$73,381,421	$244,097,153	$70,016,628	$85,199,245	$33,427,631
NPV (2008) Total Benefits		$815,631,665	$598,342,345	$2,868,727,481	$4,580,430,139	$340,648,821	$266,159,298	$885,356,625	$253,954,971	$309,023,333	$121,244,245
NPV (2008) Total Costs		$952,977,021	$288,530,659	$1,331,467,942	$3,474,530,392	$2,243,373,071	$1,333,891,399	$364,533,276	$423,259,250	$531,283,714	$1,130,406,910
Net Benefits over Total Costs		-$137,345,356	$309,811,686	$1,537,259,540	$1,105,899,747	-$1,902,724,250	-$1,067,732,101	$520,823,349	-$169,304,278	-$222,260,381	-$1,009,162,665

- Large CAFOs (over 1,000 animal units) were separated out since they were covered in February 2003 EPA CAFO regulation and its Benefit Cost Analysis (is consistent with 2003 EQIP BCA.).
- Benefits may be added across columns (categories) since some practices provide benefits in several categories.
- Costs cannot be added across columns for this would result in double counting.

Table 8 Summary of cumulative 5-year EQIP benefits and costs over FY 2008–FY 2012, using a seven percent discount rate.

($ million of 2007 dollars)

Benefit Category:	To Not Implement EQIP	2007 EQIP with $1 billion / year FY 2008 - FY 2012	2008 Act Benefits & Costs	Increases with the 2008 Act	2007 EQIP with $1 billion / year (Acres or Animal Units)	2008 Act (Acres or Animal Units)	Unit
Animal waste management*	$0	$ 554	$ 816	$ 262	2,724,000	4,061,000	Animal Units
Sheet and rill water erosion	$0	$1,948	$2,869	$ 920	8,019,000	11,955,000	Acres
Grazing land productivity	$0	$3,111	$4,580	$1,470	35,586,000	53,057,000	Acres
Irrigation water use	$0	$ 231	$ 341	$ 109	4,014,000	5,985,000	Acres
Air quality	$0	$ 181	$ 266	$ 85	8,039,000	11,985,000	Acres
Fertilizer use	$0	$ 601	$ 885	$ 284	11,370,000	16,953,000	Acres
Wildlife habitat	$0	$ 172	$ 254	$ 81	5,660,000	8,439,000	Acres
Energy use	$0	$ 210	$ 309	$ 99	7,446,000	11,102,000	Acres
Carbon sequestration	$0	$ 82	$ 121	$ 39	41,525,000	61,911,000	Acres
Grand Total Benefits	$0	$7,091	$10,441	$3,350			
Costs:							
Total costs**	$0	$7,053	$10,384	$3,332			
Net Benefits:							
Net benefits	$0	$39	$57	$18			

*Environmental benefits from improved animal waste management attributed to EQIP are 42 percent below the total CAFO related benefits to account for environmental benefits captured by EPA regulatory requirements on large CAFOs. Likewise, costs associated with large CAFOs represent about 23 percent of NRCS costs related to CAFOs of all sizes were deducted from the analysis.

**Total costs include all federal costs plus private and other non-federal costs which have historically matched federal EQIP FA funding at an overall 50 percent cost-share rate discounted at seven percent and also the CAFO adjustment above of 23 percent, discounted at seven percent..

Table 9. Summary of cumulative 5-year EQIP benefits and costs over FY 2008–FY 2012, using a three percent discount rate.

($ million of 2007 dollars)

Benefit Category:	To Not Implement EQIP	2007 EQIP with $1 billion / year FY 2008 - FY 2012	2008 Act Benefits & Costs	Increases with the 2008 Act	2007 EQIP with $1 billion / year (Acres or Animal Units)	2008 Act (Acres or Animal Units)	Unit
Animal waste management*	$0	$ 696	$1,033	$ 336	2,724,000	4,061,000	Animal Units
Sheet and rill water erosion	$0	$2,438	$3,616	$1,177	8,019,000	11,955,000	Acres
Grazing land productivity	$0	$3,951	$5,858	$1,907	35,586,000	53,057,000	Acres
Irrigation water use	$0	$ 297	$ 440	$ 143	4,014,000	5,985,000	Acres
Air quality	$0	$ 225	$ 334	$ 109	8,039,000	11,985,000	Acres
Fertilizer use	$0	$ 716	$1,061	$ 346	11,370,000	16,953,000	Acres
Wildlife habitat	$0	$ 227	$ 336	$ 109	5,660,000	8,439,000	Acres
Energy use	$0	$ 254	$ 377	$ 123	7,446,000	11,102,000	Acres
Carbon sequestration	$0	$ 103	$ 153	$ 50	41,525,000	61,911,000	Acres
Grand Total Benefits	$0	$8,907	$13,208	$4,301			
Costs:							
Total costs**	$0	$7,512	$11,139	$3,627			
Net Benefits:							
Net benefits	$0	$1,395	$2,069	$674			

*Environmental benefits from improved animal waste management attributed to EQIP are 42 percent below the total CAFO related benefits to account for environmental benefits captured by EPA regulatory requirements on large CAFOs. Likewise, costs associated with large CAFOs represent about 23 percent of NRCS costs related to CAFOs of all sizes were deducted from the analysis.

**Total costs include all federal costs plus private and other non-federal costs which have historically matched federal EQIP FA funding at an overall 50 percent cost-share rate discounted at three percent and also the CAFO adjustment above of 23 percent, discounted at three percent..

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With valuable assistance from the developers of the 2008 EQIP Environmental Assessment.

Appendix A. How NRCS Conducts Its Business.

From 1985 to the present, conservation titles in Farm Bill legislation have had an important role in food and agricultural policy. From soil erosion prevention, to wetland restoration, to water quality improvements, to wildlife and energy conservation efforts, the intent of NRCS conservation activities has been to improve the quality of the environment for future generations.

In essence, the NRCS mission is to ensure the protection and restoration of our natural environment. The NRCS vision of "Productive Lands- Healthy Environment," mission statement of "Helping People Help the Land," and a recent campaign, "Conservation: Our Purpose and Our Passion" truly exemplify how conservation technical and financial assistance translates into environmental improvements and protection.

In order to accomplish conservation goals on private and other non-federal lands, NRCS is authorized through Farm Bill legislation to use a broad range of programs to encourage the voluntary conservation of natural resources. Accordingly, Congress and NRCS have recognized the importance of providing technical and financial assistance through conservation programs delivered at the state and local level. National Farm Bill legislation states that assistance is to be provided to the areas with the most pressing environmental resource concerns.

State and local conservationists play a pivotal role in accomplishing the NRCS mission of protecting and restoring natural resources. In each state, the state technical committee, which is comprised of representatives from Federal, state, local, and Indian Tribal governments as well as representatives of organizations knowledgeable about conservation and agricultural production issues and other interested individuals, advise and make recommendations to the NRCS State Conservationist on the implementation of NRCS-administered conservation programs. This includes the prioritization of natural resource concerns and other issues related to how and where financial assistance funds will be used to address environmental resource concerns in the individual states and territories. Local NRCS conservationist planners then prepare conservation plans in consultation with private landowners. Conservation plans are designed to address environmental resource concerns on private, non-Federal, or Native American Government lands. NRCS conservationists help individuals and communities take a comprehensive approach to planning the proper use and protection of natural resources on these lands through a nine-step planning process described in the NRCS National Planning Procedures Handbook (hereby incorporated by reference).

As part of this conservation planning effort, individual environmental reviews called Environmental Evaluations (EEs) are completed which inform the conservation planning effort and assist the agency's compliance with NRCS regulations that implement the National Environmental Policy Act (NEPA). The EEs are a concurrent part of the planning process in which the potential long-term and short-term impacts of an action on people, their physical surroundings, and natural resource concerns are evaluated and alternative actions explored. The EEs and conservation plans are developed to assist the landowner in making decisions and implementing the conservation practices identified in the conservation plan. The EEs produced for each landowner also consider the on-site economic costs and benefits of the conservation

plan. NRCS field staff are trained to knowledgably discuss the full economic costs and benefits of conservation systems with the landowners.

NRCS provides financial assistance (FA) and technical assistance (TA) EQIP funds to implement practices that meet NRCS conservation practice standards and specifications as documented in the agency's Field Office Technical Guides (E-FOTG) and the National Handbook of Conservation Practices (NHCP). These conservation practices are developed through a multi-disciplinary science-based process in order to minimize the risk of failure. NRCS practice standards are established at a national level, and set the minimum level of acceptable quality for planning, designing, installing, operating, and maintaining conservation practices. At a minimum, each conservation practice standard includes the definition and purposes of the practice, conditions in which the conservation practice applies, and the criteria supporting each purpose. When a conservation practice standard is developed or revised, NRCS publishes a notice in the Federal Register of the availability of the standard for review and comment for a period of not less than 30 days from the date of publication. Standards from the NHCP and interim standards are used and implemented by States, as needed, and may be modified to include additional requirements to meet State or local needs. Because of wide variations in site conditions such as soils, climate, and topography, States can revise these national standards and develop specifications to add special provisions or provide additional details in the conservation practice standards. State laws and local ordinances or regulations may also dictate more stringent criteria; in no case, however, can states use standards that are lower than national standards.

NRCS conservation practices are normally implemented as part of a conservation system that consists of one or more conservation practices. This is done not only to address the identified natural resource concerns, but also to avoid or minimize potential adverse ancillary impacts identified through the NRCS conservation process. When NRCS provides financial assistance for a single practice, it is because adverse ancillary impacts are not anticipated, or because the landowner is progressively implementing a plan.

Financial Assistance moving from cost-share rates to payment rates:

EQIP, as part of the 2002 Act, paid a percentage of the actual costs of implementing conservation practices as documented by producer receipts (historically referred to as a cost share). For the first time, the 2002 EQIP also paid incentive payments for management practices – most of whose benefits are difficult to measure. This change plus the burden on NRCS staff and producers in collecting the bills necessary to administer cost-share payments convinced NRCS to move, in fiscal year (FY) 2008, to a fixed rate, or payment schedule, for FA. This system bases FA on the establishment of payment schedules to set fixed rates for typical practice scenarios, as determined by each State. Moving to such a rate allows producers to know the exact amount of FA that they can expect to receive for implementing a given conservation practice(s) at the time of application and contracting.

The 2008 Act formalizes the payment schedule approach and places it into Statute. As defined by Congress, EQIP payments include financial and technical assistance provided to producers for performing conservation practice(s). EQIP payments include compensation for planning, design,

equipment, materials, labor, management, maintenance, training, and income forgone by the producer. The 2008 Act requires that payments made to producers may not exceed 75 percent of the costs or 100 percent of the income foregone by the producer. Incentive payments are no longer part of EQIP. Through a special rule in the 2008 Act, the Secretary of Agriculture may afford greater significance practices that promote conservation improvements in the following areas: residue management, nutrient management, air quality management, invasive species management, pollinator habitat, animal carcass management technology, and/or pest management. By affording greater significance, the Secretary may adjust the amount and rate of payment for practices that address these areas. The new payment system is based on typical costs incurred and income forgone, meeting World Trade Organization (WTO) obligations.

While the structure for payments has changed significantly, states still have the latitude to adjust the payment rates between program years. The upper limit in the statute remains 75 percent and 90 percent for historically underserved producers that include limited resource, beginning, and socially disadvantaged farmers and ranchers.

Since payment rates are fixed, there is the potential for making a payment to some producers for more than the actual cost of the practice. This is considered a minor issue by USDA when balanced with the administrative costs of collecting producer receipts and enforcement. The rule does include a provision stating that: "The payments to a participant under the program will be reduced proportionately below the rate established by the State Conservationist or designated conservationist, or the payment limit as set in paragraph (c) of this section, to the extent that total financial contributions for a conservation practice from other leveraged sources exceed 100 percent of the costs incurred for implementing or performing the conservation practice." It is expected that this flexibility will be rarely used as historically, there has been very few EQIP contracts associated with other funding sources.

The 2008 Act also includes a provision for payments dedicated to limited resource, beginning, or socially disadvantaged farmers and ranchers. Congress requires that NRCS shall increase payments to limited resource, beginning, and/or socially disadvantaged farmers or ranchers. These three groups form a new designation referred to as "historically underserved producers." The increased payments may not exceed 90 percent of the costs for a conservation practice or be no less than 25 percent above the otherwise applicable payment rate. Also, an advanced payment may be provided to historically underserved producers up to an amount not more than 30 percent of the applicable payment rate for purchasing materials or services. Lastly, up to ten percent of funding in any state must be allocated to either beginning farmers and ranchers or socially disadvantaged farmers and ranchers or any combination of the two adding up to ten percent.

Under the 2008 Act, assistance for the application of conservation practices is limited by the payment rate percentages described above, and by the total aggregate amount that can be paid to any one producer. Congress mandated that NRCS financial and technical assistance may not exceed the aggregate of $300,000 during any six-year period (with limited waiver authority to $450,000). The 2002 Act had allowed for the aggregate amount to not exceed $450,000 during any six-year period.

Table 10. EQIP enrollment backlog by state, FY 2007.

State	FIPS	Number of contracts	Cost share obligated	Total treated acres	Unfunded applications	Estimated unfunded application dollars	Percent Backlog of applications FY 2007 contracts
ALABAMA	01	1,274	$12,984,170	102,228	1,261	$12,871,884	99%
ALASKA	02	37	$4,568,731	2,197,302	47	$5,803,523	127%
ARIZONA	04	217	$20,309,444	796,032	177	$16,565,768	82%
ARKANSAS	05	1,263	$18,843,963	188,049	605	$9,026,600	48%
CALIFORNIA	06	1,192	$48,098,767	457,367	1,365	$55,079,538	115%
COLORADO	08	1,184	$28,540,270	544,326	714	$17,210,941	60%
CONNECTICUT	09	60	$4,431,657	2,392	14	$1,034,053	23%
DELAWARE	10	161	$5,850,099	30,355	210	$7,630,564	130%
FLORIDA	12	617	$20,137,719	152,268	565	$18,440,538	92%
GEORGIA	13	1,178	$16,406,237	111,684	1,226	$17,089,251	104%
HAWAII	15	82	$4,797,947	14,185	49	$2,867,066	60%
IDAHO	16	500	$15,055,858	238,169	451	$13,580,386	90%
ILLINOIS	17	1,643	$13,362,652	186,304	856	$6,961,916	52%
INDIANA	18	739	$11,455,788	124,610	212	$3,286,369	29%
IOWA	19	1,501	$21,351,879	126,316	1,471	$20,925,122	98%
KANSAS	20	1,635	$24,001,982	583,175	536	$7,868,539	33%
KENTUCKY	21	956	$10,825,096	64,712	319	$3,612,139	33%
LOUISIANA	22	1,129	$14,349,844	141,302	495	$6,291,559	44%
MAINE	23	281	$6,398,365	36,675	473	$10,770,201	168%
MARYLAND	24	405	$6,365,194	37,316	13	$204,315	3%
MASSACHUSETTS	25	107	$3,699,604	4,194	159	$5,497,543	149%
MICHIGAN	26	440	$15,888,153	103,316	288	$10,399,519	65%
MINNESOTA	27	1,528	$26,289,610	353,611	248	$4,266,900	16%
MISSISSIPPI	28	2,367	$15,867,936	145,170	2,163	$14,500,363	91%
MISSOURI	29	1,393	$20,420,022	178,636	2,813	$41,235,851	202%
MONTANA	30	771	$23,712,638	938,787	1,811	$55,698,555	235%
NEBRASKA	31	1,712	$26,167,340	593,110	1,531	$23,400,814	89%
NEVADA	32	95	$5,713,196	35,143	141	$8,479,585	148%
NEW HAMPSHIRE	33	139	$3,662,896	10,634	168	$4,427,097	121%
NEW JERSEY	34	90	$3,749,978	9,918	283	$11,791,597	314%
NEW MEXICO	35	518	$18,399,283	1,271,017	690	$24,508,697	133%

Table 10. EQIP enrollment backlog by state, FY 2007.

State	FIPS	Number of contracts	Cost share obligated	Total treated acres	Unfunded applications	Estimated unfunded application dollars	Percent Backlog of applications FY 2007 contracts
NEW YORK	36	535	$11,227,830	65,256	284	$5,960,194	53%
NORTH CAROLINA	37	680	$15,777,154	59,302	452	$10,487,168	66%
NORTH DAKOTA	38	712	$18,080,872	624,814	1,062	$26,968,938	149%
OHIO	39	1,242	$12,125,786	128,053	1,313	$12,818,963	106%
OKLAHOMA	40	1,643	$23,369,055	587,286	3,772	$53,650,703	230%
OREGON	41	580	$17,342,417	265,934	759	$22,694,646	131%
PENNSYLVANIA	42	430	$10,782,891	39,931	1,208	$30,292,400	281%
RHODE ISLAND	44	37	$2,296,397	2,838	33	$2,048,138	89%
SOUTH CAROLINA	45	411	$6,756,832	61,663	785	$12,905,384	191%
SOUTH DAKOTA	46	369	$16,996,536	728,231	729	$33,578,520	198%
TENNESSEE	47	991	$10,633,789	69,850	1,366	$14,702,176	138%
TEXAS	48	5,099	$72,109,823	2,661,741	3,078	$43,537,479	60%
UTAH	49	360	$18,428,662	196,864	1,312	$67,162,238	364%
VERMONT	50	38	$4,429,044	12,042	185	$21,562,449	487%
VIRGINIA	51	480	$11,664,192	53,804	191	$4,641,376	40%
WASHINGTON	53	470	$16,083,409	255,772	455	$15,570,109	97%
WEST VIRGINIA	54	519	$7,917,474	47,847	707	$10,785,462	136%
WISCONSIN	55	1,094	$17,461,890	181,950	374	$5,969,605	34%
WYOMING	56	508	$13,686,500	1,270,160	949	$25,567,892	187%
PACIFIC BASIN	71	36	$1,430,661	343	2	$79,481	6%
PUERTO RICO	72	252	$3,877,983	12,249	165	$2,539,155	65%
Totals		**41,700**	**$784,185,517**	**17,104,234**	**40,535**	**$864,849,270**	**97%**

Source: NRCS Program Contracting System (ProTracts) 09/30/2007

Table 11. EQIP cost-share rates by benefit category.

Sheet and rill water erosion	Grazing land productivity	Irrigation water use	Air quality	Fertilizer use	Wildlife habitat	Energy use	Carbon sequestration
59%	59%	59%	40%	59%	59%	59%	59%

Table 12. EQIP practices contracted and installed, FY 2007.

Practice Code and Name	Units	Approved Number Contracts	Approved Number Units	Approved Cost Share	Implemented Number Contracts	Implemented Number Units	Implemented Cost Share	Total Cost
431 Above Ground, Multi-Outlet Pipeline	Ft.	8	12,601	$94,185	5	11,000	$60,301	$101,449
472 Access Control	Ac.	1327	656,789	$7,404,641	1,157	347,594	$3,070,705	$5,408,456
560 Access Road	Ft.	713	1,783,790	$5,383,290	869	1,296,858	$4,791,014	$7,799,639
311 Alley Cropping	Ac.	29	180	$38,801	61	278	$16,972	$33,944
591 Amendments for the Treatment of Agricultural Waste	AU	67	200,754	$1,756,181	275	696,716	$603,713	$1,066,257
365 Anaerobic Digester, Ambient Temperature	No.	2	2	$632,830	1	1	$100,000	$172,414
366 Anaerobic Digester, Controlled Temperature	No.	3	3	$1,025,000	2	2	$105,000	$175,073
316 Animal Mortality Facility	No.	210	216	$2,285,889	184	181	$1,563,069	$2,934,994
575 Animal Trails and Walkways	Ft.	368	263,771	$1,891,614	422	241,898	$2,072,515	$3,056,921
450 Anionic Polyacrylamide	Ac.	2	702	$5,223	6	640	$1,819	$2,717
397 Aquaculture Ponds	Ac.	9	1,276	$14,655	96	9,671	$96,689	$148,753
370 Atmospheric Resource Quality Mgmt	Ac.	135	41,535	$2,534,508	855	178,619	$3,569,394	$6,225,248
314 Brush Management	Ac.	3925	748,690	$34,319,778	7,279	857,019	$27,224,536	$50,373,823
322 Channel Bank Vegetation	Ac.	21	93	$33,024	13	190	$26,835	$43,749
584 Channel Stabilization	Ft.	10	3,862	$116,473	26	13,330	$151,750	$252,048
326 Clearing and Snagging	Ft.	4	3,518	$49,776	5	4,040	$63,189	$108,947
360 Closure of Waste Impoundments	No.	161	171	$2,591,781	200	203	$3,679,148	$6,152,128
317 Composting Facility	No.	363	352	$6,271,685	330	306	$5,246,915	$8,904,689
327 Conservation Cover	Ac.	296	5,584	$454,155	395	5,362	$391,528	$647,379
328 Conservation Crop Rotation	Ac.	729	75,810	$6,417,986	2,638	198,226	$8,800,039	$15,666,136
332 Contour Buffer Strips	Ac.	6	331	$3,741	20	437	$11,358	$20,292
330 Contour Farming	Ac.	40	781	$102,637	130	3,194	$48,907	$93,455
331 Contour Orchard and Other Fruit Area	Ac.	24	121	$14,413	86	256	$11,463	$22,559
340 Cover Crop	Ac.	1000	240,739	$5,615,646	2,885	262,257	$4,489,614	$7,780,885
342 Critical Area Planting	Ac.	2992	23,716	$2,535,610	2,976	20,827	$2,121,320	$3,589,576
589A Cross Wind Ridges	Ac.	4	1,792	$25,284	19	5,030	$25,148	$37,534
589C Cross Wind Trap Strips	Ac.	1	2	$70	1	2	$2	$3
402 Dam	No. & Ac-Ft	10	1,709	$237,870	9	9	$55,539	$111,078
348 Dam, Diversion	No.	9	266	$58,627	14	24	$34,302	$54,756
324 Deep Tillage	Ac.	69	16,275	$297,118	158	18,562	$360,101	$587,491
356 Dike	Ft.	134	1,035,118	$1,349,061	126	795,010	$870,373	$1,360,915
362 Diversion	Ft.	635	843,844	$1,290,596	694	779,897	$1,486,021	$2,429,707
554 Drainage Water Management	Ac.	71	6,590	$584,674	74	1,558	$175,194	$267,358

Table 12. EQIP practices contracted and installed, FY 2007.

Practice Code and Name	Units	Approved Number Contracts	Approved Number Units	Approved Cost Share	Implemented Number Contracts	Implemented Number Units	Implemented Cost Share	Total Cost
647 Early Successional Habitat Development/Management	Ac.	144	1,315	$179,009	277	1,152	$56,000	$92,951
592 Feed Management	No. & Aus	26	7,376	$96,055	120	34,365	$157,927	$243,510
382 Fence	Ft.	9333	52,511,081	$58,838,721	13,578	40,030,843	$39,924,783	$68,633,449
386 Field Border	Ft.	453	2,553,054	$587,792	731	2,574,057	$532,400	$1,003,866
393 Filter Strip	Ac.	325	1,029	$73,592	523	2,558	$336,860	$565,327
394 Firebreak	Ft.	404	4,022,299	$452,964	350	2,143,285	$581,223	$998,414
396 Fish Passage	Mi.	3	3	$73,800	3	3	$14,193	$24,899
511 Forage Harvest Management	Ac.	131	9,209	$848,612	219	9,474	$245,605	$442,735
384 Forest Slash Treatment	Ac.	103	3,600	$525,269	88	1,410	$191,389	$305,180
666 Forest Stand Improvement	Ac.	1054	44,045	$6,051,250	1,783	43,666	$5,202,234	$8,943,170
655 Forest Trails and Landings	Ac.	125	12,295	$491,040	153	4,400	$337,767	$521,963
383 Fuel Break	Ac.	19	901	$113,840	16	111	$51,556	$84,905
410 Grade Stabilization Structure	No.	1822	3,127	$11,909,957	2,604	3,869	$10,989,387	$18,338,988
412 Grassed Waterway	Ac.	1379	46,226	$4,274,353	1,742	2,795	$4,069,231	$6,811,974
548 Grazing Land Mechanical Trmnt	Ac.	38	4,964	$73,250	59	10,625	$157,585	$268,411
561 Heavy Use Area Protection	Ac.	3201	219,562	$20,226,967	3,671	556,773	$17,906,206	$29,532,179
422 Hedgerow Planting	Ft.	59	106,843	$100,889	60	96,160	$104,306	$187,546
603 Herbaceous Wind Barriers	Ft.	12	1,515,655	$88,381	32	257,350	$46,332	$82,150
423 Hillside Ditch	Ft.	21	112,974	$31,399	35	75,494	$18,389	$36,777
320 Irrigation Canal or Lateral	Ft.	3	3,653	$40,050	4	3,451	$21,094	$36,419
388 Irrigation Field Ditch	Ft.	15	44,211	$42,040	23	33,484	$45,790	$71,116
464 Irrigation Land Leveling	Ac.	846	234,135	$13,298,606	1,207	74,442	$10,144,420	$18,189,835
552 Irrigation Regulating Reservoir	No.	154	2,769	$1,471,228	101	105	$681,752	$1,226,614
436 Irrigation Storage Reservoir	No. & Ac-Ft	51	5,555	$2,609,504	31	26,853	$1,319,147	$2,416,843
441 Irrigation System, Microirrigation	No. & Ac.	832	32,977	$21,884,040	1,118	58,109	$24,162,811	$42,770,249
442 Irrigation System, Sprinkler	No. & Ac.	2654	398,609	$59,124,810	3,483	379,328	$57,417,025	$100,556,251
443 Irrigation System, Surface and Subsurface	No. & Ac.	203	10,939	$2,660,520	130	11,797	$1,177,316	$2,011,778
447 Irrigation System, Tailwater Recovery	No.	73	8,113	$1,906,298	115	122	$1,639,522	$2,826,971
428B Irrigation Water Conveyance, Ditch & Canal Lining, Flexible	Ft.	1	2,000	$31,500	7	50,722	$91,557	$132,691
428A Irrigation Water Conveyance, Ditch and Canal Lining, Plain Concrete	Ft.	147	343,795	$4,624,505	311	523,699	$4,389,561	$7,396,229
430AA Irrigation Water Conveyance,	Ft.	4	4,015	$15,973	4	4,006	$15,988	$25,068

Table 12. EQIP practices contracted and installed, FY 2007.

Practice Code and Name	Units	Approved Number Contracts	Approved Number Units	Approved Cost Share	Implemented Number Contracts	Implemented Number Units	Implemented Cost Share	Total Cost
Pipeline, Aluminum Tubing								
430DD Irrigation Water Conveyance, Pipeline, High-Pressure, Underground, Plastic	Ft.	1955	4,180,904	$27,670,553	2,533	4,279,412	$25,291,751	$43,304,889
430EE Irrigation Water Conveyance, Pipeline, Low-Pressure, Underground, Plastic	Ft.	1043	2,133,213	$11,321,089	1,393	2,408,800	$11,142,168	$19,283,317
430CC Irrigation Water Conveyance, Pipeline, Nonreinforced Concrete	Ft.	12	41,601	$822,480	16	29,463	$287,878	$489,059
430FF Irrigation Water Conveyance, Pipeline, Steel	Ft.	94	6,562	$89,149	90	6,420	$69,074	$117,518
449 Irrigation Water Management	Ac.	2379	376,160	$8,560,012	4,230	517,799	$5,979,637	$10,236,481
460 Land Clearing	Ac.	59	361	$103,531	72	396	$154,655	$275,722
466 Land Smoothing	Ac.	96	6,935	$858,620	139	4,732	$436,996	$767,826
468 Lined Waterway or Outlet	Ft.	153	34,801	$1,007,354	158	24,194	$615,288	$1,003,246
634 Manure Transfer	No.	685	27,208	$10,574,209	954	1,451	$8,675,422	$14,867,799
353 Monitoring Well	No.	5	6	$9,000		64,128	$539,666	$910,216
484 Mulching	Ac.	513	11,470	$1,211,848	466	3,674,205	$25,679,474	$44,649,667
590 Nutrient Management	Ac.	7052	1,557,369	$26,999,841	22,388	3,197	$630,326	$967,356
500 Obstruction Removal	Ac.	186	33,100	$798,368	185	33,071	$181,565	$263,898
582 Open Channel	Ft.	6	16,457	$211,063	12	472,374	$18,604,641	$33,716,117
512 Pasture and Hay Planting	Ac.	6874	379,234	$24,860,533	9,431	2,346,470	$18,900,590	$31,776,506
595 Pest Management	Ac.	4724	1,596,034	$17,579,684	15,707	8,718	$250,657	$437,610
516 Pipeline	Ft.	6728	23,920,358	$33,026,949	8,163	19,915,281	$22,966,897	$38,428,202
378 Pond	No.	2639	2,890	$10,903,583	2,456	5,045	$7,172,834	$12,420,420
521C Pond Sealing or Lining, Bentonite Sealant	No.	36	37	$492,428	18	103,152	$263,980	$446,292
521D Pond Sealing or Lining, Compacted Clay Treatment	No.	40	40	$681,704	9	15,074	$68,668	$122,947
521A Pond Sealing or Lining, Flexible Membrane	No.	45	46	$1,102,961	36	104,486	$780,691	$1,313,495
521B Pond Sealing or Lining, Soil Dispersant	No.	31	39	$294,508	19	19	$121,066	$203,228
462 Precision Land Forming	Ac.	31	4,966	$318,135	29	29,495	$252,802	$472,707
338 Prescribed Burning	Ac.	752	175,900	$1,899,870	737	98,468	$835,209	$1,522,208
409 Prescribed Forestry	Ac.	1209	62,114	$620,330	625	25,422	$280,649	$461,893
528 Prescribed Grazing	Ac.	4307	2,951,074	$21,718,888	9,278	6,188,773	$18,076,458	$31,704,328
533 Pumping Plant	No.	2109	2,258	$9,837,127	1,915	1,980	$6,958,306	$12,080,317

Table 12. EQIP practices contracted and installed, FY 2007.

Practice Code and Name	Units	Approved Number Contracts	Approved Number Units	Approved Cost Share	Implemented Number Contracts	Implemented Number Units	Implemented Cost Share	Total Cost
550 Range Planting	Ac.	954	100,257	$4,416,661	1,221	98,954	$3,307,074	$5,901,376
568 Recreation Trail and Walkway	Ft.	1	1,200	$58,626	1	138	$3,171	$5,766
345 Residue and Tillage Management, Mulch Till	Ac.	708	338,825	$10,221,393	2,794	719,175	$9,061,664	$16,507,545
329 Residue and Tillage Management, No-Till/Strip Till/Direct Seed	Ac.	2358	867,998	$28,732,866	10,112	1,870,495	$31,313,939	$54,553,168
346 Residue and Tillage Management, Ridge Till	Ac.	7	3,078	$96,269	37	3,475	$31,027	$58,197
344 Residue Management, Seasonal	Ac.	39	20,296	$385,488	262	74,442	$553,138	$1,003,399
643 Restoration and Management of Rare and Declining Habitats	Ac.	202	5,088	$648,885	194	8,525	$479,023	$896,162
391 Riparian Forest Buffer	Ac.	124	669	$279,120	248	1,038	$181,164	$302,607
390 Riparian Herbaceous Cover	Ac.	26	233	$15,780	49	203	$20,680	$30,331
558 Roof Runoff Structure	No.	500	2,006	$1,008,841	504	537	$937,682	$1,490,251
557 Row Arrangement	Ac.	24	1,035	$18,035	9	109	$1,783	$3,524
570 Runoff Management System	No.	1	1	$20,000	3	4	$19,716	$29,093
610 Salinity and Sodic Soil Management	Ac.	55	5,247	$456,463	105	6,370	$175,295	$270,879
350 Sediment Basin	No.	206	8,808	$2,494,189	248	296	$2,640,325	$4,573,762
646 Shallow Water Development and Management	Ac.	36	5,490	$132,475	119	8,815	$78,519	$149,055
381 Silvopasture Establishment	Ac.	11	474	$56,000	3	143	$14,790	$28,123
632 Solid/Liquid Waste Separation Facility	No.	65	73	$1,488,557	26	24	$928,385	$1,503,345
572 Spoil Spreading	Ac.	3	8	$6,650	7	17,665	$18,200	$31,477
574 Spring Development	No.	663	803	$1,358,174	778	893	$1,242,449	$2,009,855
578 Stream Crossing	No.	602	2,594	$2,076,831	400	1,793	$993,394	$1,605,057
395 Stream Habitat Improvement and Management	Ac.	21	2,475	$238,406	31	2,778	$312,739	$523,174
580 Streambank and Shoreline Protection	Ft.	310	242,281	$6,668,102	422	313,002	$4,921,149	$8,267,298
585 Stripcropping	Ac.	28	1,529	$91,824	52	3,384	$55,611	$92,005
587 Structure for Water Control	No.	1719	37,148	$8,945,175	2,579	5,104	$7,459,099	$12,488,693
606 Subsurface Drain	Ft.	568	1,583,216	$2,677,007	570	1,182,526	$1,695,433	$2,974,233
607 Surface Drainage, Field Ditch	Ft.	6	10,940	$21,508	10	24,662	$29,236	$49,225
608 Surface Drainage, Main or Lateral	Ft.	4	126,399	$203,045	7	20,761	$102,609	$179,991
609 Surface Roughening	Ac.	1	98	$735	11	2,669	$25,604	$45,721
600 Terrace	Ft.	1478	14,204,934	$11,677,565	2,155	9,803,395	$8,343,265	$15,551,793
612 Tree/Shrub Establishment	Ac.	1574	61,755	$4,792,488	2,017	57,299	$3,392,563	$6,060,336

Table 12. EQIP practices contracted and installed, FY 2007.

Practice Code and Name	Units	Approved Number Contracts	Approved Number Units	Approved Cost Share	Implemented Number Contracts	Implemented Number Units	Implemented Cost Share	Total Cost
660 Tree/Shrub Pruning	Ac.	215	15,507	$834,463	187	4,205	$306,189	$519,968
490 Tree/Shrub Site Preparation	Ac.	1126	48,471	$5,436,526	1,233	45,193	$2,936,700	$5,400,647
620 Underground Outlet	Ft.	1580	2,796,529	$6,604,013	1,952	2,264,887	$5,292,254	$9,663,273
645 Upland Wildlife Habitat Management	Ac.	905	136,864	$1,648,031	1,095	53,613	$955,005	$1,709,964
635 Vegetated Treatment Area	Ac.	131	4,767	$365,693	85	71	$236,238	$354,468
601 Vegetative Barriers	Ft.	15	11,839	$42,751	20	15,723	$61,805	$123,214
630 Vertical Drain	No.	4	8	$19,443	13	42	$22,808	$44,595
367 Waste Facility Cover	No.	34	37	$1,002,114	12	10	$272,869	$436,319
313 Waste Storage Facility	No.	1570	1,553	$62,301,080	1,941	1,871	$64,540,336	$108,417,152
629 Waste Treatment	No.	29	34	$938,087	9	8	$372,374	$625,096
359 Waste Treatment Lagoon	No.	71	80	$1,004,871	184	186	$1,116,831	$1,903,701
633 Waste Utilization	Ac.	429	118,341	$4,699,518	1,604	251,601	$3,915,450	$7,069,907
638 Water and Sediment Control Basin	No.	786	3,763	$4,653,608	1,228	4,203	$4,261,157	$7,528,824
636 Water Harvesting Catchment	No.	20	27	$126,714	27	31	$205,259	$327,770
642 Water Well	No.	2663	2,780	$12,397,807	2,591	2,500	$9,330,102	$15,868,016
614 Watering Facility	No.	7870	17,519	$21,196,491	10,547	17,172	$15,090,165	$25,248,274
640 Waterspreading	Ac.	1	184	$19,145	5	1,049	$12,120	$19,694
351 Well Decommissioning	No.	315	1,219	$338,504	388	479	$305,329	$532,180
355 Well Water Testing	No.	8	9	$525	3	5	$580	$799
658 Wetland Creation	Ac.	6	6	$15,473	3	6	$4,720	$8,096
659 Wetland Enhancement	Ac.	14	184	$138,650	13	859	$28,708	$45,975
657 Wetland Restoration	Ac.	23	208	$131,105	30	507	$183,092	$288,704
644 Wetland Wildlife Habitat Management	Ac.	41	1,121	$78,808	51	589	$37,210	$67,697
380 Windbreak/Shelterbelt Establishment	Ft.	801	2,147,482	$1,818,656	1,096	2,366,782	$1,482,712	$2,518,411
650 Windbreak/Shelterbelt Renovation	Ft.	88	312,856	$274,622	148	415,968	$250,585	$439,317
Totals		**111,814**		**$727,130,701**	**94,973**		**$618,130,500**	**$1,068,999,600**

Table 13. Historical and projected EQIP technical and financial assistance, FY 1996–FY2012.

(thousands of dollars)

Fiscal year	Technical Assistance (TA)	Financial Assistance (FA)	Total TA & FA
1996	$10,500	$125,500	$136,000
1997	$20,000	$180,000	$200,000
1998	$38,000	$162,000	$200,000
1999	$33,060	$140,940	$174,000
2000	$33,060	$140,940	$174,000
2001	$37,989	$161,954	$199,943
2002	$35,530	$151,470	$187,000
2003	$176,159	$532,891	$709,050
2004	$230,933	$755,091	$986,024
2005	$263,005	$813,113	$1,076,118
2006	$262,616	$793,502	$1,056,118
2007	$261,990	$812,023	$1,074,013
2008	$318,000	$882,000	$1,200,000
2009	$354,305	$982,695	$1,337,000
2010	$384,250	$1,065,750	$1,450,000
2011	$420,820	$1,167,180	$1,588,000
2012	$463,750	$1,286,250	$1,750,000
Totals 1996-2012	**$3,343,967**	**$10,153,299**	**$13,597,266**

Appendix B. Concentrated Animal Feeding Operations and EPA Regulations

In February 2003, EPA revised the effluent limitations and permitting regulations for Concentrated Animal Feeding Operations (CAFOs). The 2003 rule added poultry operations with dry manure handling systems to the definition of CAFO, eliminated the exemption for operations that discharge only in a large 25-year, 24-hour storm event, and added requirements for land application areas under the control of a CAFO (68 FR 7176). The 2003 CAFO rule required any large CAFO with a potential to discharge manure, litter, or process wastewater to waters of the United States to apply for a National Pollutant Discharge Elimination System (NPDES) permit.

On February 28, 2005, the Second Circuit issued a decision in Waterkeeper Alliance et al. v. EPA regarding challenges to the 2003 rule. Among its decisions, the court vacated the 2003 rule requirement that all CAFOs must apply for permits or demonstrate that they do not have the potential to discharge. The court also vacated the rule provisions that allow permitting authorities to issue permits to CAFOs without including the terms of the CAFOs' nutrient management plans (NMP's) in the permits. The court also required that permitting authorities review NMP's and provide an opportunity for public review and comment.

In response to the Waterkeeper decision, EPA published a proposed rule in June 30, 2006. EPA proposed to require only owners or operators of those CAFOs that discharge or propose to discharge to seek authorization under an NPDES permit. Second, EPA proposed to require CAFOs seeking authorization to discharge under individual permits to submit their NMP's with their permit applications or, under general permits, with their notices of intent. Permitting authorities would be required to review the NMP and provide the public with an opportunity for meaningful public review and comment. Permitting authorities would also be required to incorporate terms of the NMP as NPDES permit conditions. The proposed rule also addressed the remand of issues for further clarification and analysis. These issues concern clarifications regarding the applicability of water quality-based effluent limitations (WQBELs); new source performance standards for swine, poultry, and veal CAFOs; and "best conventional technology" effluent limitations guidelines for fecal coliform.

On November 20, 2008, EPA revised the National Pollutant Discharge Elimination System (NPDES) permitting requirements and Effluent Limitations Guidelines and Standards (ELGs) for CAFOs[21] to allow these operators to voluntarily certify that they do not discharge or propose to discharge and as such have no duty to apply for a permit. The proposal would establish clear criteria that a CAFO must meet in order to be eligible for certification. The certification option would not change the requirement proposed in 2006 that CAFOs that discharge or propose to discharge would be required to seek permit coverage. In the event of an unforeseen accidental

[21]Revised National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitations Guidelines for Concentrated Animal Feeding Operations in Response to the Waterkeeper Decision, Federal Register, V73, No. 225, Page 70418. Available at http://www.epa.gov/npdes/regulations/cafo_final_rule_preamble2008.pdf.

discharge from a properly certified CAFO, the CAFO would not be liable for violation of the duty to apply for a permit, but the certification would no longer be valid.

EPA developed a framework for identifying the terms of the NMP that must be enforceable requirements of a CAFOs NPDES permit. The proposed framework includes three alternative approaches for specifying terms of the NMP with respect to rates of application, which are needed to satisfy the requirement that the NMP include "protocols to land apply manure, litter or process wastewater…that ensure appropriate agricultural utilization of the nutrients" (40 CFR 122.42(e)(1)(viii). The proposed framework would include supplemental annual reporting requirements for permitted CAFOs to accompany these proposed alternative approaches.

The existing regulation defines facilities with 1,000 animal units[22] (AU) or more as CAFOs. The regulation also states that facilities with 300-1,000 AU are CAFOs if they meet certain conditions.[23] With this in mind, the original EQIP regulations did not allow cost sharing on CAFOs greater than 1,000 AU since the animal waste from these facilities would be covered by the EPA regulations. Therefore, EQIP cost sharing would have little additional environmental benefits.

The original EQIP statute was specifically changed to allow cost sharing of large CAFOs to help them meet regulations. SEC.1240. PURPOSES states,

"The purposes of the environmental quality incentives program established by this chapter are to promote agricultural production and environmental quality as compatible goals and to optimize environmental benefits, by—

> (1) assisting producers in complying with local, State, and national regulatory requirements …
> (2) avoiding, to the maximum extent practicable, the need for resource and regulatory programs …
> (3) providing flexible assistance to producers to install maintain conservation practices that sustain food and fiber production while—
>> (A) enhancing soil, water, and related natural resources, including grazing land, forestland, wetland, and wildlife; and
>> (B) conserving energy;
> (4) assisting producers to make beneficial, cost effective changes to production systems (including conservation practices related to organic production), grazing management, fuels management, forest management, nutrient management associated with livestock, pest or irrigation management, or other practices on agricultural and forested land; and

[22] According to the 2002 NPDES definition (EPA) an animal unit (AU) is one slaughter or feeder cattle, 0.7 mature dairy cows, 2.5 swine (other than feeder pigs), 30 laying hens or broilers (if liquid system), or 100 laying hens or broilers (if continuous overflow watering).

[23] The term AU is a measurement established in the 1970 regulations that attempted to equalize the characteristics of the wastes among different animal types; there are significant differences between the legally defined EPA definition and the USDA definition. The analysis underlying this report translates between the two definitions as needed.

(5) consolidating and streamlining conservation planning and regulatory compliance processes to reduce administrative burdens on producers and the cost of achieving environmental goals."

The economic analysis shown here identifies the economic and environmental impacts of the conservation practices installed with the FA and TA provided by EQIP funds to livestock producers, including CAFOs. The analysis includes measures being installed on a voluntary basis, those being installed to avoid the need for new regulations, and those assisting producers in complying with regulatory requirements. The increased livestock percentage of program costs, and the increased cost limitation was added precisely to help large livestock producers comply with these EPA regulations; therefore we feel it is important to identify the impact of the EQIP regulation on compliance with other rulemakings.

On the other hand, the costs and benefits of regulating CAFOs has already been analyzed and attributed to EPA regulations. Although we have provided an analysis of the relationship between these programs, this analysis separates the costs and benefits of the EPA regulations on large CAFOs and the costs and benefits of EQIP spending to assist producers in complying with the EPA regulations so as not to double-count any costs and/or benefits. These adjustments are found in Appendix D (on costs) and Appendix F (on benefits). If one were to assume that the benefits generated through EQIP funding on all animal waste discharge activities be assigned to the EPA CAFO regulations, the net benefits of EQIP would obviously be lower than under alternative assumptions (Table 14). In the case of costs, the EQIP FA and TA incurred in assisting producers to comply with EPA regulatory requirements associated with large CAFOs can be seen as transfer payments to producers in meeting an "unfunded" mandate by EPA acting much like a "shock absorber" for producers to acquire needed capital and technical expertise to meet EPA requirements. However, they represent real adjustment costs that would have been incurred by the producer through their own private sources or by NRCS in this case. Given this situation, we believe it is appropriate to reduce NRCS costs incurred in providing such assistance. EQIP conservation practices for large (regulated) CAFOs (over 1,000 AUs) and small CAFOs (under 1,000 AUs) were analyzed separately. Costs and benefits associated with the larger CAFOs are adjusted out of the summary EQIP cost and benefit Tables 1, 8, 9 and 14. Detailed costs and benefits of working with both large and small CAFOs are included in separate columns in Tables 6 and 7. Construction costs of building waste management structures have large economies of scale.

Table 14. Summary of cumulative 5-year EQIP benefits and costs over FY 2008–FY 2012, using a seven percent discount rate.

($ million of 2007 dollars)

Benefit Category:	To Not Implement EQIP	2007 EQIP with $1 billion / year FY 2008 - FY 2012	2008 Act Benefits & Costs	Increases with the 2008 Act	2007 EQIP with $1 billion / year (Acres or Animal Units)	2008 Act (Acres or Animal Units)	Unit
Animal waste management*	$0	$ 554	$ 816	$ 262	2,724,000	4,061,000	Animal Units
Sheet and rill water erosion	$0	$1,948	$2,869	$ 920	8,019,000	11,955,000	Acres
Grazing land productivity	$0	$3,111	$4,580	$1,470	35,586,000	53,057,000	Acres
Irrigation water use	$0	$ 231	$ 341	$ 109	4,014,000	5,985,000	Acres
Air quality	$0	$ 181	$ 266	$ 85	8,039,000	11,985,000	Acres
Fertilizer use	$0	$ 601	$ 885	$ 284	11,370,000	16,953,000	Acres
Wildlife habitat	$0	$ 172	$ 254	$ 81	5,660,000	8,439,000	Acres
Energy use	$0	$ 210	$ 309	$ 99	7,446,000	11,102,000	Acres
Carbon sequestration	$0	$ 82	$ 121	$ 39	41,525,000	61,911,000	Acres
Grand Total Benefits	$0	$7,091	$10,441	$3,350			
Costs:							
Total costs**	$0	$7,053	$10,384	$3,332			
Net Benefits:							
Net benefits	$0	$39	$57	$18			

*Environmental benefits from improved animal waste management attributed to EQIP are 42 percent below the total CAFO related benefits to account for environmental benefits captured by EPA regulatory requirements on large CAFOs. Likewise, costs associated with large CAFOs represent about 23 percent of NRCS costs related to CAFOs of all sizes were deducted from the analysis.

**Total costs include all federal costs plus private and other non-federal costs which have historically matched federal EQIP FA funding at an overall 50 percent cost-share rate discounted at seven percent and also the CAFO adjustment above of 23 percent, discounted at seven percent..

Appendix C. Relationship of EQIP to Other Farm Bill Conservation Programs

In addition to EQIP, there are several other conservation laws that help to conserve, enhance, protect, and improve private and non-federal lands. A brief overview of the relevant Federal programs is provided below. Other programs described below could be used in adjacent tracts and therefore can lead to overlapping cumulative effects for environmental resources with varying geographical ranges. Further, other cumulative effects might result from corridor conservation projects that may affect more than the site in which the conservation project may be applied.

It is important to note that land enrolled in other conservation programs is eligible for EQIP provided:

- EQIP does not pay for the same practice on the same land as any other USDA conservation program.
- Land enrolled in CRP and Conservation Reserve Enhancement Program (CREP) may only be offered for enrollment during the last year of the contract and no EQIP practice shall be applied on that land until after the CRP contract has expired or has been terminated.
- The EQIP practices do not defeat the purposes of either EQIP or the other conservation program.

Conservation Reserve Program CRP) / Conservation Reserve Enhancement Program (CREP)

The CRP and CREP are programs designed to establish vegetative cover on environmentally sensitive lands. These programs have also been characterized as land idling programs, designed to idle existing cropland for varying amounts of time. The intent of the programs is to retire marginally productive lands that also contribute significant amounts of pollutants to surface waters when used for agricultural production or provide significant wildlife benefits if idled with appropriate vegetative cover, or both.

The impact of these programs is to reduce the amount of low productivity land used to produce crops in the United States, provide a source of steady reliable income to owners of the enrolled cropland, reduce agricultural non-point source pollution, and provide habitat for wildlife species.

Land enrolled in CRP/CREP is eligible for EQIP provided the practices contracted through EQIP are applied after the CRP/CREP contract expires. There is very little CRP acreage with EQIP contracts on them, and this is not expected to change with the implementation of the new Farm Bill.

Wetlands Reserve Program (WRP)

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

The program offers landowners three options including a permanent easement, a 30-year easement, and a restoration cost-share agreement only. The financial assistance offered to landowners varies with each of the options. A permanent easement offers 100 percent of the value of an easement (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 of the same easement along with 75 percent of the restoration costs. A cost-share agreement only provides 75 percent of the costs of restoration. There is no easement involved with this option; however, the cost-share agreement is normally for a period of ten years.

Impacts of the program include an immediate payment to the successfully enrolled landowner, a reduction in the production of agricultural commodities, improved wildlife habitat, especially for those species specifically associated with wetland environments, and other wetland functions and value. Since the WRP participants is already participating in an NRCS program on part of their land, they are likely to participant with EQIP, WHIP (see below), or another program on their remaining working lands.

Wildlife Habitat Incentives Program (WHIP)

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

Privately owned agricultural lands, non-industrial private forest lands (NIPF) and tribal lands are eligible. This program is not primarily a land idling program, since very little cropland is enrolled in WHIP. However, WHIP may be used to enhance wildlife habitat on working forest and range lands. 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.

Farm and Ranch Lands Protection Program (FRPP)

The intent of the Farm and Ranch Land Protection Program is to help farmers keep their land in agricultural use and protect associated conservation values. 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. EQIP could potentially be used by landowners enrolled in FRPP to help address specific practice needs.

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 farm and ranch lands in agricultural uses, but also maintains green space in areas subject to development pressures.

Conservation Security Program (CSP)

The Conservation Security Program (CSP) was a voluntary program that provided financial and technical assistance to promote the conservation and improvement of soil, water, air, energy, plant and animal life, and other conservation purposes on Tribal and private working lands. Working lands include cropland, grassland, prairie land, improved pasture, and range land, as well as forested land that is an incidental part of an agriculture operation. The Farm Security and Rural Investment Act of 2002 (2002 Act) (P.L. 107-171) amended the Food Security Act of 1985 to authorize the program. The program was intended to reward landowners for their efforts on behalf of land stewardship. Payments were made to holders of agricultural lands at varying levels depending on the level of conservation applied to the land. The Conservation Security Program also made technical and financial assistance available to help producers reach and maintain these high levels of conservation. This technical and financial assistance was similar to the EQIP cost sharing, using the same 75 percent maximum cost-share limits. The 2008 Act terminated the 2002 Conservation Security Program by prohibiting any new Conservation Security Program contracts after FY 2008, and providing enough funds to complete the current contracts.

Conservation Stewardship Program (CStP)

The Conservation Stewardship Program (CStP), a new program established in the 2008 Act, is designed to encourage agricultural producers to address resource concerns in a comprehensive manner by improving, maintaining and managing existing conservation activities and undertaking additional conservation activities. Privately owned and tribal agricultural lands and associated forested lands, including non-industrial private forest lands, are eligible for enrollment in CStP. Participants enter into contracts for a period of five years during which they agree to continue existing conservation activities to address at least one resource concern and to install or adopt other conservation activities to meet or exceed stewardship thresholds for at least one additional resource concern. In return, payments are provided for installing and adopting these additional conservation activities.

EQIP will be used by some producers to enable them to move to greater levels of resource protection, and allow the producers to qualify for enrollment in CStP at a later period. In both Federal program implementation and on-farm assistance, the current EQIP rules are setting standards that will probably be adopted as the CStP implementation rules are finalized. The expectation of obtaining longer-term payments for maintaining conservation practices may increase the number of EQIP applications through the life of this Farm Bill. The interaction of these two programs will benefit each and succeed in obtaining more conservation on the ground.

Participation in CStP then provides incentives for the producers to continue the conservation activities that were started under EQIP and to address additional resource concerns.

Grassland Reserve Program (GRP)

The Grassland Reserve Program is targeted toward protecting grassland and shrub land under threat of conversion to other uses. Landowners may enroll in a permanent or 30-year (or the maximum allowed under State law if different) easement 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. The rental agreements receive up to 75 percent of the grazing value in an annual payment for the length of the contract. 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 when enrolled in the program.

While the Grassland Reserve Program can fund any needed conservation practices under its existing authority, the funding for the program may be somewhat limited. The easements to maintain lands in a grassland use may be relatively costly, and use the bulk of the funds available to the program. EQIP could provide assistance with installing any needed conservation practices and help the Grassland Reserve Program achieve its goals.

State and Private Forestry Programs (U.S. Forest Service)

The U.S. Forest Service, through its State and Private Forestry (S&PF) mission area provides expert advice, technology, and financial assistance to help landowners and resource managers sustain the Nation's forests and protect communities and the environment from wild land fires.

Through grants and cooperative agreements, State forestry agencies and other partners deliver the majority of this landowner assistance through three State and Private Forestry "umbrella" program areas that receive annual federal appropriations: Forest Health Management; Cooperative Fire Protection; and Cooperative Forestry. Forest Health Management assistance includes conducting suppression, prevention, and management activities on native and non-native insect and disease forest pests and invasive plants.

Cooperative Fire Protection programs focus on the urgent need to reduce the threat of wild land fires in wild land-urban interface areas. Assistance is provided to complete community wildfire protection plans and to implement high priority hazard mitigation projects identified in those plans, which often includes non-industrial private forest (NIPF) lands.

Cooperative Forestry programs provide TA and FA to complete a long-term multi-resource forest stewardship plan. Assistance is provided to forest landowners for conservation easements and other mechanisms to conserve private forests. From 2003 to 2006, the Forest Land Enhancement Program (enacted with 2002 Act) provided cost-share assistance to private landowners for forestry and agro-forestry practices, however new funding for the program ended in FY 2006.

Cooperative Forestry Programs include the Forest Stewardship Program (FSP) and the Forest Legacy program. The FSP provides technical and financial assistance to States to encourage the long-term stewardship of NIPF lands. Long-term multi-resource forest stewardship plans provide landowners with the information they need to achieve their unique objectives while

sustaining a variety of environmental goods and services including clean air and water, biodiversity, and wildlife habitat. Forest stewardship plans enable landowners to keep their forests in a healthy condition to reduce the risk of wildfire and pest/disease infestations. Forest stewardship plans also contribute to the future supply of forest products from private lands and thus, the health of our rural economies. Some of the assistance in these programs may appear, instead, in the form of TA and FA associated with EQIP in the future in areas where forestry resource concerns are identified as important resource concerns in EQIP ranking and funding decisions. This assistance may displace or supplement current FSP activities.

The Forest Legacy Program helps protect environmentally important Forest areas that are threatened by conversion to non-forest uses. The Program uses conservation easements and other mechanisms to conserve private forests and operates on a "willing seller and willing buyer" basis. Eminent domain or adverse condemnation is not authorized.

Summary of EQIP Interaction with Other Programs

Because EQIP is a working lands program, very little interaction between it and USDA's land-idling programs, like CRP/CREP and WRP is expected. A substantial amount of interaction can be expected with NRCS programs intended to support agricultural activities on the land. These programs include: the easement programs of FRPP and GRP and enhancement programs like WHIP and CStP. However, there are limitations on CStP participants to use EQIP funding to enable them to address that program's priority resource concerns in order to become eligible for CStP in the same year. Instead, applicants who do not meet the requirements of CStP can use EQIP funds to increase their stewardship levels and improve their likelihood of CStP enrollment in future CStP programs. Thus, it is expected that for the most part, EQIP will have little or no direct overlap with most of the other conservation programs contained in the Farm Bill. Any over-lap of EQIP with other programs will likely take the following forms: assistance to producers who enroll in the GRP and FRPP to address their conservation needs, and EQIP-assistance to producers to address resource concerns in order to become eligible for participation in CStP in future enrollments. Some displacement or additional levels of activity could occur related to forestry efforts of the Forest Stewardship Program.

Appendix D. Development of Expected Costs by Benefit Category

Sheet and Rill Water Erosion

Table 15 lists the practices that were classified as affecting sheet and rill water erosion when applied either by themselves or in combination with each other. A few of these practices used to prevent soil eroded from a land area from leaving the area are not reported in acreage units, therefore assumptions (Table 15 footnotes) were used to convert the units of treatment (generally linear feet, as in feet of terraces) to acres treated. It was assumed that on average, two practices were applied per acre.

Table 15 indicates that based on FY 2007 EQIP contracts, these practices received 13.5 percent of EQIP cost-share funds and had an average cost share of $61 per acre while the average total costs was $107 per acre (excluding the cost of government provided technical assistance). Note that these costs are not an "annual" cost, but rather a "contract" cost and reflect the total costs of applying the practice as contracted over a five-year period. The majority of practices are measured on an acreage basis, which makes it an easy conversion to calculate acreage protected. However, since it is common to install multiple related practices, it was assumed that the average treated acre would use 1.5 of the listed practices. A few practices with units other than acres are being considered associated practices. Installation costs are included in the analysis; however, the assumption is that these practices are installed as part of the conservation system.

Grazing Land Productivity

Table 16 shows a list of EQIP practices classified as having an impact on grazing land productivity, which would be expected to be implemented on 26.4 million acres if the FY 2007 acreage total persisted over FY 2008- FY 2012. Since it is rare that only single grazing related practices are installed, it was assumed that the average treated acre would use 1.5 of the listed practices. Average cost share and total costs were just over $36 and just under $63 per acre, respectively. The share of these practices in overall EQIP funding was 35.5 percent. Note that as in the case of the USLE reduction, some practices were in non-acre units and are being included as associated practices. These practices are assumed as a benefit to grazing productivity; however, only costs are included in the analysis. For grazing land, only practices included were those resulting in increased forage production. Practices expected to provide benefits in other environmental areas (such as wildlife habitat and water quality) are partly accounted for in the other benefit categories.

Irrigation Water Use

Table 17 shows the practices assigned to the benefit category of irrigation water savings. Irrigation practices account for 22.81 percent of the total funds. The program is projected to treat 3.7 million acres with a cost share of approximately $206 per acre and total costs of roughly $360 per acre. Table 17 shows that a large set of practices 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. Analysis of NRCS

agency Performance Resource System (PRS) data indicated that historical EQIP irrigation practices had resulted in reduced water applications of 5.41 acre-inches per acre.

Table 15. Historical EQIP data on practices affecting sheet and rill water erosion.

Practice Code and Name	Units	Approved Contracts* Contracts	Approved Contracts* Units–No.	Approved Contracts* Cost Share	Implemented Contracts** (excludes contract units not cost shared) Contracts	Implemented Contracts** (excludes contract units not cost shared) Units[A]–No.	Implemented Contracts** (excludes contract units not cost shared) Cost Share	Implemented Contracts** (excludes contract units not cost shared) Total Costs	Implemented Contracts** (excludes contract units not cost shared) Acres[B] Protected
329 Residue and Tillage Management, No-Till/Strip Till/Direct Seed	Ac.	11,790	4,339,988	$143,664,330	10,023	5,081,368	$156,569,693	$272,765,839	5,081,368
345 Residue and Tillage Management, Mulch Till	Ac.	3,540	1,694,125	$51,106,966	3,009	2,636,524	$45,308,322	$82,537,727	2,636,524
328 Conservation Crop Rotation	Ac.	3,645	379,049	$32,089,928	3,099	991,132	$44,000,197	$78,330,679	991,132
340 Cover Crop	Ac.	5,000	1,203,697	$28,078,232	4,250	1,311,286	$22,448,068	$38,904,427	1,311,286
412 Grassed Waterway	Ac.	6,895	231,128	$21,371,765	5,861	13,973	$20,346,154	$34,059,870	13,973
342 Critical Area Planting	Ac.	14,960	118,578	$12,678,050	12,717	104,135	$10,606,600	$17,947,879	104,135
327 Conservation Cover	Ac.	1,480	27,921	$2,270,775	1,258	26,812	$1,957,642	$3,236,896	26,812
344 Residue Management, Seasonal	Ac.	195	101,479	$1,927,440	166	1,226,248	$2,765,688	$5,016,995	1,226,248
635 Vegetated Treatment Area	Ac.	655	23,835	$1,828,467	557	357	$1,181,192	$1,772,342	357
330 Contour Farming	Ac.	200	3,905	$513,183	170	15,971	$244,533	$467,273	15,971
346 Residue and Tillage Management, Ridge Till	Ac.	35	15,392	$481,345	30	38,660	$155,137	$290,987	38,660
586 Stripcropping	Ac.	140	7,644	$459,118	119	16,919	$278,053	$460,024	16,919
393 Filter Strip	Ac.	1,625	5,146	$367,958	1,381	12,792	$1,684,301	$2,826,635	12,792
311 Alley Cropping	Ac.	145	898	$194,005	123	1,392	$84,861	$169,722	1,392
331 Contour Orchard and Other Fruit Area	Ac.	120	604	$72,067	102	1,280	$57,317	$112,797	1,280
450 Anionic Polyacrylamide	Ac.	10	3,510	$26,115	9	3,199	$9,095	$13,585	3,199
332 Contour Buffer Strips	Ac.	30	1,655	$18,705	26	2,186	$56,792	$101,460	2,186
Associated Practices[C]									
410 Grade Stabilization Structure	No.	9,110	15,634	$59,549,785	7,744	19,345	$54,946,934	$91,694,940	
600 Terrace	Ft.	7,390	71,024,672	$58,387,824	6,282	49,016,976	$41,716,324	$77,758,967	
587 Structure for Water Control	No.	8,595	185,741	$44,725,873	7,307	25,519	$37,295,495	$62,443,464	
638 Water and Sediment Control Basin	No.	3,930	18,816	$23,268,042	3,341	21,013	$21,305,784	$37,644,118	
468 Lined Waterway or Outlet	Ft.	765	174,004	$5,036,771	650	120,972	$3,076,440	$5,016,232	
386 Field Border	Ft.	2,265	12,765,270	$2,938,960	1,925	12,870,285	$2,661,998	$5,019,332	
601 Vegetative Barriers	Ft.	75	59,195	$213,753	64	78,615	$309,025	$616,069	
Totals		**82,595**		**$491,269,454**			**$469,065,643**	**$819,208,260**	**7,656,154**
Average per acre (based on implemented)							$61.00	$107.00	
Total Program Cost Share				$3,635,653,504					
Sheet and Rill Water Erosion Reducing Practice Share of Total EQIP Funding				13.5%					

*Baseline for Approved Contracts based on FY 2007 contract data multiplied by five years.

**Baseline for Implemented Contracts based on FY 2007 payment data multiplied by five years.

[A]Units for structural/vegetative practices based on ProTracts. Recurring management items are based on PRS data. Note: A divisor of 1.25 is used for PRS data to account for some duplication of reporting.

[B]Total acres protected is sum of individual practice acres, divided by 1.5, to reflect that EQIP plans typically use more than one of the listed practices is generally included in the treatment plan.

[C]Practices not in "Acre" units were not converted but assumed to be associated practices. The assumption that they were part of the systems installed on treated acres, hence their costs are included.

Table 16. Historical EQIP data on practices affecting grazing land productivity.

Practice Code and Name		Units	Approved Contracts* Contracts	Approved Contracts* Units–No.	Approved Contracts* Cost Share	Implemented Contracts** (excludes contract units not cost shared) Contracts	Implemented Contracts** (excludes contract units not cost shared) Units[A]–No.	Implemented Contracts** (excludes contract units not cost shared) Cost Share	Total Costs	Acres[B] Protected
314	Brush Management	Ac.	19,625	3,743,449	$171,598,892	16,683	4,285,098	$136,122,681	$251,869,116	4,285,098
512	Pasture and Hay Planting	Ac.	34,370	1,896,169	$124,302,665	29,218	2,361,871	$93,023,206	$168,580,585	2,361,871
528	Prescribed Grazing	Ac.	21,535	14,755,369	$108,594,439	18,307	29,109,964	$90,382,288	$158,521,639	29,109,964
561	Heavy Use Area Protection	Ac.	16,005	1,097,809	$101,134,833	13,606	2,783,864	$89,531,030	$147,660,896	2,783,864
550	Range Planting	Ac.	4,770	501,287	$22,083,307	4,055	494,769	$16,535,369	$29,506,878	494,769
511	Forage Harvest Management	Ac.	655	46,046	$4,243,062	557	488,640	$1,228,027	$2,213,674	488,640
460	Land Clearing	Ac.	295	1,803	$517,657	251	1,978	$773,276	$1,378,610	1,978
548	Grazing Land Mechanical Treatment	Ac.	190	24,820	$366,248	162	53,127	$787,927	$1,342,057	53,127
381	Silvopasture Establishment	Ac.	55	2,369	$280,000	47	713	$73,950	$140,616	713
640	Waterspreading	Ac.	5	919	$95,725	4	5,243	$60,599	$98,471	5,243
Associated Practices[C]										
382	Fence	Ft.	46,665	262,555,406	$294,193,606	39,670	200,154,214	$199,623,916	$343,167,246	
516	Pipeline	Ft.	33,640	119,601,788	$165,134,746	28,597	99,576,405	$114,834,483	$192,141,008	
614	Watering Facility	No.	39,350	87,593	$105,982,454	33,451	85,860	$75,450,827	$126,241,371	
642	Water Well	No.	13,315	13,900	$61,989,036	11,319	12,501	$46,650,512	$79,340,080	
378	Pond	No.	13,195	14,450	$54,517,913	11,217	25,224	$35,864,169	$62,102,099	
533	Pumping Plant	No.	10,545	11,292	$49,185,633	8,964	9,898	$34,791,531	$60,401,584	
578	Stream Crossing	No.	3,010	12,971	$10,384,156	2,559	8,965	$4,966,968	$8,025,286	
575	Animal Trails and Walkways	Ft.	1,840	1,318,857	$9,458,071	1,564	1,209,489	$10,362,573	$15,284,604	
574	Spring Development	No.	3,315	4,013	$6,790,870	2,818	4,465	$6,212,243	$10,049,273	
	Totals		**262,380**		**$1,290,853,313**			**$957,275,575**	**$1,658,065,093**	**26,390,177**
	Average per acre (based on implemented)							$36.30	$62.80	
	Total Program Cost Share				$3,635,653,504					
	Grazing Land Productivity Practice Share of Total EQIP Funding				35.5%					

*Baseline for Approved Contracts based on FY 2007 contract data multiplied by five years.

**Baseline for Implemented Contracts based on FY 2007 payment data multiplied by five years.

[A]Units for structural/vegetative practices based on ProTracts. Recurring management items are based on PRS data. Note: A divisor of 1.25 is used for PRS data to account for some duplication of reporting.

[B]Total acres protected is sum of individual practice acres, divided by 1.5, to reflect that EQIP plans typically use more than one of the listed practices is generally included in the treatment plan.

[C]Practices not in "Acre" units were not converted but assumed to be associated practices. The assumption that they were part of the systems installed on treated acres, hence their costs are included.

Table 17. Historical EQIP practices affecting irrigation water use.

Practice Code and Name		Units	Approved Contracts* Contracts	Approved Contracts* Units–No.	Approved Contracts* Cost Share	Implemented Contracts** (excludes contract units not cost shared) Contracts	Implemented Contracts** (excludes contract units not cost shared) Units[A] – No.	Implemented Contracts** (excludes contract units not cost shared) Cost Share	Total Costs	Acres[B] Protected
442	Irrigation System, Sprinkler	No. and Ac.	13,270	1,993,044	$295,624,050	11,281	1,896,641	$287,085,126	$502,781,256	1,896,641
441	Irrigation System, Microirrigation	No. and Ac.	4,160	164,883	$109,420,199	3,536	290,547	$120,814,054	$213,851,243	290,547
464	Irrigation Land Leveling	Ac.	4,230	1,170,674	$66,493,032	3,596	372,210	$50,722,098	$90,949,173	372,210
449	Irrigation Water Management	Ac.	11,895	1,880,800	$42,800,058	10,112	2,634,760	$29,898,184	$51,182,406	2,634,760
449	Irrigation System, Surface and Subsurface	No. and Ac.	1,015	54,696	$13,302,601	863	58,986	$5,886,579	$10,058,890	58,986
466	Land Smoothing	Ac.	480	34,676	$4,293,100	408	23,661	$2,184,981	$3,839,130	23,661
554	Drainage Water Management	Ac.	355	32,948	$2,923,370	302	7,792	$875,969	$1,336,788	7,792
610	Salinity and Sodic Soil Management	Ac.	275	26,236	$2,282,313	234	49,228	$876,475	$1,354,397	49,228
462	Precision Land Forming	Ac.	155	24,832	$1,590,674	132	147,476	$1,264,010	$2,363,536	147,476
Associated Practices[C]										
430DD	Irrigation Water Conveyance, Pipeline, High-Pressure, Underground, Plastic	Ft.	9,775	20,904,521	$138,352,765	8,310	21,397,058	$126,458,756	$216,524,447	
430EE	Irrigation Water Conveyance, Pipeline, Low-Pressure, Underground, Plastic	Ft.	5,215	10,666,067	$56,605,446	4,433	12,043,998	$55,710,839	$96,416,583	
620	Underground Outlet	Ft.	7,900	13,982,64	$33,020,066	6,716	11,324,43	$26,461,272	$48,316,365	
428A	Irrigation Water Conveyance, Ditch and Canal Lining, Plain Concrete	Ft.	735	1,718,977	$23,122,523	625	2,618,496	$21,947,804	$36,981,145	
436	Irrigation Storage Reservoir	No. and Ac-Ft	255	27,775	$13,047,520	217	134,263	$6,595,735	$12,084,216	
447	Irrigation System, Tailwater Recovery	No.	365	40,565	$9,531,488	310	609	$8,197,610	$14,134,856	
552	Irrigation Regulating Reservoir	No.	770	13,845	$7,356,142	655	525	$3,408,760	$6,133,068	
430CC	Irrigation Water Conveyance, Pipeline, Nonreinforced Concrete	Ft.	60	208,005	$4,112,400	51	147,315	$1,439,390	$2,445,294	
608	Surface Drainage, Main or Lateral	Ft.	20	631,994	$1,015,223	17	103,804	$513,046	$899,955	
636	Water Harvesting Catchment	No.	100	135	$633,569	85	155	$1,026,295	$1,638,850	
431	Above Ground, Multi-Outlet Pipeline	Ft.	40	63,005	$470,927	34	55,000	$301,505	$507,245	
430FF	Irrigation Water Conveyance, Pipeline, Steel	Ft.	470	32,809	$445,746	400	32,099	$345,372	$587,588	
388	Irrigation Field Ditch	Ft.	75	221,054	$210,201	64	167,421	$228,950	$355,582	
320	Irrigation Canal or Lateral	Ft.	15	18,267	$200,250	13	17,255	$105,469	$182,096	
428B	Irrigation Water Conveyance, Ditch and Canal Lining, Flexible Membrane	Ft.	5	10,000	$157,500	4	253,610	$457,785	$663,457	
607	Surface Drainage, Field Ditch	Ft.	30	54,700	$107,538	26	123,309	$146,182	$246,125	
630	Vertical Drain	No.	20	40	$97,215	17	210	$114,041	$222,974	
430AA	Irrigation Water Conveyance, Pipeline, Aluminum Tubing	Ft.	20	20,075	$79,863	17	20,030	$79,938	$125,340	
	Totals				**$827,295,777**			**$753,146,224**	**$1,316,182,006**	**3,654,200**
	Average per acre (based on implemented)							$206.10	$360.20	
	Total Program Cost Share				$3,635,653,504					
	Irrigation Water Use Efficiency Practice Share of Total EQIP Funding				22.8%					

*Baseline for Approved Contracts based on FY 2007 contract data multiplied by five years.

**Baseline for Implemented Contracts based on FY 2007 payment data multiplied by five years.

[A]Units for structural/vegetative practices based on ProTracts. Recurring management items are based on PRS data. Note: A divisor of 1.25 is used for PRS data to account for some duplication of reporting.

[B]Total acres protected is sum of individual practice acres, divided by 1.5, to reflect that EQIP plans typically use more than one of the listed practices is generally included in the treatment plan.

[C]Practices not in "Acre" units were not converted but assumed to be associated practices. The assumption that they were part of the systems installed on treated acres, hence their costs are included.

Air Quality

The EQIP rule states that a national priority is the "reduction of emissions, such as particulate matter, NO_x, volatile organic compounds, and ozone precursors and depleters that contribute to air quality impairment violations of National Ambient Air Quality Standards" (Part 1466.4). However, data on the link between agricultural practices and air quality that would be sufficient to support a national level benefit assessment are limited. In this analysis, we only consider those benefits arising from erosion control and the resulting improvement in air quality. Other practices funded through EQIP are expected to contribute to air quality improvements, even though the benefits could not be numerically quantified for this study. These other non-quantified beneficial effects include dust control in animal feeding operations and reductions in the emissions of NO_x, organic compound, and ozone precursor and depleters through both improved animal feeding practices and crop nutrient management. In addition, the wildlife habitat and range improvement practices are expected to increase carbon sequestration while the residue and tillage practices associated with erosion control are expected to reduce oxidation of carbon from cropland, and in some cases, actually increase carbon sequestration on those lands.

Table 18 shows the practices assigned to the benefit category of reducing wind erosion and improving air quality. These practices historically accounted for 9.4 percent of EQIP cost-share funds and had an average total cost of just over $113 per acre, with nearly $43 of cost share. Reduced tillage is a practice that greatly reduces wind erosion; however, the beneficial effects vary greatly across the United States, and are greatest in the dryer regions. To reflect the fact that some acreage of reduced tillage practices occur in areas where wind erosion is not a problem only the reduced tillage practices in the Pacific, Southern and Northern Plains and Mountain regions were assumed to provide air quality benefits. The proportion of national reduced tillage acres (Crop Residue Management Survey) occurring in these (43 percent) was calculated and used as a factor to reduce treated acreage in Table 18. This level of funding is expected to provide treatment to an estimated 5.3 million acres over the FY 2008 – FY 2012 period.

Fertilizer Use

For improved nutrient management, Table 12 included only one practice: "590 – Nutrient Management." Treated acres are estimated to total 10.7 million. Analysis of EQIP historical data showed that 72 percent of this practice's acres were for nutrient management not associated with land application of animal waste (i.e., 4.75 million acres). The average cost share for this practice was nearly $11 per acre while the total cost was just over $18 per acre.

Wildlife Habitat

Almost twenty practices were identified as directly benefiting wildlife habitat improvement on 4.3 million acres (Table 19). As in the case of irrigation, a subset of practices whose units could not be converted to acres was associated with the per-acre practices. Their costs were included in the computations. Table 19 shows that 4.3 percent of EQIP funds were spent on these practices that benefit wildlife habitat. The average cost share was nearly $28 per acre while the total costs were just over $48 per acre.

Table 18. Historical EQIP data on practices affecting air quality.

Practice Code and Name		Units	Approved Contracts* Contracts	Approved Contracts* Units–No.	Approved Contracts* Cost Share	Implemented Contracts** (excludes contract units not cost shared) Contracts	Units[A]– No.	Wind Area[B] Prop.	Cost Share	Total Costs	Acres[C] Protected
329	Residue and Tillage Management, No-Till/Strip Till/Direct Seed	Ac.	11,790	4,339,988	$143,664,330	10,023	5,081,368	0.43	$67,324,968	$272,765,839	2,184,988
345	Residue and Tillage Management, Mulch Till	Ac.	3,540	1,694,125	$51,106,966	3,009	2,636,524	0.43	$19,482,578	$82,537,727	1,133,705
328	Conservation Crop Rotation	Ac.	3,645	379,049	$32,089,928	3,099	991,132		$44,000,197	$78,330,679	991,132
340	Cover Crop	Ac.	5,000	1,203,697	$28,078,232	4,250	1,311,286		$22,448,068	$38,904,427	1,311,286
612	Tree/Shrub Establishment	Ac.	7,870	308,775	$23,962,440	6,690	286,497		$16,962,813	$30,301,679	286,497
550	Range Planting	Ac.	4,770	501,287	$22,083,307	4,055	494,769		$16,535,369	$29,506,878	494,769
342	Critical Area Planting	Ac.	14,960	118,578	$12,678,050	12,717	104,135		$10,606,600	$17,947,879	104,135
370	Atmospheric Resource Quality Management	Ac.	675	207,673	$12,672,538	574	893,097		$17,846,972	$31,126,242	893,097
327	Conservation Cover	Ac.	1,480	27,921	$2,270,775	1,258	26,812		$1,957,642	$3,236,896	26,812
344	Residue Management, Seasonal	Ac.	195	101,479	$1,927,440	166	1,226,248	0.43	$1,189,246	$5,016,995	527,287
346	Residue and Tillage Management, Ridge Till	Ac.	35	15,392	$481,345	30	38,660	0.43	$66,709	$290,987	16,624
586	Stripcropping	Ac.	140	7,644	$459,118	119	16,919		$278,053	$460,024	16,919
589A	Cross Wind Ridges	Ac.	20	8,960	$126,418	17	25,148		$125,738	$187,668	25,148
557	Row Arrangement	Ac.	120	5,177	$90,177	102	545		$8,913	$17,619	545
609	Surface Roughening	Ac.	5	490	$3,675	4	13,343		$128,020	$228,607	13,343
589C	Cross Wind Trap Strips	Ac.	5	11	$352	4	10		$10	$14	10
Associated Practices[D]											
380	Windbreak/Shelterbelt Establishment	Ft.	4,005	10,737,412	$9,093,279	3,405	11,833,908		$7,413,559	$12,592,056	
650	Windbreak/Shelterbelt Renovation	Ft.	440	1,564,278	$1,373,109	374	2,079,838		$1,252,926	$2,196,586	
422	Hedgerow Planting	Ft.	295	534,213	$504,447	251	480,802		$521,528	$937,729	
603	Herbaceous Wind Barriers	Ft.	60	7,578,274	$441,904	51	1,286,750		$231,660	$410,752	
380	Windbreak/Shelterbelt Establishment	Ft.	4,005	10,737,412	$9,093,279	3,405	11,833,908		$7,413,559	$12,592,056	
	Totals		59,110		$343,107,828				$228,381,568	$606,997,285	5,350,863
	Average per acre (based on implemented)								$42.70	$113.50	
	Total Program Cost Share				$3,635,653,504						
	Air Quality Practice Share of Total EQIP Funding				9.4%						

*Baseline for Approved Contracts based on FY 2007 contract data multiplied by five years.

**Baseline for Implemented Contracts based on FY 2007 payment data multiplied by five years.

[A]Units for structural/vegetative practices based on ProTracts. Recurring management items are based on PRS data. Note: A divisor of 1.25 is used for PRS data to account for some duplication of reporting.

[B]The proportion of national conservation tilled acreage occurring in the Mountain, N.Plains, Pacific, and S.Plains where wind erosion is a concern.

[C]Total acres protected is sum of individual practice acres, divided by 1.5, to reflect that EQIP plans typically use more than one of the listed practices is generally included in the treatment plan.

[D]Practices not in "Acre" units were not converted but assumed to be associated practices. The assumption that they were part of the systems installed on treated acres, hence their costs are included.

Table 19. Historical EQIP practices affecting wildlife habitat.

Practice Code and Name		Units	Approved Contracts* Contracts	Approved Contracts* Units–No.	Approved Contracts* Cost Share	Implemented Contracts** (excludes contract units not cost shared) Contracts	Implemented Contracts** (excludes contract units not cost shared) Units[A]–No.	Implemented Contracts** (excludes contract units not cost shared) Cost Share	Implemented Contracts** (excludes contract units not cost shared) Total Costs	Acres[B] Protected
666	Forest Stand Improvement	Ac.	5,270	220,224	$30,256,252	4,480	218,328	$26,011,170	$44,715,851	218,328
612	Tree/Shrub Establishment	Ac.	7,870	308,775	$23,962,440	6,690	286,497	$16,962,813	$30,301,679	286,497
412	Grassed Waterway	Ac.	6,895	231,128	$21,371,765	5,861	13,973	$20,346,154	$34,059,870	13,973
338	Prescribed Burning	Ac.	3,760	879,502	$9,499,352	3,196	492,340	$4,176,046	$7,611,039	492,340
645	Upland Wildlife Habitat Management	Ac.	4,525	684,319	$8,240,157	3,847	4,922,528	$4,775,025	$8,549,820	4,922,528
643	Restoration and Management of Rare and Declining Habitats	Ac.	1,010	25,441	$3,244,425	859	42,627	$2,395,114	$4,480,808	42,627
409	Prescribed Forestry	Ac.	6,045	310,568	$3,101,649	5,139	127,108	$1,403,243	$2,309,467	127,108
327	Conservation Cover	Ac.	1,480	27,921	$2,270,775	1,258	26,812	$1,957,642	$3,236,896	26,812
391	Riparian Forest Buffer	Ac.	620	3,347	$1,395,598	527	5,189	$905,821	$1,513,034	5,189
395	Stream Habitat Improvement and Management	Ac.	105	12,374	$1,192,030	89	13,889	$1,563,696	$2,615,870	13,889
647	Early Successional Habitat Development/Management	Ac.	720	6,573	$895,044	612	5,760	$280,000	$464,756	5,760
659	Wetland Enhancement	Ac.	70	921	$693,249	60	4,295	$143,541	$229,876	4,295
646	Shallow Water Development and Management	Ac.	180	27,449	$662,374	153	44,076	$392,597	$745,275	44,076
657	Wetland Restoration	Ac.	115	1,040	$655,524	98	2,533	$915,462	$1,443,522	2,533
644	Wetland Wildlife Habitat Management	Ac.	205	5,607	$394,038	174	352,028	$186,049	$338,485	352,028
322	Channel Bank Vegetation	Ac.	105	466	$165,118	89	950	$134,174	$218,743	950
390	Riparian Herbaceous Cover	Ac.	130	1,166	$78,900	111	1,015	$103,401	$151,656	1,015
658	Wetland Creation	Ac.	30	31	$77,365	26	28	$23,598	$40,478	28
666	Forest Stand Improvement	Ac.	5,270	220,224	$30,256,252	4,480	218,328	$26,011,170	$44,715,851	218,328
Associated Practices[C]										
580	Streambank and Shoreline Protection	Ft.	1,550	1,211,403	$33,340,508	1,318	1,565,008	$24,605,744	$41,336,491	
380	Windbreak/Shelterbelt Establishment	Ft.	4,005	10,737,412	$9,093,279	3,405	11,833,908	$7,413,559	$12,592,056	
386	Field Border	Ft.	2,265	12,765,270	$2,938,960	1,925	12,870,285	$2,661,998	$5,019,332	
394	Firebreak	Ft.	2,020	20,111,496	$2,264,820	1,717	10,716,425	$2,906,117	$4,992,070	
650	Windbreak/Shelterbelt Renovation	Ft.	440	1,564,278	$1,373,109	374	2,079,838	$1,252,926	$2,196,586	
422	Hedgerow Planting	Ft.	295	534,213	$504,447	251	480,802	$521,528	$937,729	
396	Fish Passage	Mi.	15	15	$369,000	13	15	$70,963	$124,496	
	Totals		49,725		$158,040,174			$122,108,378	$210,225,886	4,373,313
	Average per acre (based on implemented)							$27.90	$48.10	
	Total Program Cost Share				$3,635,653,504					
	Air Quality Practice Share of Total EQIP Funding				4.3%					

*Baseline for Approved Contracts based on FY 2007 contract data multiplied by five years.

**Baseline for Implemented Contracts based on FY 2007 payment data multiplied by five years.

[A]Units for structural/vegetative practices based on ProTracts. Recurring management items are based on PRS data. Note: A divisor of 1.25 is used for PRS data to account for some duplication of

[B]Total acres protected is sum of individual practice acres, divided by 1.5, to reflect that EQIP plans typically use more than one of the listed practices is generally included in the treatment plan.

[C]Practices not in "Acre" units were not converted but assumed to be associated practices. The assumption that they were part of the systems installed on treated acres, hence their costs are included.

Energy Use

Two main conservation practices were identified as significantly affecting energy use (Table 20). The two practices, Residue Management - No-till/Strip till and Residue Management - Mulch till, are exclusive and cannot be applied on the same acreage simultaneously. Thus, no reduction in acreage due to practice duplication need to performed here as was the case in the other benefit categories in this analysis.

Table 20 indicates that based on FY 2007 EQIP contracts, energy reducing practices received 5.4 percent of EQIP cost-share funds and had an average cost share of just over $26 per acre while the average total costs was $46 per acre (excluding the cost of government provided TA). A total of 7.7 million acres is estimated to be applied over the next five years based on the NRCS Performance Reporting System (PRS) data. PRS data was used to estimate the total impact of no-till and mulch till residue use resulting from EQIP contracts, not just practices receiving cost share. Thus, the total acres protected include all no-till and mulch till residue management activities that are part of EQIP. All these practices are also included in either the sheet and rill water or wind erosion (air quality) benefit category, so their costs are previously accounted for.

Carbon Sequestration

Table 21 lists practices that were classified as affecting the sequestration of carbon. The practices listed are all exclusive to each other, meaning that they cannot be applied simultaneously on the same acreage. As a result, no adjustment for the possibility of multiple practices being implemented on the same acreage was needed in this case as well as the previous case above.

Table 21 indicates that based on FY 2007 EQIP contracts, these practices received 11.4 percent of EQIP cost-share funds and had an average cost share of $10 per acre while the average total costs was nearly $18 per acre (excluding the cost of government provided technical assistance). Note that these costs are not an “annual” cost, but rather a “contract” cost and reflect the total costs of applying the practice as contracted over a five-year period. All these practices are also included in an earlier benefit category, so their costs are previously accounted for.

Animal Waste Management

For animal waste management related practices, the publication *Costs Associated with Development and Implementation of Comprehensive Nutrient Management Plans* (USDA, NRCS, 2003), was used to estimate costs for development and implementation of CNMPs nationwide. Development costs refer to the technical expertise required to write a CNMP; implementation costs relate to the actual costs of constructing and installing the conservation practices called for in the CNMP. Both of these costs are accounted for in the analysis.

Table 20. Historical EQIP data on practices affecting energy use.

Practice	Code and Name	Units	Approved Contracts* Contracts	Approved Contracts* Units–No.	Approved Contracts* Cost Share	Implemented Contracts** (excludes contract units not cost shared) Contracts	Implemented Contracts** Units[A]–No.	Implemented Contracts** Cost Share	Implemented Contracts** Total Costs	Acres[B] Protected
329	Residue and Tillage Management, No-Till/Strip Till/Direct Seed	Ac.	11,790	4,339,988	$143,664,330	10,023	5,081,368	$156,569,693	$272,765,839	5,081,368
345	Residue and Tillage Management, Mulch Till	Ac.	3,540	1,694,125	$51,106,966	3,009	2,636,524	$45,308,322	$82,537,727	2,636,524
	Totals				$194,771,297			$201,878,015	$355,303,566	7,717,892
	Average per acre (based on implemented)							$26.20	$46.00	
	Total Program Cost Share				$3,635,653,504					
	Energy Savings Practice Share of Total EQIP Funding				5.4%					

*Baseline for Approved Contracts based on FY 2007 contract data multiplied by five years.

**Baseline for Implemented Contracts based on FY 2007 payment data multiplied by five years.

[A]Units for structural/vegetative practices based on ProTracts. Recurring management items are based on PRS data. Note: A divisor of 1.25 is used for PRS data to account for some duplication of reporting.

[B]Total acres protected is sum of individual practice acres, divided by 1.5, to reflect that EQIP plans typically use more than one of the listed practices is generally included in the treatment plan.

Table 21. Historical EQIP data on practices affecting carbon sequestration.

Practice	Code and Name	Units	Approved Contracts* Contracts	Approved Contracts* Units–No.	Approved Contracts* Cost Share	Implemented Contracts** (excludes contract units not cost shared) Contracts	Implemented Contracts** Units[A]–No.	Implemented Contracts** Cost Share	Implemented Contracts** Total Costs	Acres[B] Protected
329	Residue and Tillage Management, No-Till/Strip Till/Direct Seed	Ac.	11,790	4,339,988	$143,664,330	10,023	5,081,368	$156,569,693	$272,765,839	5,081,368
512	Pasture and Hay Planting	Ac.	34,370	1,896,169	$124,302,665	29,218	2,361,871	$93,023,206	$168,580,585	2,361,871
528	Prescribed Grazing	Ac.	21,535	14,755,369	$108,594,439	18,307	29,109,964	$90,382,288	$158,521,639	29,109,964
550	Range Planting	Ac.	4,770	501,287	$22,083,307	4,055	494,769	$16,535,369	$29,506,878	494,769
342	Critical Area Planting	Ac.	14,960	118,578	$12,678,050	12,717	104,135	$10,606,600	$17,947,879	104,135
327	Conservation Cover	Ac.	1,480	27,921	$2,270,775	1,258	26,812	$1,957,642	$3,236,896	26,812
393	Filter Strip	Ac.	1,625	5,146	$367,958	1,381	12,792	$1,684,301	$2,826,635	12,792
	Totals				$413,961,524			$370,759,099	$653,386,351	37,191,709
	Average per acre (based on implemented)							$10.00	$17.60	
	Total Program Cost Share				$3,635,653,504					
	Carbon Sequestration Practice Share of Total EQIP Funding				11.4%					

*Baseline for Approved Contracts based on FY 2007 contract data multiplied by five years.

**Baseline for Implemented Contracts based on FY 2007 payment data multiplied by five years.

[A]Units for structural/vegetative practices based on ProTracts. Recurring management items are based on PRS data. Note: A divisor of 1.25 is used for PRS data to account for some duplication of reporting.

[B]Total acres protected is sum of individual practice acres, divided by 1.5, to reflect that EQIP plans typically use more than one of the listed practices is generally included in the treatment plan.

CNMPs are written plans which provide a blueprint for producers on how to address animal waste management. There are a wide range of practices addressing animal waste management. They range from installing concrete or metal structures to store animal waste until suitable conditions for proper applications; to planting vegetative filter strips to treat wastewater runoff; to manure spreading techniques to minimize impacts to the environment. These practices involve management, construction, and cropping activities implemented in a comprehensive manner to ensure that the environmental impact is minimized while not compromising the economic viability of the farm.

Table 22 shows the Historical EQIP data on practices used with CAFOs. This includes the estimated EQIP FA and producer costs of CNMP related practices based on 2007 costs in a similar calculation to the cost calculations of other practices. The CAFO related share of total costs is 17.9% of total EQIP costs. If Practice 590, Nutrient Management is including 590, the percentage goes to 21.6% of total 2007 EQIP costs. This table is included for comparison with the other practice costs, but is not directly used in the analysis.

Future CNMP Workload under the new EQIP

It was unclear in 2003 when the last EQIP BCA was conducted, how many CNMPs would be written under the then new EQIP due to a number of factors. Uncertainty about pending regulations played a large part. Several scenarios were analyzed that had been developed in the EPA BCA (see US EPA 2001). One scenario was chosen to represent what would occur during the analysis period of 2002 to 2007. The following section attempts to estimate the remaining existing workload based on past work accomplished under EQIP and other sources of funding, current (2007) workload, as well as changes in the livestock industry since that time.

In estimating the future number of CNMPs to be written during the 2008-2012 timeframe, there were a number of factors to consider, including

- changes in the number of livestock farms needing a CNMP due to the changing structure of the livestock industry,
- the number and size of farms that have already had a CNMP written, and
- the new funding level.

Table 23 shows the number of livestock farms that would need a CNMP (as calculated in the previous EQIP BCA report).

Table 22. Historical EQIP data on practices used with CAFOs.

Practice Code and Name		Units	Approved Contracts* Contracts	Approved Contracts* Units–No.	Approved Contracts* Cost Share	Implemented Contracts** (excludes contract units not cost shared) Contracts	Implemented Contracts** (excludes contract units not cost shared) Units[A]–No.	Implemented Contracts** (excludes contract units not cost shared) Cost Share	Implemented Contracts** (excludes contract units not cost shared) Total Costs	Acres[B] Protected
590	Nutrient Management	Ac.	35,260	7,786,847	$134,999,205	29,974	10,814,392	$128,397,369	$223,248,337	10,814,392
Associated Practices[C]										
592	Feed Management		130	36,878	$480,275	111	171,824	$789,636	$1,217,549	
591	Amendments for the Treatment of Agricultural Waste	AU	335	1,003,770	$8,780,905	285	3,483,582	$3,018,563	$5,331,284	
365	Anaerobic Digester, Ambient Temperature	No.	10	10	$3,164,150	9	5	$500,000	$862,069	
366	Anaerobic Digester, Controlled Temperature	No.	15	15	$5,125,000	13	10	$525,000	$875,365	
316	Animal Mortality Facility	No.	1,050	1,080	$11,429,445	893	905	$7,815,344	$14,674,970	
360	Closure of Waste Impoundments	No.	805	855	$12,958,906	684	1,015	$18,395,742	$30,760,638	
317	Composting Facility	No.	1,815	1,760	$31,358,426	1,543	1,532	$26,234,575	$44,523,444	
356	Dike	Ft.	670	5,175,592	$6,745,307	570	3,975,050	$4,351,865	$6,804,573	
362	Diversion	Ft.	3,175	4,219,220	$6,452,978	2,699	3,899,483	$7,430,104	$12,148,534	
634	Manure Transfer	No.	3,425	136,041	$52,871,043	2,912	7,257	$43,377,108	$74,338,994	
558	Roof Runoff Structure	No.	2,500	10,030	$5,044,206	2,125	2,686	$4,688,411	$7,451,256	
350	Sediment Basin	No.	1,030	44,040	$12,470,946	876	1,478	$13,201,623	$22,868,812	
632	Solid/Liquid Waste Separation Facility	No.	325	365	$7,442,783	276	120	$4,641,923	$7,516,725	
367	Waste Facility Cover	No.	170	184	$5,010,568	145	50	$1,364,343	$2,181,594	
313	Waste Storage Facility	No.	7,850	7,766	$311,505,398	6,673	9,357	$322,701,682	$542,085,758	
629	Waste Treatment	No.	145	170	$4,690,436	123	40	$1,861,870	$3,125,482	
359	Waste Treatment Lagoon	No.	355	400	$5,024,357	302	932	$5,584,157	$9,518,506	
633	Waste Utilization	Ac.	2,145	591,706	$23,497,588	1,823	1,258,003	$19,577,250	$35,349,537	
570	Runoff Management System	No.	5	5	$100,000	4	18	$98,579	$145,464	
	Totals				$649,151,923			$614,555,141	$1,045,028,890	
	Total FA EQIP Costs including Nutrient Management.				$784,151,128					
	Average per acre (based on implemented)							$85.20	$144.90	

*Baseline for Approved Contracts based on FY 2007 contract data multiplied by five years.

**Baseline for Implemented Contracts based on FY 2007 payment data multiplied by five years.

[A]Units for structural/vegetative practices based on ProTracts. Recurring management items are based on PRS data. Note: A divisor of 1.25 is used for PRS data to account for some duplication of reporting.

[B]Total acres protected is sum of individual practice acres, divided by 1.5, to reflect that EQIP plans typically use more than one of the listed practices is generally included in the treatment plan.

[C]Practices not in "Acre" units were not converted but assumed to be associated practices. The assumption that they were part of the systems installed on treated acres, hence their costs are included.

Table 23. Previous estimates of farms needing CNMPs (2003).

Size Class (AUs)	No. of farms needing CNMPs (EPA)	No. of farms needing CNMPs (USDA)
> 1000	12,850	11,398
500 to 1000	---	15,614
300 to 500	---	17,354
300 to 1000	28,150	---
< 300	334,740	212,835
Totals	**375,740**	**257,201**

These estimates were based on data from the 1997 Census of Agriculture. Data from the 2002 Census of Agriculture was not yet available at the time. For this current analysis, in order to update the number of livestock farms to more current figures, data from the 2002 Census of Agriculture was compared to the 1997 census, and percentage changes in that time period were analyzed. Although AU data was not available from the 2002 Census of Agriculture, data on the number of farms with livestock was available.

For the purposes of this current analysis, four data items were extracted from the 2002 Census of Agriculture; cattle and calves inventory, hogs and pigs inventory, layers 20 weeks old and older inventory, and broilers and other meat-type chickens sold. Table 24 compares the 2002 and 1997 inventories.

Table 24. Percent change in numbers of farms by livestock type from 1997 and 2002.

Item	2002 (No. of farms)	1997 (No. of farms)	Percent Change 1997 to 2002
Cattle and calves inventory	1,018,359	1,188,659	-14%
Hogs and pigs inventory	78,895	124,889	-37%
Layers 20 weeks old and older inventory	98,315	91,625	7%
Broilers and other meat-type chickens sold	32,006	27,737	15%
Total*	**1,227,575**	**1,432,910**	-14%

*Note: The total will contain double-counting due to farms that have more than one type of livestock.

From the 2002 Census of Agriculture, the 1997 total of 1.4 million farms above equates roughly with the 1.3 million previous USDA estimate of farms with any livestock. The difference can most likely be attributed to overlap of farms that have several different types of livestock. This data was used as a proxy to estimate the changes in the livestock industry from 1997 to 2002.

From 1997 to 2002, the total number of farms decreased by 14 percent. The decline is due largely to the decrease in farms with cattle and calves, and swine while the number of poultry farms increased.

Table 25 shows the percentage decline in the number of farms by type of livestock compared to the EPA estimates of the total number of AFOs by livestock type. The percentage of total AFOs was estimated by the percentage in the 2003 estimate to arrive at roughly 324,400 farms.

What Table 25 fails to show is the consolidation in the industry toward larger farms. According to the 2002 Census of Agriculture, the number of cattle and calves and swine decreased only slightly from 1997 to 2002. According to more recent data from NASS, from 2002 to 2007 the number of cattle and calves reversed this trend and increased by two percent, and the number of swine increased by 13 percent.

Table 25. Percent changes applied to previous EPA estimates of CNMP farms from 1997 to 2002.

Sector	Total AFOs*	Percent Change Number of Farms 1997 to 2002**	2002 Estimate Using Percent Change
Beef operations, including both cattle and veal operations.	106,930	-14%	91,960
Dairy operations, including both milk and heifer operations.	118,130	-14%	101,592
Hog operations, including both "farrow to finish" and "grower to finish" operations.	117,860	-37%	74,252
Poultry operations, including broilers, layers (both wet and dry operations) and turkeys.	123,750	9%	135,112
Sum Total	466,670		402,915
Total AFOs	375,740		324,408

*Source: Environmental and Economic Benefit Analysis of Proposed Revisions to the National Pollutant Discharge Elimination System Regulation and the Effluent Guidelines for Concentrated Animal Feeding Operations.

**Source: Calculated from 2002 Census of Agriculture.

Table 26 shows the number of CNMPs that have been completed from 2005 to 2007 by NRCS, under EQIP and other sources of funding.

Table 26. CNMPs completed by NRCS.

Fiscal Year	EQIP	Non-EQIP	All Sources
FY2005	2,382	3,607	5,989
FY2006	2,798	3,251	6,049
FY2007	2,539	2,666	5,205
Total	**7,719**	**9,524**	**17,243**
Yearly Average	**2,573**	**3,175**	**5,748**

Source: NRCS PRS (Progress Reporting System) data, as of June 2008

These data show that roughly 2,570 CNMPs were written under EQIP each year (2003-2004 data was not available). The total number of CNMPs written average about 5,750 per year. If the rate was constant, it could be assumed that roughly 28,750 CNMPs (5 years times 5,750) were written from 2003 to 2007), roughly just under half with EQIP.

While there is data on the number of CNMPs written, it's unclear how many AUs have been treated under these CNMPs. It could be that the CNMPs written to date have been for the larger farms, as they are under greater scrutiny from state and local governments, and had greater financial means to cover their share of the development and installation costs than smaller farms. If that was the case, it could follow that the remaining CNMPs to be written and implemented may start to trend toward the smaller farms and therefore fewer AUs per CNMP. However, the strong trend toward consolidation toward larger farms may counterbalance this assumption, because there are many new large farms to treat.

Based on the competing factors discussed, the analysis team assumed that the annual number of CNMPs to be written and implemented will stay roughly the same as is being done currently. An informal query was made of some NRCS state offices with high CNMP workload to determine their projected future CNMP workload, and these states determined that it would at minimum stay the same if not increase in future years. Also, completed CNMPs often need revision due to changes in ownership, herd size, and management techniques.

If there were roughly 300,000 farms needing CNMPs in 2002, and if about 28,750 CNMPs have been written (under EQIP and other sources of funding) during FY 2002 to FY 2007, it is evident that there is still a large number of livestock farms that need CNMPs now and in the future. For example even if the FY 2002-FY 2007 rate remained the same during FY 2008 – FY 2012, livestock operations having CNMPs would only double to about 60,000 operations out of a total 300,000 operations or roughly 20 percent. Eighty percent would still need CNMPs by the end of FY 2012.

A major question is "What percentage of the CNMPs assisted by EQIP was adopted by large CAFOs covered by EPA regulatory requirements?" Data suggest that large CAFOs represented less than four percent of all livestock operations (Table 23) while maintaining about 55 percent of the total animal units on all livestock operations. These roughly 13,000 large CAFOs would have strong incentive to comply with EPA CAFO requirements and move towards compliance with or one could assume that all of them would comply with EPA CAFO requirements by the end of FY 2012. NRCS data indicate that NRCS assistance to large CAFOs represented about 26 percent of all NRCS costs related to CAFOs of all sizes. Accordingly, this analysis reduces NRCS costs of providing CNMP assistance to CAFOs by 26 percent.

Verifying CNMP Practice Cost Data

When updating costs of practices as varied as agricultural waste related measures from over four years ago, there is a risk of the cost indexes not capturing all cost changes accurately. Therefore, the costs resulting from indexing 2003 figures were double-checked with more recent cost data from the NRCS contracts database Protracts.

Costs from Protracts were comparable to the updated 2003 costs. Therefore, the analysis used the update of both costs and benefits from the 2003 EQIP BCA. This only impacts the CNMP specific cost benefit analysis; the total EQIP program costs are used in the overall EQIP benefit cost analysis in the summary tables.

Table 27 shows the updating of costs per AU from the 2003 EQIP BCA analysis with its 2002 price base. Additional development of costs is included in the following benefits calculation section. Please read that section for more details.

Table 27. Parameters for the benefits and costs of CNMPs

Economic parameters	**Totals**	**For small CAFOs (under 1000 AUs)**	**For large CAFOs (over 1000 AUs)**
Benefits adjustment (GDP deflator) 2002 to 2007	1.15	1.15	1.15
Cost adjustment (ENR) 2002 to 2007	1.23	1.23	1.23
Inflation	0.00	0.00	0.00
Workload assumptions			
CNMPs per year	2600	2,485	115.22
AUs per CNMP	210	126	2,001
Number of AUs Treated per year	544,792	314,256	230,536
Benefits parameters	2007 Values		
WQ Benefit per AU	$34.66	$34.66	$34.66
Nutrient Value for crop benefit per AU	$18.80	$18.80	$18.80
Total Benefit per AU 2008	$53.46	$53.46	$53.46
Cost parameters			
Implementation Cost per AU per year 2002	$33.17	$42.51	$20.44
Implementation Cost per AU per year 2008	$40.80	$52.29	$25.14
CNMP Development (Hr/farm)	149	149	149
TA Cost per Hour 2003	$55.00	$55.00	$55.00
TA Cost per Hour 2007	$65.00	$64.90	$64.90
CNMP TA cost per farm	$9,670	$9,670	$9,670
CNMP TA cost per AU	$46.00	$76.46	$4.83
Percent excluding large CAFOS on original 2003 analysis			
Costs	73.9%		
Benefits	54.2%		

Appendix E: Development of Expected Benefits by Benefit Category

Sheet and Rill Water Erosion

Table 28 shows the life and expected benefit stream over time for each practice affecting sheet and rill water erosion, and the cost-share weighted averages over the group of practices. The average practice life for these practices was found to be 5.4 years, with nearly full benefits occurring in years two through six, followed by a gradual taper to 40 percent of benefits in year ten.

Determining the estimated benefit for practices affecting sheet and rill water erosion reductions required interpretation of available literature. Studies by Feather et al. (1999) and Claassen et al. (2001) were used to develop water induced erosion control benefit estimates for this assessment. Benefits are broken into two types: on-site and off-site. The studies cited above were based primarily on the erosion control benefits obtained from the CRP and Conservation Compliance (CC). The CRP removed land from agricultural production for a period of ten years and protected it with a vegetative conservation cover while the CC required that farmers receiving government benefits reduce the soil erosion rates on Highly Erodible Land that they were continuing to crop, though not necessarily to the erosion loss tolerance (T) level. Note that these benefit studies included only a partial estimate of the variety of possible program benefits; therefore this analysis remains an underestimate of the total benefits available from erosion reduction. Each program enrolled different land with different inherent erodibility. In the early CRP years, erosion reduction was the primary goal, while in later years more weight was given to wildlife and other environmental considerations.

Off-site Benefit Estimates:
Feather et al. (1999) were concerned with optimal targeting for CRP enrollments for generation of environmental benefits. They followed a three-step methodology:

- CRP acreage creates physical effects;
- Physical effects translate into biological effects; and
- Biological results affect consumer welfare.

Feather's et al. benefits were mostly accounted for by the following three components, all calculated for a 10-year program, NPV at four percent discount rate:

- Public works cost reduction for sediment based on a 45 million acre CRP with soil erosion reductions of 750 million tons per year, $3.029 billion;
- Air quality, $548 million; and
- Recreation, $8.676 billion, estimated partially based on CRP enrollments of 45 million and 34 million acres, depending upon the type of recreation benefit derived.

Table 28. Distribution of benefits over time for practices affecting sheet and rill water erosion.

Practice Code	Practice Name	Historical Cost Share	Practice Life (yrs)	Proportion of Full Annual Benefits Occurring by Year (year 1 is funding and contract year)									
				1	2	3	4	5	6	7	8	9	10
329	Residue and Tillage Management, No-Till/Strip Till/Direct Seed	$156,569,693	1	0.0	1.0	1.0	1.0	0.8	0.6	0.4	0.2	0.1	0.0
410	Grade Stabilization Structure	$54,946,934	15	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
329B	Residue and Tillage Management, Mulch Till	$45,308,322	1	0.0	1.0	1.0	1.0	0.8	0.6	0.4	0.2	0.1	0.0
328	Conservation Crop Rotation	$44,000,197	1	0.0	1.0	1.0	1.0	0.8	0.6	0.4	0.2	0.1	0.0
600	Terrace	$41,716,324	10	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
587	Structure for Water Control	$37,295,495	10	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
340	Cover Crop	$22,448,068	1	0.0	1.0	1.0	1.0	0.8	0.6	0.4	0.2	0.1	0.0
638	Water and Sediment Control Basin	$21,305,784	10	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
412	Grassed Waterway	$20,346,154	10	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
342	Critical Area Planting	$10,606,600	10	0.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
468	Lined Waterway or Outlet	$3,076,440	10	0.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
344	Residue Management, Seasonal	$2,765,688	1	0.0	1.0	1.0	1.0	0.8	0.6	0.4	0.2	0.1	0.0
386	Field Border	$2,661,998	10	0.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
327	Conservation Cover	$1,957,642	10	0.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
393	Filter Strip	$1,684,301	10	0.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
601	Vegetated Treatment Area	$1,181,192	10	0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
601	Vegetative Barriers	$309,025	10	0.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
586	Stripcropping	$278,053	5	0.0	0.5	1.0	1.0	1.0	1.0	0.8	0.6	0.4	0.2
330	Contour Farming	$244,533	1	0.0	1.0	1.0	1.0	0.8	0.6	0.4	0.2	0.1	0.0
329C	Residue and Tillage Management, Ridge Till	$155,137	1	0.0	1.0	1.0	1.0	0.8	0.6	0.4	0.2	0.1	0.0
311	Alley Cropping	$84,861	15	0.0	0.4	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0
331	Contour Orchard and Other Fruit Area	$57,317	10	0.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
332	Contour Buffer Strips	$56,792	10	0.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
716	Anionic Polyacrylamide	$9,095	1	0.0	1.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Totals	$469,065,643											
	Average, weighted by Cost Share		5.4	0.0	1.0	1.0	1.0	0.9	0.8	0.7	0.5	0.5	0.4

Of those three categories of benefits, the first and the third were added together ($3.029 billion plus $8.676 billion equals $11.705 billion). Air quality benefits of soil erosion reduction were accounted for in a different benefit category and are handled in a different manner, so are not counted here. The $11.705 billion benefit NPV was then converted to an equivalent 10-year stream of benefits with a seven percent discount factor resulting in a lump-sum benefit amount of $1.558 billion. This estimate was then divided by its corresponding tonnage (750 million) and acreage (45 million) to arrive at an annual per-ton and per acre value of $2.08 and $34.74 (2002 values), respectively. Using a GDP index of 1.15 to put these into current 2007 values raises their values to $2.38 and $39.83, respectively (Table 29).

Table 29. Estimate of per-ton benefits from reduced sheet and rill water erosion (in 2007 dollars).

Item	Annual Erosion Rate Reduction	Annual Benefits ($/ton)	Annual Benefits ($/acre)
Offsite benefits:			
CRP, early program years	16.7	$2.38	$39.83
CRP, program average	12.3	$3.94	$48.51
Conservation Compliance	3.5	$4.96	$17.38
Used for this EQIP analysis*	8.6	$4.93	$42.40
On-site benefits:			
Nutrients saved	8.6	$1.39	$11.92
Total Annual Per-Acre Benefits**	**8.6**	**$6.42**	**$54.32**

*Historical EQIP data for 2001 showed a reduction from 11.5 to 2.9 tons per acre per year on 371 thousand acres, where one state was excluded because its reduction was clearly a data error, with a rate of 50 times the average of other states.

**This total reflects the total tons per acre of soil erosion from which both off-site and on-site benefits are calculated.

In a study of alternative ways of providing incentives to farmers for environmental improvements, Claassen et al. (2001) estimated benefits for both the CRP and for Conservation Compliance. For CRP, they found 406 million tons of erosion reduction annually, but cautioned that this estimate was likely an underestimate for several reasons. If the mid-point of the range of 30 to 36 million acres enrolled since program inception is used (33 million acres), the per-acre reduction becomes 12.3 tons per acre. The estimate of erosion reduction in the Feather study was higher since it was based on original program estimates when erosion reduction was given a high enrollment priority. Claassen reported benefits of $694 million per year for reduced soil erosion and $704 million per year for improved wildlife habitat. The total of $1.398 billion of annual benefits is equivalent to $3.44 per ton of rate reduction, or $42.31 per acre (2002 values). Again, using a GDP index factor of 1.15, places these estimates in current 2007 values of $3.94 and $48.51, respectively (Table 29).

Claassen et al. (2001) also estimated a partial estimate of the economic benefits due to Conservation Compliance. The estimate was said to be partial, not only because of under

counting of benefits, but also due to a likely underestimate of the acres treated (due to Conservation Compliance requirements). The estimated soil erosion reduction on HEL lands was 323 million tons per year. These lands totaled 91 million acres, according to with the number of approved CC plans. This reduction and acreage produces an erosion rate reduction of 3.5 tons per acre per year. The estimate of annual non-market benefits for that soil erosion reduction was $1.400 billion, or $4.33 per ton and $15.16 per acre (2001 values). Indexing this to current 2007 values (using a GDP factor of 1.20) produces the reported values of $4.96 and $17.38 in Table 29.

The off-site benefits for soil erosion reduction used in this analysis are generated by an assumed 8.6 ton per acre per year assumption multiplied by an assumed value per ton of soil of $4.96 (top part of Table 29).

On-site Benefit Estimates: For on-site productivity losses, this study only includes the value of the lost nitrogen and phosphorus fertilizer carried away with the topsoil. In the future, consideration of the maintenance of long-tem soil productivity should be included, perhaps with the assistance of improved data and estimates from CEAP.

The value of fertilizer nutrients loss associated with erosion was also taken from the RCA study cited above. Some additional general assumptions based on data from Miller et al. (1998) were made. On average topsoil consists of two percent organic matter, or 1.16 percent carbon. That organic matter would have, on average, a carbon nitrogen ratio of 10 to 1. Consequently, each ton of soil that is eroded contains 2.32 pounds of nitrogen that the farmer would need to replace. The soil also contains 0.05 percent phosphorus, or 1 pound per ton of soil. Using NASS – Current Prices Paid for DAP and Urea, phosphorus and nitrogen prices for 2007 are 48¢ and 49¢ per pound. The value of lost nutrients in each ton of soil erosion is valued at $1.39 per year.

Analyses of historical EQIP data indicate sheet and rill water erosion reductions of 8.6 tons per acre per year can be attributed to the program. One justification for such a high estimate and its resultant large benefit/cost ratio is that it is assumed that EQIP funds would be targeted to situations where the largest erosion reductions would occur. Analysis of National Resource Inventory (NRI) data and EQIP data indicate that in the period since 1992, several million acres of farmed cropland have had sheet and rill water erosion reductions exceeding ten tons per acre per year. Analysis of the 1997 NRI in Appendix 2 of the 2003 EQIP Benefit-Cost Analysis shows that the new program can easily maintain that 8.6 tons per acre though the life of the 2008 Act.

With the data from the two studies and other assumptions summarized here, the per-acre benefit estimate for sheet and rill water erosion reductions consists of $1.92 from reduced loss of nutrients. Along with the $42.40 from improved water quality, the total value of benefits from adopting the conservation practices as specified in EQIP are estimated at $54.32 per acre per year (bottom of Table 29).

Grazing Land Productivity

Table 30 shows the life and expected benefit stream over time for each practice affecting grazing land productivity, and the cost-share weighted averages over the group of practices. The interpretation of the stream of benefits values is the proportion of full benefits occurring in the year indicated. It was assumed that no benefits would occur in the first year, since during that year the contract would likely not be finalized until mid-year and implementation would start at some time after that. The average practice life for the grazing improvement practices was found to be 11.6 years, with nearly full benefits occurring in years two through seven, followed by a gradual taper to 70 percent of benefits in year ten. For this analysis, the benefits occurring in years beyond the first ten years were ignored.

Namken and Flanagan report that practices such as these resulted in an average productivity increase of 1.3 Animal Unit Months (AUMs) per acre, and that the AUMs were valued at $11.10 each, resulting in per acre value of $14.43. The $14.43 value was updated from year 2000 to year 2007 using a GDP index factor of 1.2 resulting in a grazing land improvement benefit of $17.25 per acre. It is probable that many of these practices were implemented in situations where the primary and or secondary purposes were something other than improved forage production, such as for wildlife habitat or water quality enhancement; however, those benefits could not be accounted for.

Table 30. Distribution of benefits over time for practices affecting grazing land productivity.

Practice Code and Name		Historical Cost Share	Practice Life (yrs)	Proportion of Full Annual Benefits Occurring by Year (year 1 is funding and contract year)									
				1	2	3	4	5	6	7	8	9	10
382	Fence	$199,623,916	20	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
314	Brush Management	$136,122,681	10	0.0	1.0	1.0	0.9	0.9	0.8	0.8	0.7	0.6	0.5
516	Pipeline	$114,834,483	10	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
512	Pasture and Hay Planting	$93,023,206	10	0.0	1.0	1.0	0.9	0.9	0.8	0.8	0.7	0.6	0.5
528	Prescribed Grazing	$90,382,288	5	0.0	1.0	1.0	1.0	0.8	0.6	0.4	0.2	0.1	0.0
561	Heavy Use Area Protection	$89,531,030	10	0.0	1.0	1.0	0.9	0.9	0.8	0.8	0.7	0.6	0.5
614	Watering Facility	$75,450,827	10	0.0	1.0	1.0	0.9	0.9	0.8	0.8	0.7	0.6	0.5
642	Water Well	$46,650,512	10	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
378	Pond	$35,864,169	10	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
533	Pumping Plant	$34,791,531	10	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
550	Range Planting	$16,535,369	10	0.0	1.0	1.0	0.9	0.9	0.8	0.8	0.7	0.6	0.5
575	Animal Trails and Walkways	$10,362,573	10	0.0	1.0	1.0	0.9	0.9	0.8	0.8	0.7	0.6	0.5
574	Spring Development	$6,212,243	10	0.0	1.0	1.0	0.9	0.9	0.8	0.8	0.7	0.6	0.5
578	Stream Crossing	$4,966,968	10	0.0	1.0	1.0	0.9	0.9	0.8	0.8	0.7	0.6	0.5
511	Forage Harvest Management	$1,228,027	5	0.0	1.0	1.0	1.0	0.8	0.6	0.4	0.2	0.1	0.0
548	Grazing Land Mechanical Treatment	$787,927	5	0.0	1.0	1.0	1.0	1.0	0.8	0.6	0.4	0.2	0.1
460	Land Clearing	$773,276	10	0.0	1.0	1.0	0.9	0.9	0.8	0.8	0.7	0.6	0.5
381	Silvopasture Establishment	$73,950	10	0.0	1.0	1.0	0.9	0.9	0.8	0.8	0.7	0.6	0.5
640	Waterspreading	$60,599	10	0.0	1.0	1.0	0.9	0.9	0.8	0.8	0.7	0.6	0.5
	Totals	$957,275,575											
	Average, weighted by Cost Share		11.6	0.0	1.0	1.0	1.0	0.9	0.9	0.9	0.8	0.7	0.7

Irrigation Water Use

Table 31 shows the life and expected benefit stream over time for each practice affecting irrigation water use, and the cost-share weighted averages over the group of practices. The average practice life for the irrigation efficiency improvement practices was found to be 16.1 years, with full benefits occurring in years two through ten. For this analysis, the benefits occurring in years beyond the first ten years were ignored.

Presumably, any water saved as a result of the reduced water applications on any individual farm would be available for alternative beneficial uses such as use by farmers in other locations, municipalities, utility generation, wildlife habitat enhancement; or available elsewhere on the same farm or advertised for availability locally via irrigation rental markets**.** Therefore, a possible value that could be assigned to the saved water is the price that competing uses would be willing to offer. Since those prices are not available, the saved water was valued conservatively at the average that the farmers have paid or expended to obtain the water. It is assumed that the farmers could achieve a net reduction in irrigation water used by any or all of the following three methods:

- Convert from irrigation to dryland production;
- Convert to a crop or land use requiring reduced applications of water; or
- Maintain the same crop, but improve irrigation application efficiency.

The 2003 Farm and Ranch Irrigation Survey reported 32.3 million acres irrigated with groundwater having acquisition cost of $29/acre foot and 13.8 million acres irrigated with off-farm surface water at $18/acre foot, including supply cost and variable cost. The weighted average value of the water is then $25.73. Using a GDP index factor of 1.11 to update the weighted average value of water from 2003 to 2007 results in an estimated value of $28.56 per acre foot. Given the 5.41 acre-inch efficiency gain per year and assuming a 20-percent loss in storage and transmission, results in an annual per-acre benefit of $10.30.

The new stature add insurance that on the water savings.

"`(h) Water Conservation or Irrigation Efficiency Practice-

`(1) AVAILABILITY OF PAYMENTS- The Secretary may provide payments under this subsection to a producer for a water conservation or irrigation practice.

`(2) PRIORITY- In providing payments to a producer for a water conservation or irrigation practice, the Secretary shall give priority to applications in which--

`(A) consistent with the law of the State in which the eligible land of the producer is located, there is a reduction in water use in the operation of the producer; or

`(B) the producer agrees not to use any associated water savings to bring new land, other than incidental land needed for efficient operations, under irrigated production, unless the producer is participating in a watershed-wide project that will effectively conserve water, as determined by the Secretary.

Table 31. Distribution of benefits over time for practices affecting irrigation water use.

Practice Code	Practice Name	Historical Cost Share	Practice Life (yrs)	Proportion of Full Annual Benefits Occurring by Year (year 1 is funding and contract year)									
				1	2	3	4	5	6	7	8	9	10
442	Irrigation System, Sprinkler	$295,624,050	15	0	1	1	1	1	1	1	1	1	1
430DD	Irrigation Water Conveyance, Pipeline, High-Pressure, Underground, Plastic	$138,352,765	25	0	1	1	1	1	1	1	1	1	1
441	Irrigation System, Microirrigation	$109,420,199	10	0	1	1	1	1	1	1	1	1	1
464	Irrigation Land Leveling	$66,493,032	15	0	1	1	1	1	1	1	1	1	1
430EE	Irrigation Water Conveyance, Pipeline, Low-Pressure, Underground, Plastic	$56,605,446	25	0	1	1	1	1	1	1	1	1	1
449	Irrigation Water Management	$42,800,058	1	0	1	1	1	0.8	0.6	0.4	0.2	0.1	0
620	Underground Outlet	$33,020,066	15	0	1	1	1	1	1	1	1	1	1
428A	Irrigation Water Conveyance, Ditch and Canal Lining, Plain Concrete	$23,122,523	15	0	1	1	1	1	1	1	1	1	1
443	Irrigation System, Surface and Subsurface	$13,302,601	15	0	1	1	1	1	1	1	1	1	1
436	Irrigation Storage Reservoir	$13,047,520	15	0	1	1	1	1	1	1	1	1	1
447	Irrigation System, Tailwater Recovery	$9,531,488	20	0	1	1	1	1	1	1	1	1	1
552	Irrigation Regulating Reservoir	$7,356,142	15	0	1	1	1	1	1	1	1	1	1
466	Land Smoothing	$4,293,100	10	0	1	1	1	1	1	1	1	1	1
430CC	Irrigation Water Conveyance, Pipeline, Nonreinforced Concrete	$4,112,400	15	0	1	1	1	1	1	1	1	1	1
554	Drainage Water Management	$2,923,370	1	0	1	1	1	0.8	0.6	0.4	0.2	0.1	0
610	Salinity and Sodic Soil Management	$2,282,313	5	0	0.4	0.8	1	1	1	0.8	0.4	0.2	1
462	Precision Land Forming	$1,590,674	10	0	1	1	1	1	1	1	1	1	1
636	Water Harvesting Catchment	$633,569	15	0	1	1	1	1	1	1	1	1	1
431	Above Ground, Multi-Outlet Pipeline	$470,927	15	0	1	1	1	1	1	1	1	1	1
430FF	Irrigation Water Conveyance, Pipeline, Steel	$445,746	25	0	1	1	1	1	1	1	1	1	1
388	Irrigation Field Ditch	$210,201	15	0	1	1	1	1	1	1	1	1	1
320	Irrigation Canal or Lateral	$200,250	15	0	1	1	1	1	1	1	1	1	1
428B	Irrigation Water Conveyance, Ditch and Canal Lining, Flexible Membrane	$157,500	20	0	1	1	1	1	1	1	1	1	1
428B	Irrigation Water Conveyance, Ditch and Canal Lining, Flexible Membrane	$157,500	15	0	1	1	1	1	1	1	1	1	1
607	Surface Drainage, Field Ditch	$107,538	15	0	1	1	1	1	1	1	1	1	1
630	Vertical Drain	$97,215	15	0	1	1	1	1	1	1	1	1	1
430AA	Irrigation Water Conveyance, Pipeline, Aluminum Tubing	$79,863	20	0	1	1	1	1	1	1	1	1	1
	Totals	$826,438,054											
	Average, weighted by Cost Share		15.9	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9

Air Quality

Table 32 shows the life and expected benefit stream over time for each practice affecting air quality, and the cost-share weighted averages over the group of practices. The average practice life for the wind erosion control practices was found to be 4.5 years, with nearly full benefits occurring in years three through six, followed by a gradual taper to 30 percent of benefits in year ten.

The key element in the air quality benefits analysis is the estimate by Ribaudo et al. (1989) that the CRP program provided a U.S. average of $25 per acre in NPV of benefits due to reduced soil erosion (improved air quality). The estimates ranged from $0 in the Appalachia, Corn Belt, Delta States, and Lake States, up to $52 in the Mountain states. The Ribaudo study included the effects of "particulate-related costs imposed on those who live or work downwind from blowing soil; such costs include increased cleaning and maintenance for businesses and households, damages to nonfarm machinery, and adverse health effects" (Ribaudo et al., p. 422). For the EQIP program assessment, it was assumed that where applied, the practices listed in Table 32 provide the same level of benefits to air quality (same levels of erosion control and reduction in offsite damages) as did the CRP. The $25 per acre value from Ribaudo et al. is updated with data from the GDP index for the years of 1988 to 2002 for the 2003 EQIP BCA, assuming a 10-year horizon at a seven percent discount rate, which resulted in $4.98 per acre. This was updated from 2002 to 2007 to the 2007 value of $5.71 per acre.

Fertilizer Use

The benefit estimate from adopting practices that affect non-animal waste nutrient use was based solely on fertilizer savings as described below.

Since most producers do not use proper nutrient management techniques and tend to over apply fertilizers, on-farm benefits associated with nutrient management are the result of cost savings through the reduction of purchased mineral fertilizer inputs. Improvements in crop yields will normally not occur in normal years, since fertilizer usage already exceeds the minimum needed for the expected yield. Benefits associated with the proper utilization of nutrients on farms using commercial mineral fertilizers alone will tend to be smaller than those realized from the farms that apply both animal manure and commercial fertilizers. Since the purchase of mineral fertilizers directly impacts a given producer's bottom line in a manner that is obvious to the producer, they tend to apply mineral fertilizers more in line with soil test recommendations. This is not to say that over application of nutrients does not occur, just that the magnitude of each occurrence is less than that associated with the application of animal wastes.

Table 32. Distribution of benefits over time for practices affecting air quality.

Practice	Code and Name	Historical Cost Share	Practice Life (yrs)	Proportion of Full Annual Benefits Occurring by Year (year 1 is funding and contract year)									
				1	2	3	4	5	6	7	8	9	10
329	Residue and Tillage Management, No-Till/Strip Till/Direct Seed	$67,324,968	1	0.0	1.0	1.0	1.0	0.8	0.6	0.4	0.2	0.1	0.0
328	Conservation Crop Rotation	$44,000,197	1	0.0	1.0	1.0	1.0	0.8	0.6	0.4	0.2	0.1	0.0
340	Cover Crop	$22,448,068	1	0.0	1.0	1.0	1.0	0.8	0.6	0.4	0.2	0.1	0.0
345	Residue and Tillage Management, Mulch Till	$19,482,578	1	0.0	1.0	1.0	1.0	0.8	0.6	0.4	0.2	0.1	0.0
705	Atmospheric Resource Quality Management	$17,846,972	10	0.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
612	Tree/Shrub Establishment	$16,962,813	15	0.0	0.1	0.2	0.4	0.8	1.0	1.0	1.0	1.0	1.0
550	Range Planting	$16,535,369	10	0.0	1.0	1.0	0.9	0.9	0.8	0.8	0.7	0.6	0.5
342	Critical Area Planting	$10,606,600	10	0.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
380	Windbreak/Shelterbelt Establishment	$7,413,559	15	0.0	0.1	0.2	0.4	0.8	1.0	1.0	1.0	1.0	1.0
327	Conservation Cover	$1,957,642	10	0.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
650	Windbreak/Shelterbelt Renovation	$1,252,926	15	0.0	0.1	0.2	0.4	0.8	1.0	1.0	1.0	1.0	1.0
344	Residue Management, Seasonal	$1,189,246	1	0.0	1.0	1.0	1.0	0.8	0.6	0.4	0.2	0.1	0.0
422	Hedgerow Planting	$521,528	15	0.0	0.1	0.2	0.4	0.8	1.0	1.0	1.0	1.0	1.0
586	Stripcropping	$278,053	5	0.0	0.5	1.0	1.0	1.0	1.0	0.8	0.6	0.4	0.2
603	Herbaceous Wind Barriers	$231,660	5	0.0	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0	0.0
609	Surface Roughening	$128,020	1	0.0	1.0	1.0	1.0	0.8	0.6	0.4	0.2	0.1	0.0
589A	Cross Wind Ridges	$125,738	5	0.0	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0	0.0
346	Residue and Tillage Management, Ridge Till	$66,709	1	0.0	1.0	1.0	1.0	0.8	0.6	0.4	0.2	0.1	0.0
557	Row Arrangement	$8,913	15	0.0	0.1	0.2	0.4	0.8	1.0	1.0	1.0	1.0	1.0
589C	Cross Wind Trap Strips	$10	5	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Totals	$228,381,568											
	Average, weighted by Cost Share		4.5	0.0	0.8	0.9	0.9	0.8	0.7	0.6	0.4	0.4	0.3

Available information documenting reductions in nutrient use associated with the adoption of nutrient management practice in accordance with NRCS standards is somewhat limited. Some individual states have interviewed producers to obtain this information, however the sample size is relatively small, and not necessarily geographically distributed. Two sources of information were found which indicate relative reductions in nitrogen and phosphorus applications on lands utilizing nutrient management "practices".

The first is "National Management Measures to Control Nutrient Source Pollution from Agriculture, published by the US Environmental Protection Agency. The report gathered fertilizer input data from farmers located within eight USDA Demonstration and eight Hydrologic Unit Projects from 1991-1995. It was not clear how many farms were surveyed in all of the samples. This study indicated that after adoption of nutrient management, farmers reduced nitrogen application by an average of 51 pounds per acre, and phosphorus by 26 pounds. Fertilizer application rates in this study varied across the country. The nitrogen application reduction ranged from a low of 21 pounds to a high of 72 pounds. Phosphorus reduction rates ranged from six to fifty-five pounds.

A second study conducted by Christensen (1998) surveyed 890 producers in 16 states. The study did not specifically state that the adoption of nutrient management practices was a result of implementation of a plan developed with technical guidance provided in the NRCS nutrient management practice standard. Instead, the study classified producers as low, medium, and high adopters of nutrient management technologies. The factors the study considered in classifying producers in relation to nutrient management activities were:

- Nitrogen test using either soil or plant tissue in 1995 or 1996,
- Nitrogen inhibitor used in 1996,
- No nitrogen products were applied by broadcasting, or if nitrogen was broadcast, the product was incorporated into the soil for the 1996 crop,
- All nitrogen was applied at or after planting in 1996,
- Some aspect of precision agriculture was adopted before or during 1996,
- A legume was grown in rotation with corn sometime during the two years prior to 1996, and
- Either a negative or slightly positive nitrogen mass balance based on expected yield.

Producers in the high category adopted four or more of the listed nutrient management attributes. Medium category farmers used two or three of the components, and low category producers used either one attribute or none at all.

The NRCS Nutrient Management Standard (conservation practice 590) encompasses all of the previously mentioned attributes. However, most of them only apply under certain geographic and environmental situations, and are not universally required on all 590 plans. The only one of the seven attributes that is required by the NRCS nutrient management standard, (590), is item seven regarding nitrogen mass balances based on expected crop yield. Most producers do not meet NRCS standards for nutrient management. Frequently, producers will apply extra nitrogen as a form of cheap "insurance" to give crops an extra boost.

For the purposes of this analysis, a weighted average of the medium and high producers was used to approximate the producers who adopt the NRCS nutrient management standard. The relative amounts of nutrients applied to crops, and measurement of the impacts of moving from the base condition (the low adopters in the ERS study) to fully adopting the NRCS nutrient management standard (composite of the medium and high adopters) can be approximated by use of the values in the ERS study).

Table 33. Average nutrient applications on corn by class of nutrient management adopters.

Item	Low Adopters	Medium Adopters	High Adopters
Nitrogen (lbs.)	155	132	120
Phosphorus (lbs.)	58	54	46
Potash (lbs.)	84	69	82
Percent of Total Producers	19	70	12

Developing a composite application rate of those who adopt nutrient management according to NRCS standards (following the assumptions in the previous paragraph) compared to those producers who do not follow NRCS conservation practice 590 results in the following application rates:

Table 34. Average estimated nutrient application with adoption of NRCS conservation practice 590.

Item	Non Adopters	Adopted NRCS 590 Standard	Net Reduction Due to Adoption of NRCS 590
Nitrogen (lbs.)	155	130	25
Phosphorus (lbs.)	58	53	5
Potash (lbs.)	84	71	13

Prices for nutrients applied to cropland can vary based on the form in which the nutrients are applied. Anhydrous ammonia, for example, is less expensive than other forms of nitrogen. Nitrogen is the nutrient that exhibits the greatest price variation between commonly applied forms of the input. For the purposes of this analysis, prices of nutrients are set based on data from the National Agricultural Statistics Service for 2007[24]. The prices per unit are derived from the national average cost per ton of various commercial product prices based on the percentage of nutrient contained in a ton. Only mineral fertilizers that were applied as a single nutrient were used to determine nutrient price values. For the purposes of this analysis, nitrogen is valued at 49¢ per pound (based on the national average price for Urea), phosphorus at 48¢ per pound (based on the national average price for DAP), and potash at 22.6¢ per pound (based on the national average price for 0-0-62).

[24]USDA National Agricultural Statistics Service, Agricultural Prices, available at: http://www.nass.usda.gov/QuickStats

The estimated benefits per acre in cost savings are shown in Table 35.

Table 35. Reduced corn fertilizer input costs per acre with adoption of nutrient management according to NRCS standards.

Item	Input Reduction (lbs.)	Price Per Unit of Input ($)	Cost Savings ($)
Nitrogen	25	$0.49	$12.31
Phosphorus	5	$0.48	$2.40
Potash	13	$0.23	$2.94
		Value of averted losses:	**$17.65**

Wildlife Habitat

The indirect beneficial impact on wildlife habitat realized by producers participating in EQIP is a good example of the multiple environmental benefits realized by many conservation programs (Table 36 defines the average life of the practices and the benefit stream over time, similarly to those of the previously discussed benefit categories). As stated in legislation describing EQIP purposes, benefits need to include positive impacts to wildlife. Generally, EQIP focuses on erosion and water quality environmental concerns in areas where significant natural resource problems exist. However, these issues have an indirect impact on wildlife as the conservation practices often provide important habitat[25]. The program also provides opportunities for direct assistance with wildlife habit management and wetland habitat management. Fish and wildlife benefits accrue based on the types of practices installed with EQIP. The primary practices are conservation buffer practices, fencing, ponds, upland wildlife habitat management and wetland restoration and management.

A review of available literature indicates that a great deal has been written about the values of wildlife conservation (Gibilisco and Filipek, Washington Department of Fish and Wildlife). The National Survey of Fishing, Hunting, and Wildlife Associated Recreation[26] conducted by the U.S. 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. 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, and then estimates the surplus resulting from converting land to CRP. Since establishing grassland or forest cover creates suitable habitat for birds, small game, and big game, hunters and

[25]Gray, Randall; "Equipping Your Partners" Bird Conservation, Issue 11, 1999.
[26]2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, available at: http://www.census.gov/prod/2008pubs/fhw06-errata.pdf

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 EQIP based on the CRP, as summarized in the following matrix:

CRP	EQIP
Land retired from production	Land remains in agricultural production
Minimum contract length of ten years	Average contract length based on historical participation is four to six years
Emphasis on marginal land	Emphasis on productive land with treatment needs

Practices beneficial to wildlife, primarily those that improve cover, are listed in Table 36 based on the projected number of acres in future program implementation years. The annual benefits for improved wildlife habitat are based on ERS studies of the CRP program. They involve two components: improved wildlife viewing ($10.02) per acre and improved pheasant hunting ($2.36) per acre. These benefit estimates were reduced 50 percent ($6.19 per acre) to account for factors such as expected lower per-acre benefits on “working” lands versus retired lands, different spatial proximity of EQIP lands than CRP lands, shorter contract length, etc. Using a GDP index factor of 1.15 to adjust the value from 2002 to 2007, the resulting benefit is $7.10 per acre.

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, or 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 Muellbauer, 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, small, and big 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 36. Distribution of benefits over time for practices affecting wildlife habitat.

Practice Code and Name		Historical Cost Share	Practice Life (yrs)	Proportion of Full Annual Benefits Occurring by Year (year 1 is funding and contract year)									
				1	2	3	4	5	6	7	8	9	10
580	Streambank and Shoreline Protection	$33,340,508	20	0.0	0.4	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0
666	Forest Stand Improvement	$30,256,252	10	0.0	0.1	0.2	0.4	0.8	1.0	1.0	1.0	1.0	1.0
490	Tree/Shrub Site Preparation	$27,182,628	15	0.0	0.1	0.2	0.4	0.8	1.0	1.0	1.0	1.0	1.0
612	Tree/Shrub Establishment	$23,962,440	15	0.0	0.1	0.2	0.4	0.8	1.0	1.0	1.0	1.0	1.0
412	Grassed Waterway	$21,371,765	10	0.0	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
338	Prescribed Burning	$9,499,352	5	0.0	0.0	1.0	1.0	1.0	0.8	0.6	0.4	0.2	0.0
380	Windbreak/Shelterbelt Establishment	$9,093,279	15	0.0	0.1	0.2	0.4	0.8	1.0	1.0	1.0	1.0	1.0
645	Upland Wildlife Habitat Management	$8,240,157	1	0.0	1.0	1.0	1.0	0.8	0.6	0.4	0.2	0.1	0.0
643	Restoration and Management of Rare and Declining Habitats	$3,244,425	15	0.0	0.4	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0
409	Prescribed Forestry	$3,101,649	1	0.0	1.0	1.0	1.0	0.8	0.6	0.4	0.2	0.1	0.0
386	Field Border	$2,938,960	10	0.0	0.4	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0
327	Conservation Cover	$2,270,775	10	0.0	0.1	0.2	0.4	0.8	1.0	1.0	1.0	1.0	1.0
394	Firebreak	$2,264,820	10	0.0	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
391	Riparian Forest Buffer	$1,395,598	15	0.0	0.4	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0
650	Windbreak/Shelterbelt Renovation	$1,373,109	15	0.0	0.4	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0
395	Stream Habitat Improvement and Management	$1,192,030	1	0.0	1.0	1.0	1.0	0.8	0.6	0.4	0.2	0.1	0.0
647	Early Successional Habitat Development/Management	$895,044	15	0.0	0.1	0.2	0.4	0.8	1.0	1.0	1.0	1.0	1.0
659	Wetland Enhancement	$693,249	15	0.0	0.4	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0
646	Shallow Water Development and Management	$662,374	15	0.0	0.1	0.2	0.4	0.8	1.0	1.0	1.0	1.0	1.0
657	Wetland Restoration	$655,524	15	0.0	0.4	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0
422	Hedgerow Planting	$504,447	15	0.0	0.4	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0
644	Wetland Wildlife Habitat Management	$394,038	1	0.0	1.0	1.0	1.0	0.8	0.6	0.4	0.2	0.1	0.0
396	Fish Passage	$369,000	10	0.0	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
322	Channel Bank Vegetation	$165,118	10	0.0	0.1	0.2	0.4	0.8	1.0	1.0	1.0	1.0	1.0
658	Wetland Creation	$77,365	15	0.0	0.1	0.2	0.4	0.8	1.0	1.0	1.0	1.0	1.0
	Total	$185,143,903											
	Average, weighted by Cost Share		12.8	0.0	0.3	0.5	0.7	0.9	1.0	0.9	0.9	0.9	0.9

Energy Use

Table 37 shows the life and expected benefit stream over time for each practice affecting energy use in this study, and the cost-share weighted averages over the group of practices. The list contains two annual management practices with a life expectancy of one year. As a result, the average practice life for these energy reducing practices results in 1 with full benefits occurring in years two, three and four followed by a gradual tapering to zero benefits in year ten.

Benefits for energy reducing practices are based on preliminary results of CEAP (Conservation Effects Assessment Project). Using CEAP estimates of gallons of diesel fuel saved by implementing no-till and mulch tillage residue management practices in lieu of conventional tillage systems results in a savings of 2.99 gallons per acre. The Energy Information Administration reports the national average diesel price is $3.08 per gallon in October, 2007. By deducting federal and state fuel highway taxes of $0.24 and $0.22 per gallon results in a price of $2.61 per gallon for agricultural purposes. The result is a net benefit of $7.81 per acre for implementing energy reducing tillage practices.

Table 37. Distribution of benefits over time for practices affecting energy use.

			Proportion of Full Annual Benefits Occurring by Year (year 1 is funding and contract year)									
Practice Code and Name	Historical Cost Share	Practice Life (yrs)	1	2	3	4	5	6	7	8	9	10
329 Residue and Tillage Management, No-Till / Strip Till / Direct Seed	$143,664,330	1	0.0	1.0	1.0	1.0	0.8	0.6	0.4	0.2	0.1	0.0
345 Residue and Tillage Management, Mulch Till	$51,106,966	1	0.0	1.0	1.0	1.0	0.8	0.6	0.4	0.2	0.1	0.0
Totals	$94,771,297											
Average, weighted by Cost Share		1.0	0.0	1.0	1.0	1.0	0.8	0.6	0.4	0.2	0.1	0.0

Carbon Sequestration

Table 38 shows the life and expected benefit stream over time for each practice affecting carbon sequestration, and the cost-share weighted averages over the group of practices. The average practice life for the carbon sequestration practices was found to be five years, with nearly full benefits occurring in years three through six, followed by a gradual taper to 40 percent of benefits in year ten.

Carbon sequestration benefits are based on the Chicago Climate Exchange (CCX) standardized rules for issuing Carbon Financial Instrument contracts. The Chicago Climate Exchange has adopted location based carbon credit offsets available to agricultural producers implementing conservation tillage, grass plantings, grazing management and forestry practices. The assumption is that even though a producer may not elect to offer carbon credit benefits on the CCS, the practice benefits would be available to do so. Using FY 2007 EQIP practice implementation as the baseline, a weighted carbon sequestration rate of 0.233 metric ton per acre was estimated for the mixture of practices listed in Table 38. As of July 16, 2008, the value of a carbon credit was $4.00 per metric ton. EPA comments recommended using an European market price, around $25 per ton. OMB comments recommended that USDA use ‘the U.S. value of the social cost of carbon used in several other rulemakings, which is $2/ton. USDA is using $2.00/ton. As a result, the value per acre of carbon sequestration is 47¢ per acre.

Table 38. Distribution of benefits over time for practices affecting carbon sequestration.

Practice	Code and Name	Historical Cost Share	Practice Life (yrs)	Proportion of Full Annual Benefits Occurring by Year (year 1 is funding and contract year) 1	2	3	4	5	6	7	8	9	10
329	Residue and Tillage Management, No-Till/Strip Till/Direct Seed	$143,664,330	1	0.0	1.0	1.0	1.0	0.8	0.6	0.4	0.2	0.1	0.0
327	Conservation Cover	$2,270,775	1	0.0	1.0	1.0	1.0	0.8	0.6	0.4	0.2	0.1	0.0
342	Critical Area Planting	$12,678,050	10	0.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
393	Filter Strip	$367,958	10	0.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
512	Pasture and Hay Planting	$124,302,665	10	0.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
550	Range Planting	$22,083,307	15	0.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
528	Prescribed Grazing	$108,594,439	1	0.0	1.0	1.0	1.0	0.8	0.6	0.4	0.2	0.1	0.0
	Totals	$413,961,524											
	Average, weighted by Cost Share		5	0.0	0.8	1.0	1.0	0.9	0.8	0.6	0.5	0.4	0.4

Animal Waste Management

About 12 percent of the grand total of benefits estimated for EQIP is derived from producers adopting practices reducing non-point source (NPS) water pollution. These benefits are a direct update of the CNMP related benefits in the 2003 EQIP Benefit Cost Analysis accompanying the earlier EQIP Rule, which was in turn based on the benefits analysis for the 2002 EPA CAFO Rule.

There are a wide range of practices addressing animal waste management which all eventually affect water quality. They range from installing concrete or metal structures to store animal waste until suitable conditions for proper applications; to planting vegetative filter strips to treat wastewater runoff; to manure spreading techniques to minimize impacts to the environment. These practices involve management, construction, and cropping activities implemented in a comprehensive manner to ensure that the environmental impact is minimized while not compromising the economic viability of the farm.

CNMPs provide a blueprint for producers on how to address animal waste management. For the purposes of this analysis, the benefits attributable to animal waste management include all of the practices, including the structural, management, and vegetative practices as well as the upfront planning that is needed to achieve the resource management level necessary for an EQIP contract.

The previous EQIP BCA (USDA, NRCS, 2003) calculated a $30.23 benefit per AU per year for implementation of CNMPs and associated practices in 1999 dollars, attributable to water quality. This estimate was based on the benefit-cost analysis from the EPA (US EPA, 2001[27]). The EPA study was not a comprehensive estimate of all benefits expected to result from animal waste treatment. The EPA study did include estimated national benefits in the following categories for which data and methodology was available:

[27]Based on work underlying the EPA Environmental and Economic Benefit Analysis of Final Revisions to the National Pollutant Discharge Elimination System Regulation and the Effluent Guidelines for Concentrated Animal Feeding Operations 2002 , available at: http://cfpub.epa.gov/npdes/afo/cafodocs.cfm

- Improvements in water quality and suitability for recreational activities ($5 million to $145 million);
- Reduced incidence of fish kills (up to just over $1 million);
- Improved commercial shell fishing ($2 million to $3 million); and
- Reduced contamination of private wells ($70 million to $77 million).

The previous EQIP BCA (USDA, NRCS, 2003) also estimated an annual $16.40 per AU benefit[28] due to nutrient value for crops which is updated from 2001 to 2007 dollars to $18.80 per AU. The $30.23 water quality benefit estimate[29] was updated from 2001 to 2007 dollars to produce a $34.66 estimate. This is added to the crop nutrient benefit estimate, resulting in $53.46 per AU per year benefit. Note that this latter benefit is an increase in the productivity of existing inputs available to the producer. Thus, the benefits derived are mainly in lower production costs. In the aggregate, output would be expected to increase, resulting in lower prices. This aggregate impact on net economic welfare is beyond the scope of this analysis. Also, it would be expected that the formerly used inputs would make their supplies available for use by other sectors or in later time periods. The $18.80 per animal unit per year economic benefit derived from improved crop nutrient management could be considered to be part of these overall output and input market effects.

Table 39, Estimated Benefits and Costs Analysis of CNMPs expands the calculation. With the 2007 baseline extended through 2012, the cost and number of animal units treated per year remains constant, treating 545,000 animal units per year, or 2.7 million animal units over the baseline five year period. With the expanded funding in the new Farm Bill, the number of animals treated increases proportional with the added funding, treating four million animal units over the life of the new farm bill.

The number of animal units treated per year is multiplied by the $53.46 benefit per animal unit to calculate the economic benefits of these CAFO related practices for each year, both for the baseline and for the Rule. These annual benefits are discounted at seven percent to obtain the net present value of benefits of $960 million for the baseline and $1.414 billion for the new Rule.

The implementation costs of building the CNMP systems include both EQIP financial assistance (FA) costs and producer costs. The EQIP FA costs include 60 percent of the total implementation costs (estimated 60 percent cost share rate). Development costs for CNMPs, considered technical assistance, are provided 100 percent by NRCS. The total costs include all NRCS TA and FA costs, plus private costs.

The CAFO related costs and benefits are included in Tables 6 and 7. The benefits are also used in Tables 1, 8, 9, and 14.

[28]Table 21, 2003 EQIP BCA (USDA, NRCS, 2003)
[29]Table 18, 2003 EQIP BCA (USDA, NRCS, 2003)

Table 39. Estimated benefits and costs analysis of CNMPS, using a seven percent discount rate.

Item	Baseline Scenario (Continuation of 2002 Farm Bill)	New 2008 Farm Bill
Number of AUs treated per year		
2008	544,792	665,321
2009	544,792	741,279
2010	544,792	803,930
2011	544,792	880,442
2012	544,792	970,260
	2,723,962	4,061,233
NPV of ten year stream of benefits in year:		
2008	$ 218,891,356	$ 267,318,550
2009	$ 218,891,356	$ 297,837,418
2010	$ 218,891,356	$ 323,009,914
2011	$ 218,891,356	$ 353,751,548
2012	$ 218,891,356	$ 389,839,552
NPV of five years benefits in 2007	$ 960,322,622	$ 1,413,974,010
NPV of ten year stream of implementation costs in year:		
2008	$ 167,050,311	$ 204,008,269
2009	$ 167,050,311	$ 227,299,213
2010	$ 167,050,311	$ 246,509,992
2011	$ 167,050,311	$ 269,970,943
2012	$ 167,050,311	$ 297,512,060
NPV of five years costs in 2008	$ 732,885,003	$ 1,079,096,048
NPV of development costs in year:		
2008	$ 25,142,260	$ 30,704,696
2009	$ 25,142,260	$ 34,210,148
2010	$ 25,142,260	$ 37,101,507
2011	$ 25,142,260	$ 40,632,547
2012	$ 25,142,260	$ 44,777,681
NPV of five years costs in 2008	$ 110,304,406	$ 162,411,631
NPV of Total Benefits	$ 960,322,622	$ 1,413,974,010
NPV of Total Costs Both Development (TA) and Implementation (FA & Producer)	$ 843,189,410	$ 1,241,507,679
Net Benefits over Total Costs	$ 117,133,213	$ 172,466,330

Appendix F: Producer Demographics and Its Possible Linkages to EQIP

Introduction

The 2008 Act introduces the group, "socially disadvantaged farmer or rancher" (SDFRs) and merges it with two existing population groups ("beginning farmers and ranchers (BFRs) and "limited resource farmers and ranchers," (LRFRs). All three groups form a new designation of participants referred to as "historically underserved producers." Definitions for BFRs and LRFRs are as defined in EQIP's final rule published on May 30, 2003; however, the definition for SDFRs has been added in accordance with the 2008 Act. This action sought to expand EQIP participation to be more inclusive of farmers and ranchers who have been subjected to racial or ethnic prejudices because of their identity as a member of a group, without regard to their individual qualities. This definition originates from Section 2501(g) of the Food Agricultural Conservation and Trade Act of 1990, which defines "socially disadvantaged."

A farmer or rancher meeting the definition of "historically underserved producer" may be awarded the applicable payment rate and additional rate that is not less than 25 percent above the applicable rate, provided this increase does not exceed 90 percent of the incurred costs associated with the conservation practice.

The State Conservationist will also allocate ten percent of the funds to assist SDFRs, as determined by the State Conservationist, with advice from the State Technical Committee. The stature allocates five percent to assist BFRs; and five percent to assist SDFRs. In instituting the statutory change, NRCS contemplated three ways to allocate funds to meet the 2008 Act's requirements: (1) issuing the allocations at the national level to defined geographic areas, where such groups are prevalent; (2) issuing the allocations to each state; or (3) establishing a national target that conforms to the statutory language, but providing states flexibility to designate money to each specified group based on potential demand in the State.

Under Option 3, NRCS pools the money and establishes a ten percent target for each State, enabling State Conservationists to designate money to the specified groups based on potential. For example, a State may provide seven percent of the funds to beginning farmers and ranchers and three percent to socially disadvantaged farmers and ranchers. NRCS has chosen the latter option to ensure that nationwide these groups will benefit from the EQIP assistance. Similar to EQIP's national livestock target, overall State-level percentages will be tracked at the national level to ensure national goals are met. It has also chosen the option in an effort to provide flexibility to the states, since some states may have difficulty reaching the designated percentages for the particular groups, due to variations in the states' populations of these groups. Similar to the EQIP's national livestock target, states' percentages will be tracked at the national level to ensure that the 2008 Act's national goals are met.

The effects of allocating the funds at the state level, with the targets being monitored at the national level will be threefold: (1) funds will be provided to applicants who may be in the greatest need for additional assistance; (2) priority resource concerns may be better addressed; and (3) NRCS will assure that the national targets for these groups are met.

In the event a "historically underserved producer" chooses to develop or implement practice, the State Conservationist may issue advance payments up to 30 percent of the anticipated amount of the costs incurred for the purpose of purchasing materials or services to implement a conservation practice.

Potential impact of lower cost-share rate by "historically underserved producers" on their numbers in EQIP and possible impact on the environmental performance of EQIP

The risks to the overall program's ability to generate the same level of environmental benefits as would occur without them (in order to increase the number of "historically underserved producers") could be substantial. The actual results would depend on several factors, including: the initial conditions of the resource concerns of the "historically underserved producers" operations relative to their "non-historically underserved producers" and the initial mix of "historically underserved producers" to "non-historically underserved producers" and their relative size of operations. Consider a situation where the initial number of "historically underserved producers" consist of five percent of total applications and the size of all their EQIP contracts is $10,000 (also assume that the initial EQIP funding level is $1 billion, leaving $100 million designated for "historically underserved producers").

Assuming that "historically underserved producers" respond to the lowering of the cost share expected of them (from $2,500 to $1,000 or a 60 percent drop) with a 0.6 "price elasticity", one could expect to see a 36 percent increase in participation by "historically underserved producers". This increase would, indeed, increase participation by "historically underserved producers" and they would be expected to represent about seven percent of EQIP participants (Table 40). This assumes that all of the additional applicants qualify and receive the additional 15 percent cost-share amounts. In the aggregate, total spending would increase by almost $29 million (about 20 percent of which would be devoted to TA to service the additional participants and about 80 percent in additional FA). This does not assume that TA per contract would be higher for "historically underserved producers" than "non-historically underserved producers".

The $29 million increase in spending devoted to "historically underserved producers" would need to be weighed against the net change in environmental gains (comparing what the $29 million would have obtained without the "historically underserved producer" provision against pursuing a strategy to increase participation by this group). This almost $29 million increase would represent an increase in spending on these participants of almost 60 percent, but only take away less than three percent of the current spending levels for "non-historically underserved producers".

Table 40. Possible impacts of the increased cost-share rate for "historically underserved producers" in EQIP.

Item	With normal 75% cost share	With 90% cost share	Change
Number of "Historically underserved producers"	5,000	6,800	$1,800
Farmer Costs Per Contract	$2,500	$1,000	-$1,500
Total Farmer Costs	$12,500,000	$6,800,000	$5,700,000
NRCS Costs – TA	$2,800	$2,800	0
FA	$7,500	$9,000	$1,500
Total NRCS Costs Per Contract	$10,300	$11,800	$1,500
Total NRCS Costs			
TA 1/	$14,000,000	$19,040,000	$5,040,000
FA	$37,500,000	$61,200,000	$23,700,000
Total NRCS Costs	**$51,500,000**	**$80,240,000**	**$28,740,000**

Socially disadvantaged farmer or rancher

Socially disadvantaged farmers or ranchers is defined as farmers or ranchers whom have been subjected to racial or ethnic prejudices because of their identity as a member of a group without regard to their individual qualities.

In the implementation of 1996 Farm Bill, there was a loose definition of socially disadvantaged and limited resource farmer. In October, 2002, to implement the 2002 Act, USDA developed an interagency definition for Limited Resource Farmer and Rancher based on income characteristics alone. This had the unintended effect of excluding the other socially disadvantaged farmers and ranchers from lower cost-share rates available to the other traditionally underserved farmers and ranchers. In the 2008 Act, Congress rectified this by restoring the socially disadvantaged farmer group in the rule, and provided them a lower cost-share rate. The term socially disadvantaged farmers or ranchers also includes Indian Tribes, Alaska Natives, and Pacific Islanders.

Based on the 2002 Census of Agriculture, the overall number of socially disadvantaged farmers[30] increased to 112,195 farmers/ranchers, and represents 5.1 percent of US farmers and ranchers. Socially disadvantaged farmers/ranchers operate almost 80 million acres, which is 8.4 percent of U.S. farm land, an 8 million acre increase from 1997 to 2002.

These numbers indicate that socially disadvantaged farmers control increasing amounts of natural resources. These individuals probably have a need for low-cost, technically sound, approaches to natural resource conservation. Many of these individuals may need expanded technical and financial assistance to build sustainable operations.

[30] In this section, minority refers to racial and ethnic status and not gender. Female farm operators were included in the socially disadvantaged farmer category in the 1996 EQIP program, but not thereafter.

Sometimes, but not always, Limited Resource Farmers and Ranchers (LRFRs) are also members of socially disadvantaged groups, such as American Indians, African Americans, Asians, and Hispanics. LRFR is a designation based on economic status, while socially disadvantaged affiliation is determined by an individual's self-designation, and on definitions found in Federal civil rights law.

In figure 1, the existence of socially disadvantaged farmers does not necessarily mean that they are also LRFRs. This map assessed LRFR status through the manipulation of census data[31]. Additional maps for Black/African American, Hispanic, and Native American farmers are available in the Environmental Assessment for the 2008 EQIP program rule.

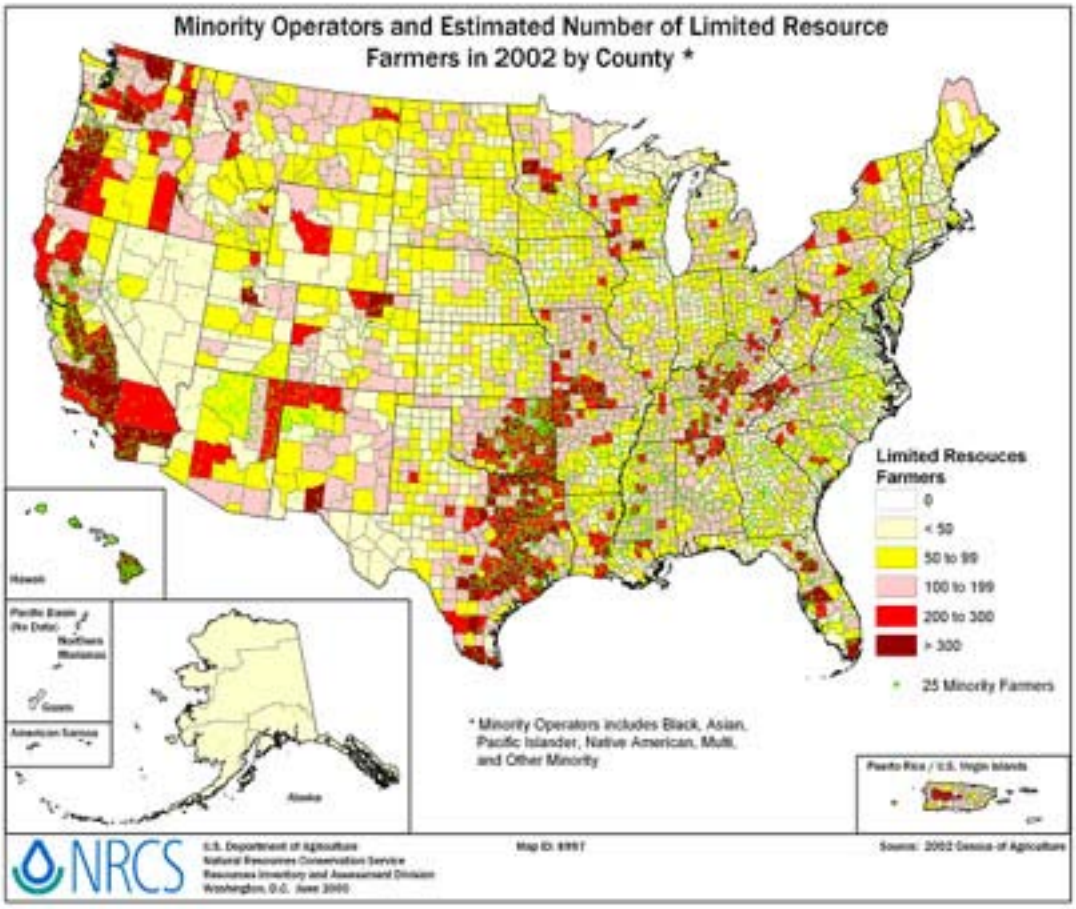

Figure 1. Location of socially disadvantaged operators and limited resource farmers.

There is an overlap between the number of LRFRs and minorities in NRCS's Eastern region (parts of FL, LA, SC, PA, NY, and the Appalachian states), Central region (parts of TX, OK, MO, WI, and MN) and the Western region (parts of NM, AZ, WY, CA, OR, and WA). TX, OK, and CA seem to have the largest coincidence of LRFRs and socially disadvantaged farmers.

[31]For the method used to calculate LRFRs, go to ftp://ftp-fc.sc.egov.usda.gov/ENTSC/ , click on sst, Limited Resource Farmers, and M8961_metadata.doc

The largest correlation between LRFR and Black farmers is in a portion of Southern states in NRCS's Eastern and Central region. Estimates vary, but over 95 percent of the Black farmers operate their farms in the Southern part of the U.S. This map shows parts of TX, OK, KY, TN, MS, SC, and FL have the largest intersection of LRFR and Black farmers. Figure 2 indicates the number of Black/African American farmers over the last several agricultural censuses have increased to 29,090 farmers, an increase of 7.9 percent from 1997 to 2002.

Hispanic farmers are the largest group of socially disadvantaged farm operators at 50,592, and are also the fastest growing group. This group increased 33 percent from 1997 to 2002. Historically, 80 percent of Hispanics were concentrated in eight states, the border/coastal states from Texas to Washington, plus Colorado and Florida. Only 19 percent of US counties had any Hispanic farm operators in the 1982 Census of Agriculture. In the last 25 years, Hispanic farmers have spread to every part of the country. Analysis of Hispanic Farmer data shows that Hispanic Operators are underserved by USDA and require additional outreach. However once they initially start using USDA services, they have the same level of service as other customers. The issue is getting them in the door that first time.[32]

Although not as spectacular an increase as Hispanic farmers, **Native American farm operators** have increased in numbers to 15,494 in 2002, about a 17 percent increase from 1997. The map information for Alaska was garnered from the Census data and appears to severely under represent the number of Native American and Alaska Natives in agriculture. One needs to exercise extreme caution when viewing these numbers for Alaska, since approximately half of the federally recognized tribes reside in Alaska.

Figure 2 shows numerical trends for socially disadvantaged farmers. From 1997 to 2002, there was a 33 percent increase in the numbers of Hispanic farmers; 17 percent increase in American Indian (AKA Native American) farmers; 8 percent increase in Black/African American farmers; and a slight decrease in Asian American farmers. Figure 3 shows the land in farms by socially disadvantaged group.

The figures 2 and 3 shows that although African American and Hispanic farmers had the largest percentile increase in farm land at approximately 29 percent and 19 percent, respectively, American Indian farmers control the most acreage at 51.7 million acres. Asian American farmers control the least number of acres and also experienced a 34 percent decrease from 1997 to 2002. However, this may be due to Hawaiian farmers being counted separately from Asian American farmers in the 2002 Census of Agriculture.

[32]Referenced to Natural Resources Conservation Service (NRCS) Support for Hispanics in Agriculture, http://www.economics.nrcs.usda.gov/technical/hispanics

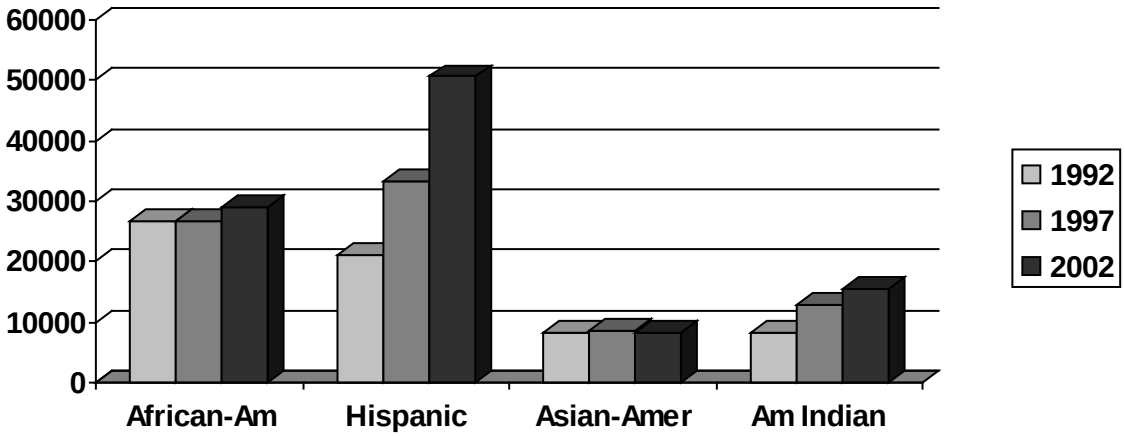

Figure 2. Number of principal operators -- African American, Hispanic, Asian American and American Indian in 1992, 1997, and 2002.

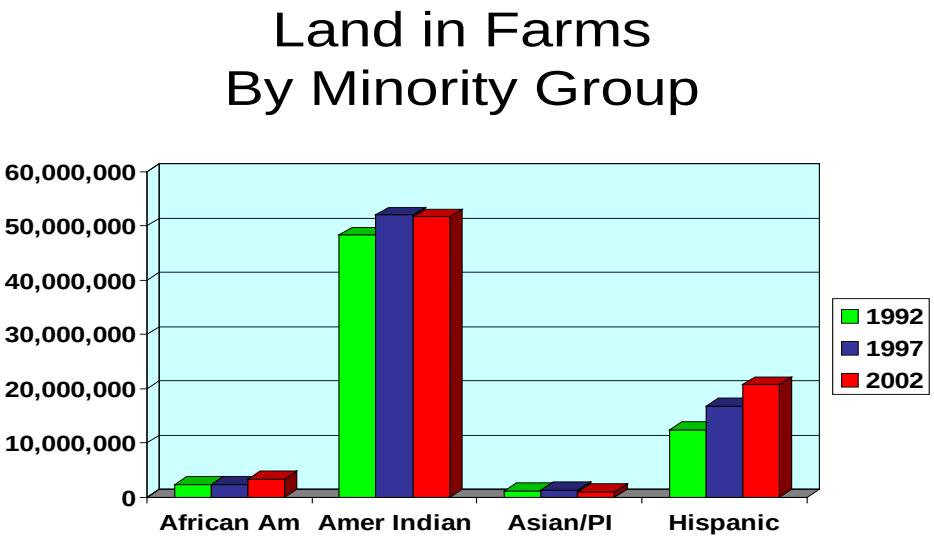

Figure 3. Land in farms by socially disadvantaged group.

Past Participation in NRCS Conservation Activities and Programs

NRCS provides data on minority farmer participation in parity reports available at http://ias.sc.egov.usda.gov/prsreport2007/. The data collection varies by year. Data from 2002 – 2008 is presented in Table 43, FY 2002 to FY 2008 NRCS parity reports on customers served

through EQIP. Table 41 shows the percentage of minorities in FY 2007 who have been reported by NRCS staff to have participated in various programs and also in Conservation Technical Assistance activities.

Table 41. Participation by minorities in conservation technical assistance and programs for FY 2007*.

Conservation Activity	Total**	Number of Minorities	Percentage of Minorities
Agriculture Management Assistance	315	4	1.3%
Conservation Reserve Program	49,883	408	0.8%
Conservation Security Program	332	19	5.7%
Conservation Technical Assistance	73,159	1,899	2.6%
Conservation Technical Assistance, Grazing Lands	33,061	1,629	4.9%
Emergency Conservation Program (56)	84	1	1.2%
Emergency Conservation Program (86)	178	2	1.1%
Emergency Watershed Program	273	6	2.2%
Environmental Quality Incentives Program	61,463	3,237	5.3%
Environmental Quality Incentives Program, Ground and	2,423	81	3.3%
Environmental Quality Incentives Program, Klamath	190	6	3.2%
Farm and Ranch Lands Protection Program	9	-	0.0%
Flood Prevention Operations	92	-	0.0%
Forestry Incentives Program	9	-	0.0%
Grazing Lands Reserve Program	9	-	0.0%
Small Watershed Operations	113	-	0.0%
Wetland Reserve Program	1,137	24	2.1%
Wildlife Habitat Protection Program	3,913	84	2.1%
Total Customers* **	**168,941**	**5,239**	**3.1%**

*Data calculated through the NRCS Performance Results System (PRS).

**The numbers listed under the column labeled "Total" are less than the totals of the columns because many customers were participants with multiple programs.

***33,570 customers or 20 percent of all customers have no demographic information available in the PRS dataset. NRCS customers are not required to specify race or ethnicity when applying for programs or technical assistance.

The percentage in the last column can be compared with the 5.1 percent of minorities who are principal U.S. farm operators. EQIP has a representation of socially disadvantaged farmers at seven percent, which may reflect the success of the agency's outreach efforts and the increased cost-share rate (up to 90 percent) that is available to LRFRs through EQIP. Although all other NRCS programs have a lower percentage of socially disadvantaged farmers who participate, CTA has a similar percentage of participants (4.2 percent), which, although lower percentagewise, is comparable to the number of socially disadvantaged farmers.

The easement programs, CRP, GRP, and the WRP, have low socially disadvantaged participation rates. Low participation may be due to many factors including low program knowledge, lack of non-working land, and ineffective outreach efforts. The reasons for these low rates need to be investigated and improved upon. The WHIP program has higher percentage of socially disadvantaged participants, but is still under the census figure of 5.1 percent.

Table 42 shows a summary for all programs of the number of applicants, the percentage accepted, and the money received. Most socially disadvantaged sub-populations have high acceptance rates based on the number of applicants; in fact, most percentage rates are higher than White non-Hispanic males (45 percent) and females (46 percent). One major difference, however, is the amount of money received by different sub-groups. The White non-Hispanic males and females received about $1.1 billion compared to $53 million received by all other groups combined. The dollar amount socially disadvantaged participants received represents about 4 percent of all program dollars. This percent is low, considering that 8.4 percent of all United States farm land is operated by socially disadvantaged farmers. However, based on the high percentage of minorities accepted in the program, it seems that people who apply for program dollars are treated fairly. The challenge seems to be to get more minorities to apply.

NRCS maintains a parity report that consolidates the number of occurrences of assistance that NRCS or partners conduct in the fiscal year for underrepresented groups and compares that to how our service compares with White non-Hispanics. This allows NRCS to report by fiscal year the number of customers by group representation assisted. Report selection criteria include location, program, time period, customer by group representation.

This report can be used to determine broad distribution trends in services provided to customers by the conservation partnership. For example, to interpret the parity data in the National row in the above report. The 2002 Census of Agriculture shows that there are 2,019,314 White non-Hispanic nationally, of which 15,111 have been served by the conservation partnership or approximately 1 percent of all White non-Hispanic served nationally. To determine parity between groups, compare Black Hispanic to White non-Hispanic (the baseline population). According to Census of Agriculture data there are 886 Black Hispanic nationally, of which 23 have been served by the partnership in 2005, representing approximately three percent of this group. To determine parity, we compare the White non-Hispanic to the other categories, in this example, the Black Hispanic. The three percent served Black Hispanic minus the one percent White non-Hispanic equals plus two disparity. This tells us that we served a higher percentage of Black Hispanic than White non-Hispanic. If the number had been a negative two, it would reflect a lower percentage of Black Hispanic served than White, non-Hispanic. Note: the Disparity cell is conditionally colored, where as if you are under or over represented by ten percent the cell is light colored, if range is greater than is ten percent or more it is a brighter color (Table 43).
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Table 42. National program participation summary, FY 2004*.

Group Representation	Applicant (Numbers)	Recipient (Dollars)	Percentage Accepted
American Indian/Alaska Native Female Non-Hispanic	144	$1,955,091	55%
American Indian/Alaska Native Female Hispanic	6	$49,240	16%
American Indian/Alaska Native Male Hispanic	50	$704,358	60%
American Indian/Alaska Native Male Non-Hispanic	989	$17,971,407	64%
Asian Female Non-Hispanic	39	$699,392	59%
Asian Male Hispanic	12	$70,859	50%
Asian Male Non-Hispanic	322	$6,219,424	56%
Black or African American Female Hispanic	3	$6,176	67%
Black or African American Female Non-Hispanic	176	$670,033	41%
Black or African American Male Hispanic	14	$49,268	29%
Black or African American Male Non-Hispanic	1,205	$5,999,140	47%
Hawaiian Native/Pacific Islander Female Hispanic	2	$397,838	100%
Hawaiian Native/Pacific Islander Female Non-Hispanic	24	$310,372	67%
Hawaiian Native/Pacific Islander Male Hispanic	7	$256,061	100%
Hawaiian Native/Pacific Islander Male Non-Hispanic	149	$2,414,532	68%
White Female Hispanic	211	$4,859,603	55%
White Male Hispanic	1,125	$10,820,623	56%
White Female Non-Hispanic	12,213	$100,506,207	46%
White Male Non-Hispanic	101,057	$999,265,154	45%

*Source: Data gathered from NRCS PRS.

Table 43. FY 2002 to FY 2008 NRCS parity reports on customers served through EQIP.

		White Hispanic	White Non-Hispanic	Black Hispanic	Black Non-Hispanic	American Indian Hispanic	American Indian Non-Hispanic	Asian Hispanic	Asian Non-Hispanic	Hawaiian Hispanic	Hawaiian Non-Hispanic	Multiple Races Hispanic	Multiple Races Non-Hispanic	No information	Total Individual Customer
	2002 Ag .Census	45,933	2,019,314	886	28,182	1,600	13,865	587	7,699	141	842	478	7,175	0	2,126,702
2008	Service	988 (2%)	41,299 (2%)	50 (6%)	790 (3%)	45 (3%)	456 (3%)	2 (0%)	215 (3%)	4 (3%)	120 (14%)	0 (0%)	74 (1%)	8,661 (0%)	52,704 (2%)
9 months	Disparity	0	N/A	4	1	1	1	-2	1	1	12	-2	-1	-2	
2007	Service	1,960 (4%)	130,132 (6%)	57 (6%)	1,397 (5%)	101 (6%)	824 (6%)	5 (1%)	445 (6%)	11 (8%)	256 (30%)	3 (1%)	180 (3%)	33,570 (0%)	168,941 (8%)
	Disparity	-2	N/A	0	-1	0	0	-5	0	2	24	-5	-3	-6	
2006	Service	654 (1%)	28,016 (1%)	27 (3%)	446 (2%)	37 (2%)	379 (3%)	6 (1%)	112 (1%)	6 (4%)	49 (6%)	0 (0%)	68 (1%)	8,648 (0%)	38,448 (2%)
	Disparity	0	N/A	2	1	1	2	0	0	3	5	-1	0	-1	1
2005	Service	385 (1%)	12,773 (1%)	23 (3%)	190 (1%)	23 (1%)	221 (2%)	4 (1%)	55 (1%)	3 (2%)	22 (3%)	2 (0%)	42 (1%)	14,385 (0%)	28,128 (1%)
	Disparity	0	N/A	2	0	0	1	0	0	1	2	-1	0	-1	0
2004	Mid-year change in baseline and definitions.														
		White Hispanic	**White Non-Hispanic**	**Black Hispanic**	**Black Non-Hispanic**	**American Indian Hispanic**	**American Indian Non-Hispanic**	**Asian/Pacific Islander Hispanic**	**Asian/Pacific Islander Non-Hispanic**	**Other Hispanic**	**Other Non-Hispanic**	**Totals**			
		18,456	1,844,326	266	18,169	322	10,307	242	8,432	8,074	1,653	**1,910,247**			
2003	Service	1,027 (6%)	55,793 (3%)	5 (2%)	1,014 (6%)	10 (3%)	1,095 (11%)	7 (3%)	343 (4%)	840 (10%)	155 (9%)	**60,289 (3%)**			
	Disparity	3	N/A	-1	3	0	8	0	1	7	6	**0**			
2002	Service	1,097 (6%)	48,346 (3%)	8 (3%)	978 (5%)	13 (4%)	920 (9%)	13 (5%)	290 (3%)	627 (8%)	105 (6%)	**52,397 (3%)**			
	Disparity	3	N/A	0	2	1	6	2	0	5	3	**0**			

NRCS Responses
Over the last several decades, the NRCS has recognized that there are increasing numbers of socially disadvantaged, beginning, female, and limited resource farmers and ranchers. Several measures have been taken to address this change in the agricultural customer base. Some of these measures include:

- Development of a separate Outreach Division in Washington D.C., along with outreach coordinators serving the states.
- Development of a NRCS outreach training course that is scheduled for release in 2008.
- Funding EQIP so that socially disadvantaged, limited resource and beginning farmers and ranchers receive cost-share rates up to 90 percent.
- Total EQIP funding set aside amounts for socially disadvantaged and limited resource farmers or ranchers.
- Developing informational materials in English and Spanish.
- Civil Rights reviews have added "Outreach" reviews when appraising state activities.
- Recognition of growing numbers of "new" or "beginning" farmers, who may require more basic forms of technical assistance.
- High acceptance percentage of socially disadvantaged farmers who apply for programs.

Methods to Increase Participation
NRCS maintains a wide array of technical practices to address conservation problems. These practices have been developed over time by working with private land owners on a wide variety of lands. As such, these practices often assume a depth of experience and knowledge that many socially disadvantaged, beginning or limited resource farmers and ranchers may not have. The NRCS must be willing and able to develop explanatory materials and methods that do not assume a great deal of experience on the part of the customer.

In a similar way, NRCS planners must be able to explain the uses and variations of particular practices in ways that are appropriate to different experience and knowledge levels. Many new socially disadvantaged farmers may not have the experience, knowledge, or equipment to implement practices that more seasoned farmers might take for granted.

The NRCS is already addressing the degree to which technical standards for certain practices (fencing, for example) may be altered to allow people of different cultural backgrounds and limited economic means to participate in conservation cost-share programs. Technical adequacy will not be compromised, but there should be a greater willingness to amend or expand technical standards to include less-costly options.

Table 44. Farm bill response to the trends of socially disadvantaged farmers.

Trends	Farm Bill Response
American Indian farmers control more than 50 million acres throughout the U.S.	Continue to provide financial and technical assistance to tribes for adoption of conservation and for establishing Conservation Districts on tribal lands.
Hispanic farmers have the highest number of socially disadvantaged farmers at just over 50,000 farmers and their numbers are increasing at a rapid rate.	Informational materials in English needs to include visual representations and Spanish needs to accompany English on informational material in heavily populated Hispanic areas.
The number of socially disadvantaged farm operators is increasing	Provide 90 percent cost-share rates for socially disadvantaged farmers, LRFRs and/or beginning farmers; ensure the use of demonstrations
Socially disadvantaged operators may also fall under the category of limited resource farmers and ranchers	Provide 90 percent cost-share rates for limited resource farmers and ranchers; ensure the use of demonstrations; EQIP also provides a total of 10 percent of total funding as a set side amount for beginning and socially disadvantaged farmers and ranchers
Socially disadvantaged operators are farming smaller acres and planting non-traditional crops	Continue to develop low cost conservation practices for small and medium size farmers
Many Asian American operators grow vegetables for internal distribution to U.S. Asian communities and for export to Asian communities abroad.	Develop special provisions and incentives for Asian vegetable growers to reward reduced agrichemical inputs.
Set-aside programs (CRP, GRP, and WRP) have extremely low participation rates for socially disadvantaged farmers	Analysis combined with increased outreach efforts in those programs need to occur

Beginning Farmer or Rancher

Definition

The Beginning Farmer or Rancher definition as stated in the final 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 will materially and substantially participate in the operation of the farm or ranch.

(B) In the case of a 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.

(C) In the case of a contract with an entity or joint operation, 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.

In the 1997 Census of Agricultural, there were 482, 997 farm operators with less than ten years on the present farm, 30 percent of all farm operators. They tend to have smaller farms, concentrating more into minor crops and livestock than grain and soybeans. Only 34 percent of these consider farming as their principle occupation, compared with 57 percent of farmers with over ten years on the farm. Most beginning farmers also work a full-time job besides managing the farm. They are less likely to be receiving any Government payments. Higher proportions of Hispanic and female operators will qualify as beginning farmers.

Beginning farmers and ranchers have a problem of low cash reserves and low equity positions that prevent their expenditures on conservation practices. Many have the education and technology available to practice good conservation, but their current loan payments are so large that they do not have the available cash. Because of their ages, they are more likely to have dependant children and higher household expenses. Providing qualified beginning farmers and ranchers with the higher cost share should help to promote good conservation by these producers.

The 'all members of the entity' subsection (ii) disallows younger farmers being brought up within well-establish extended family farms, whether in partnerships or family corporations. This is consistent with 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 usually provide better conservation on their lands because of their extended planning horizon.

Trends

There are unique challenges of farmers and ranchers who are just beginning their agricultural businesses. These "beginning farmers and ranchers" are given special recognition in the Farm Bill, in order to encourage the expansion in the number of farms and ranches across the nation, a number which has been declining for several years[33].

Figure 4 illustrates the general locations of beginning farmers across the U.S. As the map shows, the majority of beginning farmers and ranchers are grouped in the West and South. Some of the percentages depicted on the maps may be a result of a combination of low initial populations and expanding suburban areas, particularly in the western U.S. In general, however, this figure gives a good general idea of the location of beginning farmers and ranchers.

[33] US Census of Agriculture, http://www.nass.usda.gov/census/census02/volume1/us/index1.html

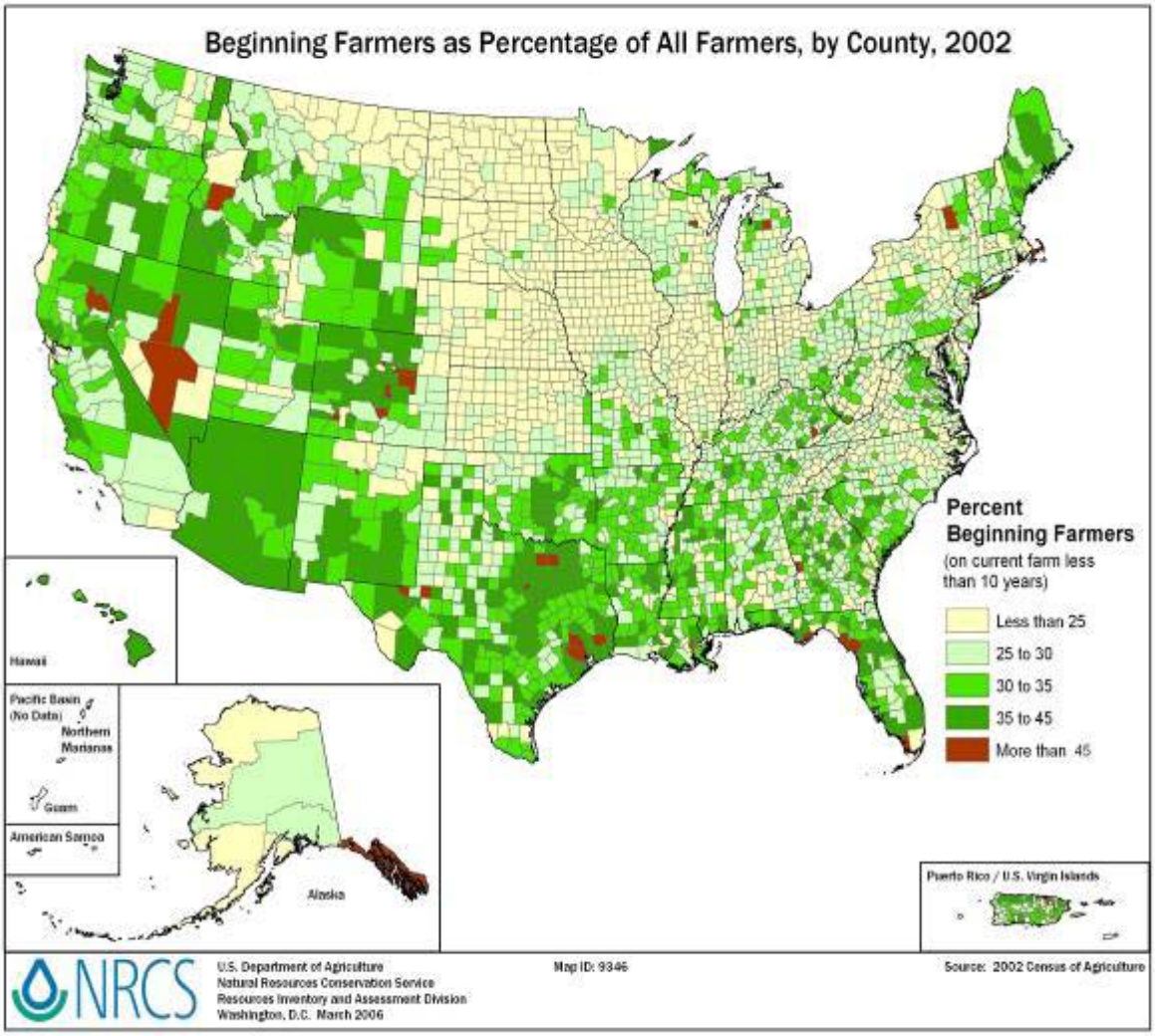


Figure 4. Percentages of beginning farmers and ranchers nationally.

Data

The 2002 Census of Agriculture reported roughly 2,112,000 principal operators of farms and ranches across the United States. The 2002 Census of Agriculture also captured information on how long principal operators have been on their current farms or ranches. Of the more than two million principal operators reported in the 2002 Census of Agriculture, 593,139 were listed as being on their present farm or ranch for less than 10 years. The number of principal operators is used in this analysis, rather than total number of operators, to more accurately reflect the actual number of beginning agricultural operations, rather than the number of persons involved.

There is a lack of historical data on the trend in numbers of beginning farmers and ranchers nationally. Based on the 2002 Census of Agriculture, however, a general picture of beginning farmers and ranchers can be formed. Table 45 shows the self-identified racial distribution of principal operators as beginning farmers and ranchers nationally.

Table 45. Racial characteristics of principal operator who is a beginning farmer or rancher*.

Race	Number	Percentage
White	572,486	97%
Black or African American	8,560	1%
American Indian or Alaska Native	5,978	1%
Native Hawaiian or other Pacific Islander	411	<1%
Asian	3,048	<1%
MTORR**	2,656	<1%

*All data taken from 2002 Census of Agriculture, Table 52.

**MTORR – More Than One Race Reported.

Additionally, 18,619 individual beginning farmer or rancher principal operators (roughly 3 percent of all beginning farmer or rancher principal operators) identified themselves as being of Spanish, Hispanic, or Latino origin, according to the 2002 Census of Agriculture. This is an increase of about 33 percent from the levels reported in the 1997 Census of Agriculture. This indicates an upward trend in the number of Hispanics who are beginning farmers and ranchers, even though the numbers remain relatively low nationwide.

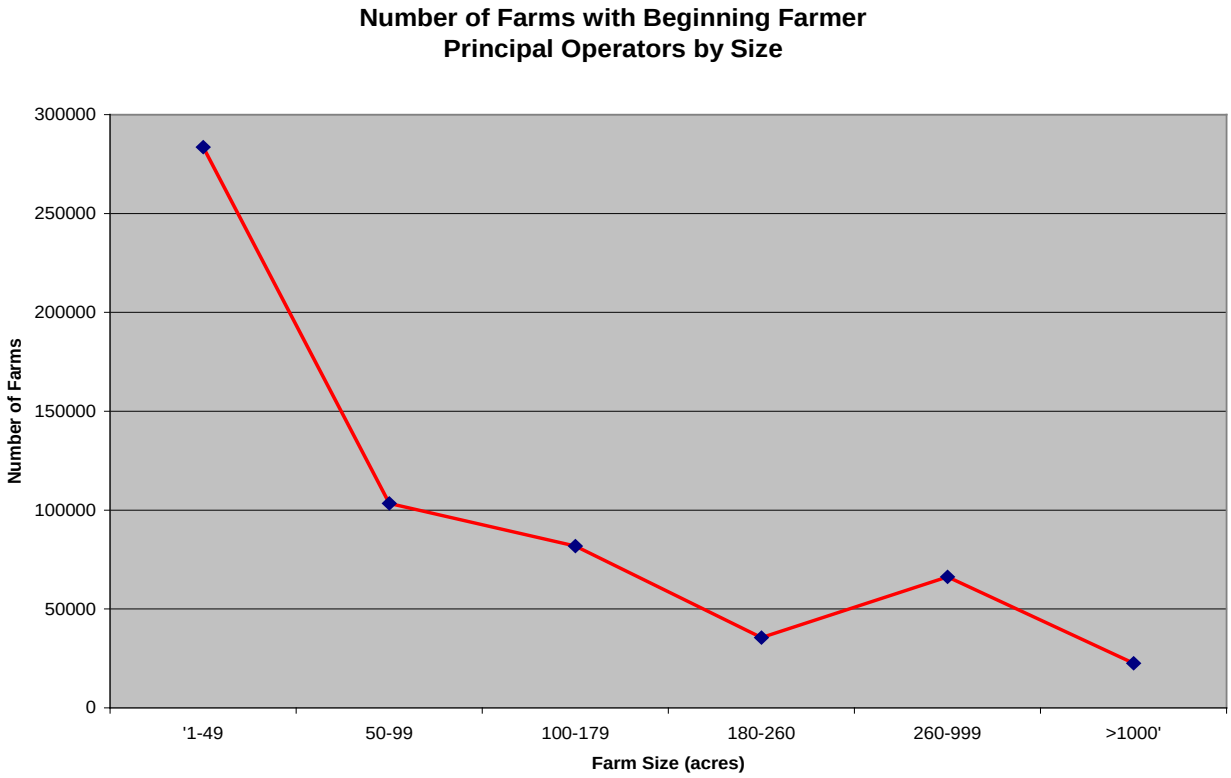
It should be noted that individuals of any race may self-identify as being of Spanish, Hispanic, or Latino origin, which is an ethnic and cultural designation. In other words, most Hispanics in the 2002 Census of Agriculture identify their "race" as "white" (93 percent), but also consider themselves to be of "Hispanic" ethnicity. Being of Hispanic/Spanish/Latino origin does not automatically make an individual "white", "black", or any other race.

The 2002 Census of Agriculture also identifies 90,523 beginning farmer or rancher principal operators as female. This is roughly 15 percent of all beginning farm and ranch principal operators. This number is up from 68,244 in 1997, also indicative of an upward trend in numbers of female beginning farmers and ranchers.

The majority of all principal operators who are beginning farmers and ranchers have operations of less than 50 acres in size (See Graph 11, below). This may indicate that most beginning farmers and ranchers do not rely solely on their agricultural operations for a living, but instead farm or ranch part time. The 2002 Census of Agriculture shows that of all agricultural operations less than 10 acres in size (179,346), 42 percent (75,354) were operated by beginning farmers or ranchers. These are relatively small operations that would probably not be a sole source of income for their operators. Some may even be retirees or hobby farmers who use agriculture to supplement their incomes.

The number and percentage of beginning farmers and ranchers drops as operation size increases. For agricultural operations over 1,000 acres in size, roughly 13 percent of all principal operator were on their current operations less than ten years. This inverse proportional relationship between operation size and number of beginning principal operators may indicate lower initial capital for investment, lower reliance on the operation as a sole source of income (as with

retirees or hobby farmers), or a focus on niche market production, such as organically grown produce or livestock, which might be done successfully on smaller acreages.



Source: All data taken from 2002 Census of Agriculture, Table 55

Figure 5. Distribution of farms by size with beginning farmer and rancher principal operators.

As noted earlier, the Farm Bill provided specific consideration for beginning farmers and ranchers. The NRCS has responded to this part of the Farm Bill through a number of means, including technical assistance for natural resource planning, the Environmental Quality Incentives Program (EQIP), the various reserve (CRP, WRP, etc.) programs, and a variety of individual state level efforts.

The NRCS has recognized that many beginning farmers and ranchers may not be familiar with many of the federal, state, and local financial and technical assistance programs. Many NRCS state and field offices have launched out reach and educational efforts targeted at new, beginning, and small farmers and ranchers, in an effort to provide service to these groups.

The NRCS has done a good job of addressing the needs of beginning farmers and ranchers under EQIP, which is the primary source of agency financial assistance for on-farm conservation planning. Table 46, below, shows the number of EQIP applications, contract approval rates, and dollars committed, for FY 2003-FY 2005.

Table 46. Beginning farmer and rancher activity under EQIP, FY 2003–FY 2005.				
Year	Number of Applications	Contracts Approved	Percent Approved	Total Contract
FY 2003	2973	2301	77%	$43,483,148
FY 2004	2879	2274	79%	$47,336,750
FY 2005	6665	4135	62%	$92,193,219

Although the percentage of total contracts approved for FY 2005 fell, the actual number of contracts almost doubled, and the dollars committed in those contracts went up 49 percent, a dramatic increase over earlier years. The NRCS is providing a sound basis for the support of new and beginning agricultural operations and operators

Table 47 below shows the number, size of contracts, and amount of cost share for FY 2006.

Table 47. FY 2006 beginning and limited resource farmer summary.			
	All Applications	Limited Resource	Beginning Farmer
Contracts Approved	39,030	1,398 3.6%	3,377 8.7%
Average Size of Contracts	$18,680	$38,794 207.7%	$26,986 144.5%
Cost Share Approved	$729,063,179	$54,233,362 7.4%	$91,132,769 12.5%
Treated Acres	20,710,205	323,262 1.6%	1,011,588 4.9%

Limited Resource Farmers or Ranchers (LRFRs)

Definition

(a) An individual, directly or indirectly, with gross farm sales not more than $100,000 in each of the previous two years (to be increased starting in FY 2004 to adjust for inflation using Prices Paid by Farmer Index as completed by NASS), and
(b) Has a total household income at or below the National poverty level for a family of four, or less than 50 percent of county median household income in each of the previous two years (to be determined annually and indexed for inflation using Commerce Department Data).

This definition was created to make it more usable in the field offices. It allows easier certification and verification with personal and farm income tax records, the same verification forms already needed for the $2,500,000 Income Limitation rules. Higher percentages of Black, Native American and female farm operators will qualify as Limited Resource Farmers.

Applicants would have to have a household income at or below a qualifying level, which in turn would be based on the higher of two thresholds. The qualifying household income level would be the greater of (1) the national poverty level income, as defined by the Census Bureau for a household of 4 persons, or (2) 50 percent of the estimated county median household income for the most recent year as reported by the Census Bureau. Each of those measures is indexed to overall inflation; the poverty threshold is adjusted each year by the Commerce Department and the county median moves with inflation. Each base is also easily available with the annual national poverty rate and the county median income updated every January.

Using a dual household income threshold assures that households with incomes below the poverty line remain eligible for limited resource farmer status, while also extending the status to relatively poor households in higher income counties, where higher costs of living may limit the financial resources available to those households for farming. Use of the county median measure alone could exclude deserving households in very poor counties.

The level would be determined annually for each county based on two objective factors, as discussed above. The level would be the greater of the poverty level for a household of 4 and 50 percent of the median county income level.

A limited resource farmer would be limited to gross farm sales less than $100,000, (increased, beginning in FY 2004, by an inflation percentage applicable to the fiscal year in which a benefit is being requested).

The definition is designed to account for strong regional variations in income, ensure that neediest farmers and ranchers are not excluded, and screen out wealthier farmers and ranchers with temporarily realized income or cash flow. The definition describes those producers with low income and sales and takes into account regional variations in both type and scale of operation.

The requirement of meeting this income limit in both preceding years was added to weed out those producers who might intentionally qualify as LRFR by moving sales or expenses from one year to another. This is based on the existing RMA definition. An alternative that would accomplish the same purpose for USDA would be to use the same three-year average as the proposed Income Limitation rule. For EQIP applicants, this three-year average is already calculated during the $2,500,000 income limitation certification process.

Self-verification

USDA has created a simple tool on its web site, the Online Limited Resource Farmer and Rancher Self Determination Tool for farmers and field staff to check eligibility. USDA did not update the gross sales requirement since November, 2006 through October, 2008; nor the underlying county income or poverty rates since January, 2006. Thus the gross sales limitation is $116,000 on the website in July, 2008, instead of $151,200 based on the Producer Prices Paid index in June, 2008. This intentional delay has extended the use of EQIP funds by limiting the number of eligible limited resource farmers.

The definition has the great advantages of clarity and brevity. It would not have to be amended on a regular basis. The data needed each year are readily available from the Census Bureau, National Agricultural Statistics Service, and applicants' own tax forms. Applicants self-certifying as Limited Resource Farmers will be required to produce their last two year's income tax forms to verify their standing upon USDA request such as the annual 5 percent spot checks.

The only national/regional dataset that can be used to estimate the number of farmers within this definition for a given year is the Agricultural Resource Management Survey (ARMS). The ARMS survey is an annual survey, conducted with different farms each year. There is no panel data available that can estimate income and expenses for the same farm over multiple years. Thus, USDA has no estimate of how many farmers are excluded by the phase "in each of the previous two years." The Limited Resource Farm and Other Farm Typology Groupings (see Table 49) has estimates of the number of Limited Resource Farms using this definition, but only based on the year 2000.

Outreach

Based on 2000 US Population Census and 2002 Census of Agriculture data, Limited Resource Farmers and Ranchers (LRFRs) and minority farmers are increasing in number throughout the U.S. According to Census of Agriculture data, the number of farms in the United States with annual sales of less than $100,000 has increased from 1,565,839 in 1997 to 1,832,127 in 2002, an increase of roughly 17 percent. Limited Resource Farmers tend to concentrate with beef cattle and non-grain field crops like tobacco, cotton, peanuts, and hay. An earlier definition of "Total operator household income is under $20,000; total farm assets are under $150,000; and gross sales are under $100,000" has been used by ERS and in USDA policy documents during Congressional development of the Farm Bill[34]. Estimated numbers using the ERS definition consist of 7.8 percent of all farms, with only 0.8 percent of total sales. Limited Resource Farmers control 1.2 percent of farmland, often the poorer farmland with greater per-acre conservation needs.

Over the last several decades, the NRCS has recognized that there are increasing numbers of Limited Resource Farmers and Ranchers. As a result, several measures have been taken to address this change in the agricultural customer base.

Limited Resource Farmers and Ranchers, by definition, have limited capital, and therefore tend to acquire lands that are lower in price, and/or lower in production potential. Because of the lower production potential, there may be greater potential for unintended natural resource problems to arise when trying to develop these lands for agricultural purposes. Areas with poor soil quality, for example, may be subject to increased fertilizer application, which may result in increased levels of nutrient runoff. Similarly, farming on sloping lands may result in increased runoff and soil erosion. However, these are only logical inferences since we do not have data that directly correlates LRFRs with increased environmental degradation. Accordingly, the funding provided under EQIP provides LRFRs the capability to install conservation practices that improve, enhance, restore, and protect natural resources.

[34]Economic Research Service. 2001. Structural and Financial Characteristics of U.S. Farms, 2001 Family Farm Report, Ag. Info. Bull. #768, http://www.ers.usda.gov/publications/aib768/

Many Limited Resource Farmers and Ranchers are not full-time farmers. Small farm size and lack of capital to invest in necessary equipment often make it necessary for these individuals to work off the farm for wages in other economic sectors to make a living. For part-time farmers of this kind, the NRCS can offer vital technical and planning assistance at low or no cost. For these operators, the services and programs offered by the NRCS are of great value.

The NRCS administers several programs that assist Limited Resource Farmers and Ranchers to conserve natural resources on the Nation's private lands. As evident in Table 48 below, the funding levels in EQIP increased substantially in FY 2006. As part of the FY 2005 funds, $6,000,000 was specifically targeted to Small and Limited Resource Farmers in eleven southern states and Puerto Rico. Expanding funding levels to allow financial as well as technical assistance enhances the ability of the NRCS to assist Limited Resource Farmers and Ranchers.

Table 48. EQIP funding for limited resource farmers and ranchers.

Program	FY 2003	FY 2004	FY 2005	FY 2006
Environmental Quality Incentives Program funding amount	$31,794,286	$18,313,110*	$29,910,036	$54,233,362
Percent of LRFR applicants approved	73%	50%	62%	66%

*See http://www.usda.gov/wps/portal/!ut/p/_s.7_0_A/7_0_10B?contentidonly=true&contentid=2005/05/0176.xml

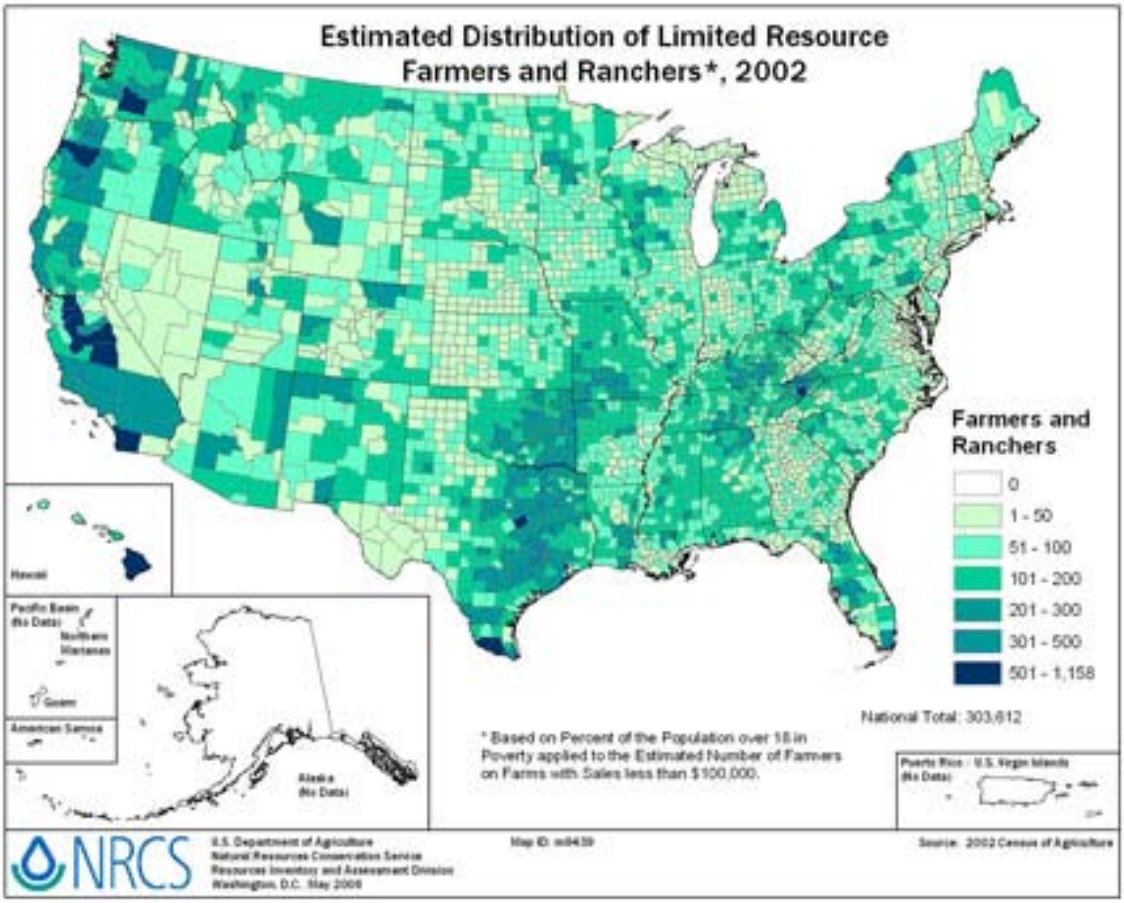


Figure 6. Number and distribution of limited resource farmers and ranchers.

Table 49. Limited resource farms and other farm typology groupings.

Defined as Gross Sales Less Than $100,000 and Poverty Level Income or Household < 50%
County Median for a single year, by farm typology grouping, 2000

	Farm typology grouping							
`	**48 State total**	**Limited resources (2000 only)**	**Retirement**	**Residential /lifestyle**	**Farming occupation /lower-sales**	**Farming occupation /higher-sales**	**Large**	**Very large**
Acres operated	896,026,489	91,077,254	40,274,836	144,724,031	145,337,011	181,460,605	132,762,450	*160,390,303
Average Acreage operated	422	254	148	167	457	1,056	1,694	*2,922
Number of farms	2,121,489	359,228	271,375	867,772	318,021	171,824	78,382	54,886
Percent of farms	100	16.9	12.8	40.9	15	8.1	3.7	2.6
Cash Grains and Soybean	15.3	12.1	5.3	10.4	20.9	39.5	38.9	20.6
Other Field Crops	19.1	16.8	32.1	20.4	14.7	11.2	10.5	10.8
High Value Crops	7	7.2	*10.2	4.4	8.8	8.9	7.2	13.5
Beef Cattle	37.7	42.7	37.4	42.7	40.4	16.6	13.3	12.5
Hogs, Poultry and Dairy	6.1	4.9	na	*1.6	5.4	20.9	26.7	40.3
General Livestock	14.8	16.3	14.2	20.4	9.8	3	3.4	2.3
Northeast	7	10.1	na	6.6	5.2	7.9	7.2	5.3
Lake States	9.7	10.3	na	9.2	9.1	15.3	12.5	10.4
Corn Belt	19.8	17.4	17.3	19.2	20.7	27.2	27.3	17.8
Northern Plains	8.3	6	na	6.4	11.7	17	17.5	12.3
Appalachia	14.3	14	22.7	15.7	10.9	6.8	6.7	7.1
Southeast	7.7	8	9.3	8.3	6.8	4.9	3.3	7.6
Delta	5.6	7.9	na	5.9	3.6	4.1	5.8	8.4
Southern Plains	14.5	16	16.6	16.2	14.3	5.3	5.8	7
Mountain	5.9	*4.4	*4.5	6.3	6.4	6.6	6.7	7.8
Pacific	7.3	5.8	*8.8	6.1	11.2	4.8	7.1	16.4
Average Value of Farm Assets	509,505	368,825	356,983	324,136	549,929	823,207	1,248,424	2,843,577
Average household income	62,220	5,061	49,777	82,629	66,793	44,987	81,219	175,489

Source: 2000 USDA Agricultural Resource Management Survey, calculations by ERS, 10/2002.

Based on 9,863 observations. All 48 contiguous States were included in the sample. *Items has low statistical reliability.