



**United States Department of Agriculture  
Natural Resources Conservation Service**

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**Interim Final Benefit-Cost Analysis**

**for the**

**Farm and Ranch Lands Protection Program  
(FRPP)**

**Food, Conservation, and Energy Act of 2008  
Title II – Conservation  
Subtitle E – Farmland Protection and Grassland Reserve  
Section 2401 – Farmland Protection Program**

January 9, 2009

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# **Interim Final Benefit-Cost Analysis Farm and Ranch Lands Protection Program (FRPP)**

## **Executive Summary**

The Farm and Ranch Lands Protection Program (FRPP) is an important tool available to farmers, ranchers, and their communities to preserve the agricultural landscape. The local community is a key driver in farmland<sup>1</sup> protection efforts and is a major beneficiary as well as incurring much of the cost. Because farmland retention efforts are driven by local decision makers and involve site-specific impacts that affect a host of intangible values (scenic views, environmental amenities, etc), performing a traditional nation-wide interim final benefit-cost analysis (BCA) with a national scope is difficult. Despite limitations, a BCA offers a means to identify the main costs and benefits and explore policy and program alternatives.

The main costs of farmland protection programs include the purchase of development rights (PDR), the reduced tax base, and the forgone economic activity fostered by development. If one assumes that: 1) development and the associated economic activity is established elsewhere without resulting in farmland conversion; and 2) the opportunity cost of lower local economic activity is off-set by a reduction in needed public infrastructure, the main costs of farmland retention programs become the initial acquisition cost of the PDR and tax revenue foregone for the local government unit. These costs are compared with the benefits of protecting farmland, which are largely intangibles, such as environmental goods and services from the land and non-market valued amenities, such as open spaces and scenic views, but also includes the economic value of retaining an active agricultural sector in the local community.

This FRPP interim final benefit-cost analysis draws heavily from the benefit transfer values and method used in the work of Heimlich and Anderson (2001). They estimated the total value of conserving rural land by combining willingness-to-pay (WTP) estimates for farmland preservation from the economics literature with a model of agricultural land facing development pressure. To model development pressure, Heimlich and Anderson used National Resource Inventory (NRI) data to determine the amount of farmland under low-, medium-, and high-pressure for urbanization nationwide. This FRPP analysis follows the Heimlich and Anderson framework, with updated WTP estimates and data on development pressure.

When possible, this BCA adopts conservative economic assumptions. Major assumptions underlying this analysis include that:

- Program participation will be equal to the budget constraint,
- The public is only willing to pay for farmland preservation in their own county,
- The number of households per urban influence ring is unchanged from the Heimlich and Anderson estimates, and
- Development pressure on agricultural landscapes is conditioned by county population growth relative to state population growth.

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<sup>1</sup>Farmland refers to agricultural land used in crop and livestock production, i.e. cropland, ranch land and pasture.

Caution is needed in interpreting results from the Heimlich and Anderson framework because of limitations in the willingness-to-pay methodology and uncertainties about extent, locations, and patterns of future development pressure. Miscalculations in projection may overvalue or undervalue the non-market valuation of retained farmland.

The baseline scenario for the FRPP interim final benefit-cost analysis is fiscal year (FY) 2007, during which FRPP entered easement agreements on 54,490 acres. FRPP costs of almost \$73 million dollars can be divided by 54,490 acres to get an average cost per acre of \$1,335.<sup>2</sup> The net present value is positive when estimated using either the recent meta-analysis WTP (Kukielka, Johnston, & Duke, 2008) or Krieger's (1999) WTP. Using the recent five-state meta-analysis as the best available estimation of farmland preservation benefits, the total annual net benefits for the FY 2007 FRPP baseline range from nearly \$81 million to almost \$285 million.

The Food, Conservation, and Energy Act of 2008 (hereafter referred to as "the 2008 Act") reauthorized the Farm and Ranch Lands Protection Program through FY 2012 and increased program funding. Mandatory changes were made to the program purpose, role of the United States Government, enrollment process, eligible land, and cost-sharing requirements for entities. In addition, the 2008 Act provided discretion for the Agency in interpreting aspects of the mandatory provisions and other discretionary elements. The major policy scenarios analyzed in this BCA include:

1. Increased Funding – Authorized funding increases from \$97 million in FY 2008 to \$200 million in FY 2012.
2. Land Eligibility – Compensate landowners for more forest land acreage and ensure that enrolled forest land contributes to natural resource benefits.
3. Certification Process – Establish a certification process and deliver increased flexibilities for certified entities.
4. Simplifying Participation – Establish a simple process for entities to select an appraisal method and use their own terms and conditions in easement deeds, as approved by the Secretary.
5. Impervious Surface Restrictions – Establish clear guidelines for entities to consult for impervious surface restrictions.
6. Ranking Priority – Provide a priority in the ranking process for applicants willing to provide "public access" for recreational purposes.
7. Non-Federal Contributions – Establish a process to accept contributions of non-federal funds.
8. Program Performance – Establish procedures to monitor and report on program performance.

Overall, the results of this analysis suggests that FRPP assistance to local farmland protection programs bears positive net benefits in areas where citizens place a high value on their amenities, regardless of whether they face low- or high-density development pressures. The presence of active farmland retention programs is empirical evidence that local decision makers anticipate

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<sup>2</sup>The analysis does not consider future costs associated with the baseline easements, but these costs are largely borne by the local entity holding the easement.

positive net benefits from protecting farmland, such as preventing undesirable changes to the landscape and adverse impacts on the natural environment that can result from development. However, the potential effects on benefits and costs for most of the areas of policy discretion covered in this analysis are not treated in existing literature, and consequently are addressed qualitatively.

# **Interim Final Benefit-Cost Analysis Farm and Ranch Lands Protection Program (FRPP)**

## **Background**

### **Legislative Authority**

The Farm and Ranch Lands Protection Program (FRPP) was established by Section 388 of the Federal Agricultural Improvement and Reform Act of 1996, Public Law 104-127; and amended by Section 2503 of the Farm Security and Rural Investment Act of 2002, Public Law 107-1712; and Section 2401 of the Food, Conservation, and Energy Act of 2008, Public Law 110-234, (hereafter referred to as “the 2008 Act”).

The Farm and Ranch Lands Protection Program is under Subtitle D of Title XII of the Food Security Act of 1985 (16 U.S.C. 3838i), Chapter 2, Conservation Security and Farmland Protection, Subchapter B, Farmland Protection Program. The authority to implement FRPP has been delegated by the Secretary of Agriculture to the Chief of the Natural Resources Conservation Service (NRCS).

### **Need for Regulatory Action**

This action fulfills the need to implement the Farm and Ranch Lands Protection Program (16 U.S.C. 3838i) as authorized and funded by Congress under the statutory provisions of the Food, Conservation, and Energy Act of 2008. As revised by the 2008 Act, the purpose of FRPP is to protect the agricultural use and related conservation values of farmland by limiting non-agricultural uses of that land.

The 2008 Act makes targeted changes to FRPP to facilitate achieving the program purpose, including:

- Increasing authorized funding levels to \$200 million by FY 2012;
- Expanding eligible land to include forest land and other land that contributes to the economic viability of an operation;
- Clarifying administrative processes, appraisal method, and terms and conditions of cooperative agreements to make the program more accessible;
- Establishing a certification process to provide greater flexibility and certainty to participating eligible entities; and
- Aligning program processes more closely with related conservation programs.

In reviewing the Managers Report, it is clear that Congress intends the mandatory changes made by the 2008 Act to streamline administrative processes and increase program participation. However, the fundamental program approach of promoting protection of working agricultural lands through federal, state, local, and private partnerships is not altered. Further, the 2008 Act provides the Agency with some discretion in designing processes to implement the mandatory changes.

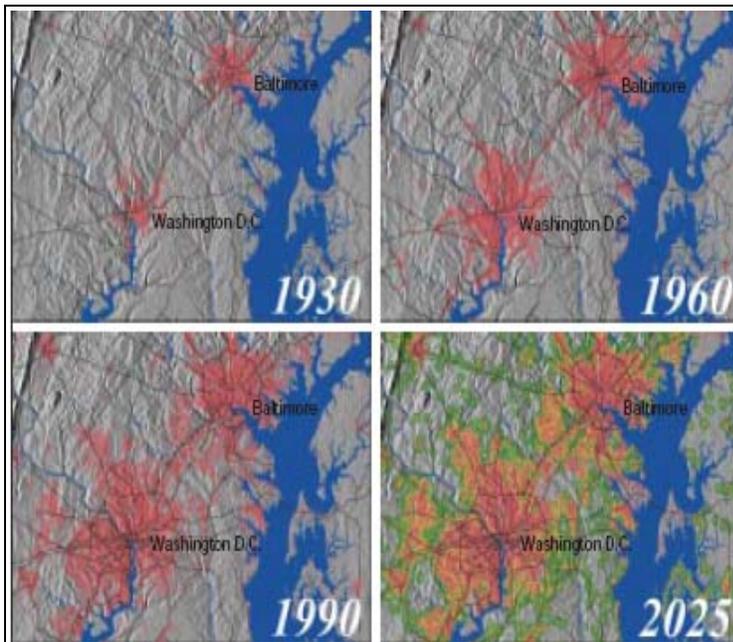
# FRPP Description and Features

## Context

Interest in preserving agricultural and forest land has grown substantially over the past several decades, driven by increasing public concern about the impacts of development on natural resources, open spaces, and rural amenities. While 19 states had farmland protection programs in FY 2000; today there are some 27 state and 60 local farmland preservation programs. Similarly, private organizations with a land conservation mission have increased significantly. In 1950, 53 land trusts existed nationwide. The 2005 Land Trust Census reported 1,667 land trusts, in every state across the country (Aldrich & Wyerman, 2006).

Accelerating conversion of formerly rural landscapes is evident regionally (figure 1) and nationally. Conversion of agricultural and forest land to developed uses is driven by numerous forces, including: population growth, household formation and land consumption rates, economic prosperity, and technological advances (e.g., internet, fuel efficiency), among others.

Between 1950 and 2001, the population of the United States increased by 90 percent. Correspondingly, the number of urbanized areas grew from 106 to 369 areas, expanded five times in size, and accounted for about 70 percent of the nation’s developed area. At the same time, population density in urbanized areas dropped from 8.4 to four people per acre as populations have spread out (see figure 1). Nationwide, the acres of developed land per person increased by 18 percent since 1982 – reflecting development trends characterized by increasing household formation and larger lot sizes.

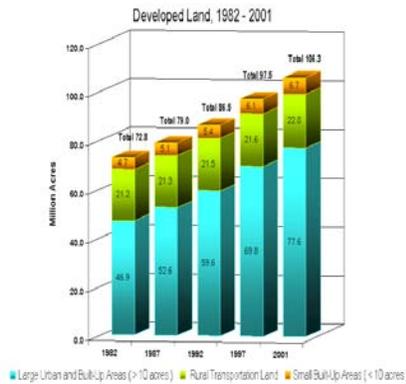


**Figure 1. Urban Area Expansion:**

This series of maps shows an example of the urban area expansion in and around the Washington, DC area. The red areas represent urban extent for each time period shown. Projections for 2025 are made using a land use change model and project high probability areas of urban growth in yellow, and moderate and low probability growth areas in light and dark green, respectively. Source: U.S. Department of the Interior, U.S. Geological Survey, 1999.

Not only has developed acreage increased, the rate of this development has also grown from 1.4 million acres per year between 1982 and 1992 to 2.2 million acres per year between 1992 and 2001. Newly developed lands come from a variety of other uses, including agriculture and

forest, idle urban, or wild lands. Between 1982 and 2001 about 34 million acres of agricultural and forest land, an area the size of Illinois, were converted to developed uses (figure 2). Private forest land is the major source of newly developed acres (figure 3). At the current rate of conversion, 38 percent of private forest land will consist of parcels less than 100 acres in size by 2010. Many industry observers have concerns that such small parcels are less likely to be managed for wood and fiber production or to provide the many environmental benefits associated with forests than non-converted acreage.

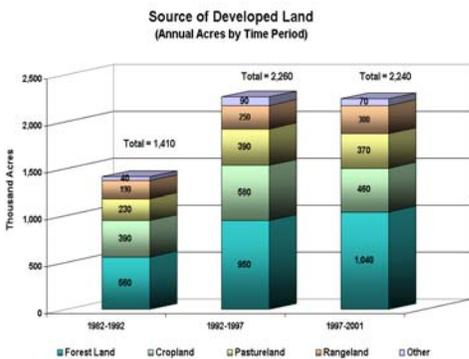


**Figure 2. Developed area – increased nearly 50 percent since**







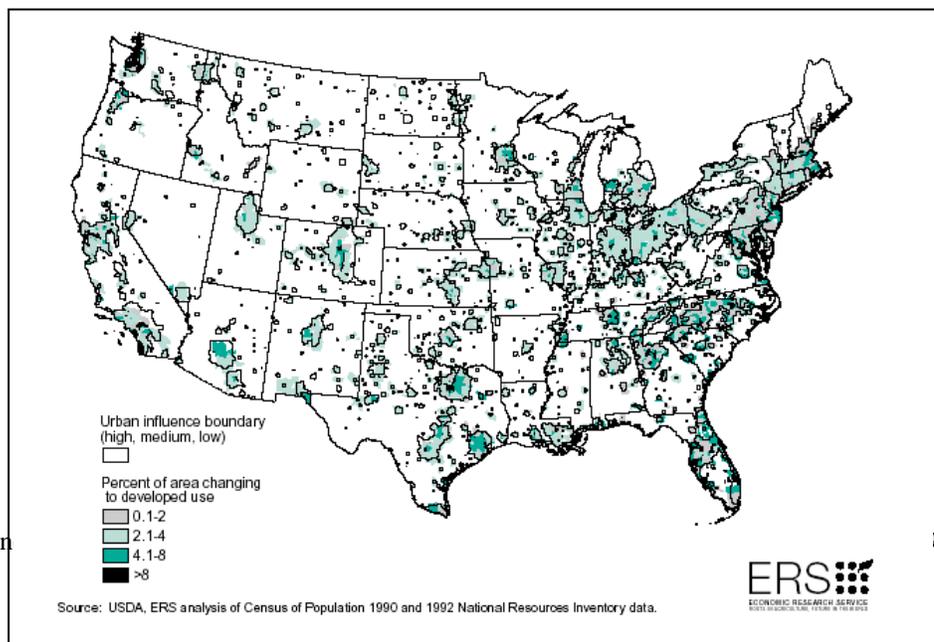


**Figure 3. Newly developed land comes from a variety of other uses.**

Nearly 30 percent of the land converted to developed uses between 1982 and 2001 was prime farmland (about 9.5 million acres). The rate of prime farmland conversion mirrored the general trend in farmland conversion, which increased by 60 percent between 1982 and 2001. Cropland remains the major type of prime farmland being developed.

Development along the nation's coastline has special

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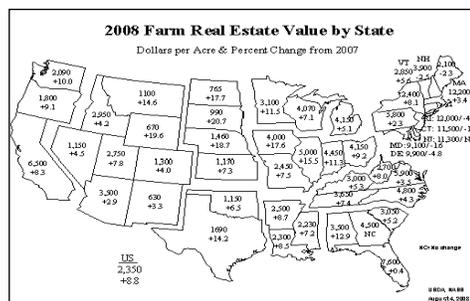
importance because these areas also have some of the most sensitive environments – important to aquatic and terrestrial species alike. The narrow coastal fringe of the United States comprises one-fifth of the nation’s land area but is home to more than one-half of the population (figure 4). In 1997, coastal watershed development was more than three times the rate for non-coastal watersheds. If these trends continue, an estimated 25 percent of coastal watershed acreage will be developed by 2025 (Beach, 2002).

**Figure 4. Comparison of estimated urban growth boundaries and percent of area changing to developed uses, 1982 – 1992.**

## Impacts

While not a present threat to food and fiber security, newly and rapidly developing areas cut a larger swath through forest and agricultural landscapes. The physical changes in the landscape commonly are accompanied by economic and social change. The transition in land use from predominantly agricultural to mixed suburban, recreational, and related hobby uses shifts the economic fabric of the community, sometimes hastening the departure of remaining agricultural landowners. One-third of the nation’s farms and ranches and 18 percent of agricultural acreage are adjacent to urban or suburban areas. Owners of an estimated 94 million acres of farm and ranch land currently face intense pressures to sell. These farms and ranches on the fringe face special challenges as their communities change and priorities shift. While many adopt new strategies, such as “pick your own” or niche markets, survival of urban fringe agriculture is moderate (Heimlich & Anderson, 2001).

As development pressure increases, agricultural land values are hard pressed to compete with developed uses. Farm real estate values continue to increase (figure 5). These values have been driven largely by non-agricultural factors, such as low interest rates and demand for residential development and recreational uses. However, capitalization of transfer payments and, more recently, high commodity prices also have an effect on land values. As of January 2006, several Northeast States, including Connecticut, Delaware, Massachusetts, Rhode Island and New Jersey, continued to register per-acre farm real estate prices that exceeded \$10,000 per acre (Hoppe & Banker, 2006). Since 1987, average farmland values in the nation have more than tripled.

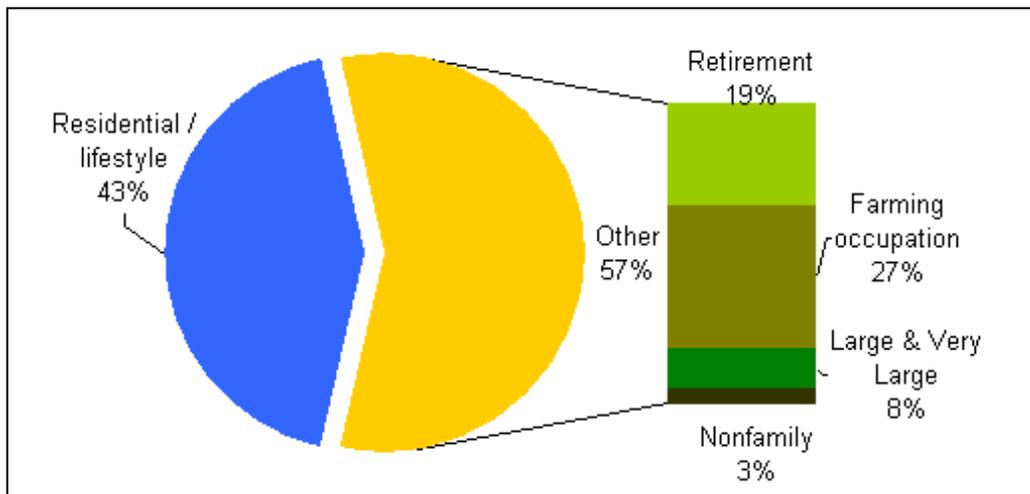


**Figure 5. 2008 Farm Real Estate Value by State**

Source: USDA, NASS (2008)

When demand for developable land is high, developers generally can outbid farmers; initiating a cycle of higher demand, higher land values, and increasing land conversion. Higher land values also can have a crippling effect on beginning and limited resource farmers or ranchers who may not have the capital necessary to initiate or expand their operations. Nationwide, the annual number of new farm entrants under age 35 declined from 39,300 from 1978 to 1982 to 15,500 from 1992 to 1997 (Gale, 2002).

While the number of younger individuals entering agriculture is declining, so also is the number of small commercial farms. These farms, with sales of \$10,000 – \$249,000, fell from 43 percent in 1989 to 34 percent in 2003 (Wiebe & Gollehon, 2006). The trend of diminishing small farms reflects consolidation trends in agriculture, but also that there are fewer new entrants into the sector. In contrast, the share of “residential / lifestyle” farms climbed from 36 percent in 1993 to 43 percent in 2006 (Wiebe, et al., 2006). The “farmette” phenomenon is due in large part to professionals seeking an escape, the retiring farmer transferring farm assets to descendents who do not farm, retiring baby boomers seeking rural amenities, and high land values (figure 6).



**Figure 6. Distribution of Farms by Farm Type, 2006**

Source: Hoppe et al., 2006

Conversion of agricultural and forest land to developed uses can fragment landscapes and diminish their values for agriculture, water and air quality management, wildlife habitat, and aesthetic purposes. Increased impervious area, for example, resulting from development is

associated with increased runoff and stream temperatures, with attendant impacts on water quality. Urban runoff is among the primary sources of impairment to lakes and estuaries (U.S. Environmental Protection Agency, 2007). The concentration of new and rapid development in geographic areas already under pressure amplifies the effects on water quality, water quantity, and air quality.

Farmland conversion also is associated with a decline in rural amenities and environmental goods and services (EGS) provided by that land, such as the beneficial relationship of agricultural land to: climate regulation, flood control, disease prevention, water purification, carbon sequestration, biodiversity and wildlife habitat, and a host of others (Millennium Ecosystem Assessment, 2005; Nickerson, 2001; Alig, Kline & Lichtenstein, 2004). These benefits are indirect and most of the EGS can be classified as public goods.<sup>3</sup> Consequently, the current market fails to fully recognize the value of benefits arising from the protection of working agricultural lands.

In the absence of comprehensive land use planning, real estate markets are based on many individual decisions that do not fully incorporate indirect and non-market benefits, and generally fail to mitigate conversion of agricultural lands. Without some intervention, or assistance to establish markets or market-like structures, this situation would be expected to produce:

- Continued land conversion in the farm sector, particularly near urban areas;
- Reduced ability for non-governmental entities to successfully preserve agricultural lands;
- Continued declines in rural amenities, such as open spaces, scenic vistas, or agricultural related recreation opportunities;
- Continued declines in natural resource benefits produced on agricultural lands, such as carbon sequestration, wildlife habitat, and aquifer recharge, and correspondingly increased susceptibility to other risks such as invasive species, wildfires, and upstream flooding;
- Continued loss of agricultural infrastructure needed to support remaining agricultural operations; and
- Increased public infrastructure costs to support newly developed housing tracts.<sup>4</sup>

NRCS programs seek to stimulate local actions to remediate these outcomes by supporting market-like structures for preserving agricultural landscapes and the benefits arising from those lands. Ideally, a BCA for FRPP would quantify how the regulatory changes proposed in the statutory language affect these outcomes. Any analysis of this kind must consider the non-quantifiable characteristics of the complexities involved in life systems, the difficulty of valuing non-market amenities, the importance of non-economic drivers in the satisfaction of human

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<sup>3</sup>Public goods differ from private goods in many respects. With public goods, the market can not exclude non-paying consumers from enjoying their provision and one person's use of them does not deprive other consumers from using them. Typical examples include public television and radio, national defense, and public health programs, among many others.

<sup>4</sup>Cost of Community Services Studies conducted over the last 20 years show working lands generate more public revenues than they receive back in public services. Their impact on community coffers is similar to that of other commercial and industrial land uses. On average, because residential land uses do not cover their costs, they must be subsidized by other community land uses (Cost of Community Services Studies: Fact Sheet, 2004).

needs, and a host of other factors. Regardless of the difficulties, the main focus of inquiry is to estimate FRPPs contribution to supporting local actions with regard to:

- Lowering the rate of agricultural land conversion to non-agricultural uses in particularly critical locations;
- Supplementing the incentives of other entities to take actions to retain more land in agricultural uses than would otherwise exist;
- Improving the environmental performance of land retained in agricultural uses, for example by reducing soil erosion and nutrient and sediment losses to air and water resources, retaining open space and pervious surfaces, providing wildlife habitat, and supporting local economies, among other outcomes; and
- Sustaining a viable agricultural production base for the local community.

## **Overview of Program**

The objective of FRPP is to help farmers and ranchers keep their land in agricultural production and local communities retain the agricultural character of their landscape. FRPP was designed to provide matching funds to state and local farmland protection programs to purchase conservation easements. Farmers and ranchers worked through local farmland protection programs to sell their development rights in exchange for a perpetual conservation easement on the farm. The outcome was to limit the conversion to non-agricultural uses of prime, unique, and other important farmland as well as to recognize the value of farmland with special characteristics, such as historical and archeological resources.

The involvement of the NRCS provides needed technical expertise and encourages consideration of a wider range of natural resource conservation concerns in many local farmland protection efforts, particularly a focus on soil characteristics. This technical expertise, plus the involvement of local decision makers, gives FRPP many desirable properties to protect farmland threatened by development.

Since FY 1996, FRPP has provided matching funds to state, tribal, and local governments and non-governmental organizations with farmland protection programs to purchase conservation easements. FRPP has enrolled 533,068 acres on 2,764 farms and ranches since FY 1996. That area has included 386,444 acres of prime, unique, and important farmland soil, or 72 percent of the enrolled acreage. FRPP also enrolled 50,007 acres of upland forest, 13,287 acres of forested wetlands, and 29,174 acres of non-forested wetlands. The federal contribution to those enrolled parcels was \$536 million; the eligible entity contribution was \$857 million; the landowner donation was \$215 million; and the total estimated value of those easements was \$1.6 billion. The average federal contribution was 33 percent of the total estimated value; the eligible entity contribution was 53 percent; the landowner donation was 13 percent.

The financial assistance provided by FRPP complements other farm retention strategies such as: agricultural protection zoning; cluster zoning; comprehensive planning; agricultural districts; agricultural value assessment; “right to farm laws”; tax credits; transfer of development rights (TDRs); term easements; fee simple acquisitions; farmland viability programs; and other

programs that improve agricultural producers' ability to market their product (greater access to markets).

The 2008 Act reauthorized the Farm and Ranch Lands Protection Program through FY 2012 and made nine mandatory changes to FRPP, including:

1. Program Purpose – The purpose of the program was adjusted from topsoil protection to protection of agricultural land use and related conservation values by limiting non-agricultural uses.
2. Eligible Entities and Land – The definition of eligible entity is clarified and the opportunity to enroll forest lands in FRPP is increased. The statute added a new land eligibility category “farmland that supports state and local farmland protection program purposes.”
3. Right of Enforcement – The United States Government (USG) is no longer a grantee of the easement on deeds, but has a Contingent Right of Enforcement that allows the USG to step in if the cooperating entity fails to enforce the terms and conditions of the easement purchased with federal funding.
4. Certification Process – The Secretary is required to establish a certification process for eligible entities, and specifies a minimum agreement length of five years for certified entities. Non-certified entities shall have agreement lengths of three to five years.
5. Application for Funding – The program will operate on a continuous sign-up basis. Eligible entities may submit applications throughout the term of their cooperative agreement. All applications from eligible entities are ranked following a public notice of the ranking period.
6. Entity Cost-sharing Requirements – The statute specifies that the minimum entity compensation be 25 percent of the acquisition purchase price.
7. Appraisal Standards – Entities may select an industry approved standard to use in appraisals, subject to approval of the Secretary.
8. Program Establishment – The Secretary's role in the purchase of easements is modified from acquiring an interest to facilitating the purchase of easements by providing cost-share (financial assistance) to eligible entities.
9. Program Constraints and Payment Limitations – The rule change requires a report detailing payments made under FRPP that exceed \$250,000.

The 2008 Act provides discretion to the Agency to interpret certain elements of the mandatory requirements, as well as other aspects of the program. These actions include:

1. Increased Funding – Evaluate authorized funding increases from \$97 million in FY 2008 to \$200 million in FY 2012.
2. Land Eligibility – Compensate landowners for more forest land acreage and ensure that enrolled forest land contributes to natural resource benefits.
3. Certification Process – Establish a certification process and deliver increased flexibilities for certified entities.

4. Simplifying Participation – Establish a simple process for entities to select an appraisal method and use their own terms and conditions in easement deeds, as approved by the Secretary.
5. Impervious Surface Restrictions – Establish clear guidelines for entities to consult for impervious surface restrictions.
6. Ranking Priority – Provide a priority in the ranking process for applicants willing to provide “public access” for recreational purposes.
7. Non-Federal Contributions – Establish a process to accept contributions of non-federal funds.
8. Program Performance – Establish procedures to monitor and report on program performance.

## **Relationships with other Farm Bill Conservation Programs**

This regulation does not affect the historical relationship between FRPP and other NRCS Farm Bill easement programs, such as the Wetland Reserve Program (WRP) and the Grassland Reserve Program (GRP). FRPP permanent easements cannot be acquired for any particular tract of land under easement in any one of these programs. However, participation in other USDA programs is possible, including participation in the Conservation Reserve Program (CRP), the Conservation Reserve Enhancement Program (CREP), Conservation Technical Assistance (CTA), Environmental Quality Incentives Program (EQIP), Wildlife Habitat Incentives Program (WHIP), WRP wetland restoration cost-share agreements, Conservation Stewardship Program (CSP), and Agricultural Management Assistance (AMA). Thus, FRPP can be applied on the same acreage to achieve high levels of conservation practice adoption on the land.

## **Analytical Model**

This FRPP BCA draws heavily from the benefit transfer values and method used in the work of Heimlich and Anderson (2001). They estimated the total value of conserving rural land by combining willingness-to-pay (WTP) estimates for farmland preservation from the economics literature with a model of agricultural land facing development pressure. To model development pressure, Heimlich and Anderson used National Resource Inventory (NRI) data to determine the amount of farmland under low-, medium-, and high-pressure for urbanization nationwide. This FRPP analysis follows the Heimlich and Anderson framework, with updated WTP estimates and data on development pressure.

## **Modeling Participation**

Given the current backlog of applicants into FRPP (and the extent of interest in farmland protection across the United States as estimated by Heimlich and Anderson), full participation by eligible entities is expected for this program up to the budget constraint.

## **Willingness-To-Pay (WTP) Estimates**

This FRPP analysis utilizes three estimates of WTP for farmland protection. Heimlich and Anderson reviewed six studies in the WTP literature, and conservatively based their analysis on the two lowest valued estimates for the United States – Bergstrom, Dillman and Stoll (1985), and Krieger (1999). Expressed in 2007 dollars, these two studies estimate annual WTP per thousand acres per household to be \$0.27 (Bergstrom, South Carolina) and \$3.80 (Krieger, Illinois).

To make the analysis as current as possible, we have also included a WTP estimate from the recent meta-analysis of agricultural land preservation values by Kukielka et al., (2008). Their meta-analysis incorporated WTP estimates from 18 studies conducted between 2003 and 2007, which covered five states (Connecticut, Delaware, Georgia, Maine, and Ohio). For this FRPP analysis, we calculated the average annual WTP per thousand acres per household to be \$1.54 for the state-level studies used in Kukielka et al., 2008. It is reassuring that this new WTP estimate falls in between the two earlier studies used by Heimlich and Anderson.

## **Number of Households Affected**

Heimlich and Anderson adopted the conservative assumption that the public is only willing to pay for farmland preservation in their own county. This FRPP analysis makes the same assumption. The average number of households in each urban influence ring can be extrapolated from their reported estimates of WTP per household per acre, the number of acres preserved, and the total benefits. This FRPP analysis makes the conservative assumption that the average number of households per urban influence ring is unchanged from the Heimlich and Anderson estimates (in reality, these data would be expected to grow with the overall population growth and continued migration to urban areas). Therefore, the benefit estimates assume 46,593 households in the low urban influence ring, 48,960 in the medium urban influence ring, and 174,518 in the high urban influence ring.

## **Acres Affected**

To follow the Heimlich and Anderson model, we analyzed development pressure in counties with FRPP easements. Development pressure was assumed to be low, medium, or high in proportion to whether each county had population growth less than, commensurate with, or greater than its state population growth rate, respectively. This data comparison suggests that the population growth rate in about nine percent of the counties with FRPP contracts experienced lower growth rates than its state average growth rate. Another 28 percent of FRPP contracts were in counties in which the population growth did not exceed the state average, which we assume to face medium development pressure. The remaining 63 percent of FRPP contracts are assumed to face a high degree of development pressure since they are located in counties with population growth rates higher than its state average.

## **Cautions**

As pointed out by Heimlich and Anderson, caution is needed in interpreting results from their framework and its assumptions. First, one must recognize that people in highly-developed areas tend to value open areas more and consequently have a higher estimated willingness-to-pay. Therefore, the choice to use the lowest WTP values from predominantly agricultural areas may

underestimate the true benefits of farmland preservation. Second, projections for the non-market valuation of land are in terms of current urbanization pressures. As time progresses and more farmland is developed, WTP for agricultural land preservation may increase. Finally, as pointed out by Heimlich and Anderson, the pattern and level of development cannot be predicted with a great deal of certainty. Thus, miscalculations in projection may overvalue or undervalue the non-market valuation of retained farmland.

## Baseline

The baseline scenario for the FRPP interim final benefit-cost analysis is FY 2007, during which FRPP entered easement agreements on 54,490 acres. To estimate the baseline level of benefits, we first estimate the acres of easements at each level of urban development pressure. Then the three estimates of annual WTP per thousand acres per household can be combined with Heimlich and Anderson's data on the average number of households per ring to estimate annual baseline benefits (table 1).

**Table 1. Annual baseline undiscounted benefits (2007 dollars).**

<b>Urban Pressure</b>	<b>Percent</b>	<b>Acres (thousands)</b>	<b>Average Number of Households</b>	<b>Annual WTP Bergstrom (\$0.27)</b>	<b>Annual WTP Meta-Analysis (\$1.54)</b>	<b>Annual WTP Krieger (\$3.80)</b>
Low	9%	4.904	46,593	\$61,693	\$351,881	\$868,278
Medium	28%	15.257	48,960	\$201,685	\$1,150,353	\$2,838,533
High	63%	34.329	174,518	\$1,617,577	\$9,226,181	\$22,765,901
<b>Totals</b>	<b>100%</b>	<b>54.490</b>	N/A	<b>\$1,880,955</b>	<b>\$10,728,415</b>	<b>\$26,472,712</b>

To calculate the present value of the annual flow of benefits from FRPP easements, we can divide each estimate of annual WTP per acre by an assumed discount rate. Table 2 capitalizes the perpetual benefit flows using both three percent and seven percent discount rates.

**Table 2. Present value of capitalized benefits (2007 dollars).**

<b>WTP Study</b>	<b>WTP per acre</b>	<b>Present Value Capitalize at 3%</b>	<b>Present Value Capitalize at 7%</b>
Bergstrom	\$34.52	\$1,151	\$493
Meta-Analysis	\$196.89	\$6,563	\$2,813
Krieger	\$485.83	\$16,194	\$6,940

Using FY 2007 as the baseline, FRPP costs of almost \$73 million can be divided by 54,490 acres to get an average cost per acre of \$1,335 (this total includes financial and technical assistance costs). Comparing the present value of benefits per acre to the one-time cost per acre establishes the net benefits per acre (table 3). This analysis does not consider future costs associated with the baseline easements, but these costs are largely borne by the local entity holding the easement.

**Table 3. Net present value per acre estimates (2007 dollars).**

<b>WTP Study</b>	<b>Present Value of Benefits per acre at 3%</b>	<b>Present Value of Benefits per acre at 7%</b>	<b>FRPP Costs per acre in FY 2007</b>	<b>Net Present Value per acre at 3%</b>	<b>Net Present Value per acre at 7%</b>
Bergstrom	\$1,151	\$493	\$1,335	-\$184	-\$842
Meta-Analysis	\$6,563	\$2,813	\$1,335	\$4,995	\$1,244
Krieger	\$16,194	\$6,940	\$1,335	\$14,626	\$5,372

As can be seen in table 3, net present value is positive when estimated using either the recent Kukielka, et al., meta-analysis WTP or Krieger’s WTP, but is negative when calculated using the older Bergstrom (1985) estimate. If we assume that the recent five-state meta-analysis is the best available estimation of farmland preservation benefits, then the total net benefits for the FY 2007 FRPP baseline range from nearly \$81 million to almost \$285 million (table 4).

## FRPP Policy Scenarios Considered

Much of the changes brought about by the 2008 Act are mandatory with some discretion associated with establishing the mandatory policy changes. The following section addresses these discretionary policy scenarios, albeit mostly in a qualitative manner.

### Scenario 1 – Increase Authorized Funding for FRPP

Section 2701 of the 2008 Act authorized annual funding levels for FRPP that increase to \$200 million dollars in FY 2012. Average easement costs per acre are assumed to rise five percent per year. Based on the increased authorized funding, and factoring in the assumed rise in land prices, we estimate that FRPP will be able to obtain easements on over 100,000 acres in FY 2012. Table 4 shows total annual net benefits using the recent Kukielka, et al., meta-analysis, and is based on the conservative assumption that WTP per acre remains constant over this timeframe. Total net benefits are estimated to range from slightly over \$130 million to slightly over \$570 million per year by FY 2012, depending on the discount rate.

**Table 4. Annual net benefits at authorized funding levels (2007 dollars).**

<b>Year</b>	<b>Funding Level (millions)</b>	<b>Average Federal Cost per acre</b>	<b>Acres</b>	<b>Net Benefits 3% Meta-Analysis</b>	<b>Net Benefits 7% Meta-Analysis</b>
FY 2007	\$73	\$1,335	54,490	\$284,869,272	\$80,518,512
FY 2008	\$97	\$1,402	69,199	\$357,146,772	\$97,634,331
FY 2009	\$121	\$1,472	82,210	\$418,536,175	\$110,229,789
FY 2010	\$150	\$1,545	97,060	\$486,996,665	\$122,998,571
FY 2011	\$175	\$1,623	107,844	\$532,774,072	\$128,331,745
FY 2012	\$200	\$1,704	117,382	\$570,366,337	\$130,157,001

### Scenario 2 – Compensate Landowners for More Forest Land Acreage

Section 2401 of the 2008 Act expanded the definition of eligible land to include forest land that contributes to the viability of the agricultural operation or serves as a buffer for an agricultural operation. This expansion can be expected to increase the proportion of forest land eligible for compensation in FRPP easements. FRPP currently allows up to two-thirds of an easement to be forested, but only compensates for forest land acreage up to the acreage of non-forested land. For example, on a 150-acre parcel with 100 acres of forest and 50 acres of non-forested land, FRPP funds can be used to purchase an easement on the entire parcel, but the proportion of FRPP funds provided are based on an appraisal of 50 acres of forest and 50 acres of non-forested land. Pursuant to the 2008 Act, compensation must be provided for eligible forest land included in the easement.

Forest land included in FRPP to date has been as an incidental land use for which landowners are not fully compensated, thus program data are inadequate for use in quantifying the potential impacts on benefits and costs relative to the baseline. Including a larger percentage of forest land in FRPP would likely increase some components of the non-market value of farmland preservation (perhaps wildlife, for example), but possibly decrease others (e.g., scenic amenity may be higher for cropland or pastureland than forest land). Alternatively, forest land is the primary land use converted to development, so increasing the proportion of forest land enrolled in FRPP could indirectly reduce pressure on agricultural lands that results as development encroaches. Separating WTP into its component values would require additional statistical precision, and will not be attempted here. The impact on costs per acre is also indeterminate. Currently, some forested acres are protected by FRPP-funded easements at no federal cost; so paying for these acres in the future would increase the federal cost. On the other hand, forested acres cost less than non-forested acres, so will be less costly assuming that forest land prices remain lower than non-forest land prices. Overall, a shift toward more forest land acreage in FRPP would likely increase the number of acres that can be enrolled, but could lower the benefits if non-market values are higher for non-forested land than for forest land.

In determining how to incorporate additional forest land enrollment in FRPP, NRCS considered criteria to ensure management of forested acres and a programmatic emphasis on agriculture. To help ensure that enrolling more forest land in the program does not negatively impact the long-term viability of the land enrolled, NRCS is requiring that forested acreages exceeding 10 percent of the easement size be managed according to a forest management plan. This is consistent with treatment of forested land that is considered an economic enterprise of the agricultural operation. NRCS further concluded that the maximum amount of forest land enrolled in any FRPP easement should remain at no more than two-thirds, reflecting that the program emphasis is on agricultural production and that other programmatic options exist for protecting wholly forested parcels (e.g., USDA, Forest Service's Forest Legacy Program<sup>5</sup>).

### **Scenario 3 – Establish a Certification Process**

Section 2401 of the 2008 Act requires the establishment of a certification process by which the Secretary will directly certify eligible entities. The 2008 Act does not specify a certification process, but does establish that to be certified, an eligible entity must have: 1) a plan for

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<sup>5</sup>USDA, Forest Service's Forest Legacy Program. Available: <http://www.fs.fed.us/spf/coop/programs/loa/aboutflp.shtml>

administering easements consistent with FRPP purposes; 2) the capacity and resources to monitor and enforce conservation easements; and 3) policies and procedures to ensure long-term integrity of conservation easements, timely completion of acquisitions, and timely reporting on use of United States Government (USG) funds. These factors are similar to existing FRPP requirements for all eligible entities. Prior to enactment of the 2008 Act, entities submitted their eligibility information along with the list of parcels for which they sought program funding. With the express inclusion of a “certified entity” category, Congress made clear an intent to recognize high performing entities and provide certain flexibilities based on this status. Therefore, thresholds or performance levels within these criteria will be needed to differentiate certified entities from eligible entities.

The 2008 Act provides that certified entities may have cooperative agreement terms of five years or more, and may periodically submit new proposals for funding throughout the agreement duration. Eligible entities participating in the program may have agreements of three to five years in duration, but are not authorized to submit additional funding proposals during that term. Otherwise there are no differences in program implementation criteria for certified entities and other eligible entities.

In determining how best to establish a certification process and deliver increased flexibilities for certified entities, NRCS decided upon a two-stage application process. All potential participating entities will apply to determine their status, which presents little change from the previous practice where entities submitted their eligibility information with their application for funding. Entities determined eligible may enter cooperative agreements for the purchase of easements, the only distinction being that certified entities will have longer term agreements and may periodically update or increase their funding requests. The 2008 Act also requires a review and revocation procedure to ensure that certified entities are maintaining their status. The Agency intends to institute a review process similar to that in related conservation programs whereby participants are periodically evaluated and if violations are identified, they have a specified period of time to cure the violation or become de-certified.

Given the novelty of the certification concept and lack of comparable data to evaluate its potential effects, it is not feasible to attempt to quantify benefits and costs of these policies and procedures at this time. To the extent that certification and increased flexibility encourages participation of well-established entities that are likely to leverage more resources, it may increase program benefits. However, establishing two different sets of policy and procedures also could increase costs by increasing administrative burden, and perhaps decrease program benefits if any resulting confusion limits participation. These policy decisions, at present, are not expected to materially change the net costs or benefits of the program.

#### **Scenario 4 – Establish a Simple Process for Entities to Select an Appraisal Method**

Section 2401 of the 2008 Act added certain flexibilities for participating eligible entities, specifically related to appraisal methodology, and easement deed terms and conditions. The 2008 Act required, effective on the date of enactment, that the fair market value of a conservation easement or other interest in eligible land be determined on the basis of an appraisal

using an industry-approved method. The entity is authorized to select any method, but the Act requires that it be approved by the Secretary in order to ensure that appropriate methods are selected. In determining how best to implement this flexibility, the Agency evaluated the issues surrounding a process for entities to submit desired appraisal methods for review and approval. NRCS concluded that an additional process would prove burdensome for entities and the USG. Consequently, the regulation provides two options for eligible entities to select from: 1) the Universal Appraisal Standards for Federal Land Acquisitions; and 2) the Universal Standards for Professional Appraisal Practice. These methods are the sole standards that the Agency determined to be sufficient to meet the rigor and credibility required for program purposes. Thus, the regulation retains flexibility for the entity, the Secretary is assured that industry approved processes will be used, and need for an additional administrative process is eliminated.

The 2008 Act also authorized eligible entities to use their own terms and conditions in easement deeds, as approved by the Secretary, so long as such terms and conditions: 1) are consistent with the program purposes; 2) permit effective enforcement of the conservation purposes of the easement or other interest; 3) include a limit on impervious surfaces that is consistent with the agricultural activities to be conducted; and 4) include a contingent right of enforcement for the Secretary. The regulation implements this discretionary flexibility by establishing a “Template Deed or Deed Addendum” to be used by all entities in developing their conservation easement deeds. Once finalized, the entity provides the new template for legal review and once declared sufficient may begin using the template for all easement purchases without additional administrative review. By doing so, flexibility is retained for the entity to add organization-specific requirements while ensuring that the minimum requirements established by statute are applied uniformly for all participating entities. The approval of entities’ template deed minimizes a potentially lengthy legal review process.

Data are not available to model the potential effect of these program administrative changes on program participation or benefits and costs. Qualitatively, the additional flexibility and certainty added by these provisions would seem to encourage increased interest or demand on the part of eligible entities. However, this analysis assumes full participation, so any demand increase resulting from these streamlining improvements would probably have little or no impact.

## **Scenario 5 – Provide Flexibility in the Impervious Surface Restrictions**

Section 2401 of the 2008 Act identifies that impervious surface limitations must be included in the easement deed, but is silent on a precise limitation. Impervious surface limitations had not been addressed in previous FRPP regulation; however, program policy established a two-percent limitation on impervious surfaces, with a waiver of up to six percent. In determining how best to implement this requirement, NRCS evaluated alternative limitations. The current two-percent to six-percent limitation has been criticized as too restrictive, particularly related to small, specialty, or niche operations. Further, impervious surfaces vary depending on operation type, for example a dairy operation may have numerous outbuildings (e.g., housing animals, storing feed, milking) and correspondingly impervious surface, but is appropriate for the operation. After evaluating various options, NRCS concluded that the two-percent limitation should be retained, but that the waiver could be increased to up to 10 percent of the easement acreage, determined on a case-by-case basis and consistent with agricultural activities to be conducted.

Increasing the impervious surface restriction could affect the benefits and costs of land preservation, but data are not available with which to attempt to quantify these impacts. Allowing more impervious surface could make the program more attractive, which could raise the landowner donation share of the easement cost, and thereby reduce the federal cost. Although increasing this restriction may help maintain non-market benefits from agricultural land by supporting agricultural viability, impervious surfaces are also implicated in negative effects on water quality, leading to the initial rationale for including a limitation in policy. It is generally the case that non-market benefits are inversely related to the percentage of impervious surface. However, since the effect of impervious surfaces on water quality varies depending on location and the conservation management practices in place on the operation, raising the limitation can provide additional flexibility yet be managed to achieve natural resource quality objectives. It seems likely that both benefits and costs would be affected with greater allowable percentages of impervious surface, but the net impacts are unknown.

### **Scenario 6 – Provide a Priority for “Public Access” in the Ranking Process**

The 2008 Act reflects an increasing national interest in public access to private lands for recreational purposes. While existing FRPP program ranking criteria are quite comprehensive, NRCS determined that additional opportunities may exist to expand the benefits provided by the program. As a result, NRCS adjusted the state-level ranking criteria to provide a priority to applications proposing to provide public access to the easement area for recreational purposes.

Allowing public access for recreational activity may increase costs in several ways. Landowners sacrifice privacy, face liability concerns and costs, and may incur additional costs to maintain the property in compliance with local regulations. It is possible that easement costs would need to increase to compensate landowners accordingly. However, the priority is state-level flexibility and expected only to be implemented in states with existing Public Access Programs that provide liability coverage for participating landowners. Providing public access also may increase benefits, since the public gains on-site use values. Thus, public access may increase costs and benefits, but the net effect cannot be discerned from the existing WTP literature.

### **Scenario 7 – Establish a Process to Accept Contributions of Non-Federal Funds**

Section 2702 of the 2008 Act authorizes the Secretary of Agriculture to accept contributions of non-federal funds to support the purposes of conservation programs, including FRPP. Additional funds would certainly allow the program to protect more acres, and effectively lower the federal per acre cost. However, establishing a process for collecting, managing, and utilizing these funds would incur additional costs to the agency. Given that well-established preservation funds already exist for private contributions, including state programs as well as local, national, and international non-governmental organizations (e.g., The Nature Conservancy), it may be difficult to develop interest in a federally managed contributions fund. To the extent that we assume local preservation efforts have more value to an individual than unspecified national preservation efforts, it seems plausible to assume that existing preservation funds are more attractive to individuals.

## **Scenario 8 – Establish Procedures to Monitor and Report on Program Performance**

Section 2708 of the 2008 Act establishes a “Compliance and Performance” provision that directs the Secretary to develop procedures:

- To monitor compliance with program requirements;
- To measure program performance;
- To demonstrate whether long-term conservation benefits of the program are being achieved;
- To track participation by crop and livestock type; and
- To coordinate these actions with the national conservation program authorized under the Soil and Water Resources Conservation Act (16 U.S.C. 2004).

NRCS has implemented procedures that address these elements as part of the Agency’s ongoing accountability responsibilities. Monitoring compliance with program requirements occurs throughout the program delivery process – from the point where an entity applies for funds and continuing through post-easement monitoring. Cooperating entities provide written annual reports to NRCS detailing easement enforcement and status. NRCS also undertakes periodic easement inspection and has in place procedures for addressing non-compliance. These program procedures are set forth in Program Policy Manual, Title 440–Programs, Part 519–Farm and Ranch Lands Protection Program, Subpart G–Conservation Easements, Amendment 31 (USDA, NRCS, 2006).

NRCS has a long-standing process for establishing and measuring annual and long-term performance goals for FRPP. Program performance data are reported to Congress annually in the Agency budget submission, and to the public in the annual performance report and Program Assessment Rating Tool (PART) update (U.S. Office of Management and Budget, 2005). Through PART, NRCS also obtains periodic independent evaluation of the impact of FRPP easements on retaining land in agricultural uses. Other independent surveys, such as those conducted by various land trusts and organizations, are also used in evaluating program performance and identifying opportunities for program improvement.

The Conservation Effects Assessment Project (CEAP), which has been underway since FY 2003, will allow NRCS to estimate the benefits of conservation measures applied to agricultural land retained in FRPP easements. As part of its continuous strategic planning cycle, NRCS uses data from its National Resources Inventory (NRI) and that from agencies with monitoring missions to evaluate whether landscape-scale conditions are stable, improving, or declining. The newly reauthorized Soil and Water Resources Conservation Act will draw on these and many other resources in assessing new programmatic opportunities to retain important agricultural and forest land.

After reviewing the accountability elements in place, NRCS concluded that the requirements established in Section 2708 will not have an effect above the baseline on program participation or benefits and costs. To the extent that additional emphasis on accountability may encourage

improved performance on the part of cooperating entities, one might expect to see fewer enforcement issues. However, given the existing rigor in program delivery, these effects, if they occur, are not expected to have a measurable effect relative to the baseline.

## **Conclusion**

Overall, the results of this analysis suggests that FRPP assistance to local farmland protection programs bears positive net benefits in areas where citizens place a high value on their amenities, regardless of whether they face low- or high-density development pressures. The presence of active farmland retention programs is empirical evidence that local decision makers anticipate positive net benefits from protecting farmland, such as preventing undesirable changes to the landscape and adverse impacts on the natural environment that can result from development. However, the potential effects on benefits and costs for most of the areas of policy discretion covered in this analysis are not treated in existing literature, and consequently are addressed qualitatively.

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