Exploring Spillover Effect of Public Investments in Conservation Programs onto Agritourism

By

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Introduction

Public investment in farmland-based conservation, such as the Conservation Reserve and Wetlands Reserve Programs (CRP and WRP, respectively), have improved the environmental state of many lands. While doing so, they also place constraints on the use of lands agriculturally, in return limiting the potential rents to land owners. CRP and WRP were initiated to remove fragile, marginal land from crop production by requiring enrolled producers to convert marginal acreages to perennial vegetation or restore wetlands for a specified period. In short, these programs offer landowners incentives to establish long-term conservation covers and wildlife habitat, and meanwhile, serve supply control objectives of US farm policy.

Between 1985 and 2002, over 32.7 million acres of land had been enrolled in both programs combined (www.nass.usda.gov/census/census02). In the 11 years from 1985 to 1996, government expenditures on CRP alone equaled $19 billion (Hoag, 1999). These programs create an institutionalized means of supporting farm income while garnering environmental benefits. There is a rich literature on many production and environmental aspects of CRP and WRP. In summary, CRP and WRP decrease the productivity of enrolled acreage. But, the long-term implications for producers' financial performance, and in a broader context, the economic activity of communities these farms operate in, receive less attention and scrutiny.

We posit that CRP and WRP may contribute to a new farm income stream based on the enhanced recreational opportunities perceived by tourists on farmland that has

richer wildlife and fish habitat, or is simply in a more natural state of development. With this in mind, further research regarding the potential role of recreational services and agritourism is warranted to determine the potential positive cash flow that policies such as CRP and WRP have unknowingly hatched, especially since such activities may also have positive economic impacts on rural communities. The research question proposed is: *does public investment in natural resources pay off indirectly to producers (and likely, surrounding communities) through expanded opportunities in agritourism?* For this study, we follow the 2002 Ag Census definition of agritourism that defines recreational activities as hunting, fishing, and wildlife viewing.

Literature Review

Since the introduction of the Conservation Reserve Program in the 1985 Farm Bill, a wide array of analyses have been conducted regarding the effects of such programs on the economic state of US agriculture. For this particular analysis, attention is focused on recreational services revenue. However, it is worthwhile to begin with an assessment of the fundamental impacts of CRP and WRP based on previous research.

The initial objective of CRP was to reduce soil erosion. In its preliminary stages CRP was questioned in regards to its cost effectiveness and narrowly defined objectives. Since the first sign-up in 1986, program costs have been estimated at $1.8 billion per year (Hoag, et al. 1995). Cost effectiveness was improved in 1990 with the implementation of the Environmental Benefits Index (EBI) that broadened the scope of the program by including multiple criteria as CRP objectives and providing more structure to the bidding process (Hoag, 1999). Some of the new criteria include: wildlife habitat, water quality,

and air quality benefits. Since the introduction of EBI in CRP regulations, secondary benefits relating to the new criteria are receiving greater interest.

The EBI is a scoring system for enrolling lands in CRP. Our original intent was to use county level EBI averages as an explanatory variable in the econometric models since it provides an evaluation criterion for enrolled acreage. But the Farm Service Agency (FSA) maintains this information and has not granted access to the public. After re-thinking the model, the USDA-Economic Research Service (ERS) Natural Amenity Scale was integrated instead to control for unique land-environment characteristics and may lessen the potential for collinearity that was expected between CRP enrollment and the EBI. The natural amenity scale measures the physical characteristics of a county that enhance its desirability as a place to live (www.ers.usda.gov/Data/NaturalAmenities/). The scale appears to play a significant role in explaining population growth (and is appropriate for statistical analysis due to its bell shaped distribution (McGranahan, 1999)). For this research, it is interesting to note that the majority of regions rich in natural amenities lie in the western United States (Figure 1).

The Wetlands Reserve Program was mandated under the 1985 Farm Bill, and is a voluntary program through which land owners can receive payments for the removal of sensitive wetlands from agricultural production (NRCS, 2004). Reauthorized under the 2002 Farm Bill, WRP currently has 1,470,998 acres enrolled with a maximum of 2.275 million acres authorized. In previous ERS research, the cost effectiveness of converting productive agricultural lands into protected wetlands was estimated and results suggest that direct benefits from wetland restoration are comparable to the costs of restoring and enrolling those lands into conservation programs (Heimlich, 1994).

Although closely related, CRP and WRP are separately run programs. WRP is administered by the Natural Resources Conservation Service (NRCS), who also oversees other conservation programs such as Wildlife Habitat Incentives Program (WHIP), the Conservation Security Program (CSP), and the Environmental Quality Incentives Program (EQIP). Meanwhile, the Farm Service Agency administers the Conservation Reserve Program (Vandever, April 11, 2005). Both NRCS and FSA are agencies within the United States Department of Agriculture. For the purpose of this analysis, CRP and WRP will be referred to jointly as the data reported in the 2002 Census of Ag combines data on both programs into one variable.

Since the appearance of CRP under the US Farm Bill, a great deal of research has been undertaken to examine direct and indirect impacts of the program. Taylor, et al used percent CRP acres to estimate cropland and pastureland values in Kansas and surrounding states. The results suggest that CRP enrollment has a negative influence on both cropland and pasture land values, suggesting that CRP is accounting for general land characteristics (Taylor, et al 2003). This is counter to our prior assumptions that improved conservation may help an alternative revenue stream, recreation, but not entirely unexpected.

Little research exists regarding the potential indirect recreational benefits of the Conservation Reserve and Wetlands Reserve Programs, and no attempts to conduct a study with the combined data of the two programs have been found. In a study conducted by Feather and Hellerstein (1997), a two-stage discrete-count demand model was used to estimate the benefit function of CRP. The study finds "the national benefit measures themselves indicate that erosion reductions… have generated large recreational

benefits," and that water-based benefits attributable to CRP are approximately $39.58 million. These benefits are attributed only to erosion reduction and do not take into account the wildlife benefits associated with CRP that would more likely impact this study's model.

CRP is expected to provide benefits for a wide range of wildlife species, many of which contribute to the enjoyment of recreational activities, such as fishing and hunting. In a study conducted by Hansen, Feather and Shank (1999) a random utility model was used to estimate consumer surplus of pheasant hunters, and benefits attributable to CRP were estimated to be $80 million per year. Prior research conducted to determine recreational value associated with CRP primarily focus on behavior models similar to the one used by Hansen, Feather and Shank. Although such CRP benefits are not all captured in this study's recreational income data (because some producers still provide free access to sportsmen), it is assumed that they positively affect such revenue streams.

Of particular interest to this analysis of CRP are its economic implications for rural communities. According to the USDA, two possible consequences of CRP on rural areas have been determined. First, CRP may have added to the quality of life in rural areas and helped support growing recreation and agritourism activities; and second, weakened local economies by taking farmland out of production and reducing the demand for farm services (Sullivan, et al 2004). This paper will focus on establishing whether there are positive impacts from CRP through expanded opportunities for agritourism in rural areas.

Research conducted by Johnson, McKean and Sandretto applied input-output analysis to determine the necessary increase in small game and migratory bird hunting to

offset the negative effects of CRP in eastern Colorado. The first scenario assumes that families with acreage enrolled in the program remain in the region and maintain local consumption spending. The second assumes that they vacate their farms and leave the region. Under the first scenario it was determined that a 250 percent increase in hunting is needed to neutralize the negative effects of CRP in terms of total business sales and a 181 percent increase is needed to offset the advance of unemployment. In the extreme case that all farmers leave their land upon enrolling in CRP, the impact on spending and employment are 4.4 and 2.3 times that of scenario one respectively (Johnson, et al, 1992). This research relates more closely to scenario one in that it assumes that individual farmers may stay in the area and benefit from recreational revenue (as well as operational income from cropland not placed into the program).

Although imprecise, the ERS estimated the benefits attributable to CRP's effects on outdoor recreation, but they estimate them in excess of $700 million per year (www.ers.usda.gov). Two methods are used to make such estimations. The first involves combining survey data on recreational behavior with land use information, whereas the second combines information on hunter expenditures with income received by farmers for recreational uses of their land (www.ers.usda.gov). ERS also comments on the effect of CRP on rural communities, suggesting that CRP creates recreation-related jobs, but that communities with low enrollment often benefit from CRP acreage in surrounding areas, thus making comparisons between high and low enrollment counties misleading (www.ers.usda.gov). Even so, there is sufficient evidence that CRP and recreational income may have some interdependence: a primary motivation for this study.

Data and Methods

The objective of this research is to determine the influence of conservation program investment on recreational services revenue, i.e. do CRP and WRP have unintended consequences possibly leading to secondary income streams for the acreage enrolled? Theory suggests that alternative income streams from increased wildlife based recreation may emerge due to the increased ecological and wildlife benefits associated with the policies. In order to test this theory, econometric methods were used to determine gross recreational services as a function of several relevant explanatory variables. The geographic focus is on the Western region, including Montana, Wyoming, Colorado, Arizona, New Mexico, Utah, Nevada, Oregon, Washington, Idaho and California (413 counties). The dependent variable for each model, recreational services revenue per county, includes supplemental farm income from hunting and fishing services provided: a new data series starting with the 2002 Census, meaning it has received little prior attention by researchers.

The relevant explanatory variables fall into three categories: unique place aspects of each county, size of agriculture (defined by sales or acreage) in the county, and the level of CRP/WRP investment. As previously mentioned, the USDA jointly reports CRP and WRP data, and they are standardized by acres enrolled to arrive at an average investment.

The Natural Amenities Index serves as an explanatory variable providing a scaled index value of multiple environmental characteristics such as topography, water, temperature and humidity. To account for the influence of metropolitan forces on the dependent variable, the county-level urban influence codes developed by USDA-ERS are

used in these models, (www.ers.usda.gov/briefing/rurality/UrbanInf/). Other explanatory variables include total sales, total sales per acre, and farmland acres, all reported by the 2002 Census of Agriculture at the county level.

Due to inconsistencies within the data, our sample size was reduced from 413 counties down to 211. The USDA does not report data on some variables among counties with such little activity that releasing numbers may cause concern about the release of private information (if only one or two entities report). Since enrollment may exist in those regions, it would have been unreliable to assume those counties as having zero activity. Therefore counties with inconclusive data were omitted from the sample.

Recreational income represents an increasingly important alternative revenue source for agricultural lands to augment that generated from traditional farming practices. Figure 2 shows the total reported recreational income reported by state. Colorado leads the western states with recreational income of $10.1 million. Montana, California, and Wyoming follow with $6.3, $5.3, and $5.3 million, respectively. On a county level, Table 1 lists the top twenty counties for gross farm recreational income. Colorado again stands out as the state leader with five out of the top six and eight of the top twenty counties. Wyoming has the second most counties on the list with four appearing in the top twenty. Reported alongside gross farm recreation income in table 1 is recreational income indexed by total farm acres as well as total farm sales as two different methods to standardize gross revenue levels. The income per farm acre and share of total sales shows no real pattern but is small among the counties with one exception. Pitkin County, CO (which includes Aspen) stands out with a recreational income to total farms sales ratio of .50, suggesting that recreational income is a vital part of farm revenues in that

county. Although Pitkin County is not highly influenced by CRP and WRP, it likely benefits from its high amenity scare, and possibly, from program contributions in surrounding regions.

Ultimately three econometric models were produced to reflect the influence of CRP and WRP on recreational services. Table 2 provides definitions and unit explanations for the variables included in all three econometric models.

The first defines gross recreational services revenue in 2002 as a function of a constant, the urban influence code, natural amenity index, CRP and WRP payments, farmland acres, total sales (2002), and CRP/WRP payments squared, all gross measures to examine the absolute levels of activity. The squared term is included to account for any nonlinearities in the effects from program investment. Model 1 is represented by the following equation:

(1) $Gross\ Recreational\ Income = \alpha_1 + \alpha_2\ Urban\ Influence + \alpha_3\ Natural\ Amenity\ Scale + \alpha_4\ CRP/WRP\ Investment + \alpha_5\ Farmland\ Acres + \alpha_6\ Total\ Sales + \alpha_7\ CRP/WRP\ Investment\text{^}2$

In model two, the dependent variable, recreational services income, is indexed by land value to account for return on assets from a new income stream. In this model, program investments are divided by acres enrolled to control for the relative value of land integrated into conservation programs (similar to a return on asset measure). A quadratic term is included again to account for non-linearity in CRP/WRP influences. The model is as follows:

(2) $Recreational\ Income/Land\ Value = \beta_1 + \beta_2\ Urban\ Influence + \beta_3\ Natural\ Amenity\ Scale + \beta_4\ Total\ Sales + \beta_5\ (CRP/WRP\ Investment)/Acres\ Enrolled + \beta_6\ ((CRP/WRP\ Investment)/Acres\ Enrolled)^2$

Lastly, the third model divides recreational services income by gross sales to account for the relative importance of this enterprise in the farm/ranch's "portfolio". The remainder of the model remains as:

(3) $Recreation\ Income/Gross\ Sales = \gamma_1 + \gamma_2\ Urban\ Influence + \gamma_3\ Natural\ Amenity\ Scale + \gamma_4\ Total\ Sales + \gamma_5\ (CRP/WRP\ Investment)/Acres\ Enrolled + \gamma_6((CRP/WRPInvestment)/Acres\ Enrolled)^2$

Empirical Findings and Discussion

The underlying theory of this research is that public investment in natural resources pays off indirectly to producers in the western United States through expanded opportunities in agritourism. Unfortunately the west is not a "major player" in regards to Conservation Reserve and Wetlands Reserve Programs. Figure 3A graphically shows the relationship between the west and "all other states." The eleven Western states included in this study account for just over 20% of total program investment. Of those eleven states, over half of the enrollment occurs in Montana and Colorado (see figure 3B). Therefore the influence of these conservation programs on recreational services income may be more pronounced outside of our study region.

In an attempt to discern a pattern between recreational services revenue and CRP/WRP investments, county averages by state are plotted against each other in figure 4. According to our theory, Montana should have the highest recreational services

revenue of the eleven states under consideration simply due to the fact that it exceeds all other states in program investments. However, this is not the case. Colorado's relationship is more consistent with our priors in that it exhibits the second highest recreational income per county and the third highest in program investments. However, Wyoming has the highest average recreational income per reporting county, but is low in CRP and WRP investments relative to surrounding states.

Land enrolled in CRP/WRP receives rental payments on a per acre basis. These rental payments reflect the opportunity cost of taking land out of production, as an economically efficient producer will not enroll in the program unless the payments are at least equal to the productive value of the land. Previous research "suggests that in counties with higher productivity and thus higher per acre returns, the rental rate is not high enough to encourage enrollment in the CRP" (Fleming, 2004). Figure 5 provides a graphical representation of the average payments per acre across states. The state of Washington has the highest investment per acre reported at $55.31. This may be due to highly productive wheat crops in the eastern part of the state and/or high timber values near the coast. Nevada and Arizona report the lowest rental payments per acre ($0 and $3.10 respectively), but may be misleading given a low share of reported data on recreational income amongst counties in those states.

Montana and Washington dominate the West for total acre enrollment and per acre investments respectively. Tables 3 and 4 further support this notion by reporting the top twenty counties in the west for total investments and total acre enrollment in CRP and WRP. Counties located in Montana and Washington appear most frequently, which is not surprising considering the averages illustrated in figure 2. All but one county from

table 3 reappears in table 4. Pondera County, Montana, with an average payment per reported acre of $38.34, is replaced by Richland County, Montana in regards to total enrollment.

Interestingly enough, there is no overlap of counties between table 1 and tables 3 or 4 (i.e. counties generating the most recreational services income do not appear to be counties of high enrollment in CRP and WRP). Thus summary statistics for the data do not support the hypothesis that program enrollment contributes to recreational services income. But, an econometric model may better explain this relationship.

The econometric models outlined in the previous section were estimated using ordinary least squares (OLS). Our hypothesis is that recreational income should be higher in counties with higher CRP/WRP flows, and although it would be optimal to look at changes in these variables across time to control for other place-specific effects, there is only one period of data on recreational services income at this time.

The first model explains absolute activity level by estimating gross recreational income as a function of urban influence, the natural amenity scale, CRP/WRP investments, CRP/WRP investments squared, farmland acres and total sales. The squared term is included to account for non-linearity as well as outliers in the data, i.e. counties with large quantities of program investment. Table 5A reports the statistical results for model 1. Unfortunately no significant relationship exists between program investments and recreational income. Both the investments variable and the squared term are insignificant. Not surprisingly, the natural amenities index is positively related to recreational income and is significant at the 99% level. This relationship is logical given that improved environmental characteristics of a county should increase the level of

recreational activity. The urban influence code is also significant and positively related to recreational income. Recall that an increasing urban influence scale means that the distance from urban regions is relatively greater. This suggests that recreation opportunities improve further away from urban locations, suggesting a "get away" effect. The total sales variable is not statistically significant in the first model and farmland acres are a significant and negative influence on recreational services income. Therefore the more land under production in a county, the lower the opportunity to generate recreational income. In short, farming/ranching and recreational income appear to be substitute enterprises rather than complementary in nature.

In the second model, recreational services income is indexed by land value to account for return on assets from a new revenue stream. Table 5B reports the econometric results from the OLS estimation. Again, natural amenity scale and urban influence code have a positive impact on the dependent variable and are significant at the 90% level. This suggests a greater return to land value with respect to recreational income in higher amenity areas further from urban interfaces (even accounting for increased values due to natural amenities). A parameter estimate of .000108 for the natural amenity scale implies that a one unit increase in scale will generate $.000108 more recreational income per dollar value of land. Similarly the results suggest that a one unit increase in the urban influence code will allow for a $.00011 increase in recreational income per dollar value of land. The similarity in the levels of these two effects is a little surprising, and may motivate the need for more research on the "place based" factors influencing recreational income and its potential for rural development. Again, total sales are insignificant as a factor determining recreational income in relation to land value.

In the second model, CRP/WRP payments per acre enrolled and the squared term are significant at the 99% and 90% levels, respectively. Interestingly the model estimates a negative relationship between program payments per acre enrolled and recreational income, counter to our hypothesis that suggests program investments would positively impact recreational revenue streams. However, the relationship becomes positive when considering the squared term. This implies that relatively higher enrollment in CRP and WRP (per acre enrolled) positively impacts the ability to generate recreational income. With this model we can conclude that enrollment in conservation programs does influence recreational income at the county level, but that the gains are dependent on having a sufficient investment to make a significant impact on wildlife.

Turning to the third model, recreational income is indexed by total sales to account for the share of total income from recreational revenue streams (see Table 5C). Again urban influence, natural amenities, total sales per acre, CRP/WRP payments per acre and a squared term are used as explanatory variables. As expected natural amenities and urban influence are significant at the 90% level and are positively related to recreational income divided by total sales. In addition to further reinforcing the importance of location when considering recreational services as an alternative business strategy, it shows how it increases the relative importance of this revenue stream among a county's portfolio of farmland-based enterprises.

Conservation reserve and wetlands reserve payments per acre and the squared term are significant at the 99% level. Payments per acre continue to be negatively related to recreational income, and similar to model 2, the relationship becomes positive with sufficient scale when accounted for by the squared term. This further supports the theory

that CRP/WRP enrollment in greater scale suggests a greater importance of alternative income streams through hunting and fishing services relative to a county's other economic activity derived from farm or ranch land.

It is important to comment on the overall significance of the three econometric models used to estimate the effects of CRP, WRP and other relevant variables on recreational services income. F-statistics were calculated for all three models individually. The results are 3.22, 3.71 and 3.93 for models one, two and three respectively, so they are significant at the 95% level. Model significance can also be determined by comparing model p-values (*p*), .0048, .0031, and .002 respectively, showing significance at the 99% level. Based on the above significance tests, all three models are believed to be statistically significant in explaining differences in recreational income among the cross section of Western counties.

What information do the three models explained above indicate to rural communities looking to improve current economic conditions through expanded recreational services revenue? First of all, it is important to note the importance of natural amenities within the county when considering the potential for recreational opportunities, or any programs the county may want to consider to increase wildlife-based tourism. Counties with higher amenity values generate more recreational services income holding all else constant. Similarly, in all three models, urban influences are positively related to recreational income suggesting that there is a "getting away" effect related to the fisher/hunter population's preference for spending time in less densely populated or traveled areas of the West. Hence, recreational opportunities are greater in areas further from urban areas even though such areas may be more difficult or expensive

to reach. This is encouraging news for the most rural of counties, since the potential economic development opportunities for remote counties are generally more limited.

Counter-intuitive to our theory, investment in CRP and WRP has a negative impact on recreational income. However, the relationship becomes positive when scaled for larger influences of program investments. Thus theory suggests that counties with relatively large investments in CRP and WRP have an advantage when generating recreational services revenue. This information can aid in the decision making process of determining if expansion in recreational opportunities is the right choice for the community of concern.

Conclusions

Not surprisingly, natural amenities and urban influence were found to significantly affect recreational income at the county level. Counties with higher amenity values are expected to have increased opportunities for expansion in recreational services, possibly leading to new income streams. This reinforces the idea that demand for recreational services is greater in areas with high natural amenities. People demanding recreational activities want to "get away" from the hustle and bustle of metro life and spend time in an atmosphere conducive to wildlife related recreation. This is captured in the positive effects of the urban influence code that suggest the farther away from an urban interface the greater the opportunity for recreational services. The natural amenities and urban influence effects confirm the importance of place in considering recreational services as an alternative business strategy.

Ultimately the results from the research were somewhat unexpected. Our theory predicted public investments in CRP and WRP to positively influence recreational income; and this to spill over to producers through increased opportunities for agritourism. Counter to our theory, program investments proved to have a negative impact on recreational income when indexed by land value and total sales. However, when investments are sufficiently large, CRP and WRP do have a positive relationship with recreational income.

From past research it is clear that conservation programs of all kinds have positively affected the ecological and environmental quality of the lands involved. In turn this has bolstered wildlife populations and increased the enjoyment and availability of wildlife based recreation. With the estimated influence of CRP and WRP investments on recreational services revenue, it is expected that areas of high enrollment have benefited somewhat from the spill-over effect of program benefits. The relationship is not as clear as was originally expected, but these findings motivate the need for further research with the USDA ARMS data focusing on individual farm enterprises. And, at the other extreme, some regional surveying and modeling could be used to assess the full community impacts from farm-based recreational services. The ERS estimates that the outdoor recreation benefits from CRP are in excess of $700 million per year. They go further to suggest that CRP creates recreation-related jobs, but suggest that more research is needed to confidently assess these contributions to local economies.

As mentioned in previous research, there are two potential effects of CRP on rural communities (Hellerstein and Sinclair). The first is improving the economic state of the region and the other is the weakening demand for farm services. Our models suggest that

in areas of high CRP/WRP enrollment, a comparative advantage exists for generating recreational revenue. Thus the increase in unemployment in high CRP areas can be moderated through the introduction of new business endeavors incorporating recreational activities. This suggests that CRP and WRP enrollment can positively impact rural communities when efforts are made to increase the recreational services offered in the area. But, the number of farmland acres is generally negatively related to recreational income levels, suggesting they are substitutes, so there may be less potential to jointly develop traditional farming and wildlife tourism models.

As public lands open to hunting and fishing become scarcer and more crowded, demand for these types of services on private land should continue to increase. Based on this assumption, the opportunity for secondary revenue streams from agritourism is expected to increase steadily over the long-run. We feel that analysis of the situation at the micro level is the next step to making accurate estimations of the benefits spilling over from conservation programs onto individual producers. Undoubtedly, the results from this type of analysis will be most informative to producers and communities speculating as to the economic benefits associated with recreational business endeavors taking place on lands protected from agricultural development.

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Table 1: Top 20 Counties by Gross Farm Recreational Income

State and County	Farm Recreation Income ($1000)	Recreation Income per Total Farm Acres	Recreation Income/Total Farm Sales
Colorado\Moffat	$ 1,347	$0.0013	$ 0.07
Colorado\Rio Blanco	$ 1,058	$0.0028	$ 0.08
Colorado\Routt	$ 963	$0.0021	$ 0.04
Colorado\Grand	$ 804	$0.0037	$ 0.11
Arizona\Cochise	$ 781	$0.0008	$ 0.01
Colorado\Garfield	$ 682	$0.0017	$ 0.03
Wyoming\Johnson	$ 597	$0.0003	$ 0.02
Montana\Custer	$ 558	$0.0003	$ 0.01
California\Humboldt	$ 546	$0.0009	$ 0.01
New Mexico\Rio Arriba	$ 546	$0.0004	$ 0.05
Wyoming\Campbell	$ 514	$0.0002	$ 0.02
Wyoming\Crook	$ 503	$0.0003	$ 0.01
California\Sonoma	$ 474	$0.0008	$ 0.00
Colorado\Mesa	$ 471	$0.0012	$ 0.01
Wyoming\Carbon	$ 455	$0.0002	$ 0.01
New Mexico\Catron	$ 422	$0.0003	$ 0.05
Colorado\Montrose	$ 407	$0.0012	$ 0.01
Washington\Spokane	$ 393	$0.0006	$ 0.00
Colorado\Pitkin	$ 375	$0.0157	$ 0.50
Montana\Park	$ 371	$0.0004	$ 0.02

Table 2: Varaible Definitions

Variable	Units	Description
Recreational Services Revune per County	$1,000s	Supplemental farm income form hunitng and fishing services
Urban Influence	Coded from 1-12	Counties are groupled according to their metro status
Natural Amenity Scale	> 3 high amenities < - low amenities	Measure physical characteristics of a county
Total Sales	$	Total amount of agricultural goods sold per county
Total Sales per Acre	$/acre	Average amount of agricultural goods sold per acre
Farmland Acres	acres	Total farmland in county
CRP/WRP Investments	$1,000s	Total amount of payments from CRP and WRP per county
CRP/WRP Acres Enrolled	acres	Total enrollment in CRP and WRP per county

Table 3: Top 20 Counties by Gross CRP/WRP Investments

State and County	Investments ($1,000's)	Acres Enrolled	Average $/Acre
Montana\Hill	$9,713.00	$309,910.00	$31.34
Montana\Chouteau	$9,137.00	$274,748.00	$33.26
Washington\Whitman	$9,016.00	$148,654.00	$60.65
Washington\Adams	$7,793.00	$198,693.00	$39.22
Colorado\Weld	$5,947.00	$200,069.00	$29.72
Washington\Douglas	$5,924.00	$166,832.00	$35.51
Montana\Valley	$5,622.00	$216,384.00	$25.98
Montana\Teton	$5,472.00	$159,980.00	$34.20
Colorado\Washington	$5,322.00	$166,719.00	$31.92
Washington\Franklin	$5,249.00	$129,928.00	$40.40
Montana\Toole	$5,200.00	$176,265.00	$29.50
Oregon\Umatilla	$4,524.00	$110,413.00	$40.97
Montana\Phillips	$4,502.00	$159,810.00	$28.17
Colorado\Baca	$4,464.00	$193,995.00	$23.01
Oregon\Morrow	$4,442.00	$104,810.00	$42.38
Montana\Sheridan	$3,984.00	$161,113.00	$24.73
Montana\Daniels	$3,723.00	$144,279.00	$25.80
Colorado\Lincoln	$3,687.00	$142,459.00	$25.88
Montana\McCone	$3,554.00	$135,085.00	$26.31
Montana\Pondera	$3,329.00	$86,838.00	$38.34

Table 4: Top 20 Counties by Total Acre Enrollment in CRP and WRP

State and County	Acres Enrolled	Investments ($1,000's)	Average $/Acre
Montana\Hill	309,910	$9,713.00	$31.34
Montana\Chouteau	274,748	$9,137.00	$33.26
Montana\Valley	216,384	$5,622.00	$25.98
Colorado\Weld	200,069	$5,947.00	$29.72
Washington\Adams	198,693	$7,793.00	$39.22
Colorado\Baca	193,995	$4,464.00	$23.01
Montana\Toole	176,265	$5,200.00	$29.50
Washington\Douglas	166,832	$5,924.00	$35.51
Colorado\Washington	166,719	$5,322.00	$31.92
Montana\Sheridan	161,113	$3,984.00	$24.73
Montana\Teton	159,980	$5,472.00	$34.20
Montana\Phillips	159,810	$4,502.00	$28.17
Washington\Whitman	148,654	$9,016.00	$60.65
Montana\Daniels	144,279	$3,723.00	$25.80
Colorado\Lincoln	142,459	$3,687.00	$25.88
Montana\McCone	135,085	$3,554.00	$26.31
Washington\Franklin	129,928	$5,249.00	$40.40
Montana\Richland	113,551	$3,268.00	$28.78
Oregon\Umatilla	110,413	$4,524.00	$40.97
Oregon\Morrow	104,810	$4,442.00	$42.38

Table 5A: Model 1 Results

Variable	Parameter Estimate	t-statisitcs	Standard Error
Constant	6.548973	0.14	46.59508
Urban Influence	8.747383	1.78	4.919955
Natural Amenity Scale	14.37111	2.41	5.970749
CRP/WRP Investments	-0.00801	-0.4	0.0202491
Farmaland Acres	-0.0000561	3.03	0.0000185
Total Sales	-0.000026	-0.64	0.0000409
(CRP/WRP Investments)^2	-0.000000366	-0.14	0.00000262
F-statistic	3.22	N=211	
RMSE	175.52		

Table 5B: Model 2 Results

Variable	Parameter Estimate	t-statisitcs	Standard Error
Constant	0.000501	0.64	0.0007834
Urban Influence	0.00011	1.66	0.0000664
Natural Amenity Scale	0.000108	1.64	0.0000659
Total Sales per Acre	-0.000000183	-0.68	0.000000268
CRP/WRP Payments per Acre Enrolled	-0.000048	-2.39	0.00002
(CRP/WRP Payments per Acre Enrolled)^2	-0.000000402	1.82	0.000000221
F-statistic	3.71	N=210	
RMSE	0.00212		

Table 5C: Model 3 Results

Variable	Parameter Estimate	t-statisitcs	Standard Error
Urban Influence	0.004848	1.87	0.0025968
Natural Amenity Scale	0.005127	1.81	0.0028346
Total Sales per Acre	-0.00000156	-0.52	0.00000299
CRP/WRP Payments per Acre Enrolled	-0.00228	-2.62	0.0008706
(CRP/WRP Payments per Acre Enrolled)^2	0.0000194	2.03	0.00000956
F-statistic	3.93	N=211	
RMSE	0.09286		

Figure 1

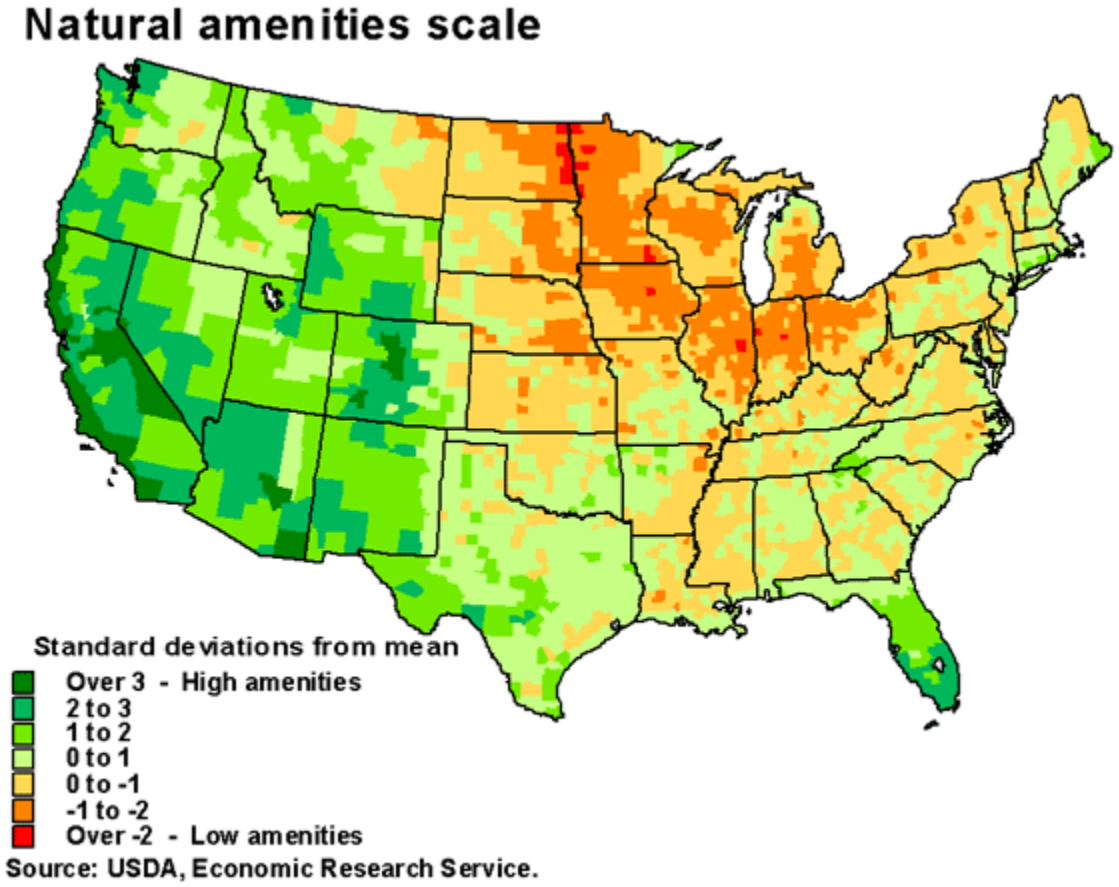

Natural amenities scale
Standard deviations from mean
Over 3 - High amenities
2 to 3
1 to 2
0 to 1
0 to -1
-1 to -2
Over -2 - Low amenities
Source: USDA, Economic Research Service.

Figure 2

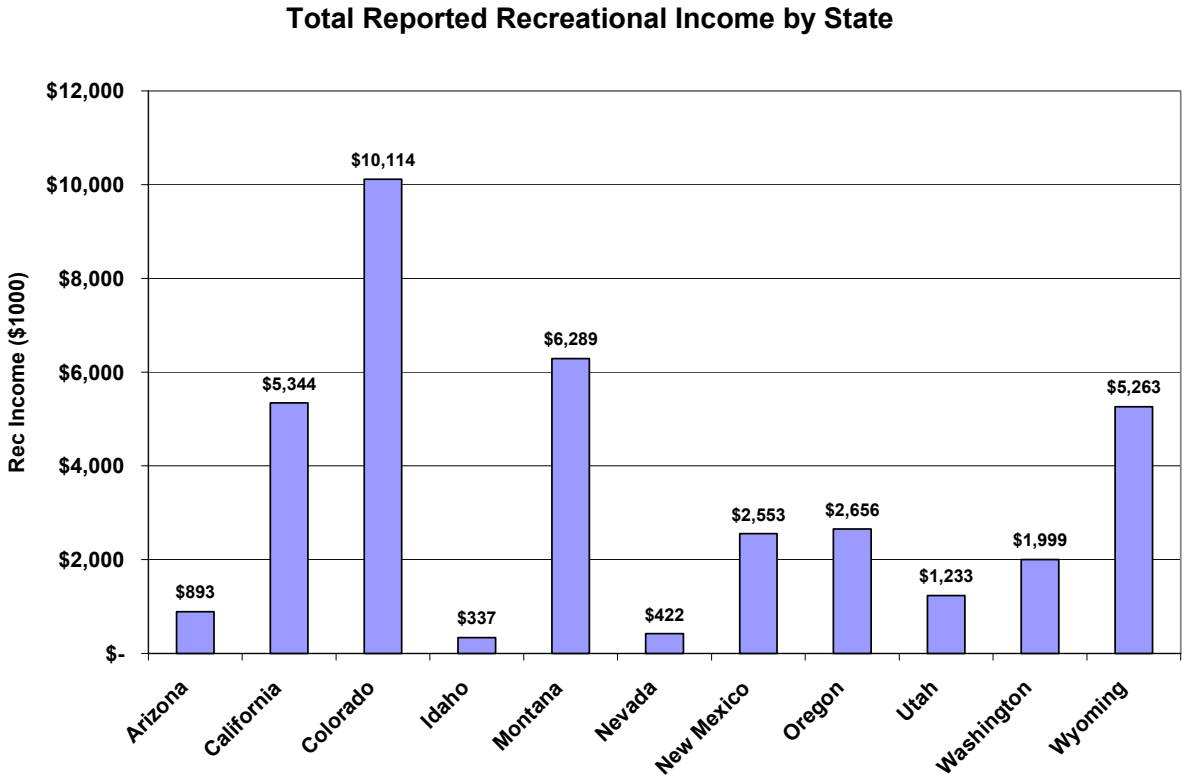

Total Reported Recreational Income by State
Rec Income ($1000)
$12,000
$10,000
$8,000
$6,000
$4,000
$2,000
$-
$893
$5,344
$10,114
$337
$6,289
$422
$2,553
$2,656
$1,233
$1,999
$5,263
Arizona
California
Colorado
Idaho
Montana
Nevada
New Mexico
Oregon
Utah
Washington
Wyoming

Figure 3A

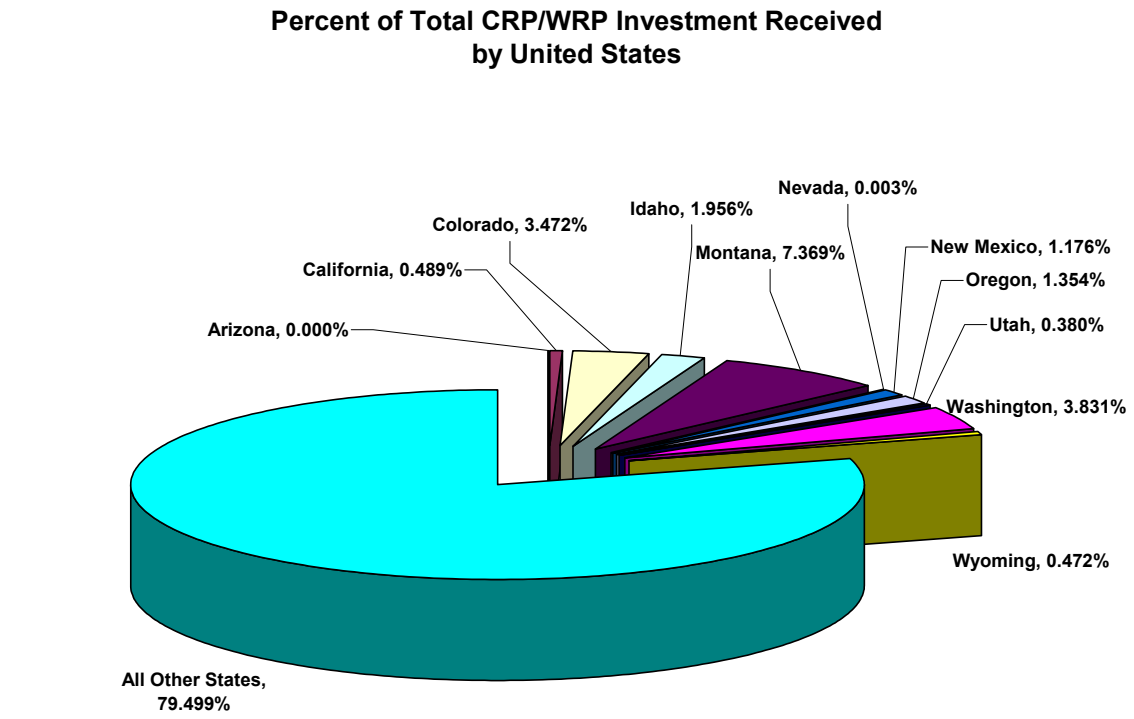


Figure 3B

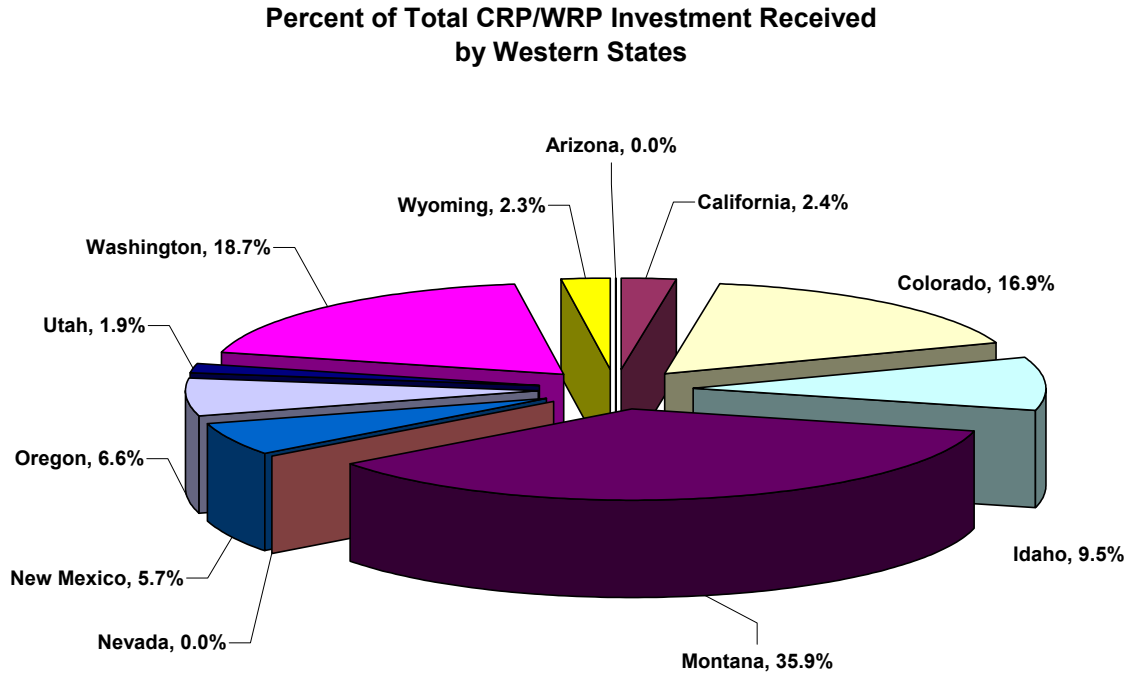


Figure 4

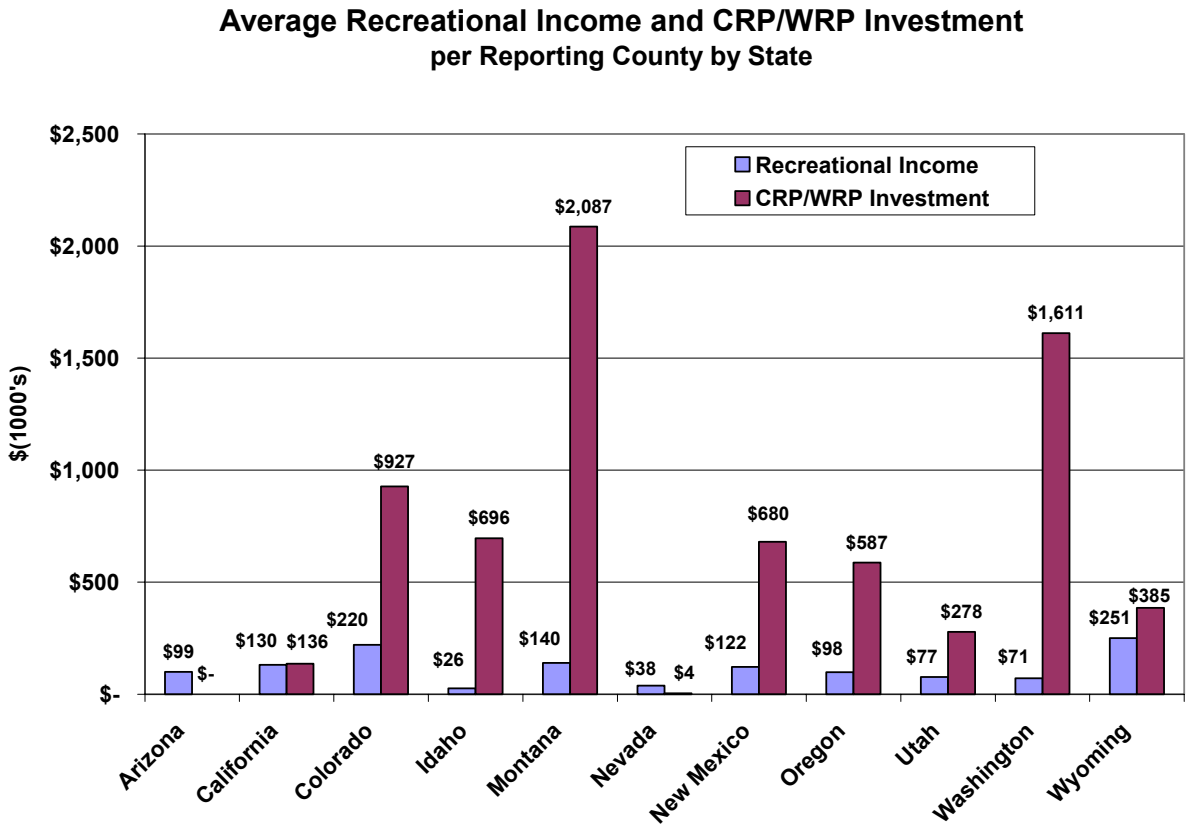
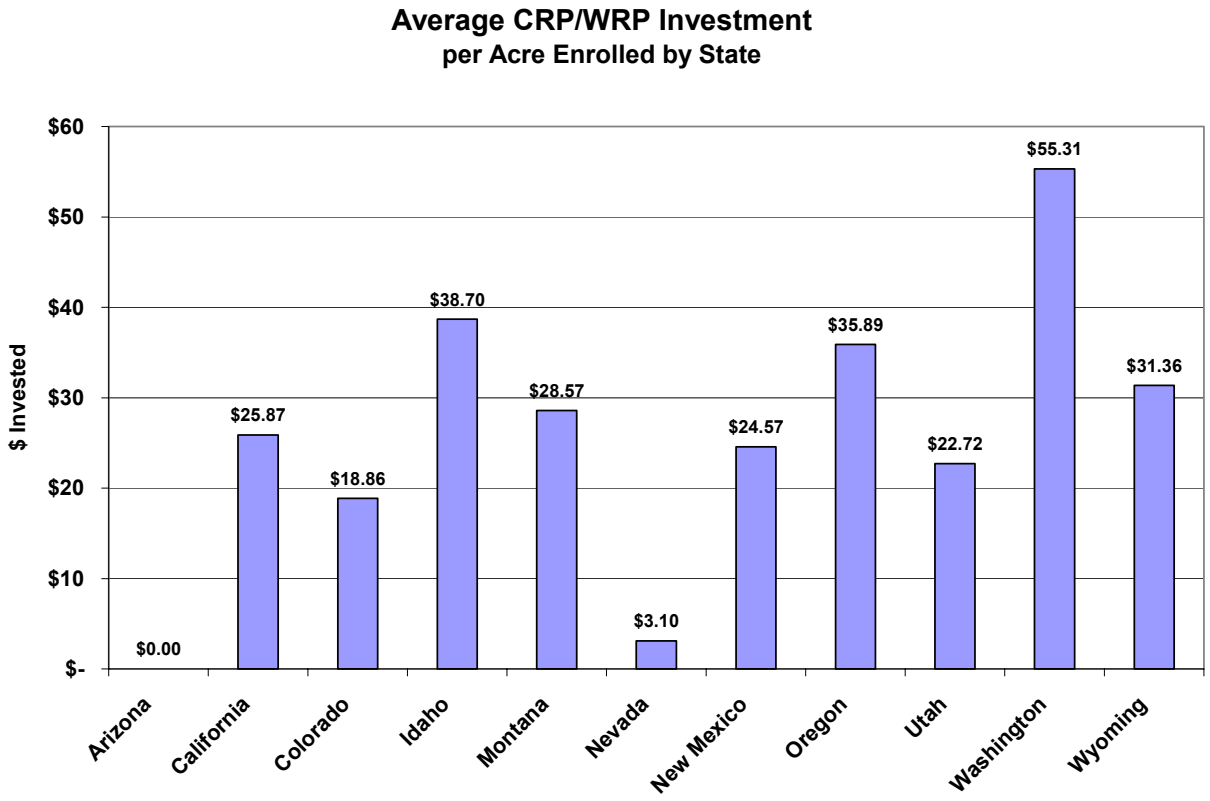

Average Recreational Income and CRP/WRP Investment
per Reporting County by State
$(1000's)
$2,500
$2,000
$1,500
$1,000
$500
$-
Recreational Income
CRP/WRP Investment
$99
$-
$130
$136
$220
$927
$26
$696
$140
$2,087
$38
$4
$122
$680
$98
$587
$77
$278
$71
$1,611
$251
$385
Arizona
California
Colorado
Idaho
Montana
Nevada
New Mexico
Oregon
Utah
Washington
Wyoming

Figure 5


Average CRP/WRP Investment
per Acre Enrolled by State
$ Invested
$60
$50
$40
$30
$20
$10
$-
$0.00
$25.87
$18.86
$38.70
$28.57
$3.10
$24.57
$35.89
$22.72
$55.31
$31.36
Arizona
California
Colorado
Idaho
Montana
Nevada
New Mexico
Oregon
Utah
Washington
Wyoming