ESTIMATED ECONOMIC IMPACT OF FEDERAL AGRICULTURAL CONSERVATION EASEMENT PROGRAMS (ACEP) ON COLORADO, 2008-2017

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[3] Including: the Colorado Cattlemen's Agricultural Land Trust (CCALT), Colorado Open Lands (COL), The Nature Conservancy (TNC), Colorado West Land Trust (CWLT), Yampa Valley Land Trust (YVLT), and Palmer Land Trust (Palmer).

EXECUTIVE SUMMARY

Between 2009 and 2017, federal Farm Bill investments in conservation easements in Colorado totaled some $80 million in 2018 inflation-adjusted dollars to support the conservation of more than 129,000 acres of farm and ranch lands. Nationwide, the Agricultural Conservation Easement Program-Agricultural Land Easement (ACEP-ALE) program expects to support private lands conservation projects totaling the mandatory spending level of $250 million in the 2018 fiscal year, or about 7% of anticipated demand and 50% of spending allocated to ACEP-ALE in 2016-17.

In anticipation of the 2018 Farm Bill debate, the Colorado land trust community has collaborated with Colorado State University to understand better the economic stimulus created by Farm Bill conservation easement programs in Colorado. We report the estimated economic impact of federal conservation easement payments to Colorado farmers and ranchers over the past two Farm Bills (2009-17).

Federal payments are economic stimulus from the perspective of the state economy. This stimulus should affect production, sales, job creation, land values, tax revenues and the like. Our economic impact modelling approach consisted of a survey to estimate how conservation easement recipients spend (or save) their payments and then 'shocking' the relevant sectors that have received injections of funds, in order to estimate total economic activity generated from those expenditures.

Some 122 parcels enrolled in a federal agricultural conservation easement program in Colorado between 2009 and 2017. Of those 122, we surveyed a sample of 68 landowners of the easements held by our partners in the Colorado land trust community and achieved an effective response rate of 66.15%.

Our survey results showed 37.2% of federal conservation easement participants in Colorado changed their agricultural practices in some way due to the easement payment including: improved irrigation (27.9%), increased acreage (14%), and changes in crop mix and rotation (2.3%). Some 9.3% of survey respondents noted an improvement in their yields attributable to participation in the federal program and 11.6% of respondents indicated that they added outdoor recreation opportunities to their operations, for a total reported increase of 255 recreation days.

We found that over the last two Farm Bills the almost $80 million (2018$) in federal conservation easement payments to Colorado producers generated more than $174 million in economic activity in the state, associated with the creation of 1,102 Colorado jobs and almost $86 million in value-added. For every dollar of federal conservation easement investment in Colorado, $2.19 of economic activity is generated due to direct, indirect and induced spending in the state.

Land trusts leverage federal dollars to receive local, state, or private dollars. We found $36 million (2018$) in federal easement program funds were used to leverage $69 million of local, state, or private funds for a rate of leverage on federal investment of about 2 to 1.

We also found our sample is predominantly rural, with 70% of federal easement acreage and 82% of direct expenditures going to rural counties. The redistribution of dollars from urban centers to the more rural areas could have important implications on the health of rural economies. This is a substantial injection of dollars largely going to rural Colorado communities in support of a vibrant and robust agricultural economy.

We anticipate the results of this economic impact analysis can help to inform the discussion of the importance of these programs to the Colorado economy, particularly its rural communities.

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INTRODUCTION: PRIVATE LANDS CONSERVATION AND THE U.S. FARM BILL

Since 1933, the "Farm Bill" has been the primary agricultural and food policy tool of the US federal government. Farm Bills typically run on approximately 5-year cycles and contain titles addressing commodity programs, conservation, rural development, research, food and nutrition, farm credit, and agricultural trade, among others. The Agriculture Act of 2014 ("2014 Farm Bill") expires in 2018 and discussion of its replacement is currently ongoing. Although the food and nutrition programs benefiting rural and urban families with less economic opportunity comprise some three-fourths of the budget, Farm Bill programs can have a particularly strong influence on wellbeing in rural America.

Born in the "Dust Bowl" era, conservation was among the early motivations for the Farm Bill.[4] In the 1980s and 1990s, policy tools for agricultural land, water and soil conservation typically included cost share technical assistance (e.g., Environmental Quality Incentive Program (EQIP), Wildlife Habitat Incentive Program (WHIP), Conservation Security Program (CSP)) and/or incentivized fallow, set asides or other supply management tools (e.g., Conservation Reserve Program (CRP), Wetlands Reserve Program (WRP)).

Since the Federal Agriculture Improvement and Reform Act of 1996, 'working lands' programs have been an important feature of the Conservation Title. Working lands programs typically use conservation easements to encourage stewardship of non-agricultural public benefits on private agricultural lands. Importantly, unlike supply management tools, federal support for such private lands conservation programs should unambiguously create economic stimulus in rural America.

The Agricultural Conservation Easement Program-Agricultural Land Easement (ACEP-ALE) program under the 2014 Farm Bill succeeded the Grasslands Reserve (GRP) and Farm and Ranch Land Protection (FRPP) working lands programs of earlier Farm Bills.[5] The USDA Natural Resource Conservation Service (NRCS) administers ACEP-ALE. Between 2009 and 2017, federal investments in conservation easements in Colorado totaled some $80 million in 2018 inflation adjusted dollars to support the conservation of more than 129,000 acres of farm and ranch lands.[6] Nationwide, ACEP-ALE expects to support private lands conservation projects totaling the mandatory spending level of $250 million in the 2018 fiscal year, or about 7% of anticipated demand and 50% of spending allocated to ACEP-ALE in 2016-17.[7]

In anticipation of the 2018 Farm Bill debate, and at the advice of Congressional staff, the Colorado land trust community has collaborated with Colorado State University to understand better the economic stimulus created by Farm Bill conservation easement programs in Colorado. We report the estimated economic impact of federal conservation easement payments to Colorado farmers and ranchers over the past two Farm Bills (2009-17) on the state of Colorado. We anticipate the results of this economic impact analysis can help to inform the discussion of the importance of these programs to the Colorado economy, particularly its rural communities.

[4] See, for example: http://nationalaglawcenter.org/farmbills/conservation/; http://nationalaglawcenter.org/farmbills/

[5] NRCS ACEP-ALE homepage: https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/acep/

[6] Soil and Water Resource Conservation Act (RCA) program reports: https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/nra/rca/ida/?cid=stelprdb1187042

[7] USDA Offers Assistance to Protect Privately-Owned Wetlands, Agricultural Lands and Grasslands. https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/newsroom/releases/?cid=nrcseprd1365223

LITERATURE REVIEW: ECONOMIC IMPACT ANALYSES OF FARM BILL CONSERVATION PROGRAMS

Conceptually speaking, as 'new money,' federal payments are considered economic stimulus from the perspective of the state economy. This stimulus should affect production, sales, job creation, land values, tax revenues and the like. The amount of economic activity generated depends on the complexity of the economy stimulated, the leakage out of that market, the amount of investment the economy can absorb (e.g., unemployment rate), and the industrial sector(s) stimulated by the payments. Similarly, state programs can be considered economic stimulus to county and municipal economies if the boundaries of analysis are at the lower level jurisdiction.

Federal Farm Bill payments certainly stimulate state level economic activity. Potentially, they may be found to provide greater stimulus to rural areas of the state, which are generally less wealthy, thus creating a desirable distributional effect within states. If federal payments are tied to rendering private lands unproductive in an agricultural sense, even if the lands are fragile or of poor quality for agriculture, the net effect of the federal payments is ambiguous. If the payments create economic activity or value in addition to agricultural production, their effect is unambiguously positive.

Conservation Reserve Program (CRP)

Established in 1985, the CRP provided landowners rental payments to establish ground cover to reduce soil erosion, increase wildlife habitat, and to improve water quality, but to discontinue production agriculture on ecologically fragile lands. Lands enrolled in the CRP were subject to these conditions for ten to fifteen years after which they could return to production. The CRP typically contained three distinct stages: idling land, establishing (investing in) cover crop, and the eventual return of some proportion of the land to production after the program sunsets.

The economics literature contains a substantial number of studies on the economic impact of CRP using input-output (I-O) approaches (Devino et al., 1988; Martin et al., 1988; Mortensen et al., 1989; Standaert & Smith, 1989; Broomhall & Johnson, 1990; Hyberg et al., 1991; Taylor et al., 1994; Sullivan et al., 2004; Otto & Smith, 2015), econometric (Hamilton & Levins, 1998; Henderson et al., 1992), or computable general equilibrium (CGE) (Uri & Boyd, 1996; Olatubi & Hughes, 2002).

Mortensen et al. (1989) surveyed participants about new expenditures due to CRP payments to estimate more precisely new economic activity in the input-output analysis. Martin et al. (1998) collected survey data about product markets and input expenditures for similar reasons. Since CRP idled formerly productive land, most research found a negative economic impact from CRP to communities. Hyberg et al. (1991), Martin et al. (1998), Broomhall & Johnson (1991), Mortensen et al. (1989), and Devino et al. (1988) all found the CRP to have a negative economic impact, while Myers & Southerland (1989) found a positive short term economic effect due to a financial infusion from CRP payments. Olatubi & Hughes (2002) used a Computable General Equilibrium framework and found the Wetland Reserve Program – which also retired farmland – had an overall negative economic impact as well.

However, an input-output analysis will not fully capture the total economic value of agricultural land protection. Myers and Southerland's (1989) study of Baca County, Colorado demonstrated many economic benefits not captured in typical input-output analyses. Although the economic impact is not explicitly calculated, they found positive environmental impacts the CRP had on Baca County, due to large negative effects of wind erosion and scarce precipitation characteristic of traditional agricultural practices in the region. Lynch & Duke (2007) argued that economic benefits of protected agricultural lands include food security, environmental amenities, and planned community development and are associated with vibrant local economies. Local food supply diversifies the economy as well as provides value to residents with direct access to consumer markets.

Young & Osborn (1990), Feather et al. (1999), and Duane (2010) considered the environmental benefits associated with CRP enrollment such as air and soil quality, wildlife and biodiversity, and soil erosion. Wu & Weber (2012) estimated monetary benefits from reduced soil erosion due to CRP, but also consider increased recreational benefits. Similarly, Wilson et al. (2006) examined the relationship between CRP enrollment and recreational income, finding CRP participation negatively affected recreational income initially, but when a threshold number of protected acres was reached, it positively affected recreational income.

Farm Bill agricultural land conservation programs disproportionately affect smaller rural communities. Henderson et al. (1992) considered how the CRP might affect the number of businesses in rural communities and found that the size of the community affects the economic impact. Even within the same county, conservation programs will affect communities differently. Hamilton & Levins (1998) found the CRP did not affect economic well-being significantly, as defined by county level median household income and percent in poverty. However, they showed the CRP negatively affected economic well-being of some communities within the county, illustrating how scale can mask potentially important hot spot effects. Further, Martin et al. (1988) considered the economic effect on three counties in Oregon and concluded different effects for each county. Morrow County experienced a positive economic impact, while Umatilla County was affected negatively, with the difference attributed to the composition of the counties' economies.

Federal Agricultural Conservation Easement Programs

In the 1990s, the CRP was joined by three additional conservation programs: Farm and Ranch Lands Protection Program (FRPP), Grassland Reserve Program (GRP), and Wetlands Reserve Program (WRP). These newer programs aimed to protect agricultural land from urban development and encourage conservation practices. Unlike the CRP, the GRP and FRPP did not require enrolled lands to cease production. In the 2014 Farm Bill, these conservation programs evolved once more into the current Agricultural Conservation Easement Program (ACEP). Enrollment in these programs involves eligible farm, ranch, or wetlands placing a permanent agricultural conservation easement against the property through a bidding process and/or voluntary donation. Enrolled farm or ranch lands continue agricultural production activities under a conservation plan. Conservation easements are effective at keeping land in production, while providing private and public conservation benefits. For example, Feng et al. (2006) found that easements provide targeted benefits more cost-effectively than retiring land.

In contrast to the CRP, conservation easements present a cleaner economic effect. Landowners receive a one-time payment for enrolling their land in the conservation easement while continuing to produce on their land. The conservation plan might require changes in production practices, but in general the program acts like a monetary injection. Conservation easement values are calculated at the opportunity cost of the restriction to the landowner as estimated by a certified appraiser. In order to minimize taxpayer burden, easement payments are not more than the opportunity cost of the restriction and are typically substantially less due to programs (e.g.,. state and federal tax credits) that incentivize donation of part or all of the easement value. Federal program payments are leveraged further with state and local programs (e.g., Great Outdoors Colorado (GOCO); Colorado Conservation Easement Tax Credit Program), increasing the reach and impact of the federal programs on the ground.

Surprisingly, we find no published economic impact studies on the more recent Farm Bill agricultural land easement programs. However, the literature does provide guidance as to how we might do so. Although agricultural conservation easements share many characteristics

with the CRP and WRP, results of those analyses cannot be applied directly to conservation easements. Since program participants continue to farm or ranch eased land, expenditure patterns should differ from the CRP. In this paper, we consider the total economic impact of the federal Agricultural Conservation Easement Program-Agricultural Land Easements, Farm and Ranch Lands Protection Program, and Grassland Reserve Program on the state of Colorado from 2009-17 using an input-output approach and based on a survey of payment recipients over that period.

In order to analyze input-output from an agricultural land conservation program, we must know how the conservation payments are spent. Esseks et al. (2013) found that 69% of participants used some of the money for personal or household expenditures and 84% of participants used some amount for agricultural improvements or inputs. Similarly Duke et al. (2016) found that 64% of participants used payments for personal uses, but found a much smaller proportion of participants put money toward agricultural expenses, 48%, than was found by Esseks. Clark (2010) found that 77% of participants used the payments toward savings or investment.

Participants typically put some proportion of the payment toward agricultural inputs, whether it is a change in farming practices, improved agricultural capital, or expanding production onto new land. Clark (2010) found that 17% of Ohio participants diversified their crops and 21% added farming businesses with their easement payments. Similarly, Esseks et al. (2013) found that 18% of surveyed participants diversified crops, 16% decreased diversification, and of those who added crops 25% added specialty crops.

In terms of the public environmental benefits provided by agricultural land protection, Merenlender et al. (2004) argued that conservation easements overstate the benefits they provide due to lack of data and enforcement. Kiesecker et al. (2007) refuted that claim, and provide data that easements effectively provide non-market benefits. Wallace et al. (2008) examined the benefits of easements in Colorado and concluded documents understated the conservation benefits created.

If the motivation to landowner enrollment can provide a guide to the benefits of participation, Vizek & Nielsen-Pincus (2017) found dual motivations of private economic incentives and public environmental benefits. At least one third of respondents agreed that conservation easements are positive for wildlife and preservation against further development, suggesting that some landowners participated in order to supply a public good. Horton et al. (2017) found that 51% of participants enrolled due to financial reasons, but surprisingly few mentioned financial changes after the easement. While 74% of landowners cited financial benefits as an outcome of the easement, perhaps monetary incentives did not have a long-lasting impact. Many of the easements in our sample were recorded in the last two months of the calendar year, potentially suggesting that income tax liability management was among the motivations for completing enrollment. We captured the private economic impact of increased recreational income, for example, for conservation easement participants in our survey; however, we restricted our analysis to the quantifiable market effects and did not include additional economic benefits, such as environmental and other non-market benefits in our calculations.

METHODS

Previous economic impact analyses of Farm Bill conservation programs limited their focus to the CRP. We expanded this treatment by using similar methods to evaluate the economic impacts of federal agricultural conservation easement programs in Colorado. Following Martin et al. (1988) and Hamilton & Levins (1998), we surveyed federal agricultural conservation easement program participants in order to derive a profile of their expenditure and production changes due to easement payments. In contrast to the CRP, individuals enrolled in the agricultural conservation easement programs may change their management practices, but the land remains in production. We evaluated survey expenditure results using the Economic Impact Analysis for Planning (IMPLAN) program to calculate the total economic impacts of conservation easement payments to the state of Colorado.

Our economic impact modelling approach consists of a two-step process. The first step of this process was to collect survey data to allow us to estimate how conservation easement recipients spend (or save) their payments. These expenditure patterns are then applied to the IMPLAN model, 'shocking' the relevant sectors which have received injections of funds, in order to estimate total economic activity generated from those expenditures, including the direct, indirect and induced, or 'multiplier' effects.

For this analysis we considered the impacts of easement payments to the state of Colorado, meaning that indirect and induced effects outside the state were not included. Placing the boundaries of analysis at the state level can mask some of the potentially interesting effects that accrue to individual rural communities, but allowed us to look at the broad impacts of Farm Bill programs to Colorado writ large. Following Hyberg et al. (1991) we assumed federal conservation easement payments are a new injection into the Colorado economy, rather than a government transfer from taxpayers to taxpayers. In addition, the Farm Bill agricultural conservation easement programs typically involve a state and/or local match of funds. We discuss these state funds, but do not include them in the economic impact analysis, as they are not new dollars into the state. In addition, land values, non-market benefits, and changes in farm productivity resulting from the easement payments are excluded from the economic impact analysis. This means that our estimates of economic impact are conservative estimates of the economic value that these programs bring to the state of Colorado.

Some 122 parcels were enrolled in a federal agricultural conservation easement program between 2009 and 2017 in the state of Colorado. We sent surveys to a sample of 67 landowners (of the total 122) of the easements held by our partners in the Colorado land trust community. Easement holders include: the Colorado Cattlemen's Agricultural Land Trust (CCALT), Colorado Open Lands (COL), The Nature Conservancy (TNC), Colorado West Land Trust (CWLT), Yampa Valley Land Trust (YVLT), and Palmer Land Trust (Palmer). This partnership with the land trusts allowed us to send the survey to conservation easement grantors from a known and trusted organization, potentially improving return rates.

The survey consisted of ten questions, crafted to capture how participants spent their easement payment, how their production practices changed, as well as new sources of income resulting from the easement payments. The survey instrument is found in Appendix C. The survey instrument was approved by the Colorado State University Research Integrity and Compliance Review Office (RICRO ID # 223-18H, Category 2 exempt). Survey distribution was conducted following the Dillman method, following the survey-postcard-survey approach, and administered in partnership with the land trust holding the easement.

Contact information was available for 65 of the 67 landowners. Of the 65 landowners surveyed, 43 surveys were returned with usable responses for an effective response rate of 66.15%. Survey results were then combined with information related to the easement grantor contained in the land trust's database. Land trust data related to the easement included: county, year easement was recorded, federal funding amount, federal program, and match amount from other state and local level partners.

Although we have a high response rate of 66.15% of those sampled, non-response bias could still affect our data. Easement grantors who did not respond might have certain characteristics compared to respondents (Champ, 2003). Since we have basic data for our sample of easements, we test to see if non-respondents receive a significantly different amount of federal funds as compared to respondents. We conclude that there is not a statistically significant difference between respondents and non-respondents with a p-value of 0.38. That is, the probability that the two groups are the same based on federal fund amounts is 38%, so we fail to reject the

hypothesis that they are statistically the same. Similarly, we fail to reject that the two groups are the same based on the appraised value of the easement (p=0.51), number of acres enrolled in the easement (p=0.89), and the calendar year the land was enrolled (p=0.77).

Using the expenditure profiles from our surveyed sample, we extrapolated to the entire population of conservation easements in Colorado. We did not have data on the 55 conservation easements outside of our sample and could not conduct more rigorous tests to check for differences between the two groups. Since we found no evidence that respondents differed from non-respondents in our sample, we concluded that our sample is representative of the entire population. As such we assumed that the entire $74.5 million federal conservation easement dollars were spent in the same manner as our sample of $34 million. Our sample comprises 55% of all conservation easements, 62% of acres enrolled, and 45% of federal easement dollars. A comparison of data from the population of Colorado conservation easements and our sample is found in Tables 1-4.

TABLE 1: Comparison of Population and Sample (Total)

YEAR	TOTAL EASEMENTS		ACRES		NOMINAL FEDERAL DOLLARS	
	POPULATION	SAMPLE	POPULATION	SAMPLE	POPULATION	SAMPLE
2009	27	2	12,488	1,896	$5,563,500	$1,047,084
2010	10	6	26,013	2,436	$6,515,900	$1,809,649
2011	35	14	48,687	2,664	$8,484,000	$4,671,087
2012	6	13	15,294	12,541	$7,172,800	$3,481,337
2013	9	7	2,465	10,712	$16,049,700	$2,253,616
2014	7	4	5,182	4,308	$4,182,000	$1,823,525
2015	9	10	3,184	22,047	$4,353,200	$8,803,452
2016	10	3	6,185	2,028	$12,962,500	$1,449,120
2017	9	4	9,213	6,346	$9,198,900	$5,924,000
2018	0	4	0	14,736	$0	$2,562,500
Total	122	67	128,710	79,714	$74,482,500	$33,825,370

TABLE 2: Comparison of Population and Sample (FRPP)

YEAR	FRPP EASEMENTS		FRPP ACRES		NOMINAL FRPP DOLLARS	
	POPULATION	SAMPLE	POPULATION	SAMPLE	POPULATION	SAMPLE
2009	26	2	7,012	1,896	$5,541,100	$1,047,084
2010	6	6	13,152	2,436	$6,451,900	$1,809,649
2011	34	14	36,483	2,664	$8,394,700	$4,671,087
2012	5	12	14,267	4,663	$7,134,400	$3,193,337
2013	2	6	1,007	3,038	$16,036,900	$1,853,616
2014	0	4	0	4,308	$9,800	$1,823,525
2015	0	8	0	21,870	$396,600	$8,398,000
2016	0	1	0	1,727	$0	$600,000
2017	0	1	0	1,573	$0	$800,000
2018	0	1	0	186	$0	$762,500
Total	73	55	71,920	44,361	$43,965,400	$24,958,798

Sample data were reported at the time the landowner received the federal payment. Population data were obtained from the NRCS and were reported at the time the financial obligation was made. Due to time lags these may not be the same date, and as such the same conservation easement may be recorded in different fiscal years based on the data source.

For the second step of the process, we used the expenditure information contained in the survey to calculate the economic impacts of federally supported conservation easements on the state of Colorado. Economic impact analysis is a commonly used methodology to determine the effects of an activity (in this case easement payments) on the broader economy (in this case the state of Colorado). The economic impacts in our analysis stem from the easement recipients spending their easement payments in the Colorado economy. This initial spending is the 'direct effect'. Economic Impact Analysis then traces the linkages of these direct effects to other related sectors in the economy, creating 'indirect effects' (in the form of expenditures on inputs)

TABLE 3: Comparison of Population and Sample (GRP)

YEAR	GRP EASEMENTS		GRP ACRES		NOMINAL GRP DOLLARS	
	POPULATION	SAMPLE	POPULATION	SAMPLE	POPULATION	SAMPLE
2009	1	0	5,476	0	$22,400	$0
2010	4	0	12,862	0	$64,000	$0
2011	1	0	12,203	0	$89,300	$0
2012	1	1	1,028	7,878	$38,400	$288,000
2013	7	1	1,458	7,674	$12,800	$400,000
2014	0	0	0	0	$174,700	$0
2015	0	0	0	0	$0	$0
2016	0	0	0	0	$13,500	$0
2017	0	0	0	0	$22,500	$0
2018	0	0	0	0	$0	$0
Total	14	2	33,027	15,552	$437,600	$688,000

TABLE 4: Comparison of Population and Sample (ACEP)

YEAR	ACEP EASEMENTS		ACEP ACRES		NOMINAL ACEP DOLLARS	
	POPULATION	SAMPLE	POPULATION	SAMPLE	POPULATION	SAMPLE
2009	0	0	0	0	$0	$0
2010	0	0	0	0	$0	$0
2011	0	0	0	0	$0	$0
2012	0	0	0	0	$0	$0
2013	0	0	0	0	$0	$0
2014	7	0	5182	0	$3,997,500	$0
2015	9	2	3184	177	$3,956,600	$405,452
2016	10	2	6185	301	$12,949,000	$849,120
2017	9	3	9213	4773	$9,176,400	$5,124,000
2018	0	3	0	14550	$0	$1,800,000
Total	35	10	23763	19801	$30,079,500	$8,178,572

and 'induced effects' (in the form of employee spending in the economy). Together, the direct, indirect and induced effects reflect the 'multiplier effect' of easement payments on the Colorado economy.

Economic impacts are typically reported in terms of output (total sales), employment and value-added.[8] The most common approach is to use the IMPLAN software model to examine how much economic activity is generated by easement payments. The IMPLAN software (www.implan.com), originally developed by the U.S. Forest Service, establishes the characteristics of economic activity in terms of 528 economic sectors. Drawing on data collected by federal and state government agencies, the IMPLAN model uses regional industry purchasing patterns to examine how changes in one industry will affect others. The IMPLAN model has been used as the basis for thousands of economic analyses throughout the United States. The most recent version of IMPLAN data (2016) was used to estimate the economic impacts of conservation easement payments. More technical details on the input-output methodology and definitions of key economic impact terms can be found in Appendix B.

RESULTS

Expenditure and Economic Impact Results

Survey respondents reported how they spent their conservation easement compensation. Specifically they reported the proportion of the easement that they invested in each of the following categories:

- **Invested in Agriculture –** the proportion of their easement payment invested back into their agricultural operation. This can come in the form of the purchase of inputs such as livestock, labor, equipment or other infrastructure such as irrigation equipment.
- **Diversification –** the proportion of their easement payment invested in non-farm land-based enterprise diversification. This can take the form of adding agri-tourism, hunting/fishing or other outdoor recreation activities to their operation.
- **Land Purchase/Real Estate –** the proportion of their easement compensation invested in the purchase or lease of additional land in order to expand their agricultural operation.
- **Education –** the proportion of their easement compensation used toward the post-high school education of a family member
- **Savings –** the proportion of their easement payment invested in savings, which could include retirement funds, the stock market as well as savings accounts
- **Debt –** the proportion of their easement compensation used to pay down debt. For our IMPLAN categories, debt and savings were combined in the model.
- **Purchase of non-business related goods –** the proportion of their easement payment spent on retail goods such as recreational vehicles, vacations or a home.
- **Other –** if this category was selected, respondents provided additional expenditure categories including: charitable giving, daily expenses, and attorneys.

Survey results indicated the greatest proportion of federal conservation easement compensation was invested in debt repayments (51.7%), followed by savings (17.3%), and re-investment in production agriculture (15.1%) (Figure 1). Debt repayment was the most frequently reported investment category, with 58.1% of respondents reporting using some portion of their easement payment on debt reduction. Some 53.4% of respondents indicated that they reinvested at least some of their easement compensation back into their agricultural operation, and 37.2% indicated that they put some of the money into savings (Table 5).

[8] Value-added is net revenue, or the difference between what someone sells a good for and what one pays for all of the components used in producing the good. For reference, this is the same measure as Gross Domestic Product.

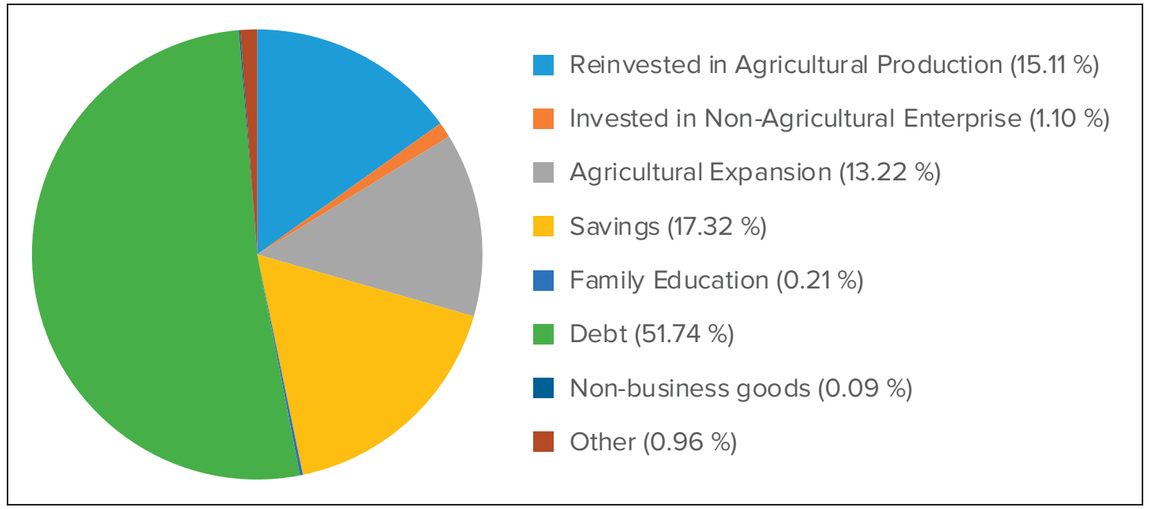

FIGURE 1: Proportion of Expenditures by Category

The published literature notes a wide range of investment strategies for conservation easement payments, and the results from this survey are in line with the literature. Duke & Ilvento (2004) found 54.2% of easement landowners reported put some proportion of easement revenues toward savings. Clark (2010) found in Ohio 63% of landowners used payments for investment and savings. In contrast, Lynch (2007) found only 28% of respondents put money toward savings, but 35% used payments to reduce debt. Esseks (2006) reported 55% of respondents put some of their payment toward debt relief. Our survey results follow more closely Duke & Ilvento (2004) and Clark (2010) with 47.7% of landowners allocating some proportion of their easement payment toward savings.

The literature also provides a wide range of results related to the proportion of easement dollars used to repay debt. Clark (2010) found 35% of easement payment dollars went to debt repayment. Some 58.1% of our survey respondents indicated that 51.7% of easement revenues went toward debt repayment, indicating that our respondents allocated a greater proportion of their easement payment towards debt repayment than Clark (2010) found.

TABLE 5: Reported Agricultural Conservation Easement Payment Use

EXPENDITURE CATEGORY	PERCENTAGE OF RESPONDENTS REPORTING USE	PERCENTAGE OF TOTAL EXPENDITURES
Investment in Agriculture	53.49	15.11
Diversification	6.98	1.10
Land Purchase/ Real estate	27.91	13.22
Savings	37.21	17.32
Debt	58.14	51.74
Non-Business related goods	4.65	0.09
Education	4.65	0.21
Other/Charity	6.98	1.20

TABLE 6: Sample Federal Conservation Easement Payments, 2018$

YEAR	NOMINAL FEDERAL $	REAL FEDERAL $	FRPP REAL FEDERAL $	GRP REAL FEDERAL $	ACEP REAL FEDERAL $
2009	$1,047,084	$1,215,243	$1,215,243	$0	$0
2010	$1,809,649	$2,084,429	$2,084,429	$0	$0
2011	$4,671,087	$5,310,994	$5,310,994	$0	$0
2012	$3,481,337	$3,794,987	$3,482,656	$312,331	$0
2013	$2,253,616	$2,422,604	$1,995,072	$427,531	$0
2014	$1,823,525	$1,947,610	$1,947,610	$0	$0
2015	$8,803,452	$9,256,644	$8,830,460	$0	$426,185
2016	$1,449,120	$1,503,364	$622,459	$0	$880,904
2017	$5,924,000	$6,034,865	$829,946	$0	$5,204,920
2018	$2,562,500	$2,602,968	$774,542	$0	$1,828,426
Total	$33,825,370	$36,173,708	$27,093,410	$739,863	$8,340,435

Our research analyzed a sample of conservation easement payments in Colorado over the last two Farm Bills (2009 to 2017). In order to do this we took the nominal annual values of the conservation payments over the period and brought them to real February 2018 dollars (Table 6). Table 6 shows Colorado federal easement payments by year. The first column shows that the total Colorado federal easement payments during the period was $33,825,370. Converted to 2018 dollars, real federal easement payments totaled to $36,173,708 (2018$). Some $8,340,435 of these easement dollars came from the ACEP program, $27,093,410 from the FRPP program and $739,863 from the GRP program.

We assume that our sample of respondents is representative of the population of easement holders in Colorado and apply expenditure proportions to the entire population, which accounted for $79,985,095 (2018$) in payment to Colorado agricultural landowners. These payments are spent in Colorado's economy and have important direct and multiplier effects to the state. In order to quantify these impacts on the economy we conducted an economic impact analysis using the IMPLAN software (see Appendix B). We used the expenditure profiles outlined in Table 5 to understand how the easement payment dollars are spent within the Colorado economy. Figure 2 illustrates the distribution of easement dollars over the 10-year period as well as the source of easement funding. All of the Colorado easement payments were from FRPP until 2012, when GRP first became part of the easement portfolio (Figure 2). ACEP succeeded the FRPP and GRP programs in 2014. Figure 2 also illustrates that easement payments are not constant from year-to-year with spikes in Colorado easement payment receipts in 2010, 2014 and 2017.

In order to calculate the economic impacts of the total $79,985,095 (2018$) in agricultural conservation easement payments on the state of Colorado, we used the proportions provided by the expenditure profiles of our sample landowners (Table 5). Our sample of survey respondents accounted for 55% of the population of

TABLE 7: Total Direct Expenditures by Category

EXPENDITURE CATEGORY	TOTAL DIRECT EXPENDITURES
Investment in Agriculture	$ 12,088,460
Diversification	$ 882,317
Land Purchase/Real estate	$ 10,571,180
Savings and Debt	$ 55,235,311
Non-Business related goods	$ 841,037
Education	$ 170,372
Other/Charity	$ 196,417

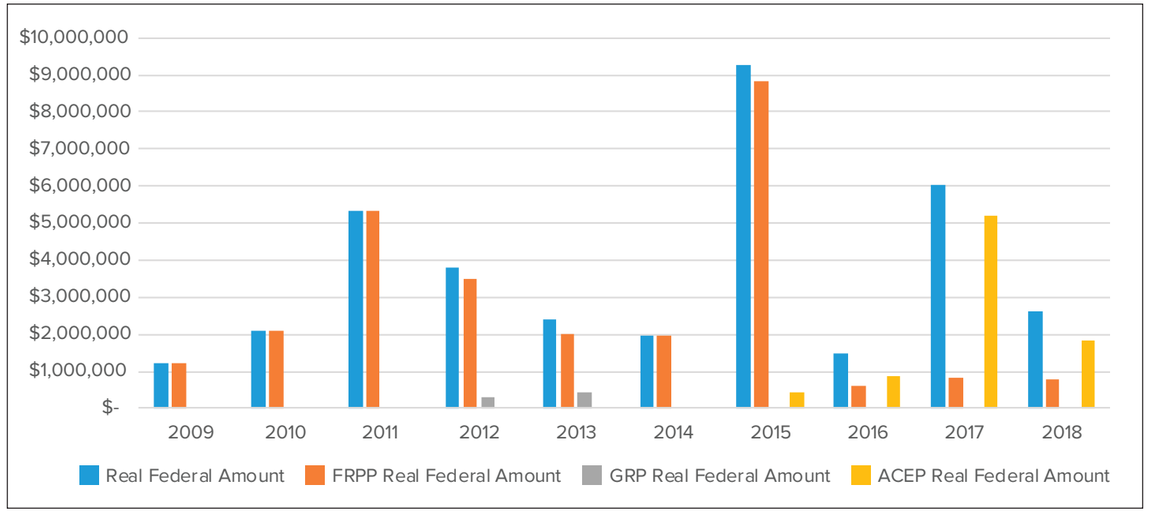

FIGURE 2: Federal agricultural conservation easement payments to Colorado, 2009-2018

Colorado easement grantors and 45% of the conservation easement funds awarded. Table 7 shows the distribution of these almost $80 million in easement revenues among the survey investment categories based on the proportions found in the survey results. By far the largest expenditure category was over $55 million in debt repayment and savings.

We used this direct investment profile to 'shock' each expenditure category in our input-output model and determined the multiplier (indirect and induced) effects of the spending. The IMPLAN input-output model contains 529 different sectors of the economy, which is a higher degree of granularity than we were able to capture in our survey of easement grantors. To create our expenditure categories in IMPLAN, we aggregated existing IMPLAN sectors to create categories for each of the types of expenditures included in the survey. For a full listing of the IMPLAN sectors included in each expenditure category please refer to Appendix C. The economic impacts from federal conservation easement payments to Colorado over the last two Farm Bills generated from our input-output model are found in Table 8.

All told, we found that $79,985,095 in federal agricultural conservation easement program spending created more than $174 million in new economic activity to the state of Colorado over the past two Farm Bills (2009-2017). The $174 million in new economic activity created 1,101 new

TABLE 8: Economic Impacts of Federal Conservation Easement Payments on Colorado, 2018$

IMPACT TYPE	EMPLOYMENT	LABOR INCOME	VALUE ADDED	OUTPUT
Direct Effect	485.4	$23,445,104	$35,256,988	$79,420,511*
Indirect Effect	338.2	$19,153,346	$28,452,221	$55,021,219
Induced Effect	278.1	$12,886,437	$22,732,155	$39,595,043
Total Effect	1,101.7	$55,484,887	$86,441,364	$174,036,773

*Note that this value is slightly lower than the total easement payments due to margining in the retail sectors

jobs and $86 million in value-added in Colorado over the period.

The generated economic activity is associated with a Colorado level output multiplier of 2.19 for financial injections from federal agricultural conservation easements. This means that for every dollar of federal conservation easement payments in the state, $2.19 dollars of direct, indirect and induced economic activity is generated in Colorado. This multiplier is larger than we typically see due to the large economic multipliers associated with the banking sector, which is where over $55 million of our easement payments were invested in the form of debt repayment and contributions to savings.

Table 9 illustrates in more granular detail the sectors of the Colorado economy that are most affected by the $79,985,095 in federal conservation easement payments. The banking sector is affected most by the easement payments, which is unsurprising as our survey found that debt repayment and investing in saving accounted for 69% of all conservation easement expenditures. Other sectors associated with direct spending, such as agricultural reinvestment and retail sectors, also ranked in the top ten. Due to the multiplier effects of the easement payment spending many of the sectors in the top ten are not areas where direct payment expenditures occurred. The industrial sectors that experience relatively large effects all have linkages to the banking sector and include: wholesale trade, insurance carriers and data processing.

Over $174 million in generated economic activity from federal agricultural conservation easement payments is a sizable contribution to the Colorado economy, but this value is an underestimate of the potential impacts to rural communities from the conservation easement payments. The federal dollars are a substantial injection of dollars largely directed to rural communities. Since Economic Impact Analyses only included new dollars injected into the regional (here Colorado) economy, substantial state matching funds are not included in the easement expenditure calculations and thus not in the total economic activity generated from the easements. The state matching funds of almost $69 million (real 2018 dollars) are about double the $36 million federal dollars associated with the conservation easements in our sample (Table 10). We might expect a total state match in the neighborhood of $150 million, if our sample is representative of the entire population of 122 federally supported conservation easements. Just as with the federal agricultural conservation easement payments the largest state matching funds are associated with the FRPP program with over $59 million in state matching funds. It is likely payment recipients do not distinguish between the sources of funds supporting their participation in the easement program. As a result, expenditure patterns are likely the same, but would be scaled to a higher direct impact, albeit at a smaller scale of analysis and, therefore, a smaller multiplier effect per dollar of direct expenditure.

TABLE 9: Top Ten Colorado Industries Affected by Agricultural Conservation Easement Compensation

DESCRIPTION	EMPLOYMENT	LABOR INCOME	VALUE ADDED	OUTPUT
Banking sector*	393.9	$24,516,092	$30,754,115	$70,118,196
Real estate	99.7	$1,834,828	$12,495,326	$18,386,135
Ag reinvestment*	113.3	$2,792,746	$3,394,145	$14,257,650
Owner-occupied dwellings	0	$0	$3,009,048	$4,638,781
Retail*	48	$1,549,287	$2,510,684	$3,936,442
Insurance agencies, brokerages, and related activities	21.7	$1,253,114	$1,566,467	$3,599,156
Wholesale trade	14.6	$1,268,870	$2,181,336	$3,359,130
Management of companies and enterprises	12	$1,597,661	$1,895,692	$3,046,577
Insurance carriers	5.8	$579,596	$1,081,858	$2,287,652
Data processing, hosting, and related services	7.4	$803,896	$849,265	$2,181,135

*Custom aggregated sector, for details on the industries in these sectors refer to Appendix C

TABLE 10: Sample State Matching Funds for Federal Agricultural Conservation Easement Payments, 2018$

YEAR	NOMINAL MATCH $	REAL MATCH $	FRPP REAL MATCH $	GRP REAL MATCH $	ACEP REAL MATCH $
2009	$2,584,525	$2,999,592	$2,999,592	$0	$0
2010	$5,629,655	$6,497,987	$6,497,987	$0	$0
2011	$9,162,231	$10,390,412	$10,390,412	$0	$0
2012	$7,421,677	$8,080,428	$7,742,069	$338,359	$0
2013	$5,681,296	$6,106,365	$5,181,828	$924,536	$0
2014	$2,546,375	$2,720,249	$2,720,249	$0	$0
2015	$18,130,988	$19,064,143	$18,771,443	$0	$292,700
2016	$2,073,583	$2,151,202	$1,338,288	$0	$812,914
2017	$4,802,950	$4,917,945	$1,876,663	$0	$3,041,282
2018	$6,068,500	$6,164,335	$1,549,083	$0	$4,615,252
Total	$64,101,780	$69,092,658	$59,067,613	$1,262,895	$8,762,149

Although state dollars are not an injection of new money into the economy, there perhaps is an important redistribution of funds to less economically fortunate rural communities, which may create positive economic outcomes. Our economic impact results do not include any of these redistribution effects and thus are likely an underestimate of the total economic activity generated to the state of Colorado.

In addition, we do not evaluate the potentially significant investment effects that may come from conservation easement payments. We treat the conservation easement payments as a one-time influx of dollars into the Colorado economy, which under-estimates the positive economic outcomes stemming from the conservation easement payment. For example, if the easement payment is used to invest in better technology, that improved technology may have lasting positive effects on the economy that are not captured in our analysis.

Summary Results from the Survey

In addition to gaining a better understanding of expenditure patterns and economic impacts stemming from federal agricultural conservation easement program payments to the state of Colorado, survey questions allowed us to gain a better understanding of how conservation easement payments are used by Colorado farmers and ranchers. From our sample, the average real federal conservation easement payment was $540,856, with an average of 1,190 acres enrolled or $424 per acre. The average real non-federal match was $1,031,234, indicating federal funds are leveraged at 2:1 in Colorado, ignoring potential state and federal tax credit program participation. The vast majority (55 of 67) of our sample of agricultural conservation easements in the state were administered through the FRPP, while 10 were administered through ACEP/ALE, and two through GRP.

Rural-Urban Continuum Codes (RUCC) classify counties based on their population and geographic location near urban centers. A RUCC score of 1 signifies a metro county

with a population greater than 1 million people, while a score of 9 signifies a county not adjacent to a metro county and having an urban population of less than 2,500.

Figure 3 shows a map of the locations of our sample of Colorado conservation easements and Figure 4 shows the RUCC. Unsurprisingly, our sample is predominantly rural, with 61% of easements located in a county with a RUCC score of 7 or greater. Further, 70% of acres under federally supported easement programs are located in these rural counties, and 82% of federal easement expenditures go to these counties. Only seven of the conservation easements were located in counties with a RUCC score of less than 3.

This finding supports the contention that federally supported agricultural conservation easement funds are used for the environmental public good ecosystem services generated from agricultural lands in rural counties, rather than as an urban planning or growth management tool. Potentially, the per-acre financial cost of protection can be minimized using this strategy rather than prioritizing parcels in the direct path of population growth, higher (sub-urban) incomes, and more intensive land development.

Our survey results also showed 37.2% of federal conservation easement participants in Colorado changed their agricultural practices in some way due to the easement payment. Some commonly reported changes include: improved irrigation (27.9%), increased acreage (14%), and changes in crop mix and rotation (2.3%). Perhaps in part due to these changes in practices, 9.3% of survey respondents indicated that they noted an improvement in their yields attributable to participation in the federal program. This changes in practices could also have lasting benefits to more efficient water use from improved irrigation. Of interest to rural development is the result that 11.6% of respondents indicated that they added outdoor recreation opportunities (a strategy that has the potential to diversify farm incomes) to their operations, for a total reported increase of 255 recreation days.

Other survey results illustrate some of the non-market benefits that we were not able to capture in our input-output analysis:

- One respondent indicated that the easement money was a contributing factor that allowed them to get through difficult years of drought. Economic impact analysis is not able to capture these tipping point effects or risk portfolio management effects of different policies and expenditures.
- One respondent mentioned more grazing for elk on their property. Wildlife benefits can often be substantial but difficult to quantify.
- Another respondent was able to revitalize an older orchard with easement money, which should create economic returns for decades. However, we assumed a one-time injection of funds shocking various industrial sectors was the total effect and ignored any possibility of lasting effects over time, which are actually quite likely.
- Agricultural conservation easement payments allowed other respondents to build vacation rental homes, invest in river projects in order to provide fishing recreation, assist in a company sale, and lease federal land for grazing; valuable investments, none of which were well captured in terms of economic impact.

CONCLUSIONS

Through a survey of federal conservation easement program participants over the past two Farm Bills, we were able to examine the economic impact of federal money coming into the state of Colorado, as well as better understand where and how easement grantors invest their conservation easement payments. Expenditure patterns showed that the majority of agricultural conservation easement payment recipients put some of the money toward paying off debt and the second most common use was investing back into the agricultural operation. This is similar to past research that has shown a large proportion of payments being used for debt

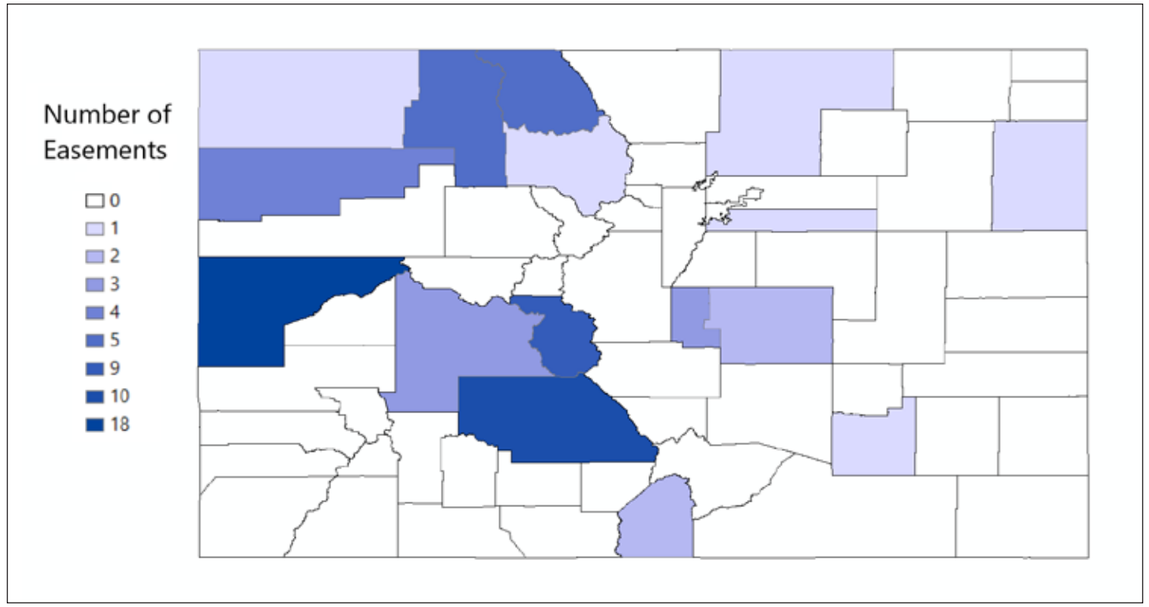

FIGURE 3: Colorado Conservation Easement Sample Map

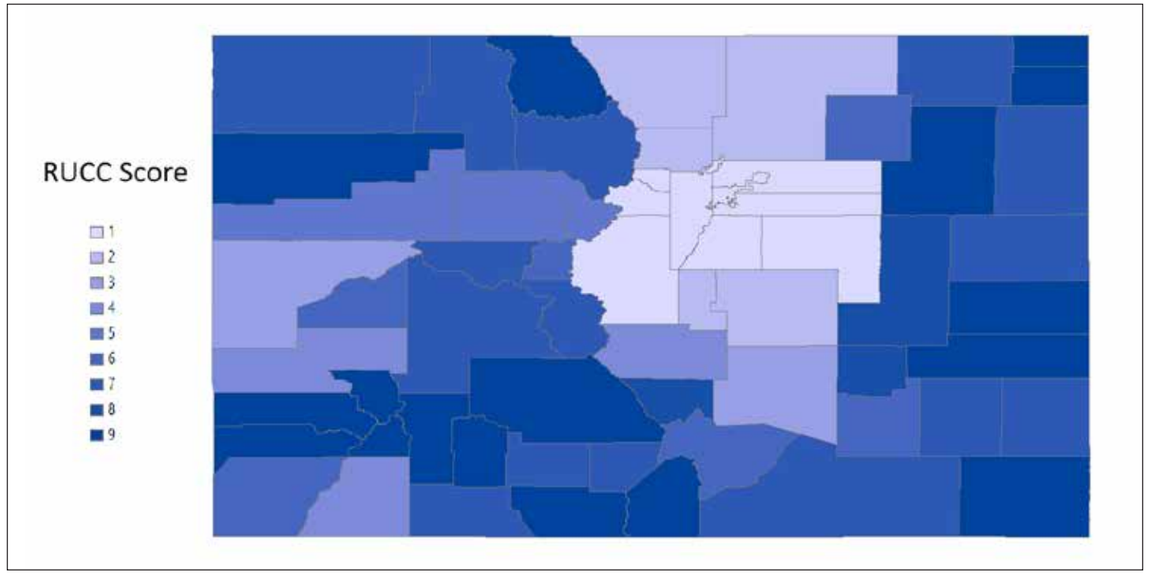

FIGURE 4: Rural-Urban Continuum Codes for Colorado

payments. In total $80 million (in 2018 inflation adjusted dollars) in federal agricultural conservation easement payments were received by Colorado farmers and ranchers from 2009 to 2017.

The total economic impact of these $80 million in direct expenditures amounted to greater than $174 million in new economic activity to the state of Colorado over the last two Farm Bills. In addition, this federal spending created 1,101 new jobs, and $86 million in value-added. Spending from the federal agricultural conservation easements has an estimated output multiplier of 2.19, which means that for every $1 dollar of federal conservation easement expenditures in Colorado, $2.19 dollars of economic activity is generated in the state.

The sample of federal investment of $36 million (in 2018 inflation adjusted dollars) was used to leverage $69 million of state, local or private funds. Land trusts often leverage federal dollars to receive local, state, or private dollars. These funds are not by definition economic impacts, as economic impacts involve new economic activity generated by a region. However, the redistribution of dollars from urban centers to the more rural areas could have important implications on the health of rural economies and could be considered new economic activity at the scale of these rural counties. This is a substantial and potentially important injection of dollars largely going to rural Colorado communities in support of a vibrant and robust agricultural economy.

Our survey results also indicated that there are likely other positive economic outcomes from the easement payment that are not captured in this analysis. For example we found that 37.2% of surveyed federal conservation easement participants in Colorado changed their agricultural production practices in some way due the easement payments. These changes in production practices include improved irrigation, increased acreages, changes in crop mix and rotation, as well as the diversification of operations to include revenue generating outdoor recreation opportunities. In addition, we do not evaluate the positive outcomes that stem from potential environmental improvements and long-term economic outcomes that may come from the injection of funds into rural economies.

REFERENCES, RESOURCES AND LITERATURE CITED

Broomhall, D., & Johnson, T. G. (1990). Regional impacts of the conservation reserve program in the southeast with conversion to trees: an application of input-output analysis. *The Review of Regional Studies*, *20*(2), 76.

Champ, P. A. (2003). Collecting survey data for nonmarket valuation. In *A primer on nonmarket valuation* (pp. 59-98). Springer, Dordrecht.

Clark, J. (2010). Ohio's agricultural easement purchase program: From pilot to permanent presence – A survey of AEPP participants. Columbus, OH: The Ohio State University.

Devino, G., Van Dyne, D., & Braschler, C. (1988). Agribusiness and the CRP. *Journal of Soil and Water Conservation*, *43*(5), 379-380.

Duane, T. P. (2010). Increasing the public benefits of agricultural conservation easements: an illustration with the Central Valley Farmland Trust in the San Joaquin Valley. *Journal of Environmental Planning & Management*, *53*(7), 925-945. doi:10.1080/09640568.2010.495487

Duke, J. M., & Ilvento, T. W. (2004). Supplying Preservation: Landowner Behavior and the Delaware Agricultural Lands Preservation Program. Retrieved from http://udspace.udel.edu/handle/19716/12610

Duke, J. M., Schilling, B. J., Sullivan, K. P., Esseks, J. D., Gottlieb, P. D., & Lynch, L. (2016). Illiquid capital: Are conservation easement payments reinvested in farms? *Applied Economic Perspectives and Policy*, *38*(3), 449-473.

Esseks, J. D., Nelson, J. M., & Stroe, M. E. (2006). Evaluation of USDA's Farm and Ranch Lands Protection Program (FRPP) through surveying a random sample of owners of agricultural land whose development rights were sold in part through the FRPP. University of Nebraska-Lincoln: Center for Great Plains Studies.

Esseks, J. D., Schilling, B. J., & Hahn, A. (2013). Impacts of the Federal Farm and Ranch Lands Protection Program: an assessment based on interviews with participating landowners.

Feather, P., Hellerstein, D., & Hansen, L. (1999). Economic valuation of environmental benefits and the targeting of conservation programs: the case of the CRP.

Feng, H., Kurkalova, L. A., Kling, C. L., & Gassman, P. W. (2006). Environmental conservation in agriculture: Land retirement vs. changing practices on working land. *Journal of Environmental Economics and Management*, *52*(2), 600-614.

Goodwin, B. K., Mishra, A. K., & Ortalo-Magné, F. N. (2003). What's Wrong with Our Models of Agricultural Land Values? *American Journal of Agricultural Economics*, *85*(3), 744-752.

Hamilton, L. L., & Levins, R. A. (1998). Local Economic Impacts of Conservation Reserve Program Enrollments: A Sub-County Analysis. In *Conference on Food, Agriculture and the Environment*, Minneapolis, MN.

Henderson, D., Tweeten, L., & Woods, M. (1992). A multicommunity approach to community impacts: the case of the conservation reserve program. *Community Development*, *23*(1), 88-102.

Horton, K., Knight, H., Galvin, K. A., Goldstein, J. H., & Herrington, J. (2017). An evaluation of landowners' conservation easements on their livelihoods and well-being. *Biological Conservation*, *209*62-67. doi:10.1016/j.biocon.2017.02.016

Hyberg, B. T., Dicks, M. R., & Hebert, T. (1991). Economic impacts of the conservation reserve program on rural economies. *The Review of Regional Studies*, *21*(1), 91.

Kiesecker, J. M., Comendant, T., Grandmason, T., Gray, E., Hall, C., Hilsenbeck, R., Kareiva, P., Lozier, L., Naehu, P. Rissman, A., Shaw, M. R., & Zankel, M. (2007). Conservation easements in context: a quantitative analysis of their use by The Nature Conservancy. *Frontiers in Ecology and the Environment*, *5*(3), 125-130.

Konyar, K., & Osborn, C. T. (1990). A national-level economic analysis of Conservation Reserve Program participation: a discrete choice approach. *The Journal of Agricultural Economics Research*, *42*(2), 5-12.

Lynch, Lori. (2007). "Economic Benefits of Farmland Preservation," ed., Constance T. F. de Brun, The Economic Benefits of Land Conservation, The Trust for Public Land, San Francisco, CA.

Lynch, L., & Duke, J. M. (2007). Economic benefits of farmland preservation: evidence from the United States. Working Paper – Department of Agricultural and Resource Economics, University of Maryland, (07-04).

Martin, M., Radtke, H., Eleveld, B., & Nofziger, S. D. (1988). The impacts of the conservation reserve program on rural communities: the case of three Oregon counties. *Western Journal of Agricultural Economics*, 225-232.

Merenlender, A. M., Huntsinger, L., Guthey, G., & Fairfax, S. K. (2004). Land trusts and conservation easements: Who is conserving what for whom? *Conservation Biology*, *18*(1), 65-76.

Meyer, E. (2001). The Impacts of Conservation Easements on Property Taxes in Wisconsin. Gathering Waters Conservancy, Madison, Wisconsin. http://www.gatheringwaters.org

Mortensen, T. L., Coon, R. C., Leistritz, F. L., Leitch, J. A., & Ekstrom, B. L. (1989). Regional Economic Impact of the Conservation Reserve Program: An Application of Input-Output Analysis. *North Dakota University Agr. Exp. Sta. Res. Bull*, (89003).

Myers, S. O., & Sutherland, P. L. (1989). CRP: A Baca County, Colorado perspective. *Journal of Soil and Water Conservation*, *44*(5), 431-436.

Olatubi, W. O., & Hughes, D. W. (2002). Natural resource and environmental policy trade-offs: a CGE analysis of the regional impact of the Wetland Reserve Program. *Land Use Policy*, *19*(3), 231–241. https://doi.org/10.1016/S0264-8377(02)00017-0

Otto, D. M., & Smith, D. B. (2015). Economic impacts of CRP on communities. *Iowa Ag Review*, *2*(2), 7.

Seidl, A., Anderson, D., Bennett, D., Greenwell, A., and Menefee, M. (2017a). Colorado's Return on Investments in Conservation Easements: Conservation Easement Tax Credit Program and Great Outdoors Colorado: Executive Summary. Colorado State University, Fort Collins, Colorado. https://warnercnr.colostate.edu/wp-content/uploads/sites/2/2017/07/ColoradoStateU_CE-ROI-study_web.pdf

Seidl, A., Anderson, D., Bennett, D., Greenwell, A., and Menefee, M. (2017b). Colorado's Return on Investments in Conservation Easements: Conservation Easement Tax Credit Program and Great Outdoors Colorado. Colorado State University, Fort Collins, Colorado. https://warnercnr.colostate.edu/wp-content/uploads/sites/2/2017/07/ColoradoStateU_CE-ROI-study_web.pdf

Standaert, J. E., & Smith, H. A. (1989). CRP effects on Montana's economy. *Journal of Soil and Water Conservation*, *44*(5), 507-509.

Sullivan, P., Hellerstein, D., Hansen, L., Johansson, R., Koenig, S., Lubowski, R. N., ... & Bucholz, S. (2004). The conservation reserve program: economic implications for rural America.

Uri, N. D., & Boyd, R. (1996). The Impact of the Conservation Reserve Program on the US Economy: A General Equilibrium Analysis. In *Recent Advances in Spatial Equilibrium Modelling* (pp. 301–322). Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-80080-1_15

Villar, D., Seidl, A. F., Sundberg, J., Allison, L., & Mahowald, H. (2015a). *Economic implications of differential taxation for agriculture in the Intermountain West: Issues and Alternatives*. ARPR 15-02. Agricultural and Resource Policy Report, Department of Agricultural and Resource Economics, Colorado State University, Fort Collins, Colorado, USA, 80523-1172. June 2015. 50 pp. http://webdoc.agsci.colostate.edu/DARE/ARPR/ARPR%2015-02.pdf

Villar, D., Seidl, A. F., Sundberg, J., Allison, L., & Mahowald, H. (2015b). *Economic implications of differential taxation for agriculture in the Intermountain West: Issues and Alternatives (Executive Summary)*. ARPR 15-01. Agricultural and Resource Policy Report, Department of Agricultural and Resource Economics, Colorado State University, Fort Collins, Colorado, USA, 80523-1172. June 2015. 6 pp. http://webdoc.agsci.colostate.edu/DARE/ARPR/ARPR%2015-01.pdf

Villar, D., & Seidl, A. F. (2014a). The Agricultural Act of 2014: Working Lands Programs, The Environmental Quality Incentives Program (EQIP). Agricultural and Resource Policy Report, ARPR 14-06. June 2014. 5 pp. http://webdoc.agsci.colostate.edu/DARE/ARPR/ARPR%2014-06.pdf

Villar, D., & Seidl, A. F. (2014b). The Agricultural Act of 2014: Working Lands Programs, The Conservation Stewardship Program (CSP). Agricultural and Resource Policy Report, ARPR 14-05. June 2014. 3 pp. http://webdoc.agsci.colostate.edu/DARE/ARPR/ARPR%2014-05.pdf

Villar, D., & Seidl, A. F. (2014c). The Agricultural Act of 2014: Regional Partnership Programs, The Regional Conservation Partnership Program (RCPP). Agricultural and Resource Policy Report, ARPR 14-04. June 2014. 3 pp. http://webdoc.agsci.colostate.edu/DARE/ARPR/ARPR%2014-04.pdf

Villar, D., & Seidl, A. F. (2014d). The Agricultural Act of 2014: The Conservation Reserve Program (CRP). Agricultural and Resource Policy Report, ARPR 14-03. June 2014. 5 pp. http://webdoc.agsci.colostate.edu/DARE/ARPR/ARPR%2014-03.pdf

Villar, D., & Seidl, A. F. (2014e). The Agricultural Act of 2014: Conservation Easement Programs, The Agricultural Conservation Easement Program (ACEP). Agricultural and Resource Policy Report, ARPR 14-02. June 2014. 5 pp. http://webdoc.agsci.colostate.edu/DARE/ARPR/ARPR%2014-02.pdf

Villar, D., & Seidl, A. F. (2014f). The Agricultural Act of 2014: Comparison of 2008 and 2014 Conservation Programs. Agricultural and Resource Policy Report, ARPR 14-01. June 2014. 8 pp. http://webdoc.agsci.colostate.edu/DARE/ARPR/ARPR%2014-01.pdf

Vizek, A., & Nielsen-Pincus, M. (2017). Landowner attitudes toward conservation easements: Balancing the private and public interest in land. *Society & Natural Resources*, *30*(9), 1080-1095. doi:10.1080/08941920.2017.1331486

Wallace, G. N., Theobald, D. M., Ernst, T., & King, K. (2008). Assessing the ecological and social benefits of private land conservation in Colorado. *Conservation Biology*, *22*(2), 284-296.

Wilson, J., Thilmany, D., & Watson, P. (2006). The role of agritourism in Western states: Place-specific and policy factors influencing recreational income for producers. *The Review of Regional Studies*, *36*(3), 381.

Wu, J., & Lin, H. (2010). The effect of the conservation reserve program on land values. *Land Economics*, *86*(1), 1-21.

Wu, J., & Weber, B. (2012). Implications of a reduced conservation reserve program. *The Conservation Crossroads in Agriculture: Insight from Leading Economists*.

Young, C. E., & Osborn, C. T. (1990). The Conservation Reserve Program: an economic assessment. *Agricultural Economic Report – Economic Research Service, U.S. Department of Agriculture*, (626).

APPENDIX A: ANALYTICAL LIMITATIONS AND AREAS FOR FUTURE RESEARCH

- In this analysis we only look at the economic impacts that stem from the spending of the agricultural conservation easement payments. This leaves out many potential benefits to communities including non-market benefits such as improved irrigation technology and the adoption of best management practices. We also only evaluate the spending of the easement payments as a one-time injection of economic activity into the Colorado economy. This excludes the evaluation of potentially significant investment effects that may come from the easement payments. For example, if the easement payment is used to invest in better technology, that improved technology may have lasting positive effects on the economy that are not captured in our analysis.

- Conservation easements preserve the enrolled land from future development. Restricting land from future development typically decreases property values, which in turn can decrease the property taxes associated with the land (but see 38-30.5-109, C.R.S., which governs the taxation of property subject to conservation easements in Colorado). However, it may result in higher values of adjacent lands, as there is a robust literature indicating property values next to protected areas increase. The net effect on property values and tax revenues is ambiguous and as a potential fiscal impact, is outside of the scope of this analysis.
- Some survey respondents did not account for the entire 100% of their easement money. In such cases, we assigned the remaining money into the "Other" category.
- The survey explicitly asked for the proportion of money used to pay down farm debt, but some respondents commented that they used the money for private debt as well. Other respondents mentioned using easement money to buy out family members, allowing those relatives to leave the business. If these were noted in the survey, we combined them as essentially paying down all kinds of debt.
- At least six landowners who have multiple easements against several properties or portions of properties. We asked these landowners to fill out a survey for each easement on their property. We assume that easement grantors reported expenditures separately for the different easements. Four of the six landowners with multiple easements provided spending data that differed across easements, which suggests that our data reflects the easements rather than the grantors themselves.

APPENDIX B: TECHNICAL INPUT-OUTPUT METHODOLOGY AND DEFINITIONS

In this analysis, we estimate the total economic impact of agricultural conservation easement payments on the Colorado economy using an economic impact software program known as IMPLAN (Impact Analysis for Planning). Originally developed by the U.S. Forest Service, IMPLAN is an input-output model that is widely-used to quantify how businesses use technology, labor and materials (i.e., inputs) to produce a product (i.e., output). The IMPLAN software and database (www.implan.com) establishes the characteristics of economic activity in terms of 10 broad industrial groups, involving as many as 528 sectors. In practice, the IMPLAN model is used in every state and hundreds of communities across the nation to catalog economic activity and predict the effect of alternative policies and various economic changes. We use IMPLAN to generate information on a number of important economic indicators.

In order to use models such as IMPLAN to examine the role of an industry in a local economy, analysts should have information on the final demand (i.e., expenditures) for any related goods and services. The conservation easement recipient's expenditure data collected in the survey serve as the basis for our analysis. In this study, final demand is expressed by the total expenditures by category. To determine the direct and secondary effects, we matched the total expenditure data with the IMPLAN sectoring scheme, and entered the appropriate amounts as a final demand "shock" to the model. This generates estimates of both the direct and indirect economic effects. As appropriate, expenditures were entered either on an industry or a commodity basis. For the retail sectors, we applied IMPLAN's default household margins. Secondary effects are based on the IMPLAN Type SAM multipliers, with endogenous households. The SAM multiplier is calculated by dividing the sum of the direct effects, indirect effects and induced effects by the direct effects. Endogenous households is the standard practice (and default in IMPLAN), this means that we internalize into the model the household spending of labor income but not the spending of tax revenues or returns on capital.

Because IMPLAN models are quite stable from year-to-year, we applied the 2016 multipliers (the most recent year available) to the 2017 survey data. In the remainder of this Appendix we define multipliers and other topics related to this analysis. The material largely is drawn from the IMPLAN User's Guide. A detailed description the IMPLAN sectoring scheme is available on the IMPLAN website.

Input-Output Definitions

Multipliers

Input-output models are driven by final consumption (or final demand). Industries respond to meet demands directly or indirectly (by supplying goods and services to industries responding directly). Each industry that produces goods and services generates demand for other goods and services and so on, round by round. These so called *ripple effects* are described by **multipliers**. A multiplier examines how much spin-off economic activity is generated by a marginal change in an industry. For example, multipliers can describe how many total jobs (employment) in the economy are created when an industry adds one new job. In general, input-output modelers describe three types of multiplier effects when examining the role of an industry in a county economy.

1. The **direct effect** is the contribution of the industry itself. It may represent the total revenue (output), employment or employee compensation. The value of the direct effect multiplier is always 1.
2. The **indirect effects** are effects of the industry on its suppliers. This multiplier captures the additional activity in businesses that provide inputs to the industry of interest.

3. The **induced effects** capture the impacts of changes in spending from households as income changes due to the direct effect. This effect captures the impact of spending by a) employees of the industry being studied, and b) employees of the input supplying businesses. These effects usually show up in retail and service industries. In the study here, the *secondary effects* are the sum of the indirect and induced effects.

In this study we use the IMPLAN Type SAM multipliers. The Type SAM multiplier is obtained according to the following formula:

Type SAM multiplier = (direct effect + indirect effect + induced effect) ÷ direct effect

Input-output analysis is a means of examining the relationships within an economy both between businesses and between businesses and final consumers. It captures all monetary transactions for consumption in a given time period. The resulting mathematical formulae allow one to examine the effects of change in one or several economic activities on an entire economy.

Industry output is a single number in dollars for each industry. The dollars represent the value of an industry's total production. In IMPLAN, the output data are derived from a number of sources, including U.S. Bureau of Census economic censuses and the U.S. Bureau of Labor Statistics employment projections. Another way to think about industry output is as the total revenue generated by an industry.

Employment is the total number of wage and salaried employee and self-employed jobs in a region. It includes both full-time and part-time workers. The data sets used to derive employment totals in the IMPLAN model are the ES-202 data, County Business Patterns, and the Regional Economic Information System (REIS) data.

While output captures the total dollar value of economic activity, its use as a measure of economic activity can be over-counted, in that it captures the value of all intermediate stages of the production process as well. For example, the price one pays for a car at the local auto dealership in large part represents economic activity that occurred in the production process. If one were to consider the price one paid for a car as the contribution to the local economy, then one would likely be overstating its impact unless all of its component parts were engineered locally, assembled locally, and sold locally. This is called double counting. To avoid double counting, economists usually examine economic contributions in terms of **value added**. At the local level, value added is equivalent to the concept of Gross Domestic Product, in that it examines the unique contribution of an industry to the overall economy. In input-output analysis, value added consists of four components.

1. **Employee compensation** is wage and salary payments as well as benefits, including health and life insurance, retirement payments, and any other non-cash compensation. It includes all income to workers paid by employers.
2. **Proprietary income** consists of payments received by self-employed individuals as income. This is income recorded on Federal Tax Form 1040C. Note: labor income is the sum of employee compensation and proprietary income.
3. **Other property type income** consists of payments for interest, rent, royalties, dividends and profits. This includes payments to individuals in the form of rents received on property, royalties from contracts, and dividends paid by corporations. This also includes corporate profits earned by corporations.
4. **Indirect business taxes** consist primarily of excise and sales taxes paid by individual to businesses. These taxes occur during the normal operation of these businesses but do not include taxes on income or profit.

APPENDIX C: SECTORS USED IN THE ECONOMIC IMPACT ANALYSIS

SURVEY CATEGORY	CODE	DESCRIPTION
"Invested back into the ag operation through purchases of inputs (including restocking livestock herds), labor, equipment or other infrastructure (including irrigation infrastructure)"	2	Grain farming
	4	Fruit farming
	11	Beef cattle ranching and farming, including feedlots and dual-purpose ranching and farming
	19	Support activities for agriculture and forestry
	262	Farm machinery and equipment manufacturing
"Purchase of non-business related goods (e.g., recreational vehicle, vacation, second home)"	396	Retail – Motor vehicle and parts dealers
"Other"	397	Retail – Furniture and home furnishings stores
	398	Retail – Electronics and appliance stores
	399	Retail – Building material and garden equipment and supplies stores
	400	Retail – Food and beverage stores
	401	Retail – Health and personal care stores
	402	Retail – Gasoline stores
	403	Retail – Clothing and clothing accessories stores
	404	Retail – Sporting goods, hobby, musical instrument and book stores
	405	Retail – General merchandise stores
	406	Retail – Miscellaneous store retailers
	407	Retail – Nonstore retailers
"Invested in savings (could include retirement fund or stock market investment as well as savings accounts)" and "Pay down farm debt"	433	Monetary authorities and depository credit intermediation
	434	Nondepository credit intermediation and related activities
	435	Securities and commodity contracts intermediation and brokerage
	436	Other financial investment activities
"Invested in post-high-school education of a family member"	472	Elementary and secondary schools
	473	Junior colleges, colleges, universities, and professional schools
	474	Other educational services
"Invested in non-farm land-based enterprise diversification (e.g., agritourism, hunting/fishing, outdoor recreation)"	496	Other amusement and recreation industries
	500	Other accommodations
"Charitable donations"	513	Religious organizations
	514	Grantmaking, giving, and social advocacy organizations
"Invested in the purchase or lease of additional land to expand the ag operation"	440	Real Estate

APPENDIX D: CONSERVATION EASEMENT GRANTOR SURVEY

[land trust letterhead]

[date]

Dear **[insert name]**,

The Colorado Land Trust Community is partnering with researchers at Colorado State University's Department of Agricultural and Resource Economics (DARE) to better understand the economic impact of federal conservation easement programs on Colorado communities. Participants include all Colorado landowners who received payments from these federal programs since 2007. The results of this research will be used to help inform funding decisions for these types of producer programs in the future.

We at **[insert organization]** request that you complete and return the enclosed survey within the next two weeks. Participation will take approximately 10-15 minutes. Your participation in this research is voluntary. If you decide to participate in the study, you may withdraw your consent and stop participation at any time without penalty.

This survey is designed to help researchers estimate the economic impact of these programs on Colorado communities. We will keep your identity strictly confidential and all data analysis and reporting protocols will be followed closely. When we report and share the data with others, we will combine the data from all participants.

While there is no known direct benefit to you, we hope to gain important insights that will help inform funding decisions for conservation programs in the future. It is not possible to identify all potential risk in research procedures, but the researchers have taken reasonable safeguards to minimize any known and potential (but unknown) risks. Completing the survey and returning it in the enclosed stamped envelope is your consent to participate.

If you have any questions about the research, please contact Professor Andy Seidl at andrew.seidl@colostate.edu or Research Scientist Rebecca Hill at rebec.hill@colostate.edu and refer to Federal Conservation Easement Payment Recipient Survey in the subject line of your message. If you have any questions about your rights as a volunteer in this research, please contact the CSU IRB at: RICRO_IRB@mail.colostate.edu; 970-491-1553.

[land trust director salutation, name and address/contact]

Federal Conservation Easement Payment Recipient Survey

The Colorado Land Trust Community[9] is partnering with researchers at Colorado State University's Department of Agricultural and Resource Economics (DARE) to better understand the economic impact of federal conservation easement programs[10] on Colorado communities. Participants include all Colorado landowners who received payments from these federal programs since 2007. The results of this research will be used to help inform funding decisions for these types of producer programs in the future.

In **[insert date of easement closing]** you received payments in the amount of **[insert $$ number]** for conveying a conservation easement to **[insert organization]**. This survey is designed to help researchers estimate the economic impact of these programs on Colorado communities. For the easement payment described above, please respond to each question fully and to the best of your ability. If you have entered into more than one easement agreement on your operation since 2007, you will need to complete the survey for EACH easement agreement separately. Participation will take approximately 10-15 minutes.

Your participation in this survey is voluntary and strictly confidential. If you decide to participate in this survey, you may withdraw your consent and stop participation at any time without penalty. We will keep your identity strictly confidential and all data analysis and reporting protocols will be followed closely. When we report and share the data with others, we will combine the data from all participants. While there is no known direct benefit to you, we hope to gain important insights that will help inform funding decisions for conservation programs in the future. It is not possible to identify all potential risk in research procedures, but the researchers have taken reasonable safeguards to minimize any known and potential (but unknown) risks. To indicate your consent to participate in this research please select "Yes" below and continue with the survey. If you do not consent, please select "No" and return the survey using the self-addressed stamped envelope.

◯ Yes ◯ No

[9] Including: the Colorado Cattlemen's Agricultural Land Trust (CCALT), Colorado Open Lands (COL), The Nature Conservancy (TNC), Colorado West Land Trust (CWLT), Yampa Valley Land Trust (YVLT), and Palmer Land Trust (Palmer).

[10] *Farm and Ranch Land Protection Program (FRPP), Grassland Reserve Program (GRP), Agricultural Conservation Easement Program (ACEP), Agricultural Land Easements (ALE).*

1. As a result of this easement have you added hunting/fishing or other outdoor recreation activities to your operation?

◯ Yes ◯ No

2. If you answered "Yes" to question 1:

a) What were the estimated gross revenues from these activities: $_____/yr.

b) What are the estimated number of visitor-days from these activities: _____/yr.

c) If you added employees, please indicate the number of full time equivalent employees hired to support these activities: _____ FTE.

3. In completing the table below, please round to the nearest acre:

	Immediately Before Entering into Easement	Directly Following Entrance into Easement (1-3 years post easement)
Total Farmed (Ranched) Acres	acres	acres
Acres Irrigated with Flood Irrigation	acres	acres
Acres Irrigated through Mechanized Means (roller, drip, center pivot)	acres	acres

4. How many acres are in production of the following (Please round to the nearest acre):

	Immediately Before Entering into Easement	Directly Following Entrance into Easement (1-3 years post easement)
Livestock Grazing	acres	acres
Fallow	acres	acres
Fruit Production	acres	acres
Row Crop Production (e.g., corn, wheat, alfalfa, sugar beets)	acres	acres
Idle	acres	acres
Other	acres	acres

If Other, please describe: _____

5. For the operation on which this easement is placed I:

◯ Am the primary operator

◯ Am a co-operator

◯ Lease out the land

6. Have you noticed any change in your yields or stocking rates as a result of adopting the conservation practices required by the easement?

◯ Yes ◯ No

7. If you answered "Yes" to question 6, please indicate by what percentage your yield or stocking rates changed due to conservation easement practices:

	Baseline yield or stocking rate per acre	Estimated yield or stocking rate change due to easement practices (% change) (please circle one)
Livestock Grazing	/acre	-50 -40 -30 -20 -10 0 (no change) +10 +20 +30 +40 +50
Fruit Production	/acre	-50 -40 -30 -20 -10 0 (no change) +10 +20 +30 +40 +50
Row Crop Production (e.g., corn, wheat, alfalfa, sugar beets)	/acre	-50 -40 -30 -20 -10 0 (no change) +10 +20 +30 +40 +50
Other	/acre	-50 -40 -30 -20 -10 0 (no change) +10 +20 +30 +40 +50

If Other, please describe: _____

8. Did you change your farming operation in any way due to this easement? (Select all that apply)

☐ Changed Crop Mix/Rotation

☐ Increased Acreage Farmed (acres ranched or number of livestock/stocking rate)

☐ Decreased Acreage Farmed (acres ranched or number of livestock/stocking rate)

☐ Improve Irrigation Practices

☐ Other (Please Describe) _____

9. If you changed your farming/ranching operation due to this easement, please use the space below to describe how has your operation changed because of your enrollment in the easement program:

10. In the list below please indicate what proportion of your total conservation payment went to each of the following (they should sum to 100%):

Invested back into the ag operation through purchases of inputs (including restocking livestock herds), labor, equipment or other infrastructure (including irrigation infrastructure)	_____%
Invested in non-farm land-based enterprise diversification (e.g., agritourism, hunting/fishing, outdoor recreation)	_____%
Invested in the purchase or lease of additional land to expand the ag operation	_____%
Invested in savings (could include retirement fund or stock market investment as well as savings accounts)	_____%
Invested in post-high-school education of a family member	_____%
Pay down farm debt	_____%
Purchase of non-business related goods (e.g., recreational vehicle, vacation, second home)	_____%
Other	_____%
	100%

If Other, please describe: _____

Thank you for taking the time to fill out this survey. Please use the space provided below to provide any other information or feedback that you think might be helpful to our understanding and analysis.

We anticipate the results of this survey will be available in May 2018. If you would like a copy of the results, to hear from us when the results will be presented in your community, have questions, comments or other feedback, please contact: Professor Andrew Seidl (andrew.seidl@colostate.edu) at your Colorado State University

<This survey is complete. Thank you for your participation.>


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