

Land-Use and Economic Implications of Expiring CRP Contracts

There are a number of ways of estimating the economic impacts of an ongoing land retirement program, such as the CRP, with secondary data. One is to examine local economic changes that accompany enrollment of cropland in CRP. That was the approach taken in the previous section, where we examined socioeconomic trends in farming communities before and after the CRP program was put in place. That approach has the benefit of hindsight but has the disadvantage of focusing on the past when policy decisions often require an assessment of what is happening now and what is likely to happen in the future.

A second approach to measuring CRP's economic impacts is to estimate what might happen if farmers were hypothetically released from their CRP contracts. That is, given the current distribution of CRP enrollment, rental payments, and ground cover, as well as prevailing commodity market conditions, public policies, and government regulations, what might happen if CRP contracts were suddenly all to expire without any additional enrollments? In doing so, we are not suggesting that cancellation of CRP contracts is a policy option to be explored. Nor do we attempt to model what will happen under the current timetable for the expiration of existing CRP contracts. Rather, our analysis of a hypothetical immediate expiration of contracts is merely a convenient way of measuring the economic impact of the program's continuation, given current conditions.⁴⁴ In this section, we use social accounting matrix (SAM) multiplier models to estimate what might happen to several regional economies with particularly high CRP enrollments should the program expire. The first question that comes to mind is whether an expiration of the program today would simply cancel the effects of its creation in 1985. If so, then a simulation model is redundant. But, since the CRP has changed over the years, as have many of the factors that influence land-use decisions, the short answer is no—the community effects of a hypothetical expiration of the CRP are not necessarily a mirror image of those associated with its creation. Then too, rural counties are different than they were 15 years ago—perhaps in ways that are not easily reversed.

The expiration of CRP could affect rural economies in several distinct ways. First, land currently enrolled in the CRP could switch out of conservation uses. Some of this land would be used to produce crops, livestock, and other agricultural goods. Some of the land leaving the CRP would be developed for nonagricultural uses, such as housing tracts, shopping malls, or industrial sites, and some would remain in conservation uses. Decisions about what to do with the land would affect not only demand for local farm inputs and services, but to the extent that they influence market prices for farm commodities, they could affect all market participants. Second, the environmental benefits generated by the CRP have been credited with increased public participation in outdoor activities such as hunting, freshwater fishing, wildlife viewing, and other forms of outdoor recreation. To the extent that decisions about the fate of land released from the CRP affect the quality of

⁴⁴ Our analysis compares an immediate release of all CRP contracts to a situation where the program continues indefinitely at its current level of enrolled acreage (i.e., the government will continue enrolling acres by exactly the amount of expiring contracts). In reality, existing contracts will expire over time and Congress will decide whether and at what level to enroll new acres. Comparing different scenarios of CRP continuation is beyond the scope of this study.

these outdoor activities, expenditures for recreational trips and their geographic distribution could change as well. Third, households that currently receive CRP payments would likely change their consumption expenditures as these payments cease, particularly if net income generated by land released from the CRP falls short of CRP rental payments.

To model the economic impact of CRP expiration, it is first necessary to model the disposition of lands currently enrolled in the CRP. With this information, changes in agricultural production can be estimated. Furthermore, expected changes in land use can be combined with information on rural outdoor recreation to estimate potential changes in recreational expenditures. This information can then be used to estimate the economywide impacts of CRP's expiration and, by implication, its continuation.

Land-Use Decisions

Normally, when a CRP contract expires, the enrollee can offer to re-enroll if that is an option, or CRP participation can end. Those whose land is not re-enrolled may choose to return land to crop production or grazing (either directly or by renting or selling their land to other farm operators), develop the land for nonfarm use, or keep their options open by leaving the land unused, presumably in either managed or unmanaged conservation cover.⁴⁵ The factors that will help determine which choice, or set of choices, an individual enrollee makes include expected returns from farming (or cash renting) the released land, the cost of converting conservation cover to other uses, demand for land for nonfarm purposes, and the goals and portfolio needs of the decisionmaker. It is not a foregone conclusion that all the land enrolled in the CRP will revert to its previous use when it drops out of the program.

To estimate land-use changes that would likely accompany a sudden expiration of CRP contracts, we use an econometric model based on data drawn from the 1992 and 1997 Natural Resources Inventory (NRI).⁴⁶ The model starts with approximately 21,000 NRI observations that were in the CRP in 1992. Between 1992 and 1997, about 2,800 of these observations dropped out of the CRP as a result of the enrollee's decision to either terminate a CRP contract early or to forego the option of extending an expiring contract. (Since all CRP enrollees had the option of extending expiring contracts for 1 year beyond the original termination date in 1996 and 1997, none of these parcels was forced out of the program because their 10-year CRP contract ended.) Of all land not currently enrolled in the CRP, these formerly enrolled parcels are expected to most closely resemble land currently enrolled in the CRP. By observing the uses these former CRP lands were put to, and modeling the decision process to determine why land was put to its new use, we can estimate what land uses would be adopted by the remaining CRP participants should they be dropped from the program.⁴⁷

Table 4.1 provides information on the use of land in 1997 that had dropped out of the CRP after 1992. Roughly 63 percent of the 3.6 million acres that dropped out of the program was subsequently used to grow crops. Another 31 percent was used for pasture or rangeland, and the remaining 6 percent

⁴⁵ Even if an enrollee chooses the latter, he may be able to earn a return from hunting, fishing, or other recreational activities. As a result, leaving land idle need not be a complete drain on the enrollee's resources.

⁴⁶ NRI data is collected by USDA's Natural Resources Conservation Service. NRI data collects information from approximately 800,000 sample points scattered randomly across the private lands of the United States. Each point contains data on land use, soil type, and other biophysical variables. Our econometric model depends on CRP data from the NRI. In describing the NRI, Fuller (1999) writes "...administrative data on acres in the Conservation Reserve Program (CRP) for the years 1992 and 1997 are used as controls in the estimation process." He also notes that "...a procedure is used that makes the CRP acres close for each county, but the total control is imposed only at the state level." It is not clear how these adjustments influence the sample properties of the NRI and, by extension, our econometric estimates.

⁴⁷ The econometric model predicts whether a parcel of land in CRP will switch to either crop production or to a noncrop land use, after accounting for the decision to opt out of CRP in the first place. Lands predicted to switch to a noncrop land use are allocated to specific noncrop activities (i.e., pasture, range, forest, and urban uses) based on actual land-use patterns of parcels dropping out of the CRP between 1992 and 1997. For a more detailed description of the model and its development, see Lubowski and Roberts (2003).

Table 4.1—1997 use of lands that dropped out of the CRP after 1992

| CRP contracted cover practice ¹ | Units | Land use in 1997 | | | | | | |
|--|------------------------|------------------|---------|-------|--------|-------|--------------------|---------|
| | | Crops | Pasture | Range | Forest | Urban | Other ² | Total |
| Grasses & legumes | 1,000 acres | 2,161.8 | 771.7 | 288.4 | 22.7 | 5.0 | 37.4 | 3,287.0 |
| | Percent of all acres | 65.8 | 23.5 | 8.8 | 0.7 | 0.1 | 1.1 | 100.0 |
| | Percent standard error | 0.6 | 0.4 | 0.3 | 0.1 | 0.0 | 0.1 | |
| Trees & wildlife habitat | 1,000 acres | 76.1 | 37.8 | 8.8 | 161.7 | 2.3 | 3.5 | 290.2 |
| | Percent of all acres | 26.2 | 13.0 | 3.0 | 55.7 | 0.8 | 1.2 | 100.0 |
| | Percent standard error | 2.5 | 1.7 | 0.8 | 2.2 | 0.5 | 0.4 | |
| All cover | 1,000 acres | 2,237.9 | 809.5 | 297.2 | 184.4 | 7.3 | 40.9 | 3,577.2 |
| | Percent of all acres | 62.6 | 22.6 | 8.3 | 5.2 | 0.5 | 1.1 | 100.0 |
| | Percent standard error | 0.7 | 0.4 | 0.3 | 0.3 | 0.2 | 0.1 | |

¹These are general categories reported by the NRI that include the more specific practices contracted for under the CRP.

²Includes rural roads, water bodies, barren lands, and “other” farm and nonfarm lands, as designated by the NRI.

Source: Estimates are from the National Resources Inventory (NRI) based on 2,756 observations that dropped out of the CRP between 1992 and 1997. Percentages in each cell are of total acres dropping out from the specified contracted cover practice. Standard errors are based on the NRI’s stratified cluster sampling design.

was left as forest or devoted to other nonfarm uses.⁴⁸ One factor that clearly influences the choice of post-CRP land use is the type of cover used when the land was in the program. CRP land planted to trees is far less likely to be converted to crop production upon the contract’s expiration than is CRP land planted in grasses and legumes. But, as was mentioned previously, other factors likely to influence land-use decisions include the profitability of available land-use activities, which vary geographically and with market conditions, and the aspirations of the whomever controls the land, which vary by individual attributes, such as age, wealth, and tenure. While we do not have information on the ownership of specific CRP parcels or their profitability, we do have information on each parcel’s erodibility, conservation cover, and location which can be used to estimate the profitability of alternative uses. As described in Appendix B, we use observation-specific data from the NRI and county data on the profitability of alternative land uses, to develop a model that estimates the probability that an NRI observation will switch from CRP to crop production or one of the other major land-use categories listed in table 4.1.

Previous studies suggest that characteristics of the participant (e.g. retirement status) and of the operation (e.g. size) also influence post-CRP land use (Skaggs et al., 1994; Johnson et al., 1997; Cooper and Osborn, 1998). We do not include such data in the model since they are ultimately based on decisions of the owner or operator. Over time, people and firms will presumably locate in particular areas based upon profit maximization. Given our focus on the longer term consequences of CRP expiration, we include only profit measures and fixed physical characteristics that determine the net returns to converting that land to alternative uses.

Since those who dropped out of the CRP between 1992 and 1997 did so voluntarily, we cannot assume their land-use decisions represent the decisions of those who remained in the CRP. The model described in Appendix B uses statistical techniques to correct biases that could arise due the nonrepresentativeness of the sample. Nonrepresentativeness arises partly from changes in enrollment criteria following early CRP signups and partly from factors particular to enrollees who chose not to remain in CRP. The

⁴⁸ Appendix B provides further detail on the land-use definitions from the NRI. “Pasture” is land managed for introduced forage for livestock grazing. “Range” is land under native or introduced forage suitable for grazing which, unlike pasture, receives only limited management.

model also uses mechanisms to allow for interactions between explanatory variables and to account for possible nonlinear relationships in their effects on land-use decisions. The coefficients generated by this econometric model are then used to predict what would happen to all land enrolled in the CRP if the program expired. These predictions are based on CRP contracts as of November 2002, as well as profitability data computed using 2001 prices and costs and 5-year lags of yields (as described in Appendix B). The net result is to assign all current CRP acreage to one of several alternative land uses: cultivated and uncultivated cropland, pasture, forest, range, and urban development.

Overall, the model predicts that 51 percent of land enrolled in the CRP would have returned to crop production within about a year if the entire program had expired at the end of 2002, but this percentage varies from one region to the next. Table 4.2 presents our model's predictions for the United States and three multicounty regions where CRP enrollment is high (fig. 4.2). Figure 4.1 presents information on the geographic distribution of CRP land converted to all of the major land uses considered. Land remaining in forest is concentrated in the Southeast while land converted to urban uses is concentrated around a few urban centers. The other uses of land are more geographically dispersed.

Predictions for multicounty regions or smaller units of geography are subject to a greater degree of uncertainty than are national predictions since the estimates from the land-use model reflect average patterns of behavior across the entire country. Because we only have data for land-use choices between 1992 and 1997, we cannot estimate separate regional models based on variation in explanatory factors over time. Instead, our estimates must rely on variation across space over a large geographic area. As a result, if cropland decisions in some relatively small regions are more or less sensitive than average to changing economic conditions (perhaps due to differ-

Table 4.2—Predicted share of CRP acres returning to crops, 2002

| Region ¹ | Land in CRP <i>1,000 acres</i> | Land returning to crops if CRP expires <i>1,000 acres</i> | <i>Percent</i> |
|---|-----------------------------------|--|-----------------|
| 48-State total (95-percent confidence interval) | 33,892 | 17,346 (13,670 - 21,425) | 51 (40 - 63) |
| Northern Plains Crescent (95-percent confidence interval) | 8,327 | 5,732 (5,103 - 6,302) | 69 (61 - 76) |
| Southern Plains Ellipse 95-percent confidence interval) | 8,543 | 3,816 (2,715 - 4,616) | 45 (32 - 54) |
| Southwestern Corn Belt ² (95-percent confidence interval) | 1,859 | 1,533 (695 - 1,770) | 82 (37 - 95) |

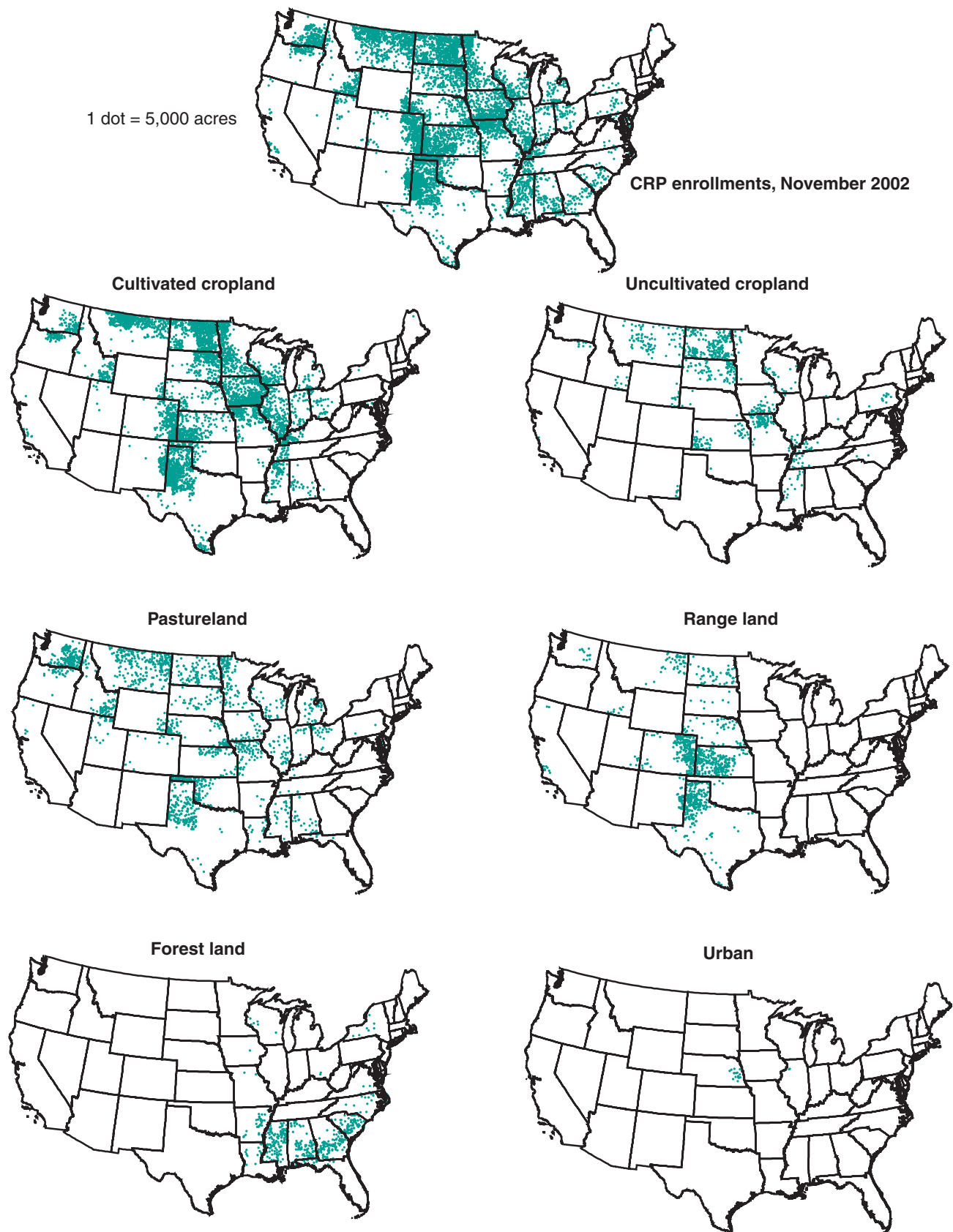
¹Regions are delineated in figure 4.2.

²The confidence interval for the Southwestern Corn Belt is skewed because the underlying distribution is skewed (binomial with a mean of 82 percent) and the sample size is small (much smaller than in the other regions), which makes the confidence interval less symmetric.

Source: FSA's CRP Contracts file as of November, 2002 with predictions of land returning to crops based on Lubowski and Roberts (2003).

Figure 4.1

Disposition of enrolled acreage under hypothetical CRP expiration



Source: ERS analysis of the CRP Contracts file.

ences in the proportion of marginally productive soils), reversion to crop production could be overestimated or underestimated in these small areas.⁴⁹

In addition, predictions are based on prices in 2001 and prevailing government programs before 2002. Aside from relatively high loan rates for certain commodities such as soybeans, the production incentives present in 2002 are similar in nature to those present in 1996. Nonetheless, as market prices change, the amount of CRP land that would return to crops and other agricultural uses will vary.

Previous studies of post-CRP land-use choices—completed before land began dropping out of the program—generally predict higher percentages of land released from the CRP going into crop production. Using a linear programming model, De La Torre Ugarte et al. (1995) estimate that roughly 57 percent of CRP land would return to the production of major commodities if the program was not extended in 1996. The Soil and Water Conservation Society conducted national surveys of CRP participants in 1990 and 1993 to determine landowners' post-CRP land-use intentions (Nowak et al., 1990; Osborn et al., 1994). The 1990 survey indicated that 53 percent of acres would return to crop production after their contracts expired if CRP renewal was not an option. The 1993 survey, based on a larger sample, indicated that 63 percent of CRP acres would return to cropping upon contract expiration if re-enrollment was not an option, with wide variation depending on region, expected commodity prices, and CRP cover.⁵⁰ The estimates ranged from 58 to 78 percent, respectively, if future commodity prices were assumed to be 20 percent lower or higher than in 1993.

Our estimate that 51 percent of CRP land would return to crop production reflects, in part, differences in the assumed level of crop prices. Our econometric estimates may also reflect greater rigidities in land use than were apparent before CRP contracts started expiring and researchers could examine actual land-use decisions. Possible explanations for the persistence of CRP land retirements, at least in the short run, include rigidities in land-use change due to fixed costs of land-use conversion, which provide incentives to delay land-use decisions until more can be learned about the profitability of alternative uses.⁵¹ In addition, the portfolio needs of CRP contract holders may obviate the active farming of their CRP land. Over one-third of CRP enrollees are residential farm operators who allocate most of their work time to off-farm pursuits. At least some of these participants may decide to leave their CRP land permanently idle in support of their chosen lifestyle. Whatever the explanation, these results suggest that there may be longer term environmental benefits associated with the CRP that could outlive the program itself.

Land-use decisions are important to rural economies because they have a direct bearing on farm production levels and prices, purchases of farm-related goods and services, and recreational spending.

⁴⁹ In particular, one reviewer expressed concern that our predictions for the Northern Great Plains overestimated the reversion to crop production.

⁵⁰ A series of additional surveys in States with CRP acres, conducted in 1993, generally found that about 60 percent of CRP acres would return to crop production if the CRP ended (see Diebel et al., 1998 for a review).

⁵¹ Predictions of post-CRP land use are calibrated using parcels that opted out of CRP approximately 1 year prior to observing their subsequent use. It is possible some farmers intended to convert their land back to crops but had not yet done so. In certain areas, however, a large proportion of former CRP land did return to crops in this timeframe. This suggests enough time had elapsed for farmers to transition to their intended land use.

Recreational Spending

In addition to agricultural production, the distribution of land uses affects the natural environment. Removing land from the CRP, thereby increasing crop production, grazing, or putting the land to other uses, is likely to affect air and water quality, wildlife populations, and the aesthetic qualities of the rural landscape. These impacts may result in changes in outdoor recreational trips taken by the public (Feather et al., 1999). Changes in recreational spending can, in turn, affect rural economies (Beck et al., 1999; Siegel and Johnson, 1991). To investigate this issue, we consider freshwater- and wildlife-based recreation. Freshwater-based recreation includes fishing, swimming, boating, and shore-side activities. Wildlife-based recreation includes hunting and wildlife viewing.

Given the lack of data directly linking CRP to recreational expenditures, we generated estimates using two different methods. The first method combines survey data on recreational trip taking behavior with information on land uses; in particular, with information on the amount and distribution of CRP land. The second method combines information on expenditures by hunters with information on fee income received by farmers for recreational uses of their land. We use these two methods to estimate low- and high-end impacts that CRP's land-use requirements have on recreational expenditures.

As described in Appendix C, the first method (referred to as the "trips-based" method) uses data from the U.S. Fish and Wildlife Service's 1996 National Survey of Fishing, Hunting and Wildlife-Associated Recreation (FHWAR) and the U.S. Forest Service's 2000 National Survey of Recreation and the Environment (NSRE). A travel cost model is developed that predicts where people visit, given the characteristics of the set of places they can visit. One of these characteristics is the geographic distribution of CRP land. Thus, as this distribution changes under alternative scenarios, including a "no CRP" scenario, we are able to predict changes in trip-taking behavior.

The second method (referred to as the "receipts-based" method) looks just at CRP's impact on hunting and wildlife viewing. The 2001 Agricultural Resource Management Survey includes data on the recreational receipts of about 800 farms with CRP acreage.⁵² These data were used to estimate per-CRP-acre recreational receipts for each of the ERS Farm Resource Regions (see Appendix C).

Both methods require data on recreational expenditures. The trips-based method uses average per-trip expenditures obtained from the FHWAR and NSRE surveys. To derive measures of impact, these per-trip expenditures are multiplied by predicted changes in the number and location of trips due to changes in CRP. The receipts-based method uses regional estimates of expenditures derived from the FHWAR survey. Given that the overall average of recreational expenditures is proportional to recreational receipts received by farms with CRP land, measures of CRP's impact are derived by multiplying CRP acres by per-acre recreational receipts and an access-fee-to-overall-expenditures multiplier.⁵³

Both methods group expenditures into the following categories: transportation and wholesale trade, eating and lodging, retail trade, and services.

⁵² Farmers reported receipts for recreational uses of their land, including hunting, fishing, horseback riding, and other activities (Banker et al., 2001).

⁵³ This multiplier is derived on a regional basis, using expenditure data from the FHWAR.

Eating and lodging expenditures include hotel services and restaurant meals. Retail trade expenditures include equipment, supplies, and trip sundries, while service-sector expenditures cover government licenses and permits, site access fees, and guide services.

With the trips-based method, we find that the extent of CRP enrollment in a county and the overall erosion rate, which is strongly influenced by CRP, have statistically significant effects on participation in outdoor recreation. But the impacts are small, totaling about \$7 million nationwide. With the receipts-based method, we estimate higher impacts, totaling about \$290 million nationwide.

Given the estimated impacts of CRP on wildlife viewing and hunting reported by previous studies and reviewed earlier, the small impacts estimated by the trips-based method are surprising. One possible explanation for the discrepancy between our earlier estimates of the consumer surplus associated with wildlife viewing and the recreational travel expenditure predictions derived by the trips-based method is that expiration of the CRP would not reduce the total number of trips taken for recreational activities, but would instead influence where they are taken among the alternative sites available. This redistribution may affect the typical individual's enjoyment of recreational travel, thereby reducing consumer surplus, without affecting how much is spent on recreational travel.

The impacts estimated with the receipts-based method more closely agree with prior research (Bangsund et al., 2002). However the highly aggregated expenditure data used with this method require use of several simplifying assumptions, such as assuming a State-specific relationship between recreational receipts and overall recreational expenditures (Thigpen et al.). These assumptions, while reasonable, could not be tested. Therefore, we use both methods to provide a range of possible recreational travel expenditure impacts associated with the CRP. A more accurate measurement of how CRP affects recreational expenditures may require new sources of data along with more sophisticated statistical models.

Revenue Impacts Associated With Land-Use Changes

The analysis simulating what would happen if all CRP contracts expired in 2002 estimates the probability that each CRP contract would return to crop production if the program were no longer available. Multiplying these estimates by the acres in each contract and aggregating to the county level yields predictions for the amount of CRP land in each county that would return to production. For the purposes of estimating the economic impact of these changes, we first estimate associated revenue changes for the following land-use activities: grains, oilseeds, cotton, hay and pasture, and other crops. To do so, we allocate CRP lands predicted to return to crop production to specific crops based on the current use of cropland within each county.⁵⁴ We allocate other CRP lands to pasture based on actual land-use patterns of parcels dropping out of the CRP between 1992 and 1997. We then estimate changes in annual revenues by multiplying our predicted acreage changes by county-level estimates of expected 2002 revenues per

⁵⁴ The current crop mix in a county presumably reflects the current profitability of those crops. NRI parcels that returned to crop production in 1997 after dropping out of the CRP typically did not return to the same crop that was planted before the parcel was enrolled in the CRP. While the most profitable crop for each acre of CRP land exiting the program might differ from the county average due to unique land characteristics, the current crop mix in the county should be a reasonable proxy for crop allocation on acres exiting the CRP.

acre for each land use. To calculate revenues from crops we use 5-year average yields for each county, adjusted for the productivity of CRP acreage, and 2001 commodity prices. County-level revenue estimates for pasture and hay employed a similar approach (for details, see Lubowski and Roberts, 2003).

One potential shortcoming of this approach is that it does not allow the price effects of increased production to feed back into land-use decisions. That is, since land released from the CRP will increase production, we would expect commodity prices to drop, lowering expected revenue for all affected crop farmers and discouraging some farmers from planting a crop. If this happens, our national estimates of the production and revenue impacts of CRP expiration will be overstated and our regional estimated impacts may be over- or understated, depending on interregional shifts in cultivation. This is slippage in reverse. Over the years, researchers have argued that the production-control impacts of land retirement and diversion programs are reduced as rising commodity prices encourage uncultivated land into production. Slippage rates of 20 to over 50 percent have been reported, varying greatly by crop, land quality, and geography (see Leathers and Harrington, 2000; Love and Foster, 1990; and Wu, 2000). Others have found evidence suggesting that local slippage rates are much lower (Hoag et al., 1993; Roberts and Bucholtz, 2002). If reverse slippage follows a similar pattern, CRP land coming into production in one area may cause non-CRP land to drop out of production in other areas.

To check on the likely size of price effects as CRP land returns to production, the analysis was supplemented with an assessment of how the overall agricultural economy might change if CRP expired, based on the U.S. Regional Agricultural Sector Model (USMP; see House et al., 1999). As described in Appendix D, the USMP is a comparative-static market equilibrium model. While much more aggregated than the land-use model we estimated econometrically, as an equilibrium model it is able to capture the dynamic response of the agricultural economy as policies and programs change. For this analysis, the USMP model was constrained to force CRP land to return to production to determine the likely price and revenue impacts if CRP contracts expired.⁵⁵ The results suggest that as CRP acreage is released from conservation uses, crop production will increase and crop prices will fall. There is considerable variation among crops, with corn showing the greatest response with production increasing by 4 percent and market prices falling by about 6 percent.⁵⁶ As producers make further adjustments in response to these market conditions, one would expect fewer total acres to be planted, with prices moderating. But our concern is with the initial shock of eliminating CRP contracts, so we make no attempt to predict a new longrun equilibrium for farm commodity markets or the broader economy.

We estimated crop revenue impacts using two alternative scenarios: (1) no commodity price effects, which is consistent with early input-output modeling efforts; and (2) allowing prices to decline as predicted by USMP, but not allowing further slippage in planting intentions. The first case overestimates the revenue impact because it does not account for a reduction in revenue occurring on all cropland stemming from a fall in commodity

⁵⁵ The USMP model and the econometric model discussed previously are not strictly comparable and were not designed to work with each other. Furthermore, the USMP model only accounts for about two-thirds of the land in the CRP, so this simulation provides only rough estimates of what would happen if only 51 percent of CRP land returned to production.

⁵⁶ The price response for other crops ranges from close to 0 to about 4 percent. These production and price responses are similar in magnitude, but in the opposite direction of, those estimated when the CRP program was just

prices. The second case exaggerates the price response, and therefore underestimates the revenue impact, because total acres planted to crops will not increase one-for-one as CRP acres are returned to production. Together these two approaches should provide a reasonable range of revenue shocks associated with the expiration of all CRP contracts. We used the econometric model to estimate the changes in agricultural output and the social accounting matrix (SAM) model to analyze the effects of these changes on the linked sectors.

If CRP rental payments end, household expenditures would also be affected. Data from the Agricultural Resource Management Survey are used to apportion CRP rental payments going to low-, middle-, and high-income households, using farm operator wealth to measure permanent income.⁵⁷ The size of each of these economic shocks is estimated for the United States and for three multicounty regions likely to be most affected by expiration of the CRP. For the regional models, we assume that all transfer income is spent within the region. (CRP rental payments accruing to nonoperator landlords living outside the region represent expenditure leakages that diminish the regional impact of the CRP.)

Table 4.3 presents the changes in final demand affecting producers, households, and factor income flows for the Nation and the three regional economies used to define our two scenarios. Scenario 1 is called the “traditional scenario” because it assumes that agricultural price changes do not affect farm incomes—the traditional approach adopted by previous analyses. With no agricultural price effects accounted for, post-CRP shifts in land use generate \$3 billion in increased agricultural production nationally. Partially offsetting this is a net reduction in outdoor recreational expenditures of \$7 million (using a trips-based model) and the loss of \$1.6 billion in CRP rental payments. Scenario 2 is called the “augmented scenario” because it allows for agricultural price changes to also affect farm enterprise incomes. In this scenario, post-CRP shifts in land use lead to a \$7.46-billion reduction in the value of current agricultural production at the national level in addition to increasing agricultural production by \$3 billion.⁵⁸ However, we assume that this reduction in farm enterprise income merely represents a transfer from the farm sector to the rest of the economy.⁵⁹ Hence, from a national perspective, the two effects offset each other.

Nevertheless, since the regional economies we will be examining later in the section are not closed economies, farm enterprise income losses are not likely to be offset by other consumer expenditures within the region. We therefore include the loss of farm revenue stemming from lower prices as part of the agricultural shock to these regions. We also include in the augmented scenario estimates a loss of \$293 million in rural recreation expenditures (using the receipts-based model) and a loss of \$1.6 billion in CRP payments to U.S. households.⁶⁰

⁵⁷ Changes in household consumption patterns derive from changes in the perceived level of permanent income rather than transitory income which, particularly for farm households, can fluctuate widely from year to year. Low-income households with little net worth did not receive any CRP payments. This is consistent with information on the source of income among farm households categorized by the ERS farm household typology (fig. 2.5). Seventy-two percent of CRP funds accrue to farm households with moderate average incomes: retirement, residential lifestyle, and low-sales farming occupation farms. In contrast, 71 percent of total farm program payments accrue to farm households with high average incomes: high-sales farming occupation, large, and very large farms.

⁵⁸ The \$7.46-billion decrease occurs on land that was in production while the CRP was in place. Inelastic demand for food (and our assumption that all cropland in production stays in production) means a small change in price leads to a substantial drop in revenue. The \$3-billion dollar increase comes from land that was in the CRP but shifts to crop production. Therefore, farm income for the entire agricultural sector is down approximately \$4 billion.

⁵⁹ We are assuming this income transfer stays within the United States. To be able to quantify the extent to which a portion of this \$7.46 billion in consumer surplus accrues to foreign purchasers of U.S. agricultural products requires further study.

⁶⁰ In both scenarios, loss of CRP rental payments are treated as household income transfer losses. To treat them as value-added losses would be equivalent to assuming that they are linked to producer decisions at the margin. In fact the CRP program payments are decoupled from producer decisions at the margin.

Table 4.3—Initial shock: estimated revenue impacts of CRP’s hypothetical expiration

| Sector: | Region ¹ | | | | |
|--|---------------------|--------------------------|-------------------------|------------------------|----------------|
| | U.S. total | Northern Plains Crescent | Southern Plains Ellipse | Southwestern Corn Belt | 3-Region total |
| <i>Millions of 2001 dollars</i> | | | | | |
| Agriculture with constant (2001) commodity prices: | | | | | |
| Total | 3,019.9 | 748.5 | 466.0 | 159.7 | 1,374.2 |
| Livestock ² | 72.8 | 5.1 | 22.1 | 5.2 | 32.4 |
| Cotton | 259.9 | 0 | 133.5 | 0 | 133.5 |
| Grains | 864.9 | 117.0 | 208.5 | 39.4 | 364.9 |
| Hay & pasture | 889.0 | 198.5 | 60.5 | 71.6 | 330.5 |
| Other crops | 162.6 | 10.8 | 41.5 | 0 | 52.3 |
| Oilseeds | 770.8 | 417.1 | 0 | 43.4 | 460.6 |
| Loss of farm enterprise income from falling prices: ³ | | | | | |
| Total income | — | -169.2 | -221.4 | -55.2 | -445.8 |
| Labor income | — | -76.6 | -90.6 | -28.5 | -195.7 |
| Capital income | — | -92.6 | -130.8 | -26.7 | -250.1 |
| Rural recreation—trips-based model: | | | | | |
| Total | -7.3 | 5.9 | -4.4 | -3.9 | -2.5 |
| Wholesale trade & transportation | -1.5 | 0.8 | -0.7 | -1.2 | -1.1 |
| Retail trade | -0.9 | 3.7 | -2.3 | -1.0 | 0.3 |
| Eating & lodging | -4.6 | 1.0 | -1.1 | -1.4 | -1.5 |
| Services | -0.2 | 0.4 | -0.3 | -0.3 | -0.1 |
| Rural recreation—receipts-based model: | | | | | |
| Total | -293.2 | -104.2 | -29.4 | -33.8 | -167.4 |
| Wholesale trade & transportation | -87.6 | -40.5 | -10.5 | -11.9 | -62.8 |
| Retail trade | -16.9 | -6.7 | -1.7 | -2.4 | -10.8 |
| Eating & lodging | -101.1 | -42.1 | -11.4 | -13.5 | -66.9 |
| Services | -87.6 | -14.9 | -5.9 | -6.0 | -26.9 |
| Household CRP funds: ⁴ | | | | | |
| Total | -1,616.9 | -287.8 | -287.8 | -137.1 | -712.8 |
| Middle-income | -1,439.0 | -256.2 | -256.2 | -122.0 | -634.4 |
| High-income | -177.9 | -31.7 | -31.7 | -15.1 | -78.4 |

¹The three regions refer to multicounty areas of the country with high levels of CRP enrollment and are delineated in figure 4.2.

²Livestock estimates are produced by the USMP model. The remaining agricultural revenue shocks were imputed based on the land-use projections from our econometric model.

³The national farm revenue loss of \$7.46 billion is considered a transfer rather than a shock.

⁴Represents the loss of CRP payments with expiration of the program. Middle-income households have annual incomes of \$20,000 to \$77,000. High-income households are those with annual incomes over \$77,000.

Source: Economic Research Service, USDA.

Modeling Economywide Impacts

To estimate CRP’s effects on sector output, value added, household income, and employment, we use the 1996 Impact Analysis for Planning (IMPLAN) database⁶¹ to develop a set of social accounting matrix (SAM) multiplier models for the Nation and three multicounty regions that cut across State boundaries. Unlike input-output models, the SAM framework allows us to capture precisely all of the endogenous linkages between production, labor and capital income, and household expenditures. The SAM presents a snapshot of the economy at a particular time. The strength of the SAM is its integration of industrial input-output flows with a set of household, government, capital, interregional, and international accounts in order to represent the complete set of revenue and income flows between production, income,

⁶¹ The USDA Forest Service in the mid-1970s developed IMPLAN for community impact analysis. The current IMPLAN input-output database and model is maintained and sold by MIG, Inc. (Minnesota IMPLAN Group), <http://www.IMPLAN.com>.

consumption, investment, and trade (see Appendix E for a description of the SAM framework).

In estimating possible impacts of allowing CRP to expire, we use two different scenarios that encompass the choice of whether commodity prices are allowed to adjust or are held constant, and whether recreational travel expenditure impacts are estimated with the trips-based model or the receipts-based model. Traditionally, most input-output models have predicted the economywide impacts of increasing CRP enrollment assuming prices are fixed and ignoring recreational travel (e.g., Hyberg et al., 1991 and Dodson et al., 1994). To reflect this view, we construct a “traditional” scenario which holds prices constant and estimates recreational travel using the trips-based approach. However, because price effects matter within smaller regional economies and recreational travel might be important to rural economies, we also present the results of an “augmented” scenario which allows prices to fall as CRP contracts expire and estimates recreational travel using the receipts-based model. When estimating the national impacts of allowing CRP land back into production, the only practical difference between these two scenarios is that the augmented scenario reflects higher recreational travel expenditures than does the traditional scenario (because farm commodity price effects don’t affect national land-use and output estimates).⁶² But, as we will see, the two approaches can yield very different results for sub-national regions. Expiration of the CRP could increase agricultural production by as much as 1.3 percent nationwide (table 4.4). This increased production would stimulate demand for nonagricultural goods and services. The stimulus is partially offset by the loss of household expenditures from the \$1.6 billion cut in CRP rental payments and reduced recreational travel expenditures of \$7 million to \$290 million. The net result is an increase of \$1.3-\$2.3 billion (0.01-0.02 percent) in nonagricultural production. The difference in estimated CRP impacts using the traditional and augmented scenarios is due entirely to differences in the size of the recreational travel expenditures associated with CRP’s environ-

⁶² We do not incorporate feedbacks on land use and output resulting from changes in prices induced by CRP land returning to crop production. As a result of falling prices, some CRP acres might not enter crop production and some cropland elsewhere might exit production. This implies that we slightly overestimate total crop acreage and output in the event CRP land returns to production.

Table 4.4—Two scenarios of short-term national impacts of CRP’s hypothetical expiration

| Economic measure | U.S. baseline | CRP-related stimulus | | | |
|------------------------------|-------------------|----------------------|----------------|--------------------|----------------|
| | | Traditional scenario | | Augmented scenario | |
| | <i>\$ Billion</i> | <i>\$ Million</i> | <i>Percent</i> | <i>\$ Million</i> | <i>Percent</i> |
| Output: | 14,401 | 5,526 | 0.038 | 4,480 | 0.031 |
| Agricultural | 234 | 3,200 | 1.368 | 3,133 | 1.334 |
| Nonagricultural | 14,635 | 2,326 | 0.016 | 1,347 | 0.009 |
| Value added (factor income): | 7,704 | 2,598 | 0.034 | 2,034 | 0.026 |
| Household income: | 7,470 | 125 | 0.002 | -283 | -0.004 |
| Low | 1,146 | 104 | 0.009 | 80 | 0.007 |
| Medium | 4,341 | -363 | -0.008 | -612 | -0.014 |
| High | 1,983 | 383 | 0.019 | 249 | 0.013 |
| | <i>Million</i> | <i>Thousand</i> | <i>Percent</i> | <i>Thousand</i> | <i>Percent</i> |
| Number of jobs: | 152.3 | 181.7 | 0.119 | 151.2 | 0.099 |
| Agricultural | 2.9 | 117.4 | 4.073 | 115.1 | 3.993 |
| Nonagricultural | 149.4 | 64.3 | 0.043 | 36.1 | 0.024 |

Source: Vogel (2003). Value of output and income are in 2001 dollars. Nonagricultural industries include the manufacturing, construction, utilities, mining, trade and transport, and service sectors. Employment includes the number of full- and part-time jobs.

mental benefits. The higher recreational travel estimate of \$290 million in expenditures that would be foregone if CRP were to expire results in a much smaller net boost to the nonfarm economy.

Changes in factor or value-added income include changes in wages, proprietors' income, and returns to property assets, and represent changes in gross domestic product. For the Nation, expiration of all CRP contracts would induce an increase in factor income of about 0.03 percent. With respect to employment, expiration of CRP could induce a net increase of 4 percent in agricultural jobs and a 0.1-percent net increase in the total number of jobs.⁶³ Recreational travel expenditures also affect these estimates; the effect of CRP's expiration would be smaller if CRP-induced recreational travel expenditures are large.

A central result is that changes in household income reflect impacts of both the loss of CRP transfer income and the gains in factor income associated with production increases. This reconciles the apparent discrepancy between the \$2-\$3 billion in factor income generated in production and much smaller changes in total household income (table 4.4). Because middle-income households would experience the largest drop in CRP transfers, their income would decline collectively by \$363-\$612 million. In contrast, income of low-income households would increase by \$80-\$104 million, while that of high-income households would increase by \$249-\$383 million. At the national level, these changes are smaller than typical quarterly fluctuation occurring in the economy.

Previous estimates of CRP's impact on the U.S. economy found generally similar results using input-output multiplier models based on IMPLAN data. If CRP enrollment had reached its initial 45-million-acre goal, Hyberg et al. (1991) estimated that agricultural output would have declined by almost 3 percent and total U.S. output would have declined by 0.17 percent. Although the size of these impacts is greater than we find, the program is now smaller than that initially envisioned, so our lower estimates are expected. As initial CRP contracts were about to start expiring, ERS estimated that allowing the program to lapse would add about 94,000 jobs nationwide, evenly split between farm and nonfarm jobs (Dodson et al., 1994). Adding induced effects to the direct and indirect effects of the traditional input-output multiplier model (used in Dodson et al., 1994) increases the job estimates of the latter by roughly 100 percent, which makes their estimate remarkably similar to that of our traditional scenario. Thus, while the size of the impacts vary depending on the research assumptions concerning exogenous shocks and the economic conditions, all three studies report that the nationwide impact of ending the CRP on jobs and income is likely to be quite small.

Regional Economic Impacts

Although CRP enrollments occur throughout the Nation, their impact on rural communities varies with program participation, community demographics, and the structure of the local economy. For example, large payments to farmers in a sparsely populated, agriculturally dependent county in the Midwest would be expected to yield more significant county-

⁶³ IMPLAN uses industry survey data to obtain national and regional statistics on the number of full- and part-time jobs (MIG, Inc., 1999). According to IMPLAN, there were 153 million full- and part-time jobs in the U.S. According to the Council of Economic Advisors (2003), the employed civilian labor force numbered 127 million people. Clearly the statistics on the number of full- and part-time jobs double count those holding two or more jobs, so care should be taken when interpreting the employment estimates reported in this section.

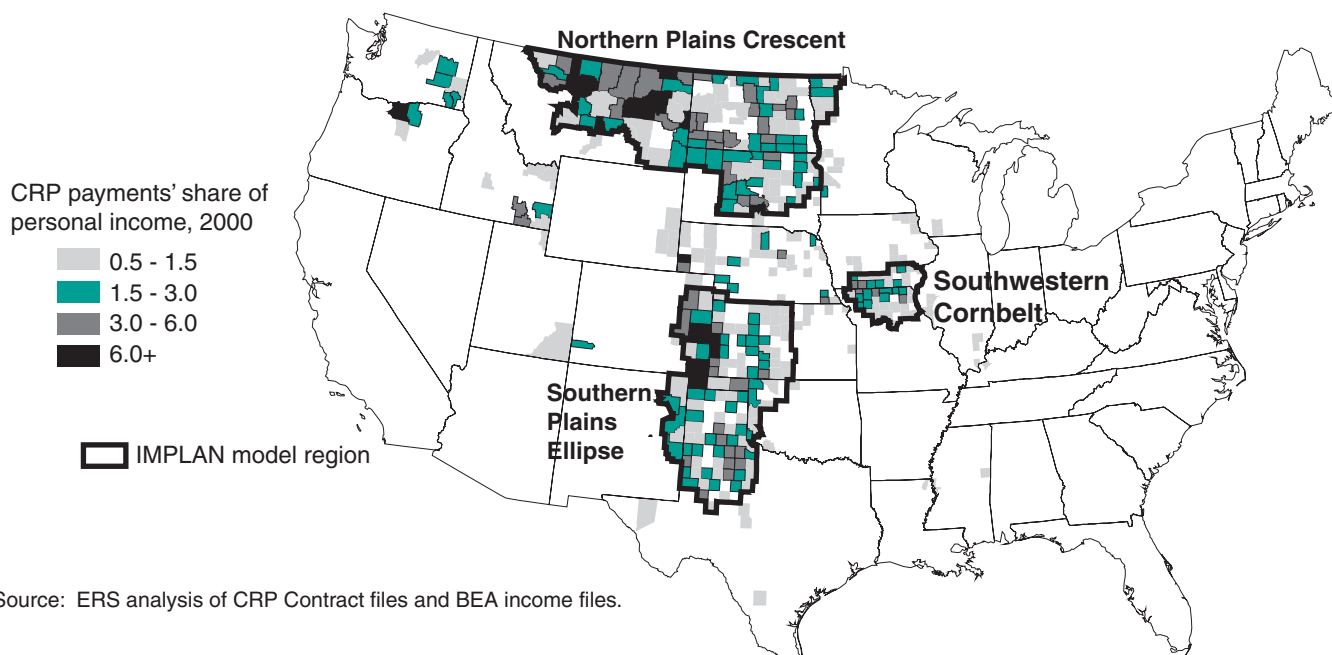
wide impacts than payments to producers in a more densely populated, economically diversified county in the eastern Corn Belt or in the South. To highlight CRP's impact on areas of the country most likely to be affected by the program, we select three multicounty regions for further study. As in the previous section, we measure CRP's local importance by the proportion of local income coming from CRP rental payments.⁶⁴ In figure 4.2, the black borders circumscribe 323 counties defining three large contiguous regional economies most significantly affected by CRP payments. These regions are defined across 6 States, and include 149 counties in which CRP rental payments comprise at least 1.5 percent of total personal income.

The Northern Plains Crescent region comprises 132 counties and forms a crescent extending from the eastern half of Montana to the northern half of South Dakota and ending along the North Dakota-Minnesota border. With a rural population density of 4.2 people per square mile, the Northern Plains Crescent represents one of the least-populated regions in the country. Its primary crops are wheat, other grains, and oilseeds. Bismarck, Fargo, and Grand Forks, ND are the region's urban centers.

As the largest of the three regional economies, the Southern Plains Ellipse comprises 142 counties that form a north-south ellipse encompassing the panhandles of Texas and Oklahoma, parts of eastern New Mexico and Colorado, and the western half of Kansas. In contrast to the Northern Plains Crescent and Southwestern Corn Belt, raising livestock is the largest agricultural activity in the Southern Plains Ellipse, with grains and cotton accounting for most of the crop farming. Amarillo and Lubbock, TX are the only urban centers found in this region, but there are a number of major metropolitan areas in close proximity.

⁶⁴ While the previous section was concerned with program impacts in the 1980s and 1990s, here we are concerned with today's impacts. As a result, we look at a 3-year average of the ratio of CRP rental payments to income during 1998-2000 as a guide when defining our regions.

Figure 4.2
CRP payments' share of personal income, 2000



Source: ERS analysis of CRP Contract files and BEA income files.

As the smallest of the three regions, the Southwestern Corn Belt comprises 49 counties that straddle the Iowa-Missouri border. The Southwestern Corn Belt is the most populous of the three regions studied, with a rural population density of over 24 people per square mile. The main crops are grains and oilseeds (primarily corn and soybeans), but livestock is also important, accounting for 40 percent of agricultural output. While there are no urban centers in the Southwestern Corn Belt, this region lies just to the south of Des Moines, IA.

Overall, these three regional economies are far more dependent on agriculture than is the Nation as a whole, both in terms of the value of output and the number of jobs (table 4.5). Even in the Southwestern Corn Belt (the most economically diverse of the three regions), agriculture produces one out of every nine dollars in sales. In contrast, nationally, one out of every 50 dollars in sales is derived from agriculture. Average household income is somewhat lower in each region than is the national average, but there is considerable variation among the three regions. The trade exposure measure reported in table 4.5 attempts to capture each region's dependence on inter-regional imports. A low measure implies that most of the goods and services produced in the region use local inputs. This measure is important since it partially explains why employment impacts vary from region to region.

In table 4.6, the regional impacts of allowing CRP to expire are presented for the traditional (i.e., no price effects and minimal recreation impacts) scenario and the augmented (i.e., price effects and sizeable recreational impacts) scenario. Earlier, we saw that CRP's economywide impacts were sensitive to assumptions about the size of the recreational travel response to changes in CRP enrollment. The nationwide output and jobs response to CRP's expiration was 19 and 17 percent lower, respectively, under the augmented scenario, which assumed recreational travel expenditures would decline by \$290 million instead of the \$7 million decline modeled by the traditional scenario.

Table 4.5—Regional and national population, income, and employment levels

| Variable: | Units | Region ¹ | | | U.S. total |
|-----------------------------|---------------|--------------------------|-------------------------|------------------------|------------|
| | | Northern Plains Crescent | Southern Plains Ellipse | Southwestern Corn Belt | |
| Population | Million | 1.1 | 1.6 | 0.6 | 265.3 |
| Rural population density | Per sq. mile | 4.2 | 7.8 | 24.4 | - |
| Household income | \$ per capita | 56,690 | 58,710 | 52,910 | 71,660 |
| Total output | \$ billion | 54.7 | 87.0 | 27.5 | 14,635.8 |
| Agriculture | Percent | 18.3 | 17.3 | 10.9 | 1.6 |
| Number of jobs ² | Thousand | 730.2 | 958.3 | 349.1 | 152,314.9 |
| Agriculture | Percent | 11.3 | 12.8 | 13.7 | 1.9 |
| Trade exposure ³ | Percent | 18.1 | 22.4 | 26.3 | 3.5 |
| CRP enrollment | Million acres | 8.3 | 8.5 | 1.9 | 33.9 |

¹The three regions refer to multicounty areas of the country with high levels of CRP enrollment and are delineated in figure 4.2.

²Full- and part-time jobs.

³The ratio of total imports to total output, expressed as a percentage. In the SAM framework, imports of intermediate goods are part of the firm's total costs.

Source: SAM model files generated from the 1996 IMPLAN Database and the CRP contracts file. Statistics for household income and total output are adjusted to 2001 prices.

Table 4.6—Short-term regional impacts of CRP’s hypothetical expiration under two scenarios

| Scenario/sector: | Region ¹ | | | | | |
|-----------------------------|--------------------------|----------------|-------------------------|----------------|------------------------|----------------|
| | Northern Plains Crescent | | Southern Plains Ellipse | | Southwestern Corn Belt | |
| | <i>\$Million</i> | <i>Percent</i> | <i>\$Million</i> | <i>Percent</i> | <i>\$Million</i> | <i>Percent</i> |
| TRADITIONAL | | | | | | |
| Output: | 1,088.9 | 2.0 | 549.4 | 0.6 | 151.0 | 0.6 |
| Agricultural ² | 782.1 | 7.8 | 492.8 | 3.3 | 166.1 | 5.6 |
| Nonagricultural | 306.8 | 0.7 | 56.6 | 0.1 | -15.1 | -0.1 |
| Value added (factor income) | 502.8 | 1.9 | 134.6 | 0.4 | 70.2 | 0.6 |
| Household income: | 48.3 | 0.2 | -206.8 | -0.5 | -94.4 | -0.7 |
| Low | 38.2 | 0.5 | 8.7 | 0.1 | 5.4 | 0.1 |
| Medium | -16.0 | -0.1 | -200.5 | -0.9 | -91.0 | -1.1 |
| High | 26.1 | 0.7 | -15.0 | -0.3 | -8.8 | -0.6 |
| | <i>Number</i> | <i>Percent</i> | <i>Number</i> | <i>Percent</i> | <i>Number</i> | <i>Percent</i> |
| Number of jobs: | 26,968 | 3.7 | 11,872 | 1.2 | 4,127 | 1.2 |
| Agricultural | 17,684 | 21.4 | 10,800 | 8.8 | 4,890 | 10.3 |
| Nonagricultural | 9,284 | 1.4 | 1,072 | 0.1 | -762 | -0.3 |
| AUGMENTED | | | | | | |
| Output: | 747.5 | 1.4 | 356.8 | 0.4 | 61.0 | 0.2 |
| Agricultural ² | 772.3 | 7.7 | 477.5 | 3.2 | 160.5 | 5.4 |
| Nonagricultural | -24.8 | -0.1 | -120.7 | -0.2 | -99.5 | -0.4 |
| Value added (factor income) | 151.3 | 0.6 | -180.9 | -0.5 | -31.8 | -0.3 |
| Household income: | -195.4 | -0.7 | -413.0 | -1.1 | -167.9 | -1.2 |
| Low | 10.6 | 0.2 | -14.5 | -0.1 | -3.8 | -0.1 |
| Medium | -189.9 | -1.1 | -340.8 | -1.5 | -144.2 | -1.7 |
| High | -16.0 | -0.4 | -57.8 | -1.0 | -19.8 | -1.3 |
| | <i>Number</i> | <i>Percent</i> | <i>Number</i> | <i>Percent</i> | <i>Number</i> | <i>Percent</i> |
| Number of jobs: | 15,492 | 2.1 | 6,838 | 0.7 | 1,501 | 0.4 |
| Agricultural | 17,482 | 21.1 | 10,484 | 8.5 | 4,743 | 9.9 |
| Nonagricultural | -1,991 | -0.3 | -3,647 | -0.4 | -3,242 | -1.1 |

¹The three regions refer to multicounty areas of the country with high levels of CRP enrollment and are delineated in figure 4.2.

²The size of the agricultural output changes reported here are larger than the revenue shocks reported in table 4.3 because the initial shock stimulates increased agricultural as well as nonagricultural production.

Source: Vogel (2003). Value of output and income are in 2001 dollars. Nonagricultural industries include the manufacturing, construction, utilities, mining, trade and transport, and service sectors. Employment includes the number of full- and part-time jobs.

When the two scenarios are used to estimate regional impacts, the discrepancies between their estimated economic impacts are even larger. At the regional level, not only do recreational travel expenditures play a role, but we can no longer assume that a decline in farm revenue due to falling prices is offset by an increase in consumer expenditures within the region. Therefore, if CRP’s expiration decreases farm commodity prices, the resulting drop in farm enterprise income tends to reduce the expansionary impact that increased planting has on a region’s economy. By relaxing the traditional scenario’s simplifying assumptions, the augmented scenario (presented in the bottom half of table 4.6) estimates regional output responses that are 30-60 percent lower than those predicted by the traditional scenario. The CRP’s impact on jobs is even more sensitive to the price and recreational expenditure assumptions, falling by 43-64 percent once farm prices and recreational travel expenditures are assumed to decline.

Allowing CRP contracts to expire has a large enough impact on recreational travel and farm revenue in the augmented scenario that the impact on the nonfarm economy is negative. That is, the program's continuation has an expansionary effect on nonfarm output that partially offsets the impact that retiring environmentally sensitive cropland has on farm production.

By recognizing that expiration of the CRP might have a detrimental affect on others in addition to CRP participants (by reducing demand for recreational services and reducing farm enterprise income), the augmented scenario predicts that the income of nearly every household group identified would fall if all CRP contracts expired. The results of these two scenarios demonstrate how sensitive economywide and regional projections are to the price and recreational travel assumptions. We do not present either model as "the truth" since both encompass simplifying assumptions and ignore adjustments that farm operators and other economic agents would make when faced with shifting prices. However, these scenarios do provide a rough measure of the adjustments the economy might face if CRP contracts were to expire, and taken together or separately provide insight into the factors that influence the size of the economic response to a change in CRP enrollment.

For the remainder of this section, we compare the results of the augmented scenario for the three regions we have selected for closer study. This is done for expositional ease, since the same patterns emerge whether we look at the traditional or the augmented scenario. Furthermore, the factors that explain interregional differences in the economic response to changes in CRP enrollment also explain interregional differences between the relative size of the response from each scenario.

For the three regions, expiration of the CRP would have different impacts on industry output and jobs. The Northern Plains Crescent would experience the most pronounced effects, with agricultural production potentially increasing by up to 7.7 percent and the number of agricultural jobs increasing by about 21 percent. At the same time, nonagricultural output and jobs would decrease slightly. In contrast, the Southern Plains Ellipse and the Southwestern Corn Belt would experience more modest increases in agricultural and steeper declines in nonagricultural production and jobs. The large discrepancies between the estimated effects of expiration of the CRP on agricultural and nonagricultural sectors reflect the predicted decline of household spending out of farm enterprise and transfer income, as well as the drop in recreational travel expenditures as CRP rental payments end.

With respect to household and value-added income, the picture is also mixed. As a measure of regional well-being, value-added income is preferred to household income because it reflects the actual performance of industrial activities located in these regions. In contrast, the household income measure includes valued-added income as well as the loss of CRP transfer and farm enterprise income. Thus, in the Northern Plains Crescent, value-added income would increase by 0.6 percent while household income would decrease by 0.7 percent. In contrast, both value-added and household income would decline in the Southern Plains Ellipse and Southwestern Corn Belt regions. For households in these regions, the positive stimulus of increased agricultural production would not be sufficient to offset the nega-

tive effects of the loss of transfer and farm enterprise income. Middle-income households would be hit the hardest, with their income falling by 1.1 percent in the Northern Plains Crescent and by 1.5 percent or more in the Southern Plains Ellipse and the Southwestern Corn Belt.

The small output and employment effects on nonagricultural sectors reported in table 4.6 mask the differing regional forces at work. In each of these regions, the agricultural response (increased planting but lower revenue) would generate positive impacts in the farm and nonfarm economies, while the household expenditure response (loss of CRP payments and reduced recreational travel expenditures) would generate negative impacts almost exclusively in the nonfarm economy. Consequently, the net positive benefits to CRP expiration would be confined to the agricultural sectors alone.

The Northern Plains Crescent's strong nonfarm response (which shows up as the smallest overall decline in nonfarm output and jobs in table 4.6) is explained in a large part by its geographic isolation.⁶⁵ Having the lowest trade exposure of the three rural economies is an artifact of its isolation and low population density. As a consequence, the residents in the Northern Plains Crescent are more self-reliant with respect to producing goods and services within the region. Labor productivity in nonfarm production (output per worker) in the Northern Plains Crescent is \$63,200 per worker versus \$88,300 per worker for the United States as a whole. Lower productivity implies that firms substitute labor for more expensive capital goods imported from outside the region. Hence, the employment response would be larger because workers are less productive in terms of value added than the national average.

The Southern Plains Ellipse response to the expiration of CRP contracts would differ from that of the Northern Plains Crescent for two reasons. First, Southern Plains Ellipse producers would convert over half their CRP enrolled land to rangeland. Since producers do not add direct value to rangeland, the increased livestock production reported in table 4.3 captures any positive feedback from this conversion. Second, the dominant crops benefiting from CRP expiration in the Southern Plains Ellipse produce less revenue per acre than the dominant crops in the Northern Plains Crescent. According to National Agricultural Statistical Service (NASS) data for 2001, oilseed crops of all types produce the highest revenue per acre in the Northern Plains Crescent. In the Southern Plains Ellipse, cotton and grains are the dominant crops, both of which generate lower revenues per acre than oilseeds in the Northern Plains Crescent.

In the Southern Plains Ellipse, the agricultural response would generate proportionately smaller demands for nonfarm intermediate goods and services and nonfarm employment than in the Northern Plains Crescent because of the former region's greater linkages with the national economy and its higher labor productivity.⁶⁶

As the smallest of the three regions, the Southwestern Corn Belt is a completely rural economy with the highest trade exposure, lowest labor productivity in agriculture, and moderate nonfarm labor productivity. Expiration of the CRP would induce agricultural producers to increase produc-

⁶⁵ The lack of proximity to a major metropolitan area enhances this region's economic isolation. The nearest metropolitan hub serving the entire Northern Plains Crescent regional economy is the Minneapolis-St. Paul urban area. It lies about 250 miles southeast of Fargo and 300 miles south-southeast of Grand Forks.

⁶⁶ If the Southern Plains Ellipse' trade exposure was as low as that in the Northern Plains Crescent, nonfarm production would increase 30 percent more than is projected. And if labor productivity of \$78,800 per worker in the Southern Plains Ellipse were as low as that of the Northern Plains Crescent, nonfarm employment would increase 43 percent more than is projected.

tion of program crops (grains and oilseeds), hay, and pasture. The Southwestern Corn Belt's high trade exposure means that more nonfarm goods are imported rather than being regionally produced. Consequently, the employment spillover effect into the nonfarm labor market induced by the agricultural response is the smallest of the three regions.

The impacts on these three regional economies of allowing the CRP to expire illustrate how their different economic and geographic features would shape their response to a policy change. The Northern Plains Crescent is the most agriculturally dependent region, while the Southwestern Corn Belt is the least. The Southwestern Corn Belt is most reliant on imported goods and services, while the Northern Plains Crescent is the least. The Southern Plains Ellipse has the highest labor productivity, while the Northern Plains Crescent has the lowest. The varied regional responses to expiration of the CRP highlight the fact that places with very similar CRP enrollments, such as the Northern Plains Crescent and the Southern Plains Ellipse, can have very dissimilar responses to changes in program participation.

The regional impacts reported here demonstrate patterns similar to those found in earlier studies. In a 1994 assessment of the impact that elimination of CRP would have on several rural economies, job impacts ranged from 0.1 to 1.8 percent and income impacts ranged from 0.3 to 1.4 percent (Dodson et al., 1994). Pocatello, ID, an area neighboring the Northern Plains Crescent region, had the largest income and employment impacts of the locations studied. In a study of three counties in Oregon, countywide estimates of CRP's impact ranged from \$1.2 million to -\$3.6 million, depending on the local economic base (Martin et al., 1988). Other IMPLAN studies also report considerable variation in local economic impacts within States (Mortensen et al., 1990; Otto and Smith, 1996; Standaert and Smith, 1989) and between States (Hines et al., 1991; Hyberg et al., 1991). It is clear from this research that projected local impacts of CRP enrollment can be sizeable in some cases, but they are far from uniform and there are often winners and losers even when the national impact of the program is small.

While most of the land enrolled in the CRP is located in rural America, it does not necessarily follow that expiration of the CRP would generate only rural jobs. At least some of the direct, indirect, and induced employment impacts are felt in urban counties.

Rural-Urban Impacts

Since both the Northern Plains Crescent and Southern Plains Ellipse include urban centers, this section looks at the rural-urban distribution of employment responses by simulating the expiration of the CRP in rural areas using a rural SAM multiplier model for these two regional economies.

The very low population density in the Northern Plains Crescent, together with the fact that no major metropolitan areas lie adjacent to it, supports the use of the hub-and-spoke metaphor to describe the economic landscape of this region. That is, the urban areas of Bismarck, Fargo, and Grand Forks, ND represent regional hubs of economic activity with transportation and infrastructure spokes extending out into the rural hinterlands. As a result, in

the Northern Plains Crescent, about one out of every five jobs generated in the post-CRP environment is found in the urban counties (fig. 4.3). Almost 80 percent of these urban jobs are agricultural.

Two factors explain the size of the urban impact. First, farmers in the region’s urban counties received \$13 million per year in CRP payments from 1998 to 2000 (about 5 percent of the region’s total CRP payments). Ending CRP payments induces farmers in urban counties to increase their production, making a significant contribution to stimulating new jobs in these counties. Second, given the geography of the Northern Plains Crescent, some of the off-farm jobs created by an expanding agricultural sector in rural counties are located in the urban counties. Thus, on average, \$1 million of additional agricultural output in rural Northern Plains Crescent counties creates 20 rural jobs and 2.9 urban jobs (including direct, indirect, and induced jobs). Urban “leakage” of jobs in the nonfarm economy in rural counties is smaller, with 1.5 urban jobs created for every 20 rural jobs.

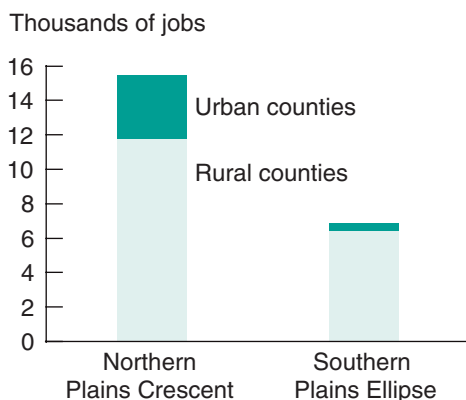
The Southern Plains Ellipse has a higher population density and is adjacent to more major metropolitan hubs relative to the Northern Plains Crescent. A higher trade exposure means that more intermediate goods are imported into this region. Consequently, in contrast to the Northern Plains Crescent, the Southern Plains Ellipse does not experience the spatially imposed self-reliance on production of goods that could be easily imported.⁶⁷ Hence, the leakage of employment effects to urban areas in the Southern Plains Ellipse is about half that found in the Northern Plains Crescent. About 6 percent of jobs generated in the Southern Plains Ellipse occur in urban areas. For every 20 agricultural jobs created in rural counties, 1.2 indirect and induced jobs are generated in urban areas of the Southern Plains Ellipse. For every 20 nonfarm jobs created in rural counties, only 0.5 jobs are generated in the metro counties.

Summary and Caveats

If all CRP contracts were to immediately expire and there were no further enrollments, we estimate that roughly 51 percent of the land currently under contract would return to cultivation within about 1 year. The remainder would be used as pasture, rangeland, or forest, would be put to nonfarm uses, or would remain idle. As CRP land is brought back into production, the supply of agricultural output increases, reducing commodity prices. However, we estimate that the price effects would be modest—often less than 1 percent and never greater than 6 percent. Aggregate, nationwide impacts on recreational spending (as sedimentation and other forms of

Figure 4.3

Rural-urban distribution of CRP employment impacts



Source: Vogel (2003)

⁶⁷ Essentially, the geographic isolation of the Northern Plains Crescent implies that it must produce a higher level of goods and services relative to the Southern Plains Ellipse and the Southwestern Corn Belt because of lower interregional imports.

pollution increase and wildlife habitat shrinks) vary considerably depending upon estimation procedures. Using a trips-based approach, recreational travel impacts are minimal, as travelers choose alternate destinations but do not reduce overall spending by much. However, a receipts-based approach to estimating the amount of recreational travel induced by CRP yields much higher estimates which reduce CRP's output and employment impacts by roughly 18 percent.

Increased farming activity increases demand for nonfarm goods and services, and both lead to higher demand for consumer goods and services as the number of jobs and household incomes rise. Counteracting this expansion is the loss of CRP rental payments (which reduces consumer demand by affected households), a drop in farm revenue, and possible decreases in CRP-induced recreational spending. The net effect of CRP expiration is likely to be a small positive impact on the U.S. economy as a whole, with varying impacts on local economies. With respect to the three regions we studied, expiration of the CRP creates a net positive economywide impact for all regions, with output increases ranging from 0.2 percent to 2.0 percent and the number of jobs increasing by anywhere from 0.4 percent to 3.7 percent. However, households suffer income losses of up to 1.2 percent as CRP transfer payments cease. Farm revenue could decline by up to \$4 billion as increased production drives down farm commodity prices.

In interpreting these results, several caveats are in order. First, most of our assumptions were geared toward providing a reasonable upper-bound estimate of the economic impact of expiration of the CRP. For example, we assumed that as CRP land is returned to production, it does not encourage other marginal land to drop out of production. Second, as with all multiplier models, our estimated impacts assume the economy will move along a predictable path. But in areas heavily affected by a change in the status of CRP enrollment (or any other economic shock), the economy is very likely to react in unpredictable ways as prices, industrial structure, and preferences all change. Finally, employment gains in our models are induced changes in labor demand. Although these simulations project increases and decreases in labor demand, *ex post* changes in actual employment levels cannot be assessed by the SAM framework. The framework treats job gains/losses as permanent due to a perfectly elastic labor supply response, which overstates the estimated job gains reported here. Conditions of low unemployment would put upward pressure on regional wages, forcing firms to compete to fill their job vacancies. Hence, not all of the new jobs created by expiration of the CRP would be filled. Conditions of moderately high unemployment could also be indicators of a high level of disguised underemployment in the labor market. In this case, fewer workers would be needed to meet the new labor demands of the post-CRP environment.