

## Appendix A: Balancing Multiple Objectives in U.S. Conservation Programs: Indices and Beyond

If an index were the only design feature that affected which applications were accepted into an agri-environmental program, that index would be a significant determinant as to how well that program met its environmental goals. However, different agri-environmental programs typically contain different combinations of features, which collectively act to make landowners more likely to offer to enroll certain parcels of land over others. This means that even if two programs seek the same environmental goals, an index—or changes to that index—may have different impacts on program benefits and costs depending on which other features define the program.

### The Effects of Changing Weights in an Index Can Be Influenced by Other Program Features

One example of a program feature that can easily affect outcomes in voluntary agri-environmental programs is eligibility criteria. Eligibility requirements may constrain the universe of eligible lands such that lands enrolled are very similar in the types of environmental benefits that could be achieved. If most benefits in an agri-environmental program are obtained just by meeting eligibility requirements, even large perturbations in index weights or payment rates (as in the Conservation Security Program) may have little impact on environmental quality.

The type, and length, of contracts used in a program may also affect outcomes and the impact of changes in index weights. The Conservation Reserve Program (CRP), Environmental Quality Incentives Program (EQIP), and Conservation Security Program (CSP) offer contracts up to 15 years in length, while the Wetlands Reserve Program (WRP) and Farm and Ranch Lands Protection Program (FRPP) use permanent or very-long-term (30-year) easements. In the former case, the potential turnover in enrolled lands provides program administrators with more opportunities to influence environmental outcomes through modifications to an index. Permanent easements remain continuously enrolled in the program so changing an index would only influence outcomes for easements that are enrolled subsequent to the change.

How programs target enrollments based on location relative to other land uses can also help determine whether index weight changes affect program outcomes. In particular, over the long term, the environmental benefits provided by enrolled land can be affected by practices taking place on *adjacent* lands. These effects can be significant, such as when the conversion of adjacent farmland into residential housing units hampers the ability of a farm enrolled in a conservation program to deliver wildlife or other benefits. Conversely, close proximity to permanently preserved natural lands may help maintain benefits. The effects of making changes in a program's index may have more predictable impacts when programs account for adjacent land uses.

By design, some programs trade off cost or environmental performance against reducing the risk of contract nonperformance. For example, in the FRPP, easements are co-held with local entities, and the local entities are responsible for managing the easement in perpetuity. The weights given to factors measuring program performance have been as large as those assigned to cost factors in allocating national FRPP program budgets to States (see table A1.7).

## **Multi-Objective Programs and Indices in Action: Examples From U.S. Conservation Programs**

Five of the Nation's largest agri-environmental programs seek multiple objectives and demonstrate different combinations of program features that affect how objectives are traded off (see box, "Multi-Objective Programs in Action: The Case of U.S. Conservation Programs"). Two of the programs retire land (CRP and WRP), while the other three are working lands programs (EQIP, FRPP, and CSP).

### ***Conservation Reserve Program***

The CRP is a land retirement program and is the Nation's largest conservation incentive program in terms of acres enrolled. In the early years of the CRP, landowner applications satisfying a single environmental objective—reducing soil erosion—were accepted until the program acreage constraint was met. In the early 1990s, increasing concerns about offsite problems arising from farming operations motivated the adoption of a selection mechanism that could address additional resource concerns. The environmental benefits index (EBI) was adopted in 1990 to help measure the multiple environmental benefits and the costs of implementing conservation practices on parcels offered for the program and to target enrollments to parcels on this basis (Osborn, 1993; 1997). In essence, the EBI balances the benefits of reducing negative environmental impacts of agricultural production against the costs of retiring the land and installing conservation practices.

Before adoption of the EBI, between 1986 and 1989 the CRP enrolled over 33 million acres based on the land's potential to provide benefits from reduced soil erosion. After adoption of the EBI in the early 1990s, which considered multiple objectives, the program enrolled about 37 million acres through multiple general signups (Barbarika et al., 2004).<sup>1</sup> The bulk of the acres enrolled in both the pre- and post-EBI periods are in the Northern Great Plains, Prairie Gateway, the Heartland, and along the Mississippi Basin (fig. A1.1). At a national level, only minor geographic shifts in pre- and post-EBI enrollment patterns are evident.

At the local level, larger shifts are obvious. As shown in figure A1.2, counties coded green experienced at least a 20-percent increase in enrolled CRP acreage during the time period following adoption of the EBI (1995-2003). These counties are clustered in the Northwest (Washington State, north central Montana), the Mississippi Basin, and several New England States. Regional differences in the ability of the land to provide multiple environ-

<sup>1</sup>The 33 million and 37 million acres represent all land accepted for enrollment into the CRP during the respective time spans and include lands enrolled as old contracts expired. The totals do not represent the enrollment at any given time (which has never exceeded 35 million acres).

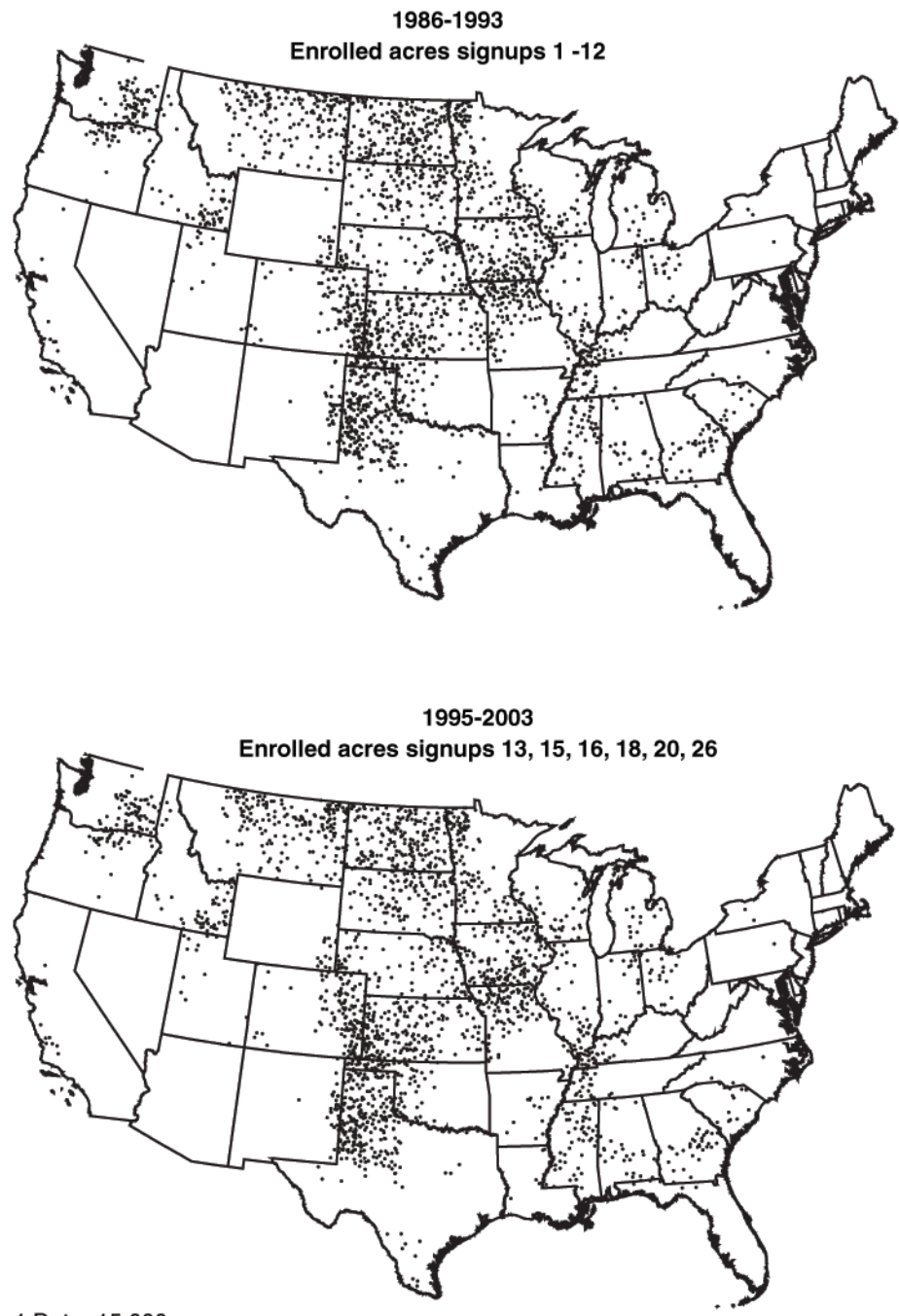
## Multi-Objective Programs in Action: The Case of U.S. Conservation Programs

Many of the Nation's largest conservation programs have adopted a multi-objective approach to achieving program goals. The programs reviewed in this appendix include:

- *Conservation Reserve Program (CRP)*. The CRP is the largest conservation program ever to be adopted at the Federal level. The CRP offers landowners incentive payments (and cost sharing for installation costs, in some cases) to implement environmentally enhancing practices on agricultural land that they take out of production for 10- to 15-year terms. Congress mandated an acreage enrollment cap, which the Farm Security and Rural Investment Act of 2002 (2002 Farm Act) expanded to 39.2 million acres from 36.4 million acres. Program expenditures have averaged over \$1.3 billion annually. The CRP was initiated in 1985 and is administered through the USDA's Farm Service Agency. For further information, see <http://www.ers.usda.gov/Briefing/ConservationAndEnvironment/qa.htm#consreserve>. Or see [http://www.fsa.usda.gov/dafp/cepd/crp\\_statistics.htm](http://www.fsa.usda.gov/dafp/cepd/crp_statistics.htm) for current CRP statistics.
- *Environmental Quality Incentives Program (EQIP)*. Implemented in 1996, EQIP provides farmers and ranchers with financial and technical assistance to install or implement structural and management conservation practices on "working" agricultural lands. The 2002 Farm Act significantly increased funding for this program, with an authorized \$6.16 billion for the 6-year period 2002-07. USDA's Natural Resources Conservation Service (NRCS) administers EQIP. For further information, see <http://www.ers.usda.gov/data/eqip/>.
- *Conservation Security Program (CSP)*. The CSP provides payments to farmers and ranchers for maintaining and enhancing conservation efforts on "working" agricultural lands. It is a new program authorized by the 2002 Farm Act and has a congressionally mandated payment cap of \$3.8 billion over 10 years. Although originally deemed an entitlement program in which all eligible producers are enrolled, budget constraints have resulted in use of a selection mechanism based on soil quality and the level of environmental effort to be undertaken. CSP is administered by NRCS. For further information, see <http://www.nrcs.usda.gov/programs/csp/>.
- *Wetlands Reserve Program (WRP)*. The WRP was mandated in 1985 to provide assistance to farmers to protect, restore, or enhance wetlands in exchange for retiring land from agricultural production. The program currently has an acreage enrollment cap of 2,275,000 acres, with annual enrollment limited to 250,000 acres. As of fiscal 2003, 1.47 million acres were enrolled. In fiscal 2004, almost \$275 million was spent on WRP contracts. This program is administered by the NRCS. For further information, see <http://www.nrcs.usda.gov/programs/wrp/>.
- *Farm and Ranch Lands Protection Program (FRPP)*. Unlike the above programs that primarily seek changes in land use or land-use practices, the primary purpose of FRPP is to prevent a change in agricultural land use. Specifically, FRPP provides matching funds to State and local governments, tribal governments, and nonprofit organizations and acquires an interest in easements that prevents conversion of the land to urban uses. Landowners retain the rights to farm the land. The 2002 Farm Act gave FRPP a significant funding boost, authorizing a more than tenfold increase from about \$53 million during 1996-2001 to \$597 million for 2002-07. Since program inception through 2003, easement interests have been secured on nearly 295,000 acres across 41 States. This program is administered by NRCS. For further information, see <http://www.nrcs.usda.gov/programs/frpp/>.

Figure A1.1

**Location of CRP enrolled acres: Pre- and post-EBI**

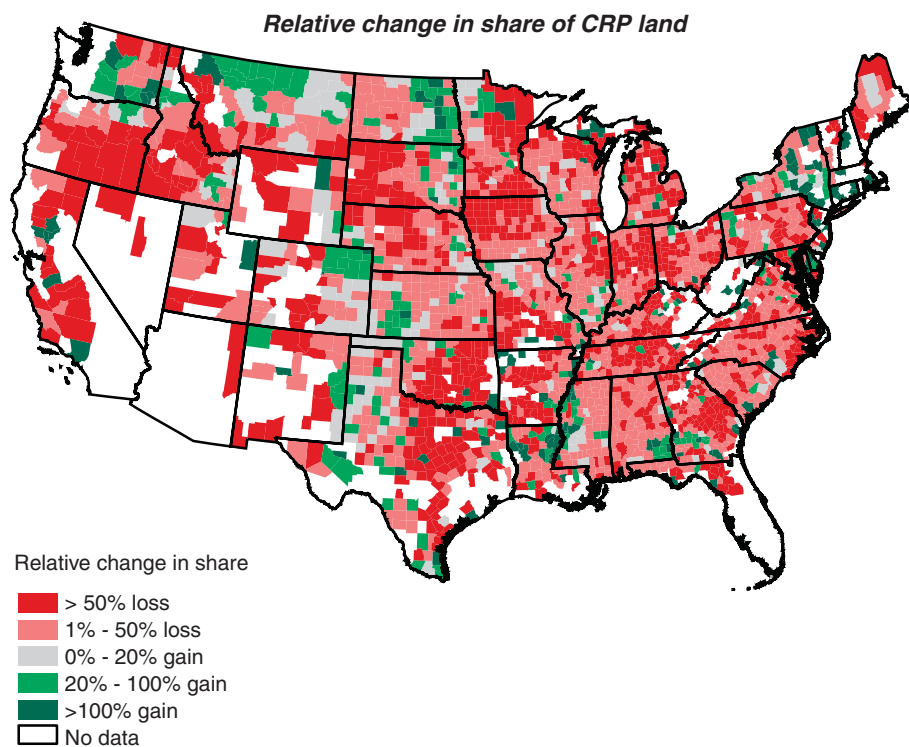


1 Dot = 15,000 acres

Source: Compiled by USDA's Economic Research Service using data from USDA's Farm Service Agency.

Figure A1.2

**Change in acreage enrolled in CRP between 1993 (pre-EBI) and 2005 (post-EBI)**



Source: Compiled by USDA's Economic Research Service using data on CRP contracts from USDA's Farm Service Agency.

**Change in CRP-share: By relative category**

Category	Number of counties	Total change in share	Average change (per county)
20 to 100 percent loss	1,464	-15.3	-0.0110
0 to 20 percent loss	348	-1.5	-0.0043
0 to 20 percent gain	285	2.5	0.0088
20 to 100 percent gain	297	10.9	0.0370
> 100 percent gain	165	3.3	0.0190

Notes: The map shows what counties lost and gained "share" between 1993 (acres enrolled in pre-EBI signups) and 2005 (acres enrolled in post-EBI signups). Since total CRP acreage changes over time, the share of total CRP acreage in a given county is used.

Share is defined as:  $\text{county\_crp\_acres} / \text{national\_crp\_acres}$ .

The categories are based on the proportional change in share, defined as  $(\text{share}_{2005} - \text{share}_{1993}) / \text{share}_{1993}$ .

Total change in share is defined as: change in percent of total CRP acres (summed across all counties in a category). The average change is defined as  $(\text{total change in share}) / (\# \text{ of counties})$ .

Note that 1,812 counties had their "proportional change in share" decrease, while 747 had an increase. Consequently, the change in share in "loss" counties is (on average) about 40 percent of the change in "gain" counties.

Numerous factors can contribute to these changes, such as changes in commodity prices.

mental benefits, as opposed to only soil erosion benefits, may have contributed to these shifts.<sup>2</sup>

Relative to the program targeting primarily on the basis of achieving the single objective of reducing soil erosion, adoption of the EBI is expected to enhance the CRP's provision of environmental benefits (Ribaudo et al., 2001). For example, using economic models of recreational trip taking, Feather et al. (1999) show that adoption of the EBI increases public enjoyment of wildlife viewing and water-based recreation.

The CRP is a centralized program, and (at least since 1990) all offers for a given signup are evaluated on the basis of the same EBI. The types of environmental concerns considered in the EBI have changed over time, however. Initially covering about 2.5 million acres enrolled between 1990 and 1992, the EBI considered reduced soil erosion benefits, water quality benefits, and enduring benefits (which measures the length of time benefits are expected to endure). From the 17-million-acre 15th signup of 1997 until the present, the EBI has also considered wildlife habitat and air quality, as well as reducing program costs. Overall, the points awarded to the various concerns have remained relatively similar since they were introduced, with equal priority given to wildlife habitat, water quality, and soil erosion benefits, and the greatest allocation of points to the cost factor (see table A1.1a for an outline of the EBI points used since 1997, and table A1.1b for details on the practices that contribute to the EBI points used in the 26th (2003) signup).

### ***Environmental Quality Incentives Program***

EQIP seeks three of the four environmental objectives sought by CRP:

- Reduction in soil erosion
- Reduction in water pollution from agricultural nonpoint sources
- Habitat conservation

EQIP also seeks the reduction of a fourth type of pollutant: emissions to the atmosphere, including particulate matter, nitrogen oxides, volatile organic

<sup>2</sup>The EBI may not have been the only reason for these shifts in enrollment patterns. Other influences could include changes in commodity prices or commodity program payments that affect the returns a landowner could earn by keeping the land in production.

Table A1.1a

#### **EBI weights used in signups 15 to 29**

Objective	15th signup (1997)		16th - 20th signups (1998-2001)		26th and 29th signup (2003-04)	
	Maximum EBI score attainable	Implicit maximum weight	Maximum EBI score attainable	Implicit maximum weight	Maximum EBI score attainable	Implicit maximum weight
Wildlife	100	0.167	100	0.179	100	0.183
Water quality	100	0.167	100	0.179	100	0.183
Erosion reduction	100	0.167	100	0.179	100	0.183
Enduring benefits	50	0.083	50	0.089	50	0.092
Air quality	25	0.041	35	0.063	45	0.083
Priority area benefits	25	0.041	25	0.045	0	0
Cost savings	200	0.333	150	0.268	150	0.275
Total	600	1.000	560	1.000	545	1.000

Note: Until the 26th signup in 2003, the EBI included an objective that assigned additional points to lands located within designated State or national conservation priority areas (CPAs). In all signups, location within these CPAs was one of several possible eligibility criteria.

Source: Compiled by USDA's Economic Research Service using data from USDA's Farm Service Agency.

Table A1.1b

**Details of the 26th signup EBI: Points awarded to subfactors**

EBI concerns					
Wildlife (100 points)	Water quality (100 points)	Erosion reduction (100 points)	Enduring benefits (50 points)	Air quality (45 points)	Costs (150 points)
Cover: Introduced grass, native grass, trees (50 points)	Within designated State Water Quality Zone (30 points)	All points awarded based on erodibility index (100 points)	All points awarded based on enduring benefits (tree plantings, wetland restoration, existing tree, grass seeding) (50 points)	Air quality benefits (35 points)	Per acre rent (125 points maximum)  125 * (185- bid amount) / 185 (185 is CRP's maximum allowed bid)
Priority zones (30 points)	Groundwater vulnerability (25 points)			Wind erosion soils (5 points)	No cost share (10 points)
Wildlife enhancement (20 points)	Surface water vulnerability (45 points)			In air quality zones (5 points)	Bid below maximum rate (15 points)

Source: Compiled by USDA's Economic Research Service using data from USDA's Farm Service Agency.

compounds, and ozone precursors and depleters. EQIP is also meant to help producers comply with regulations. Although this is not an environmental objective, it does play a role in terms of the resource concerns addressed. For example, 60 percent of the program's funds are targeted to livestock-related resource concerns, with the expectation that they can offset some of the costs of recently introduced environmental regulations for confined animal feeding operations (Ribaud et al., 2003).

EQIP is operated in a decentralized manner, with two separate indices used to implement the program. Environmental outcomes can be affected through changes in either mechanism. The first index is a single index used to allocate the national program budget to States, where the allocation is made on the basis of these four environmental objectives (see table A1.2 for an outline of this index). This index largely determines the overall spatial distribution of total environmental benefits that can be achieved—for example, States receiving higher funding amounts may be able to provide more environmental benefits. The second index consists of a set of indices developed by State and local Natural Resources Conservation Service (NRCS) conservationists, which are used to prioritize and select applications for acceptance into the EQIP program. States and localities have considerable flexibility in designing their indices, with some States even allowing for county-level variation within the State-level index. For example, the index used in Montana includes a statewide ranking for animal feeding operations but accommodates locally developed rankings for other provisions of EQIP (such as for counties affected by the spring rise of the Missouri River) (NRCS, 2004a). These indices distribute potential environmental benefits across the landscape at a finer spatial scale and also determine the types of benefits that will be achieved in any particular location. For example, water conservation is given priority in Utah, while Minnesota

Table A1.2

**Summary of EQIP formula to allocate national program funds to States**

**Top 10 factors (accounting for about 50 percent of funds). These factors are measured in the appropriate units (such as tons of waste and acres of cropland):**

- |  |  |  |
|--|--|--|
| <ul style="list-style-type: none"> <li>• Animal waste generation</li> <li>• Livestock animal units</li> <li>• Impaired rivers and streams</li> <li>• Air quality - wind erosion</li> </ul> | <ul style="list-style-type: none"> <li>• Cropland erosion &gt; T</li> <li>• Pastureland needing treatment</li> <li>• Irrigated cropland</li> </ul> | <ul style="list-style-type: none"> <li>• Fair and poor rangeland</li> <li>• Limited-resource producers</li> <li>• Non-Federal grazing lands</li> </ul> |
|--|--|--|

**Other factors (accounting for about 50 percent of funds):**

- |  |  |   |
|--|--|---|
| <ul style="list-style-type: none"> <li>• Phosphorous runoff potential</li> <li>• Waste management system costs</li> <li>• Cropland</li> <li>• Wetlands</li> <li>• Land with saline/alkaline problems (surface water vulnerability)</li> <li>• Land with saline/alkaline problems (groundwater vulnerability)</li> <li>• Forest land</li> <li>• Federal grazing lands</li> <li>• Acres subject to flooding</li> </ul> | <ul style="list-style-type: none"> <li>• Coastal zone lands</li> <li>• Native American tribal lands</li> <li>• Land in specialty crops</li> <li>• At-risk species habitat conservation</li> <li>• Potential pesticide and nitrate runoff</li> <li>• Forest land erosion &gt; T</li> <li>• Commercial fertilizer/cropland</li> <li>• Number of farms and ranches</li> <li>• Population</li> </ul> | <ul style="list-style-type: none"> <li>• Carbon sequestration</li> <li>• Combined animal feeding operations/animal feeding operations</li> <li>• Water body acreage</li> <li>• Livestock animal units/cropland</li> <li>• Air quality nonattainment areas</li> <li>• Other land in farms</li> </ul> |
|--|--|---|

For further details, see [http://www.nrcs.usda.gov/programs/Env\\_Assess/EQIP/EQIP\\_EA\\_finals/EQIP%20Final%20EA%204-11-03.pdf](http://www.nrcs.usda.gov/programs/Env_Assess/EQIP/EQIP_EA_finals/EQIP%20Final%20EA%204-11-03.pdf)

Source: Compiled by USDA's Economic Research Service using data from USDA's Natural Resources Conservation Service.

gives priority to reductions in soil erosion. Table A1.3 outlines a few State-level EQIP ranking systems.

Environmental concerns receiving priority in EQIP, and thus the environmental benefits likely to be achieved, vary significantly across States. Although factors affecting producers' incentives to apply to EQIP will affect outcomes (because, like the other programs discussed here, EQIP relies on voluntary participation), variation in local priorities likely contributes to the significant variation in types of practices that are ultimately funded. On a national basis, and prior to the Farm Security and Rural Investment Act of 2002 (2002 Farm Act), 33 percent of EQIP-funded activities involve water-related conservation practices. Soil erosion and land management practices account for 21 percent of funding, followed by livestock nutrient management with 19 percent of funds. Practices addressing wildlife habitat management, crop nutrient management, and other concerns account for the remaining 27 percent. Management of livestock waste receives most of the funding in the Northern Crescent, Eastern Uplands, and Southern Seaboard regions of the United States (fig. A1.3). Water quality and conservation practices receive most of the funding in the Basin and Range and Northern Great Plains regions.



Table A1.3

**Examples of State-level EQIP weights**

In the tables that follow, the EQIP weights assigned in 2003 to different environmental concerns are listed for a small subset of counties within selected States. For comparability across States, all scoring mechanisms have been rescaled so that points sum to 100 (more points mean the objective is more important). The States selected are meant to provide an overview of concerns, but they are not representative of the diversity of approaches to ranking applications in EQIP. In fact, the indices presented here were chosen also because of their simplicity and concise presentation. In many States, the ranking procedures are quite complex and are linked to details of specific conservation practices; in others, points assigned to an environmental concern are obtained by multiplying a unit score by the acres involved so that there is no predefined maximum score. Ranking criteria can change substantially from one year to the next.

**Utah**

For the purpose of managing EQIP, Utah was divided into seven zones by NRCS, and each zone in 2003 had its own ranking criteria. The ranking mechanisms reported in the table below vary between all points going to water—either quality or quantity concerns—in zone 3, and points being spread among multiple environmental concerns as in zone 7—which balances water quantity, soil erosion, grazing, and multiple resource concerns. In two areas (zones 4 and 5), the weight is allocated based on the share of applications addressing a resource concern: funding is allocated where there is most demand by producers. Wildlife habitat benefits are not used as a ranking criterion in Utah.

Item	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7
Water quantity	60	50	65			0	14
Water quality	0	35	35	Weight is	Weight is	35	0
Soil erosion	10	0	0	based on	based on	0	20
Grazing and rangeland	30	15	0	share of	share of	65	34
Multiple resource benefits	0	0	0	applications	applications	0	32

Source: Compiled by USDA's Economic Research Service from USDA's Natural Resources Conservation Service—FY 2003 ranking criteria for Utah.

**Iowa**

In Iowa, water quality in 2003 was consistently ranked highly by NRCS as a resource concern across counties, with soil erosion and/or live-stock grazing as the other main concerns.

Item	Palo Alto	Benton	Union	Lee	Carroll	Winnebago	Allamakee
Water quality	66	48	25	37	40	38	45
Soil erosion	21	18	44	37	37	62	0
Wildlife habitat	14	12	0	4	7	0	0
Livestock grazing	0	15	31	22	17	0	55
Air quality	0	7	0	0	0	0	0

Source: Compiled by USDA's Economic Research Service from USDA's Natural Resources Conservation Service—FY 2003 ranking criteria for Iowa (<http://www.ia.nrcs.usda.gov/programs/stateeqipmap.html>).

**Minnesota**

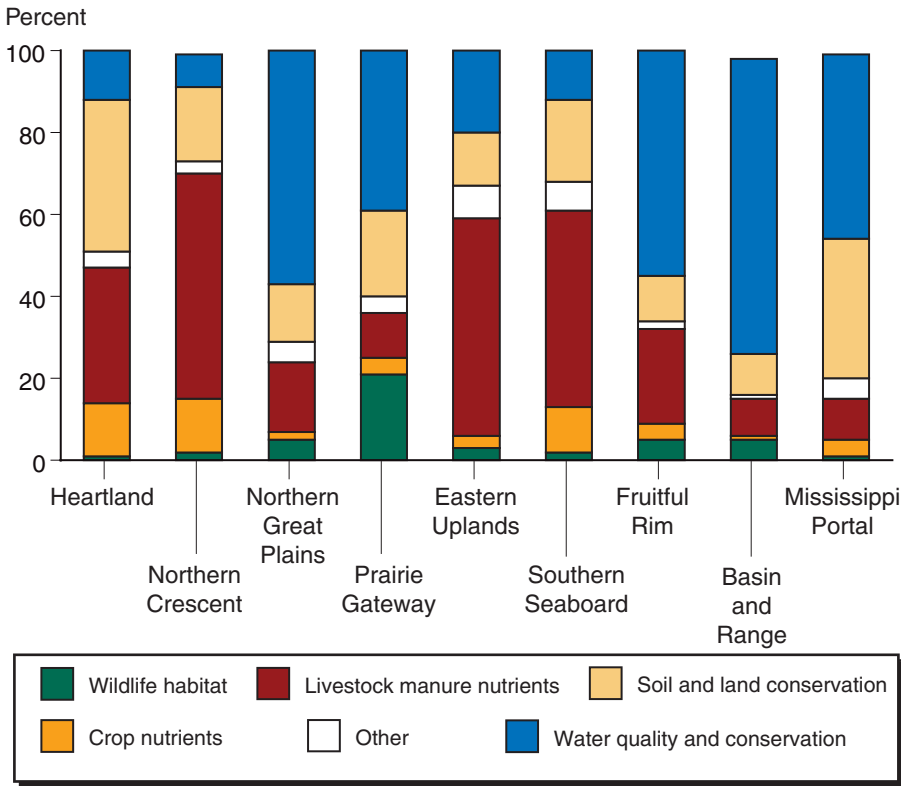
No single concern took priority throughout the State in 2003 as shown by the subset of counties reported below. The State provides a guideline for ranking EQIP applications, which counties can modify. The State ranking criteria express a balanced approach to resource concerns, with water quality and soil erosion ranked highest. The rankings at the local level can be considerably different from the State rankings, indicating considerable heterogeneity of resource concerns across the State. For example, Aitkin County's index demonstrates an even more balanced weighting scheme where water quality, soil erosion, wildlife habitat, forest management, and other local concerns all have nearly the same weight. By contrast, in Root River County's index, nearly 50 percent of all available points are assigned to erosion control.

Item	State ranking (advisory)	County adaptation of advisory State ranking (subset of counties)					
		Aitkin	Beltrami	Cotton-wood	Murray	Root River	Traverse
Water quality	29	35	28	47	54	18	44
Erosion control	21	13	4	23	36	49	27
Wildlife habitat	11	15	11	2	2	10	9
Air quality	10	6	2	2	2	3	4
Grazing system	10	4	22	2	2	8	15
Forest management	10	12	11	2	2	13	2
Additional local concern	10	15	22	21	2	0	0

Source: Compiled by USDA's Economic Research Service from USDA's Natural Resources Conservation Service—FY 2003 ranking criteria for Minnesota (<http://www.mn.nrcs.usda.gov/programs/eqip/>).

Figure A1.3

**Distribution of EQIP funds by region and environmental concern, 1997-2004**



Note: Funding is presented according to the main environmental concern associated with implemented practices; however, in reality many practices address multiple concerns. Here, only the main concern addressed is taken into consideration.

Source: Compiled by USDA's Economic Research Service using data from USDA's Natural Resources Conservation Service and Farm Service Agency.

Cost considerations can influence the ability of a program to efficiently provide environmental benefits. Prior to 2002, program administrators used cost to rank otherwise similar applications. The 2002 Farm Act eliminated the provision that allowed producers to “bid down” the cost of implementing practices to improve their chances for being accepted into the program. Consequently, the significant additional funding authorized for EQIP may be buying less in terms of environmental improvements.<sup>3</sup>

While no longer used at the national level, many indices used by States and localities for ranking EQIP applications still consider cost. For example, Pennsylvania's index ultimately ranks parcels on the basis of a cost-benefit ratio (cost of implementing conservation practices relative to the environmental benefits provided). In Iowa, the cost-benefit ratio is only used to prioritize applications that offer the same total environmental benefits.

**Conservation Security Program**

The CSP provides financial and technical assistance to agricultural producers who are already conserving soil quality, water quality, air quality, wildlife, and energy on working agricultural land. Producers are eligible for

<sup>3</sup>An analysis of EQIP contract behavior found evidence that practices were more likely to be withdrawn or not implemented if they had lower cost-share payments (Cattaneo, 2003). If a larger share of contracted practices are now being implemented as planned due to higher cost-share rates under the “no bidding down” rules, the overall impact of this change may be less than expected.

CSP only if they have already achieved minimum standards for soil and water quality (often referred to as the “nondegradation” standard), that is, relative to conventional farming practices, significant environmental improvements have already been achieved. Furthermore, CSP stresses “enhancements”—the adoption of practices or activities that go beyond these minimum standards. In contrast, other programs, such as EQIP, do not require previous conservation effort and do not provide incentives for “enhancement” activities.

The CSP seeks improvements in many of the same environmental concerns as the CRP, EQIP, and WRP, but two program features set it apart in terms of how changes in program priorities might affect environmental outcomes. First, the CSP uses “enrollment categories” rather than an environmental benefit-cost index to rank and select applications. Producers with eligible land are assigned to one of eight enrollment categories, an assignment based on soil quality (which reflects past soil management), the amount of conservation effort expended by the producer to date, and the amount of additional effort the producer is willing to put forth. Producers are thus ranked on the basis of *effort* rather than benefits and costs. Second, CSP uses “benefits-based” payments: in addition to cost-share payments for the practices they implement, producers are paid more as they take on more enhancement practices. In many cases, these additional payments are based on expected improvements in measures of environmental performance—such as improvements in a soil condition index. Greater increases in environmental benefits thus lead to higher payment amounts—unlike other programs in which producers receive cost-based financial assistance. Taken together, these two provisions mean that if the relative priorities of different objectives change in the CSP, program administrators would need to adjust the definitions of enrollment categories and/or payment rates (rather than just the weights assigned in an index) to effect changes in environmental outcomes. The environmental tradeoffs that occur when these adjustments are made depend on the interrelation of the environmental benefits and their responsiveness to the changes.

Table A1.4 outlines the CSP enrollment categories to which applications are assigned. Applicants assigned to category H meet only the basic requirements of the program (i.e., they have addressed soil and water quality concerns)—and are thus least likely to be enrolled. Applicants assigned to category A agree to implement multiple enhancement practices and activities. These applicants are most likely to be enrolled.

### **Wetlands Reserve Program**

The overall objectives of the WRP include maximizing wetland functions and values, such as providing quality wildlife habitat.<sup>4</sup> Though the WRP is a land retirement program like the CRP, WRP is operated as a decentralized program similar to EQIP: an index is first used to allocate national program funds to States, and then locally determined indices are used to compare and rank applications.

Unlike EQIP, the allocation of program funds to States in WRP is determined by more than just the potential for environmental gains. As noted in

<sup>4</sup>Although not a primary focus of the program, the CRP incorporates wetlands protection in several ways. First, wetlands are part of the wildlife and water quality factors of the EBI. Second, about 122,000 acres of land are enrolled as part of the Farmable Wetland “continuous CRP” initiative.

Table A1.4

**Sample CSP enrollment categories for cropland stewards**

Category	Criteria				
	Soil conditioning index	Soil tillage intensity rating <sup>1</sup>	Stewardship practices from list(*) in place for 2 or more years	Stewardship activities from list(**) in place for 2 or more years	Enhancement activities (to be completed by the third year of the contract)
A	At least 0.1	Less than 30	At least three practices	At least three activities	Agree to (1) move to the next tier <sup>2</sup> or to add two stewardship practices or activities from list and (2) conduct onfarm project or assessment and evaluation activity
B	At least 0.0	Less than 30	At least three practices	At least three activities	Agree to (1) add two stewardship practices or activities from list and (2) conduct onfarm project or assessment and evaluation activity
C	At least 0.1	Less than 60	At least two practices	At least two activities	Agree to (1) add two stewardship practices or activities from list and (2) conduct onfarm project or assessment and evaluation activity
D	At least 0.0	Less than 60	At least two practices	At least two activities	Agree to (1) add two stewardship practices or activities from list and (2) conduct on-farm project or assessment and evaluation activity
E	At least 0.1	Less than 60	At least two practices	At least one activity	Agree to (1) add two stewardship practices or activities from list and (2) conduct on-farm project or assessment and evaluation activity
F	At least 0.0	Less than 100	At least one practice	At least two activities	Agree to add two stewardship practices or activities from list
G	At least 0.0	Less than 100	At least one practice	Any number of activities	Do not agree to do additional enhancement activities
H	Must meet minimum program eligibility requirements as defined in the rule				Do not agree to do additional enhancement activities

\* Stewardship practice list for cropland in this example:<sup>3</sup> contour buffer strips, cover crop, grade stabilization structure, irrigation water management.

\*\* Stewardship activity list for cropland in this example:<sup>4</sup> Test soil and/or plant tissue on annual basis, precision application of nutrients, such as banding, side dressing, injection, fertigation, irrigation system efficiency evaluations and adjustments.

<sup>1</sup>STIR is an index used to evaluate the kind, severity, and number of ground-disturbing passes on soil quality. High STIR numbers indicate more disturbance.

<sup>2</sup>Moving to the next tier means the producer agrees to expand the amount of the farm under contract or the number of resources to be addressed.

<sup>3</sup>The list would contain all conservation practices identified in the *Field Office Technical Guide* for application to cropland to improve soil and/or water quality.

<sup>4</sup>The list would contain all applicable stewardship activities which, when applied to a cropland field, mitigate off-site resource damage or improve soil and/or water quality.

Source: Compiled by USDA's Economic Research Service using data from USDA's Natural Resources Conservation Service.

table A1.5, when allocating WRP funds, the Federal Government weighs ecological considerations against two program performance objectives: maximizing landowner participation and State performance in the program over time—that is, allocating funds to States with a history of easement purchases. As with EQIP, States place varying priority on different environmental benefits and program costs in the locally developed indices (see table A1.6 for an example of a State-level evaluation criteria).

Table A1.5

**Criteria used for WRP fund allocations to States**

Most important criteria:	<ul style="list-style-type: none"> <li>● Ecological concerns: protecting bird migration routes, rate of wetland loss</li> <li>● State performance: program delivery and easement-closure</li> <li>● Landowner interest: level of unfunded applications</li> </ul>
Less important criteria	<ul style="list-style-type: none"> <li>● Cost</li> </ul>

Source: USDA’s Economic Research Service.

Table A1.6

**Outline of Minnesota’s Wetlands Reserve Program easement evaluation worksheet**

Factor	Score			
Geographic priority	10			
Landscape significance Depressional wetland	Number of restorable basins	Upland: Wetland ratio		
		>1:1	0.5:1-0.9:1	<0.5:1
	>5	15	10	5
	3-4	10	5	3
	<3	5	3	3
Floodplain wetland	Easement size	Frequently flooded	Other	
	>120	10	5	
	40-119	5	3	
	< 40	3	0	
Nondepressional wetland	Size			
	>120	3		
	40-119	1		
	<40	0		
Hydrological restoration	Practice	Points depend on current hydrological manipulation		
	Pothole restoration			
	● >80 potholes restored	● 35, 20, or 4		
	● 30-79% restored	● 20, 10, or 0		
● < 30%	● 0			
Floodplain restored	20, 10, or 0			
Vegetation establishment	Native ecosystem restoration	5		
	3-5 native species	2		
	<3 native species	0		
	Cost	(2000- easement value) / 400		
Restoration cost	<\$100 per acre	5		
	Otherwise	(2,000 - total per acre restoration cost)/400		

Source: USDA’s Economic Research Service.

## **Farm and Ranch Lands Protection Program**

Conservation programs can use indices regardless of their primary program goals. The primary goal of FRPP is to prevent the loss of existing agricultural production benefits—by purchasing easements to prevent farmland from changing use (primarily to an urban use). As with other USDA conservation programs, the FRPP uses indices to allocate national program funding and also to rank applications.

Like EQIP and WRP, the FRPP uses a decentralized funding approach. The index used to allocate national program funding to States includes objectives relating to maximizing production benefits (by protecting prime, unique, or important lands and lands that are most likely to be converted) and program performance (by supporting States with established histories of acquiring easements). Unlike those of EQIP and WRP, FRPP’s funding allocation index also includes objectives relating to minimizing program costs. The weight assigned to production benefits has typically been about twice the weights assigned to cost or program performance factors.

The locally developed State indices include some of these same objectives, as well as environmental objectives and objectives relating to the provision of social amenity benefits—such as open space and maintenance of rural lifestyles (Hellerstein et al., 2002). These latter objectives are often measured in terms of protecting larger parcels, land used for particular farming types, and land in particular locations relative to environmental and urban features (USDA, 2003). Table A1.7 provides an outline of the FRPP’s funding allocation formula index, and table A1.8 provides an example of a State farmland protection ranking system.

Table A1.7

### **Criteria used by the FRPP to determine 2004 allocations to States**

Criteria	Source	Weight
Total acres of farm and ranch land converted to urban and built-up uses (1992 – 1997)	NRI	100
Prime farmland percent change (1992 – 1997)	NRI	150
Prime farmland gross acreage change (1992 – 1997)	NRI	150
FY-04 prime acres to be protected	State plans	300
Total acres to be protected	State plans	100
Percent of total land estimated to be protected that is prime and important farmland	State plans	300
Average total federal cost per acre	Calculated from State plans	200
Percent of easement cost (leveraging)	Calculated from State plans	200
Cooperating entities average number of staff years devoted to farmland protection	State plans	100
Average number of years of entities acquiring easements	State plans	100
Average annual FRPP easement expenditures	State plans	200

Source: Compiled by USDA’s Economic Research Service using data from USDA’s Natural Resources Conservation Service.

Table A1.8

**Outline of Montana’s farm and ranch land protection program ranking system**

Criteria	Levels	Possible points
LESA score		100
Share of total dollars from FRPP	< 25%	30
	25 to 35%	20
	35 to 45 %	10
	45 to 50 %	5
Appraisal completed	Yes	20
	No	0
Sponsor’s history in farmland protection	< 5 years	5
	5- 10 years	10
	> 10 years	15
Sponsor’s staff years (SY) devoted to farmland protection	< 0.5 SY	5
	0.5-1.5 SY	10
	1.5-30. SY	15
Timely completion of conservation plan	Yes	5
	No	0
Project area has active watershed group, or a complete conservation needs assessment	Yes	10
	No	0

Source: Compiled by USDA’s Economic Research Service using data from USDA’s Natural Resources Conservation Service.

## Multiple Objectives and Heterogeneity in Environmental Concerns: Above and Beyond the Use of Indices

In addition to using indices as a way of balancing multiple environmental objectives, some conservation programs use other strategies to focus enrollments and to minimize tradeoffs. For example, the CRP has adopted a number of strategies to complement its use of the EBI. Just a few years after implementing the EBI, the CRP identified certain high-priority conservation practices and allowed for noncompetitive enrollments while offering additional financial incentives for landowners to implement these practices. These enrollments occur in the “continuous signups,” in which applications are not ranked according to the EBI.

EQIP, the WRP, and CSP have also targeted certain geographic areas as a strategy. Prior to the 2002 Farm Act, EQIP allocated more of its funding to designated Conservation Priority Areas (CPAs). While CPAs no longer influence funding allocations from the Federal level, some States have incorporated spatial location considerations into the index used to rank applications. In 2004, the first Wetlands Reserve Enhancement Program (WREP) partnership was established in Nebraska, with a focus on improving wildlife habitat and increasing the flood storage capacity of the Lower Missouri River (USDA, 2004b). The CSP has targeted a limited set of watersheds thus far, though this is mostly due to budgetary considerations.

In another strategy that helps direct the flow of program dollars, USDA partners with local entities. For example, the FRPP provides matching funds for easement purchases to State and local governments, tribal governments,

and nonprofit organizations that have existing farmland protection programs. Landowners must apply to FRPP through one of these entities. Because the applications must satisfy the local entity's farmland protection objectives, in addition to FRPP objectives, program outcomes are influenced by local priorities (which can vary widely across States). The Federal-State Conservation Reserve Enhancement Program (CREP) focuses a portion of CRP resources on specific local environmental problems. In New York and Maryland, for example, CREP is targeted to protecting water quality in specific watersheds. In Washington and Oregon, CREP focuses on endangered species habitat (Smith, 2000).