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Economic implications of differential taxation for agriculture in the Intermountain West: Issues and Alternatives¹

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Introduction: Differential taxation and public benefits

Private lands occupy the most biologically diverse portions of the landscape in the Intermountain West, provide more than 80 percent of the critical habitat of about half of America's threatened or endangered wildlife species⁵, sustain food and fiber production, source and purify drinking water, and protect important riparian resources. These lands also provide recreational opportunities and scenic values, create a transition and connectivity between developed communities and public wildlands, and provide an economic foundation for Western communities.

The population and economies of the Intermountain West are among the fastest growing in the

United States. Population and income growth create upward pressure on private land prices, particularly in and near communities with high natural amenities and where private developable land is limited due to a high proportion of public lands in the area. This creates both challenge and opportunity to rural landowners who contribute to the stewardship of these desirable and valuable ecosystem services and the communities they live in or near. As rural lands are irreversibly converted to accommodate low density residential and commercial development typical of the region, residents may experience negative fiscal and service effects and critical habitat connectivity and ecological quality thresholds may be reached or surpassed, putting the very attributes of the landscape that attracted people to the community at risk. As a result, the manner in which the remaining pri-

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⁵ Bean, M., Bonnie, R., Male, T., and T. Searchinger. 2003. The Private Lands Opportunity: The case for conservation incentives. Environmental Defense.

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increasingly important and taxes are among the policy tools available to state and local governments to guide the incentives for private land use decisions and land use change.

Agricultural use value taxation results in lower tax burden for the landowner relative to residential, commercial, industrial or 'best and highest use' value taxation, reducing the incentive to convert agricultural lands to one of those uses. Taxing only the value of production on agricultural lands and not its market value can be considered fair and justified due to the public values noted above that are created by working landscapes relative to higher density developments. A New York State study in 2010 concluded, "Not only does open space indirectly support industries (such as forestry, forest based manufacturing, agriculture, outdoor industries and tourism) that generate billions of dollars in the economy, it directly produces critical ecosystem services. The choice for natural drainage over an engineered replacement can translate into substantial cost savings for a municipality. This, however, is just one example of how public infrastructure costs and therefore, local taxes, can be reduced by utilizing the ecosystem services of open space."⁶

All states in the Intermountain West assess farms and ranches at their agricultural use value. California, Idaho, Montana, Nevada, Oregon, Texas, and Washington currently extend some form of preferential use value assessment to land managed for its value for wildlife, natural resource conservation, outdoor recreation, and open space – not just for commodity production. Property tax laws and assessment practices in other Western states create obstacles for landowners who want to manage their private land for natural resource conservation or diversified, land-based revenues. For example, "Colorado taxes nonagricultural open space at twice the residential rate, increasing pressures to develop such property, even if the landowner and local government would like to preserve the property as open space for other public purposes."⁷

In some cases, property tax structures run directly contrary to financial incentives provided by

federal, state and local governments. For instance, a landowner who agrees to reduce, suspend or eliminate livestock grazing due either to drought or in partnership with state wildlife recovery or watershed protection efforts may no longer qualify for agricultural tax classification. These tax policies also undermine economic opportunities for landowners who seek to diversify income streams by managing for multiple objectives (e.g. ecosystem services payments or eco-tourism).

The demographics and the economic foundations of both urban and rural communities in Western states have changed dramatically in the past few decades; however, the statutory framework for non-agricultural property tax assessments has not kept up with social and economic changes. Property tax policy and practices can be improved to better support and incentivize the conservation of natural resources and the sustainable economic health of our communities. In Colorado alone, hunting, fishing and ecotourism related to wildlife generate more than \$3 billion annually and support an estimated 32,000 jobs.⁸

While there is a clear ecological and economic case for increased flexibility and diversity in land management, some Western county assessors are tending in the opposite direction. There have been calls for more stringent enforcement of agricultural tax classification requirements, closing the agricultural tax 'loophole,' so that only "legitimate" agricultural producers can qualify. Ensuring only legitimate commercial agricultural operations receive the agricultural tax rate is argued to result in a more equitable tax burden across all properties, as taxes on non-qualifying parcels would be increased substantially. Although this approach may suss out land speculators and hobby farms, equally it may be counter-productive. In order to retain agricultural tax designation, some landowners will respond by increasing agricultural activity, regardless of whether such increase is profitable or appropriate for the land. Other landowners will subdivide or sell their land due to the increased tax burden. In either case, tax revenue increases realized may be counter-balanced or surpassed by increases in the public costs of higher density development and the loss of natural amenity based ecosystem service values due to land use change.

⁶*Economic Benefits of Open Space Protection*, Office of the State Comptroller (NY), 2010. <http://www.osc.state.ny.us/reports/environmental/openspacepreserv10.pdf>

⁷*Managing Development for People and Wildlife: A Handbook for Habitat Protection by Local Governments*, Clarion Associates of Colorado, LLC and the Colorado Division of Wildlife for Great Outdoors Colorado Trust.

⁸*The Economic Impacts of Hunting, Fishing and Wildlife Watching in Colorado*, BBC Research and Consulting, prepared for Colorado Division of Wildlife, 2008.

From an economic perspective, a better alternative may be to optimize the health and productivity of private lands in order to spur economic development and sustain rural livelihoods. Payments for ecosystem services, outdoor recreation, and eco-tourism are increasingly important sources of revenue that sustain land-based enterprises and rural communities. Adjustments in property tax codes to accommodate these important emerging trends in agriculture and sustainable land management should be considered. As a result, the purpose of this analysis is to evaluate the potential of reforming property tax structures in the Intermountain West to provide for more diversified revenue opportunities on working lands, improved opportunities for wildlife and natural resources management, the protection of intact agricultural and open space lands, and economic benefits for local communities.

This report has four general sections followed by a section synthesizing recommendations, conclusions and caveats:

1. A comparative review of differential agricultural taxation laws in Arizona, Colorado, New Mexico, Utah and Wyoming.
2. A discussion of the potential dimensions of proposed revisions to current laws to enable the treatment of agricultural lands under such legislation to include management for wildlife habitat, open space and other publicly valued rural land attributes, as adopted by other Western states.
3. A review of the potential dimensions of economic impact due to enabling diversified management of agricultural land use, as well as the likely implications of stricter compliance with the current agricultural use taxation laws relative to the current situation or 'baseline' case.
4. An illustrative estimate of the economic impact of the potential changes on the states of Colorado, New Mexico and Utah is provided, including hypothetical representative ranches in high growth, high amenity rural counties of each of these states.

⁹The taxable value for a property is determined by taking the current use valuation, as determined by state formula, and multiplying it by the assessment ratio for the current land use. Arizona, Colorado, and Wyoming all have assessment ratios that vary by use. Arizona uses an assessment ratio of 16% on agricultural property, as compared to 19% on commercial and industrial property, and 10% on residential property. Colorado uses an assessment ratio of 7.96% on residential property, and a ratio of 29% on most other properties, including agricultural. Wyoming's assessment ratio is 9.5% for most properties, including agricultural, and 11% for industrial property. Thus the advantage of differential assessment ratios is nil or even negative for agricultural property compared to residential property, and nil to slightly positive compared to industrial property. As will be shown below, the benefit of current use valuation far exceeds any differential created by variations in assessment ratios.

¹⁰The calculations may be done locally or by the state office, depending on the state.

Section 1. Comparative Review of Use Value Assessment Programs for Agriculture

All fifty states offer some type of use value assessment program for land used in agriculture. The programs are a response to concerns that high development pressure, primarily near residential areas, will result in higher property values, higher assessments, and more property taxes paid on agricultural lands. The intent of the programs is to reduce the tax cost of owning land that is in productive use, and thereby lower the likelihood that high tax bills will result in the development of agricultural land.⁹ Use value assessment programs typically base the property tax assessment solely on the value of the agricultural the development rights untaxed. Criteria used include productivity of the land, effectively leaving the value of current land use, parcel size, income/use qualification, and any prior use requirements.

Each state assesses qualifying land parcels according to the income that an owner actually earns, or might reasonably expect to earn, from the land, by using typical management practices that result in average yields for the area. The exact details of the programs differ in a variety of ways, but the basic methods used are similar. The assessor¹⁰ estimates the revenue that is, or could be, generated from a parcel, based on its area-appropriate use in agriculture or grazing and the growing conditions typical to the area. Actual or typical expenses are then calculated and deducted from revenue in order to establish the net income. The net income, or lease payment if appropriate, is then capitalized at a statutory rate in order to calculate the approximate market value of the property as determined solely by the productive capacity of the land in its current use. This method ignores any increment in property value due to the possibility of future development, or due to any amenities that do not result in higher productivity as determined by the state formula.

This section compares the various criteria used by five intermountain states: Arizona, Colorado, New Mexico, Utah, and Wyoming. All five programs are specifically designed for land that is used for agriculture, which includes grazing land, cropland, and land used for a variety of other purposes related to the pro-

duction of agricultural products. Colorado, New Mexico, Utah and Wyoming extend the program to land that is used for forestry or timber production, when the production results in marketable forest products. Tables 1 and 2 present comparisons of the program details for each state.

Table 1: Current Preferential Assessment Programs for Agricultural/Farmland					
	Program Name	Eligible Land Uses	Eligibility Criteria	Method of Preferential Treatment	Penalty for Change of Use
Arizona	Agricultural Valuation	Agricultural/Farmland	Plot/Land Size; Income Production; Prior Years' Land Use	Current Use Valuation; Different Assessment Ratios	No
Colorado	Agricultural Valuation	Agricultural/Farmland Other Land Uses	Income Production; Management Plan; Prior Years' Land Use	Current Use Valuation; Different Assessment Ratios	No
New Mexico	Valuation of Agricultural Land	Agricultural/Farmland Forest Land/Timber Production Other Land Uses	Plot/Land Size	Current Use Valuation; Value Determined by State	No
Utah	Farmland Assessment Act (FAA) "Greenbelt" Law	Agricultural/Farmland Forest Land/Timber Production	Plot/Land Size; Income Production; Management Plan; Prior Years' Land Use	Current Use Valuation; Value Determined by State	Yes
Wyoming	Valuation of Agricultural Land	Agricultural/Farmland Forest Land/Timber Production	Plot/Land Size; Income Production	Current Use Valuation; Different Assessment Ratios	No

Colorado allows landowners to enroll land protected by a conservation easement; however, only land which was used for agriculture in prior years is eligible. Colorado, New Mexico and Wyoming allow landowners to enroll agricultural parcels that are simultaneously enrolled in the Conservation Reserve Program (CRP) or a similar program.¹¹ Conservation and forestry parcels typically are required to have a management plan on file that describes how the land will be improved to make it more productive in those uses.

There are a few differences in how each state defines agricultural land, mainly having to do with improved land. All the states but Colorado tax home sites at market value; Colorado includes the home site as agricultural land if the occupant is involved in the agricultural operation. Arizona allows the land used for facilities that process agricultural products to qualify for the program, while Utah and Wyoming expressly deny the eligibility of land used for processing facilities. The language used in Colorado and New Mexico suggest that processing facilities would not qualify for the preferential treatment. This potentially points to an intent to preserve public goods aspects of agricultural lands management as opposed to protecting the agriculture industry for, say, food security purposes.

The states are consistent in some matters. All five states consider the land under traditional agricultural buildings, such as barns, to be in agricultural use.¹² The presence of livestock used for pleasure or recreation does not qualify as agricultural use. Hunting and recreational fishing do not automatically disqualify the property from eligibility, but do not count as an agricultural use.

States vary considerably in the size of parcel necessary for program eligibility, as shown in Table 2. Arizona requires that land be at least 10 or 20 acres, depending on the agricultural use; grazing land must be large enough to support at least 40 animals. Wyoming requires a minimum of 35 acres in the parcel. Exceptions are allowed in both states under certain circumstances. The other states have very small minimum sizes, though Colorado does require large parcels for

properties under conservation easement which include a residence. New Mexico has a separate requirement for grazing parcels; they must be large enough to support at least one animal, which in many counties is defined as 80 acres.

In most cases, the land must be actively used to generate income, with state requirements for inclusion in the program. These requirements vary dramatically across states. At one extreme, Arizona simply requires a land use that has a reasonable expectation of making a profit, without considering the cost of the land as an expense. Colorado has a similar requirement. Wyoming requires a profit of at least \$500 per year for land which the owner manages, or a profit of at least \$1,000 for land leased to someone else. The earnings test for New Mexico compares agricultural income from the land to nonagricultural income from the land; the former must exceed the latter. Hunting fees do not qualify as agricultural income, nor are they counted as nonagricultural income, so they are neutral with respect the earnings test.

¹¹ While the legislation appears to offer eligibility to land in several different programs, in Colorado and New Mexico the Conservation Reserve Program is effectively the only option used.

¹² Some states appraise improvements at market value while others appraise them at replacement cost.

Table 2: Current Preferential Assessment Programs for Agricultural/Farmland (continued)

	Minimum Parcel Size	Income Requirements	Management Plan Criteria	Prior Years' Land Use Criteria
Arizona	Ag land- 20 acres (10 acres if permanent crops) Grazing land- min capacity of 40 animals	Reasonable expectation of operating profit, exclusive of land cost	None required	In active production at least 3 of the past 5 years
Colorado	None for ag land; parcels under conservation easement must be at least 80 acres if a residence is present	Primary purpose of management must be to obtain a profit	Only for former ag land being restored for conservation purposes or former ag land under CE	Must have been in ag use for previous 2 years
New Mexico	Ag land- 1 acre Grazing land- sufficient to maintain at least one animal unit	None; presumption is that income from ag must exceed income from non-ag uses Grazing land must meet minimum stocking requirements ¹³	None required	Ag use in prior year
Utah	5 acres (may be spread across multiple parcels)	Land must produce in excess of 50% of the average agricultural production per acre for the given type of land and the given county or area (some exceptions) ¹³	Timber operations must be documented by a harvest or forest management plan	Must have been in ag use and met average production requirements for previous 2 years
Wyoming	Over 35 acres; some exceptions	At least \$500/yr (\$1,000 if leased)	None required	None

Utah has a somewhat different requirement; land enrolled in the program must produce at least half of the average production per acre for similar land in the area. Previously, there was also a requirement that the parcel produce at least \$1,000 in gross income, but that requirement was removed in 2009. A second

program, the Urban Farming Assessment Act (2013), provides similar treatment for small cropped parcels in Salt Lake and Davis Counties. All states other than Wyoming require that land must have been used for agriculture in the prior year before becoming eligible for the program.

¹³Some assessors require grazing parcels to be stocked with at least 51% of the established carrying capacity. There is wide variation among assessors regarding interpretation and enforcement of this rule.

When the land is used for purposes other than those supported by the program, the owner must notify the assessor of the change. The land is then reclassified and assessed at market value. Utah requires that upon such a reclassification, the landowner is responsible for paying a “rollback tax”, calculated as the difference between the tax that would have been due without the program enrollment and the tax actually paid. The rollback tax must be paid on previous years in which the land received the use value assessment, up to a maximum of five. In this case, the agricultural valuation program does not immediately reduce taxes, but defers them for a maximum of five years. Once they are deferred for five years, the liability is eliminated. The other four states do not charge any penalty or deferred tax for a change in land use. The land is simply reclassified and taxed at the higher value going forward from the date when the land use changed.¹⁴

Assessing land at the agricultural use value rather than the market value will often create a dramatic reduction in value, especially in areas with high land prices due to development activity. However, even in predominantly rural areas current use valuation can result in substantial reductions in the assessed value of property compared to market value. One 2009 study estimated the effect of use value assessment for over 6,300 acres of agricultural land, zoned to permit non-agricultural uses, in 14 Wisconsin municipalities.¹⁵ The assessed use value for the parcels as a whole was \$1,599,400; the estimated market value for the land was

\$251,751,100. The use value used for assessment is just 0.6% of the market value for the full sample. This percentage varied considerably across the municipalities, from a high of 6.9% in a rural area to low values of 0.1-0.3% in areas near the cities of Madison and Milwaukee.

A variety of data sources indicate that effects of a similar order of magnitude probably exist in many parts of the Intermountain West. Utah collects information on agricultural use value and market value in order to collect rollback taxes when necessary, making it the most accurate source of data in the study area. Weber County publishes an annual summary of this information. For the county as a whole, 4,166 parcels were enrolled in the farmland assessment (greenbelt) program in 2014, for a total of 159,887 acres. The greenbelt value was \$40.26 million, which was 3.8% of the market value (\$1,067.94 million). Looking at the data from the nine regions individually, the percentage ranged from 1.0% to 4.4%. Data from 2013 provided similar figures, with regional percentages from 1.1% to 4.7%.

Another source of comparison data for Utah comes from a 2009 study, which unfortunately only looked at data from two unnamed counties.¹⁷ It presents estimated market values and greenbelt values for a variety of agricultural lands, looking at both urban and rural areas (which have different greenbelt valuations). Table 3 presents their findings.

Classification	Greenbelt Value (per acre)	Market Value (per acre)	Greenbelt as % of Market
Irrigated Tillable II (urban)	\$610	\$50,000	1.2%
Irrigated Tillable III (urban)	\$460	\$60,000	0.8%
Irrigated Tillable III (urban)	\$460	\$4,650	9.9%
Irrigated Tillable III (rural)	\$215	\$2,500	8.6%
Grazing I (urban)	\$76	\$16,500	0.5%
Grazing II (urban)	\$15	\$2,190	0.7%
Grazing II (rural)	\$16	\$200	8%
Grazing III (rural)	\$11	\$450	2.4%
Dry Tillable III (urban)	\$120	\$2,810	4.3%

¹⁴ States typically impose penalties in cases where the land use is changed but the landowner does not inform the assessor. The violation arises from the lack of official notification, not from the change in use.

¹⁵ State of Wisconsin Legislative Audit Bureau (2010), pp. 14-16 (calculations by authors).

¹⁶ Ulibarri (2014).

¹⁷ Israelsen, Greenhalgh, and Heaton (2009).

Utah data can also be evaluated by comparing the 2014 farmland assessed valuations per acre (county level) to average 2014 market values at the state level, which are estimated by the U.S. Department of Agriculture.¹⁸ These comparisons are shown in Table 4. The USDA data present values for irrigated, non-irrigated, and pasture land; pasture refers to land used for grazing. The state agricultural values represent the average value by county, averaging across all four classes of irrigated land, both classes of dry land, meadow land, and all four classes of grazing land. In all cases, statewide esti-

mated market value greatly exceeds the highest average value for any county, even when looking at the most valuable class of property within each type of use. For example, the single most valuable county average for irrigated land is Irrigated I in Davis County, with an average value of \$870 per acre. The other three categories of irrigated land in Davis County (II, III, and IV) are valued at \$764, \$615, and \$514. Other counties all have land with an average value below \$870 in every class. However, average market value for irrigated land in the state is estimated to be \$5,250 per acre.

Table 4: Utah Farmland Agricultural Valuations vs. USDA Estimated Market Values, 2014

Classification	Average Agricultural Value, All Counties and Classes	Highest Agricultural Value, Any Class, County Average	Lowest Agricultural Value, Any Class, County Average	Estimated Market Value, State Average	Average Agricultural Value as % of Market
Irrigated Lands	\$432	\$870 (Davis)	\$82 (Kane)	\$5,250	8.2%
Non-irrigated (Dry) Lands	\$40	\$121 (Cache)	\$14 (Millard, Washington)	\$1,120	3.6%
Pasture (Meadow)	\$197	\$303 (Weber)	\$105 (Garfield)	\$1,050	18.8%
Pasture	\$28	\$91 (Piute)	\$5 (21 counties)	\$1,050	2.7%

Comparison to USDA data appears to underestimate the benefit of agricultural use valuation compared to the tax data used in the earlier examples, but in all cases the benefit is substantial, almost always resulting in a valuation that is less than 10%, even less than 5%, of the market value. As in Wisconsin, these percentages should be even smaller in areas with high development pressure.

The other states studied in this section provide significantly less data to use for similar comparisons. In

New Mexico, recent activity in Taos County provides assessment information that allows an examination of the effect of agricultural use valuation.¹⁹ A 2014 effort to evaluate the use of parcels has resulted in 453 parcels losing their agricultural status, and 37 parcels moving into agricultural status. This change in status provides data points for both valuations in the same year, thus creating a very accurate comparison (though only for a single county) Table 5 shows the results of the analysis of these changes.

¹⁸Utah State Tax Commission- Property Tax Division (2015) and U.S. Department of Agriculture National Agricultural Statistics Service (2014).

¹⁹These are tax values, which are one-third of the actual values because New Mexico's assessment ratio. Converting to actual values would not affect the percentage differences.

Table 5: Effect of 2014 Agricultural Use Valuation on Parcels in Taos County, NM		
	Removed From Ag Status, 2014	Placed In Ag Status, 2014
Average Agricultural Use Tax Value, all parcels (N = 453)	\$670	\$5,732
Average Nonagricultural Use Tax Value, all parcels (N = 37)	\$50,791	\$37,067
Ag Value as % of Non-Ag value, sum of all parcels	1.3%	9.9%
Ag Value as % of Non-Ag value, average of all parcels	2.2%	11.1%
Ag Value as % of Non-Ag value, median of all parcels	1.0%	1.3%

The median effect of removing agricultural status in Taos County results in an increased assessed value by a factor of 100. Taos County is an area with relatively high land prices, even though median income and population growth are the average for New Mexico as a whole.²⁰ Reports from Mora County, another county with low median income and actually declining population, found that removing agricultural status from parcels caused values to rise by a factor of roughly 20, indicating that use value resulted in valuations of approximately 5% of the market value.²¹ These cases suggest that the difference between agricultural and market values could be substantially higher in areas with more development pressure and higher land prices. As is the case in Utah, agricultural use valuation provides extremely high benefits to New Mexico ranchers and farmers who qualify.

Colorado does not provide direct comparisons between agricultural use value and market value. However, the state does provide data on the number of acres, total value, and average value per acre for various

classes of agricultural land. This allows the construction of average values by county and for the state. These values can then be directly compared to USDA average values for the state to get at least some sense of the impact of agricultural valuation.

As was the case with Utah, USDA farmland values greatly exceed the agricultural use valuations for every type of use. In fact, the average use value for each county is almost always a small fraction of the market value, except for the cases noted. In all other categories, county use values are substantially below the USDA values.

As the analysis demonstrates, agricultural use valuation results in substantially lower taxable values for landowners in Colorado, New Mexico, and Utah. Data to make similar comparisons were not found for Arizona or Wyoming, but since the programs are designed for the same purposes it is reasonable to expect significant tax savings in those states as well.

²⁰United States Census Bureau (2015).

²¹Steinmetz (2008).

Table 6: Colorado Farmland Agricultural Valuations vs. USDA Estimated Market Values, 2013

Classification	Assessed Value, State Average	Agricultural Value, State Average ^a	Estimated Market Value, State Average	Average Agricultural as % of Market	Counties with Average Ag Value above Average Market Value
Irrigated Lands	\$96 (Sprinkler) \$156 (Flood)	\$331 (Sprinkler) \$538 (Flood)	\$4,100	8.1% (Sprinkler) 13.1% (Flood)	0 1 (Mesa)
Non-irrigated (Dry) Lands	\$24	\$83	\$1,200	6.9%	0
Pasture (Meadow Hay)	\$70	\$241	\$680	35.4%	2 (Mesa, Mineral)
Pasture (Grazing)	\$6	\$21	\$680	3.1%	3 (Gilpin, Mesa, Mineral)

^a Assessed value is 29% of the agricultural use value because of the assessment ratio.

Section 2. Preferential Assessment for Wildlife Habitat and Other Open Space

The states discussed in Section 1 offer preferential assessment, based on current use valuation, for agricultural land. The programs are designed for parcels that historically have been used for agriculture, and used in such a way as to at least potentially generate a profit. They offer extremely limited preferential assessment options for land not actively used in agriculture. Three of the states allow land to continue to be classified as agricultural if it is enrolled in the Conservation Reserve Program, a federal program designed to protect and enhance agricultural productivity. Utah allows land under permanent conservation easement to be enrolled, but only if it continues in agricultural use. Colorado allows large parcels under easement to be enrolled without being used for agriculture; however, they must have been in agricultural use at the time the easement was created in order to be eligible.

Many states provide similar preferential assessment programs for undeveloped land, or open space, which provide wildlife habitat and other benefits. The justification is that open space also provides benefits to surrounding communities, even if the land is not actively used for agriculture. These programs are often available to properties formerly in agricultural use, but are also frequently available to properties with no

recent history of agriculture. This section examines the criteria used by other states who offer such programs. It examines opportunities available to landowners in five Western states.

Tables 7 and 8 present information about the relevant preferential assessment programs for open space in the comparison states. In Idaho, Montana, and Washington the programs are part of the agricultural valuation program. Oregon offers special programs for non-agricultural properties, while Texas offers one program for agricultural parcels in alternate use and another program specifically for non-agricultural properties.

In most of these states, land that qualifies as open space is valued as if it were in agricultural use, so that the “current use” valuation does not literally apply to the actual use of the property in question; they are valued based upon their agricultural potential, as if they were actually in agricultural use. The properties receive a similar tax treatment without the expectation of any profit from activities on the land.

Table 8 provides more detail about the programs, concentrating on the provisions relevant to determining eligibility for open space parcels which are not currently in agricultural use.

Table 7: Current Preferential Assessment Programs- Comparison States

	Program Name	Eligible Land Uses	Eligibility Criteria	Method of Preferential Treatment	Penalty for Change of Use
Idaho	Valuation of Agricultural Land (Speculative Value Exemption)	Agricultural/Farmland and Conservation/Open Space Other Land Uses	Plot/Land Size Income Production Management Plan Prior Years' Land Use Multi-Year Commitment	Current Use Valuation Value Determined by State	No
Montana	Valuation of Agricultural Land	Agricultural/Farmland and/Open Space	Plot/Land Size	Current Use Valuation	No
Oregon	Special Assessment	a) Conservation Easement b) Open Space Land c) Wildlife Habitat Conservation and Management	a) Use; Commitment in Perpetuity b) Various Criteria c) Use	Current Use Valuation	Yes
Texas	a) Agricultural Use and Open Space Agricultural Use Value b) Use Valuation for Recreational, Park, or Scenic Land	a) Agricultural/Farmland b) Recreational/Scenic Land	a) Income (ag only) Production (ag only) Prior Years' Land Use Plot/Land Size (open space only) Management Plan (open space only) b) Deed restriction limiting use of land, minimum of 10 years	Current Use Valuation	Yes
Washington	Open Space Taxation Act	Open Space	Benefits to the General Welfare	Current Use Valuation	Yes

Table 8: Current Preferential Assessment Programs- Comparison States (continued)

	Minimum Parcel Size	Income Requirements	Management Plan Criteria	Prior Years' Land Use Criteria	Description of Method of Preferential Treatment
Idaho	> 5 acres some exceptions	only for parcels of 5 acres or less	10-year plan for land under conservation	Last 3 years in <u>ag.</u> for small parcels or parcels under conservation agreement	Based on capitalized value of production or of rent
Montana	160 acres (any use other than <u>res/comm/ind</u>); 20-160 acres in <u>ag</u>	\$1500, for parcels under 160 acres; some exceptions	None	None	Based on productive capacity of land
Oregon	None	None	a) Must be managed in accordance with easement terms b) None c) Plan must be approved by <u>Dept</u> of Fish and Wildlife, and must have begun implementation	None	a) Valued as either forest or <u>ag</u> land, regardless of use b) Valued per current use c) Valued as either forest or <u>ag</u> land, regardless of use
Texas	a) Varies with use b) 5 acres	a) Varies; <u>ag</u> use is for full-time ranchers/farmers. Open space has no requirement. b) None	a) Prudent management b) None	a) Last 3 years (<u>ag</u>); 5 of last 7 (open space <u>ag</u>) b) None	a) Based on productive capacity of land during previous 5 years b) Valued as restricted
Washington	None or 1 acre, depending on benefit	None	None	None	Use value, unless county has a public benefit rating system

Idaho's program is similar to that of Colorado, in that it allows eligibility for former agricultural land under conservation easement with a conservation management plan. However, Idaho's program explicitly allows smaller parcels of land to be restored for the specific benefit of wildlife, and requires a conservation easement or conservation agreement held by a private nonprofit 501(c)3 corporation.²² The owner must create a management plan explaining how habitat will be enhanced, and comply with Idaho's noxious weed law. This land need not have been recently used for agriculture. Montana's program is considerably more accessible for open space properties, since any parcels of at least 160 acres are eligible, as long as there are no residential, commercial, or industrial activities, and no deed restrictions that prohibit future use in agriculture. No history of agricultural use is necessary for large parcels.

Oregon's three programs, Conservation Easement (CE), Open Space (OS), and Wildlife Habitat and Conservation Management (WH), have some differences. The CE program allows the enrollment of any property under a conservation easement meeting the requirements of IRS Rule 170(h), including the requirement of perpetuity. CE properties are assessed as if they were in either agricultural or forestry use. OS properties can qualify under any of nine possible criteria, subject to local approval. In this program, the assessed value is determined by the actual use, rather than the local agricultural value. WH properties must have an approved management plan, and a certification that the landowner has begun to implement the plan. These properties are also assessed as if they were used for forestland or agriculture. Counties can choose whether or not to participate in the WH program.

Texas offers two agricultural programs, with the great majority of properties enrolled in the Open Space Agricultural Use Value program. This program allows landowners to take property previously in agricultural use and convert it to wildlife management. The

property continues to be valued as if it were in agriculture. The landowner must complete at least 3 of 7 possible approved activities designed to aid a particular population of wildlife, and those animals must be produced for human use. The human use condition is very broadly defined, encompassing hunting, fishing, bird-watching, and other activities. The landowner must submit a management plan to the county appraiser. Counties appear to have some leeway to set a minimum parcel size, depending on local agricultural productivity. There are no income requirements.

The second Texas program, Use Valuation for Park, Recreational, or Scenic Land, allows landowners to apply for preferential assessment on such properties after filing a deed restriction that prevents an alternative use for at least ten years. The land is then valued as restricted.

Idaho and Montana do not charge penalties or deferred taxes for any change of use away from agriculture. Oregon's CE and WH programs require the return of all deferred taxes for up to ten years if land use is changed in an area zoned for exclusive farm use, and the return of deferred taxes for up to five years in other zones. The OS penalty is the return of all deferred taxes during the entire period of time the parcel received the use valuation assessment, plus interest of 8% per year since deferral.²³ Texas properties with changed use must pay up to five years of deferred tax plus interest accrued at 7%.

Washington has a program that is similar to the Oregon Special Assessment Open Space plan, but with more oversight by local government.²⁴ Parcels of any size are eligible to apply, based on meeting one or more of a large number of broad criteria. The application is made to the appropriate granting authority, which is either the county, or the city and the county. The granting authority determines whether the application should be approved, based on "the benefits to the general welfare of preserving the current use of the property."²⁵

²²Land owned by such a corporation is also eligible for the program.

²³This penalty cannot exceed the difference between the real market value and the assessed value as open space in the year the property is withdrawn from the program.

²⁴Washington's Open Space Taxation Act also includes the agriculture and forestry programs, which are very similar to the other programs discussed above.

²⁵"Open Space Taxation Act", Washington Department of Revenue (June 2014).

If the property is approved for enrollment, it is valued at its current use, subject to that valuation being no lower than the valuation for agricultural land in the same area. Counties also have the option of establishing a public benefit rating system for open space. The criteria for that system determine both the eligibility of a property and the valuation of enrolled properties. Owners of properties that are withdrawn from the program are required to pay seven years of deferred tax plus interest; owners must announce the intent to withdraw, and wait two years before doing so.

The degree of local governmental control of the Washington program is somewhat unusual compared to other states that offer use valuation for open space.²⁶ The creation of a county-specific public benefit rating system appears to be unique at this time, at least in the United States.

Section 3: Conceptual approach to the analysis; potential dimensions of economic impact

A key issue for agricultural land use taxes involves rewarding legitimate agricultural operations for providing benefits to the public without creating tax loopholes for speculators or hobbyists. Good policy will align the incentives facing landowners with the broader objectives of the state. Poor policy results in an inequitable tax burden and/or the failure to meet land use and economic development objectives. The agricultural tax laws described in Section 1 detail state efforts to meet these objectives. The unintended consequences of such regulations can include:

1. Encouraging unsustainable land management practices in order to remain in compliance with narrow average carrying capacity based requirements of the law;
2. Forcing local assessors into difficult and largely subjective choices as to when operators are or are not in compliance with the intent vs the letter of the law; and
3. Foreclosing potential or emerging economic opportunities commensurate with providing the public benefits similar to agricultural land management, but not in strict compliance with the currently required practices under the state's agricultural use value legislation.

Section 2 details state efforts to address these three challenges with existing agricultural land use legislation by either:

1. extensive land management activities; or
2. Creating parallel legislation to specifically address these land use alternatives with tax assessments similar to agricultural use.

Without passing judgement as to which of these legislative approaches might be most appropriate for the particular realities in each state, in Section 3 we hope to describe a means by which the likely economic effect of such alternatives might be estimated. We capture the portfolio of likely land use alternatives discussed in Section 2 under the umbrella term 'diversified management.' Diversified management is compared to 'stricter enforcement' with the current, or 'baseline,' agricultural use taxation legislation using our best understanding of the likely land use changes that might be observed under those conditions. In Section 4 we then proceed to undertake economic estimates of these three potential land use outcomes and discuss their implications.

Broader economic implications of individual land use decisions

Extending the status quo use value assessment, or baseline, stricter enforcement of the current policy and diversified management each have distinct implications for the financial incentives facing farm and ranch operators' investments in agricultural and alternative land use practices. Changes in production decisions and land use choices of local farmers and ranchers lead to changes in economic activity along the entire supply chain and, therefore, in the economic health and wellbeing of communities.

A transition to stricter compliance or diversified management by a large number of farms and ranches could lead to significant changes to the structure of their local and regional economies. When farms and ranches shift from producing agricultural products to other goods and services the value of their output changes. Farms and ranches produce agricultural products, but also the public benefits discussed above. Diversified management produces fewer agricultural products, but more recreation and tourism opportunities, and perhaps a somewhat different mix of public benefits in the form of land aesthetics and ecosystem services. While demand for certain agricultural inputs

²⁶The only other states that require local approval are California, Connecticut, Oregon (Wildlife Habitat only), Tennessee, and Virginia. Four other states allow local approval as one of several possible enrollment methods.

While demand for certain agricultural inputs will decrease, sectors that support natural resource conservation and recreation will see increased demand. Large changes can affect employment decisions, consumer spending, industrial output, and tax receipts in regions that host affected farming and ranching operations and connected industries.

The conversion of land from productive uses (e.g., agriculture, recreation, tourism) to unproductive uses (e.g., residential) has broad economic consequences. Although it is true that people have to live somewhere, each acre of land used for housing that could have been used for agriculture/recreation reduces production and sales and the economic impact of the sector. It may also create a net fiscal drain on taxpayers for those community services that increase in cost with increases in distance from city center (e.g., school busses, snow plows, emergency services, sewer, water, electric). Although the agricultural tax burden is substantially lower than residential uses, the demand for community services is even lower.

The American Farmland Trust (AFT, 1999) reports:

- Residential development requires \$1.15 in community services for every \$1 of tax revenues it contributes.
- Farm and forest land uses require \$0.35 in services for every \$1 of tax revenue generated, and
- Commercial or industrial uses demand even less (\$0.27: \$1) relative to their contribution.

The USDA (Heimlich and Anderson 2001) reports:

- Residential development requires \$1.24 in community services for every \$1 of tax revenue generated,
- Agriculture demands \$0.38 in services per \$1 of tax revenue contributed.

In sum, commercial, industrial, agricultural and forest uses of lands pay for themselves from a public policy perspective and residential development, on average, is a net drain on county coffers.

Increasing the density of housing, while maintaining or increasing public (rather than private) urban green spaces to manage population and income growth is more likely to result in net fiscal benefits relative to a lower density alternative.

Forces of land use change

Land use change is expected where there are incentives for change. Population and income growth increase the value of residential properties and the incentive to convert agricultural land to residential use by driving a larger and larger wedge between the value of land in agriculture²⁷ and its value in alternative uses. In general, counties can be classified into one of four categories: urban high amenity, urban low amenity, rural high amenity and rural low amenity with likely impacts of the policy differing for each county type. These qualities are summarized Table 9 below.

Table 9: Farm and ranch conversion risk factors: Urban to Rural and Low to High Natural Amenities		
	Urban Area	Rural Area
Low Amenity Values	Development pressures exist due to nonfarm land use opportunities.	Low development pressures.
	Smaller more recreational and adaptive farming operations	Larger more traditional farming/ranching operations
	At risk for reclassification under tightened enforcement.	Low risk for reclassification under tightened enforcement.
	Opportunity for adaptive farming or conversion to residential or commercial use	Less likely to change land use from current use.
	Less likely to engage in diversified management	May engage in some diversified management
High Amenity Values	High development pressures exist due to nonfarm land use opportunities and draw of natural amenities.	High development pressures exist due to draw of natural amenities.
	Smaller more recreational and adaptive farming operations	Larger more traditional farming/ranching operations
	At risk for reclassification under tightened enforcement.	Low risk for reclassification under tightened enforcement.
	Opportunity for adaptive farming or conversion to residential or commercial use	Opportunity for diversified management strategies, adaptive farming and development for residential use.
	Less likely to engage in diversified management	Likely to engage in diversified management
Sources: Adapted from Heimlich and Anderson (2001) and David A. McGranahan (1999)		

²⁷Nickerson et al. (2012)

Agricultural use taxation provides an incentive for agricultural land uses relative to residential uses (recall Section 1 for the substantial difference in tax incidence/burden) and reduces the incentive to convert. Diversified management use taxation should have a similar effect. Tightening enforcement in an attempt to close the agricultural tax loophole, without considering public good dimensions of extensive land management, will increase the incentive to convert.

Due to the common characteristics of agricultural use taxation reviewed in Section 1, smaller properties closer to high growth and/or more affluent communities will experience greater private incentives to convert to residential uses. Mitigating, sometimes co-located, characteristics include significant off farm income, diversification of on farm activities, including recreation, and non-economic (e.g. family, traditional) motivations for landownership among others.²⁸ In addition, the value of natural amenities, recreational opportunities, views, etc., also increases with population and income growth.^{29, 30} Providing incentives to nurture these dimensions of working landscapes can prevent development of land that is highly valued for its urban proximity, natural amenities or both, as well as offer alternative use opportunities for non-threatened farms. In turn, such communities will feature higher values than otherwise expected for residential properties due to spillover effects of proximity to abundant natural amenities and recreational opportunities.³¹

Building agricultural land use change scenarios:

Baseline assumptions:

In the absence of a change in state policy or of its enforcement, we assume that farms and ranches will not change land use for the foreseeable future despite potential intentions of the owners and opportunities to do so due to population and income growth. That is, land currently classified as agricultural remains so for the baseline analysis.

Alternatives: Stricter enforcement and diversified management:

Although arguments could be made in either direction at the margin (i.e., more pasture will come available at lower prices, fewer farm services will be closely available, local culture will become less farm friendly), we assume, on balance, farmers and ranchers currently in compliance with existing agricultural use value legislation will not be materially affected by tightened enforcement of these laws by county assessors. Of course, changes or strong variation in weather, federal farm policy, commodity prices, input prices, or household dynamics could easily move operations temporarily or permanently out of the compliance category and more likely subject to conversion pressures.

Farmers and ranchers who are not currently in compliance could respond to tightened enforcement in three primary ways. They could:

- Increase production/stocking rates/sales in order to come into compliance and retain agricultural use value taxation;
- Anticipate a substantial increase in their tax bill due to redesignation and therefore sell the property for (residential) development;
- Manage the property for a mix of alternative land use under ‘diversified management’ legislation, if there were such an option in place.

Logically, farmers and ranchers who are not currently in compliance are doing so either because they are legitimate farmers but the current condition of their property is not conducive to managing stocking/sales rates high enough to comply, because they are managing for diverse objectives, including natural resource values, or because they are hobbyists or speculators taking advantage of a tax loophole. In any case, attempts to come into compliance may result in poor land management, inappropriate use of marginal lands, inefficient use of resources and reductions in

²⁸Heimlich and Anderson (2001)

²⁹Charles Barnard et al. (2008)

³⁰Heimlich and Anderson (2001)

³¹David A. McGranahan (1999)

environmental quality. As a result, tightened enforcement is likely to result in the conversion of some lands to residential or commercial uses due to closing the tax loophole, but also due to a lack of ability to explore short or longer term diversified management alternatives to hedge against, or a strategy to take advantage of, variations in climatic or economic conditions, while still maintaining the public benefits of extensive land management.

With the ability to engage in diversified land management practices marginal farms and ranches have the opportunity to provide valuable public benefits in the form of natural resource conservation, ecosystem services and recreation opportunities. Diversified management could limit both farming induced land degradation and the development of valuable rural landscapes.

To summarize, the following types of land use will be estimated:

1. Baseline or status quo
2. Stricter enforcement resulting in:
 - A. Some increases in the intensity of farming activities.
 - B. Some amount of conversion of agricultural land into residential properties.
3. Provisions for use value taxation in diversified management resulting in:
 - A. Some conversion of farming and ranching to natural resource conservation activities.
 - B. Some avoided conversion of agricultural lands to residential properties.

Using this information, three scenarios will be considered relative to the baseline:

1. tax policies are more strictly enforced without diversified management incentives;
2. status quo enforcement of agricultural land use tax policies, but new use tax provisions for diversified management are available;
3. both stricter enforcement and diversification are part of the policy landscape.

Section 4: Economic impact analysis: Data and empirical methods

Modeling changes in the economic base:

Changes in the public policy environment affect private landowner incentives, which in turn result

in decisions affecting the landscape among agricultural, diversified management and residential uses. These changes in land use, modeled as changes in (agriculture, tourism, etc.) industry output (sales), will affect purchases of local goods and services, employment, and tax receipts and therefore have local, regional and state level economic implications. The economic contributions of agricultural and alternative land use practices will be measured by modifying the output of the related industry in the IMPLAN software. Changes in total agricultural output are calculated by estimating the number of farms and ranches affected in each of the four county types described in Table 9 and summing the net change in output.

There are two essential types of data needed to calculate economic changes in the IMPLAN model: the first are data on constructed by the IMPLAN Group Inc. for use in their IMPLAN regional economic impact modeling software and the second are land use and management characteristics that allow for the estimation of changes to model inputs. The IMPLAN software provides production functions for 536 industries along with numerical figures for output, employment, income, and tax revenue sourced from government databases that allow for the assessment of industry changes on the entire regional economy. By specifying changes to agricultural output and sectors affiliated with alternative land uses it is possible to trace a shift in production through intermediate suppliers and consumers to estimate the effect on the larger economy. IMPLAN uses the industry production functions and relationships between economic actors captured in a Social Accounting Matrix (SAM) to calculate the net change in measurements of economic activity for a specified region. Changes to industry output alters industry purchases from intermediate suppliers, consumer spending, industry employment, and government tax receipts. As a result any change to one area of the economy is followed through all affected industries giving a holistic view of the changes.

Adapting IMPLAN with USDA Data: Agriculture, Natural Resource Conservation, Natural Amenities

In order to use IMPLAN, data on agricultural and alternative land use activity is needed to specify the correct changes in IMPLAN. To populate the input-output model farm characteristics from the U.S. Department of Agriculture (USDA) 2012 Census of Agriculture are used to identify representative farm characteristics including average size and output for each industry. Estimates for the cost of alternative land uses related to

Table 10: Definitions for IMPLAN and the 2012 Census of Agriculture datasets using NAICS			
Impact Industry	IMPLAN Index	IMPLAN Description	2012 NAICS Description
Hay	10	All other crop farming	Hay farming (111940); Peanut farming (111992); All other miscellaneous crop farming (111998)
Beef Cattle	11	Beef cattle ranching and farming, including feedlots and dual-purpose ranching and farming	Beef cattle ranching and farming (112111); Cattle feedlots (112112)
Sheep and Goat	14	Animal production, except cattle and poultry and eggs	Hog and pig farming (1122); Sheep and goat farming (1124); Aquaculture (1125); Other animal production (1129)
Source: IMPLAN Group			

natural resource conservation come from the USDA Natural Resource Conservation Service (NRCS) payment scenarios³² and estimates of recreation spending are obtained from the U.S. Fish and Wildlife Service National Survey of Fishing, Hunting, and Wildlife (NSFW).³³ Changes in recreation days by nonresidents will result in increased spending in the community on food and lodging, transportation, equipment and other expenditures that can be modeled in IMPLAN. Conservation payments are considered household or proprietor income for the farmer; however, if conservation payments are assumed to be spent on natural resource conservation activities then they will be captured by conservation spending.

The Rural-Urban Continuum Codes and a Natural Amenity Index compiled by the USDA Economic Research Service allow for distinctions based on urbanity and measures of natural amenity value. The IMPLAN software provides the underlying economic framework for the region of interest and allows for the calculation of economic activity under user defined scenarios; however, this will not capture the full effect of land use changes. Neither nonmarket values such as land aesthetics and ecosystem services nor the relative efficiency of land practices, including the cost of providing community services, can be captured in IMPLAN. These values must be calculated separately using estimates of nonmarket values and returns to tax dollars collected from the literature.

Scenario building: Estimating changes in land use

Economic effect of the agriculture industry

To estimate how much a farm or ranch contributes to economic output, farm characteristics will be assessed based on the average characteristics of a farm in a given industry. As a result, distinctions among farms and ranches are made only based on the industry they belong to and do not otherwise vary. It is logical that extensively managed lands (e.g., beef and sheep operations) and supporting agricultural operations (e.g., hay) are most likely to be affected by these policies. Estimates will be used to provide reasonable approximations of the number of farms and ranches and acreage affected by policy changes. This allows for a proxy measure for operations vulnerable to the financial influence of tax policy changes by industry. Scenarios are defined based on how many operations in each industry are affected.

Diversified management

Land can be converted into natural resource conservation practice at a per acre cost using the NRCS data. It is not necessary to assume the parcel receives NRCS funding; the NRCS data are used only to estimate project cost. Recreational land use may also require some constant maintenance costs that can be framed as NRCS practices so natural resource conservation and recreation are not mutually exclusive. These changes will be modeled as increased sector output. Recreation will increase output in food, lodging,

³²Colorado Payment Scenarios available online at: <http://efotg.sc.egov.usda.gov/toc.aspx?CatID=1430>

³³National Survey of Fishing, Hunting, & Wildlife available online at: <http://www.census.gov/prod/www/fishing.html>

and recreation sectors based on a change in nonresident recreation days. These can be interpreted as new spending if they are assumed to not have otherwise visited the state. While resident recreation days may also increase, it is commonly assumed that they would have spent their

money on something else within the state if not on recreation. Resident recreation is only a contribution to the economy if they would have otherwise recreated out of state. This activity is not considered in the model.

Table 11: Diversified management land use practices and IMPLAN sectors

NRCS Code	2012 NRCS Description	2012 IMPLAN Sector
472	Access control	11 - Beef cattle ranching and farming
342	Critical area planting	2 - Grain farming
643	Restoration of declining habitats	2 - Grain farming
645	Upland wildlife habitat management	2 - Grain farming
646	Shallow Water Management for Wildlife	31 - Sand and gravel mining (94%) 32 - Other clay, ceramic, refractory minerals mining (6%)
657	Wetland Restoration	31 - Sand and gravel mining (94%) 32 - Other clay, ceramic, refractory minerals mining (6%)

Source: U.S. Department of Agriculture Natural Resource Conservation Service ³⁴

Table 12: Recreation spending IMPLAN sectors

National Fish and Wildlife Survey Expense	2012 IMPLAN Category
Food and lodging	499 - Hotels and motels (50%) 400 - Food and beverage stores (25%) 501 - Full service restaurants (25%)
Transportation	402 - Retail gasoline stores
Equipment (Sport specific)	Assumed not to be purchased in state by non-residents
Equipment (Auxiliary)	Assumed not to be purchased in state by non-residents
Other trip expenses (Equipment rental)	404 - Sporting goods, hobby, musical instrument and book stores
Other expenses (Fees, dues, permits, misc.)	496 - Other amusements and recreation

Nonmarket benefits are not generated in IMPLAN, but can be calculated using estimates from available literature. An analysis of 18 studies yields 38 estimates for the value of preserving land for future generations, aesthetics, and wildlife habitat. Per acre estimates of nonmarket benefits can be calculated to determine a nonmarket value of farm land that can be applied to lots

of various sizes. Our analysis finds the average value of nonmarket benefits is \$2.31 per acre for open space and rangeland. This benefit transfer excludes other forms of nonmarket benefits and could be considered a lower bound estimate of the total value created by open land.

³⁴Constructed with the NRC Practice to IMPLAN Code guide accessible online at: <ftp://ftp-fc.sc.egov.usda.gov/Economics/implan/>

Table 13: Nonmarket values of Farm and Ranchland, per acre				
	Low	High	Mean	1,000 Acres
Aesthetics	\$0.00223	\$20.14020	\$2.27056	\$2,270.56
Existence	\$0.00229	\$0.09573	\$0.01448	\$14.48
Habitat Provision	\$0.00040	\$0.10060	\$0.02142	\$21.42
Total Nonmarket Value	\$0.00492	\$20.33653	\$2.30646	\$2,306.46
Source: Benefit transfer analysis by the authors based upon the valuation literature cited in the bibliography.				

Adaptation to address fiscal effects

Sprawl and/or land use density effects on net tax revenues are not generated in IMPLAN, but can be calculated using estimates from available literature. Cost of community services is calculated on a per acre basis. Using the total number of rural acres affected and an average 35 acre household a number of new rural residences is determined.³⁵ Literature figures for average tax generation per person are utilized with the average household size to determine total tax revenue raised. Applying the finding that “dispersed rural residential development in Colorado costs county government and schools \$1.65 in expenditures for every dollar of new revenue received” the total cost of community services is calculated.³⁶

Development pressure and opportunity cost

In order to account for development pressure and other land opportunity factors, farms and ranches will be classified as either urban low amenity, urban high amenity, nonurban low amenity or nonurban high amenity based on the characteristic of the county they reside in using USDA guidelines (Table 9). The U.S. Department of Agriculture has released a natural amenity index that rates counties based on the relative prevalence of climate, topology and surface water measures. The index considers warm winters, winter sun, temperate summers, summer humidity, topographic variation and proximity to surface water but does not consider value added amenities or scenic beauty. It assigns each characteristic a standardized value and the scale is equally weighted sum of the

Table 14: Urban-Rural Designation, USDA definitions	
Metropolitan Counties	
Code	Description
1	Counties in metro areas of 1 million population or more
2	Counties in metro areas of 250,000 to 1 million population
3	Counties in metro areas of fewer than 250,000 population
Nonmetropolitan Counties	
4	Urban population of 20,000 or more, adjacent to a metro area
5	Urban population of 20,000 or more, not adjacent to a metro area
6	Urban population of 2,500 to 19,999, adjacent to a metro area
7	Urban population of 2,500 to 19,999, not adjacent to a metro area
8	Completely rural or less than 2,500 urban population, adjacent to a metro area
9	Completely rural or less than 2,500 urban population, not adjacent to a metro area
Source: U.S. Department of Agriculture Economic Research Service	

³⁵ A 35 acre household is chosen as the unit of analysis to remain consistent with the original study which found that on average, dispersed rural residential development in the conversion of 35 acres of agricultural land in Colorado costs county government and schools \$1.65 in expenditures for every dollar of new revenue received. Thirty-five acres is used in the reference study due to Colorado’s state rural subdivision regulation known as ‘the 35 acre rule.’ Home rule counties, such as Weld County with an 80 acre rule, do not necessarily abide by the state subdivision regulations.

³⁶ Calculated from R. Coupal and A. Seidl Rural Land Use and Your Taxes: The Fiscal Impact of Rural Residential Development in Colorado. March 2003. 25 pp.

values. Since the scale is meant to track characteristics attractive for permanent residential population change it underestimates value where amenities are primarily seasonal. Nevertheless, it provides a consistent classification for amenity value across the United States with a few caveats. For the purposes of this study any county that is two standard deviations or more above mean

amenity values is considered to be high amenity, while all other counties are considered low amenity. Colorado's "Front Range" and mountain counties, for example, typically rank highly on this index. The USDA RUIC provides even more detail with nine types of urban influence accounted for allowing for the determination of urban and rural influence.

Figure 1: Natural Amenities Scale (U.S.)

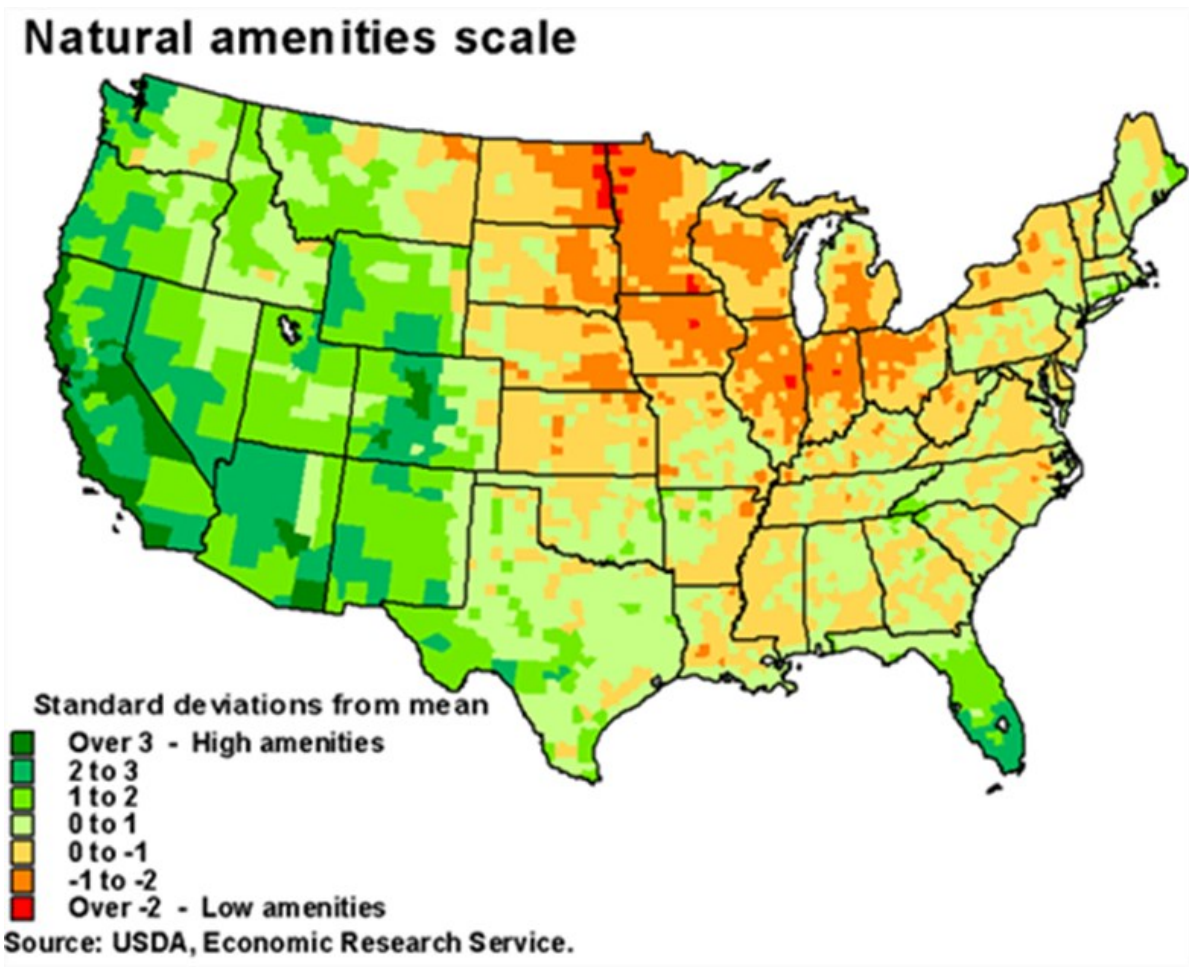


Table 15: Natural amenities scale designation

Deviations from the mean	Amenity Rank	Amenity Designation
Over -2	1	Low Amenity
-1 to -2	2	Low Amenity
0 to -1	3	Low Amenity
0 to 1	4	Low Amenity
1 to 2	5	Low Amenity
2 to 3	6	Mid Amenity
Over 3	7	High Amenity
Source: U.S. Department of Agriculture Economic Research Service		

The Baseline Scenario:

The baseline scenario considers the current contribution of the hay, beef, sheep and goat farming sectors to the Colorado economy in 2012. The market value of all agricultural products as well as private land based tourism and recreation income is taken from the 2012 USDA Census of Agriculture. These figures are entered into IMPLAN to estimate the number of jobs and total output the activity supports. Total nonmarket value of agricultural land in these industries is calculated and the contribution of nonresident recreation days is also measured using figures from the

2011 USFWS National Survey of Fish and Wildlife. These numbers provide an estimate of the status quo and illustrate the relative magnitude of results based on the methodology. If estimates are not within expectations this could point to possible areas where new data or empirical methods may improve the model; however, tightened enforcement and diversified management policy scenarios occur relative to these levels of spending, job creation and total economic activity which allows for reasonable comparison across results. There are a few caveats due to methodology and assumptions summarized in Table 16.

Table 16: Assumptions and implications	
Assumption	Implication
Aggregate industry production functions	Some precision is lost in tracing economic activity through the economy.
Only covered Employment and Wage data utilized	Labor not covered by unemployment is not considered; labor changes may be underestimated.
Conservation payments are assumed to be spent on natural resource conservation activities	Conservation payments have no benefit other than supporting natural resource conservation activities.
Farm size and output occur at average levels for each industry for each farm	May over estimate changes in output and land use since the distribution of farm characteristics is skewed; no distinction in farm size or output by region.
Estimates can be interpreted as total economic activity created by industry only if assumed to be relative to a baseline of zero production.	Agricultural activity can be interpreted as creating economic benefits; however, additions to natural resource conservation practices and recreation activity can only be interpreted as creating benefit if it is assumed they would not have otherwise occurred. Otherwise, they are interpreted as the benefit the activities support but not necessarily create.
Constant returns to nonmarket values	No adjustment for value of benefits provided based on scale or quality, either positive or negative.
No nonmarket land value for residential land	Could overestimate the loss if all benefits are not lost when developed
Land degradation is not captured in the model	Model does not account for potential negative effects on future output or other market or nonmarket benefits.
Residents and nonresidents spend proportionately the same amount on all recreation expenses.	If nonresidents spend proportionately more on certain expenses, food and lodging for example, then nonresident recreation impacts may be under estimated.

Stricter Enforcement:

In a scenario of stricter enforcement, urban farms and ranches operating at a loss are most likely to be affected, though impacts will occur everywhere. Some increase in stocking levels or other agricultural activity occurs to meet tax requirements while other farm and ranch land is sold to developers, reducing agricultural output. The cost of providing community services increases where rural residential development takes place and all nonmarket land benefits are lost on developed farmland. We assume that residential development is possible in urban areas without converting agricultural lands through infill and other forms of higher density development. Thus, stricter enforcement of agricultural use value legislation will shift residential development to agricultural lands. The loss of environmental amenities and farmland result in a decrease in nonresident recreation days.

Diversified Management:

The diversified management scenario is generally what one might expect under either Oregon's Wildlife Habitat and Conservation Management or Texas' Open Space Agricultural Use Value programs

discussed in Section 2. If diversified management is part of a tightened enforcement policy some disqualified landowners will invest in natural resource conservation and management diversification rather than sell. Other farmers may also elect to engage in natural resource conservation activities without risk to their agricultural tax status. Spending on alternative activities can occur using low, average and high cost natural resource conservation activities. Some landowners will receive conservation payments that are invested in natural resource conservation. Loss of economic and environmentally valuable land is prevented and some improvements may occur. Recreation days by out of state visitors may increase.

Results

Colorado IMPLAN Analysis: Baseline Scenario

Table 17: Colorado industry statistics			
	Hay farming	Beef cattle ranching	Sheep and goat farming
Market value of agricultural products sold	\$259,740,000	\$958,445,000	\$98,229,000
Average market value of agricultural products sold	\$45,497	\$91,038	\$81,047
Number of farms	5,709	10,528	1,212
Total acreage	2,921,220	14,521,367	503,850
Average size	500	1,379	416
Farms and ranches with net losses	3,146	6,405	988
Farms and ranches with agritourism and recreation income	87	312	15
Average agritourism and recreation income	\$11,205	\$39,090	\$15,333
Number of Farms: Urban low amenity	1,391	2,811	350
Number of Farms: Urban high amenity	637	1,667	275
Number of Farms: Rural low amenity	2,464	3,947	395
Number of Farms: Rural high amenity	1,217	2,103	192
Nonmarket value per acre ³⁷	\$2.31	\$2.31	\$2.31
Source: U.S. Department of Agriculture 2012 Census of Agriculture			

³⁷Estimated values for future generations, aesthetics, and wildlife habitat from benefit transfer analysis by the authors based upon the valuation literature cited in the bibliography.

Table 18: Colorado nonresident recreation spending, 2011		
National Fish and Wildlife Survey Expense	IMPLAN Category	Estimated Nonresident Spending ³⁸
Food and lodging	499 - Hotels and motels (50%)	\$63,829,624
Food and lodging	400 - Food and beverage stores (25%)	\$31,914,812
Food and lodging	501 - Full service restaurants (25%)	\$31,914,812
Transportation	402 - Retail gasoline stores	\$113,203,061
Equipment (Sport specific)	Assumed not to be purchased in state by non-residents	\$0
Equipment (Auxiliary)	Assumed not to be purchased in state by non-residents	\$0
Other trip expenses (Equipment rental, etc.)	404 - Sporting goods, hobby, musical instrument and book stores	\$28,467,567
Other expenses (Fees, dues, permits, misc.)	496 - Other amusements and recreation (Hunting, fishing, wildlife watching, etc.)	\$40,032,517
Total		\$309,362,393
Source: U.S. Fish and Wildlife Service 2011 National Survey of Fish and Wildlife		

The agricultural census provides information on both agricultural output and income from agritourism and recreation. In Colorado the estimated direct agricultural output of hay, beef cattle, sheep and goat farming sectors in 2012 was \$1,316,413,963 which directly employed 7,693 people. Demand from intermediate supply industries added an additional \$302 million and supported 1,301 jobs. The net contribution of all three industries including direct, indirect and induced economic activity was nearly \$1.9 billion in total output and 11,000 in job support. The agritourism and recreation income on Colorado hay, beef, sheep and goat farms and ranches totaled \$13,405,115 and supported just over \$19 million of economic output and 91 jobs. Recreation spending by nonresidents in Colorado totaled nearly \$310 million for fishing, hunting and wildlife watching. These visitors generated slightly more than \$320 million in total output and supported nearly 3,500 jobs. Combined, the activity associated with agriculture, agritourism and recreation generated \$115 million in state and local tax revenue.

The estimated nonmarket value of maintaining land currently employed in hay, beef, sheep and goat operations for future generations, aesthetics and wildlife habitat totals \$2.31 per acre or slightly less than \$41.5 for current agricultural lands. In sum, the total annual economic impact of the baseline scenario on the

Colorado economy is \$2.4 billion and 14,527 jobs. While most of this value is derived directly from agricultural market activity the associated recreation and land benefits account for 17% of the total value derived from agriculture.

Colorado IMPLAN Analysis: Stricter Enforcement

By means of illustration, based upon our understanding of the data and best estimate, 50% of urban farms and ranches and 25% of rural farms and ranches will be disqualified from their agricultural tax status under stricter enforcement of current laws. This situation reflects the assumption that rural farms and ranches are less likely to be disqualified as they are more often characterized as traditional farming operations rather than hobby or adaptive farms.³⁹ These 6,145 farms and ranches represent 6,333,285 acres, about 35% of the total hay, beef, sheep and goat operations. In terms of productivity this represents nearly 33% of urban and 25% of rural farms and ranches operating at a loss. Beef ranching represents the majority of both farms and ranches and acres affected with 3,752 farms and ranches accounting for 5,174,478 acres while hay, sheep and goat farming account for the remaining 2,393 farms and ranches and 1,158,807 acres.

³⁸Estimated based on proportion of nonresident recreation days and total resident and nonresident spending.

³⁹Heimlich and Anderson (2001)

In response to stricter enforcement, 50% of disqualified urban and rural farms and ranches increase production by 15% to meet agricultural valuation standards, while the other 50% of farms and ranches are sold and subdivided to meet demand for new housing.⁴⁰ While the increase in agricultural activity to meet the newly enforced requirements counters the loss that occurs from residential development the overall result is a net loss of agricultural output and farm related agritourism activity totaling \$200 million in direct output and 1,160 agricultural sector jobs. This loss induces a contraction in related supply industries as well as sectors that utilize agricultural output with the total effect on the economy of 1,662 jobs and almost \$290 million in total output lost in all direct, intermediate and induced sectors. The available data do not directly connect recreation days to private land use. However, it is safe to assume that outdoor recreation will not increase due to land conversion to residential development, as significant wildlife habitat, viewsheds, and other attributes of the outdoor recreation experience will certainly be lost. If recreation days from nonresidents are reduced very modestly, say by 10%, as a result of development, the economy will lose \$30,936,239 in recreation spending. This activity would have supported 577 jobs and \$37.3 million in total economic activity. Total state and local tax revenue collected is \$96.6 million, almost \$18 million less than what is collected in the baseline scenario. This includes social insurance, sales, income, property, motor vehicle and other taxes.

In addition to the loss in marketable agricultural and recreation output the associated reduction in farmed land would itself have significant implications for public welfare in Colorado. The identified market effect

would cause the total acres in agriculture to be reduced by 3,166,643. If land use shifts to anything other than managed or idle open space the nonmarket benefits generated by Colorado land would be reduced by \$7.3 million. The increased activity of those operations managing to the assessor could further reduce the ability of Colorado farm land to support ecosystem services and other nonmarket benefits.

Where this land is converted to rural residential development the cost of providing community services in rural areas would increase from approximately \$0.35 per dollar of tax revenue for farm land to \$1.65 per dollar of tax revenue for rural residences.⁴¹ Coloradans generate, on average, \$926 in relevant tax revenue per person.⁴² If lost agricultural land is divided into 35 acre parcels, the 1,303,794 rural acres create 37,251 new residences. Assuming the state average household size of 2.49 people, this generates \$86 million in tax revenue, but creates \$141.7 million in service costs. Assuming the same 2.49 people per household the 1,290 rural farms and ranches would have generated nearly \$3 million in tax revenue at a cost of only \$1 million. A cost of community service surplus of \$1.9 million is transformed into a \$55.7 million deficit. The analysis of the cost of providing community services is independent from the estimated change in tax revenue generated. Since the cost of community services pertains to how far a dollar of tax revenue goes in covering the costs of servicing that area while state and local tax revenue are estimated in IMPLAN by applying Census of Government Finances data to the economic activity specified in the scenario the two figures can be added so long as the ratio of cost to revenue remains constant. Incorporating changes to both the cost and revenue gives a more complete picture than looking at changes in tax generation or costs alone.

⁴⁰An increase in output of 15% is chosen as a reasonable approximation of what might be expected. If the change in output needed to manage to meet agricultural valuation standards under stricter enforcement were too high, it is unlikely farms and ranches would do so since they are already choosing to under produce. The assumption is that marginal farms and ranches that value maintaining agricultural status for future benefit will choose to increase output while farms and ranches that are far under threshold will not. This may be reasonable because farms and ranches that have fallen far out of production have done so for some reason which could reflect poor production potential, owner preferences or other factors which may be correlated with a willingness or ability to increase farm output. On the other hand marginal farms and ranches have less of a burden to meet and have displayed some preference for higher production levels. Overall, 15% represents an average for all farms and ranches managing to meet agricultural valuation standards under stricter enforcement, thus it is not necessary that no farm increases output by 50% or more and farms and ranches could increase output by less. However, the results could benefit from a sensitivity analysis and from site-specific expert opinion relevant to any particular case under examination.

⁴¹R. Coupal and A. Seidl. Rural Land Use and Your Taxes: The Fiscal Impact of Rural Residential Development in Colorado. March 2003. 25 pp.

⁴²Calculated from R. Coupal and A. Seidl Rural Land Use and Your Taxes: The Fiscal Impact of Rural Residential Development in Colorado. March 2003. 25 pp.

In sum, the effect of stricter enforcement of existing agricultural use value laws is a net loss of approximately \$413 million due to reduced agricultural production, recreation, tourism and nonmarket benefits of Colorado agricultural lands in exchange for 37,251 low density houses and a net loss in public services expenditures of over \$55 million statewide.

Colorado IMPLAN Analysis: Stricter Enforcement – Representative Ranch

It is illustrative to scale the state analysis to the level of a representative Colorado farm or ranch operation. There are 5,709 hay farming operations in Colorado. The average operation is 500 acres in size and produces \$45,497 in total market value of agricultural products sold. Of all hay farms it is estimated that agritourism and recreation income totaled \$979,115, or about \$11,205 per farm reporting this type of income. If stricter enforcement results in disqualification from the agricultural tax, closing the average Colorado hay operation results in a \$45,668 loss in agricultural and agritourism output that supported a total of \$70,714 in economic output and one job. The nonmarket value of the lost farm is \$1,156. The typical farm affected by stricter enforcement will be one that is under producing

relative to legal thresholds; if they choose not to increase output then their productivity is lost. While nearly half of all hay farm operations are located in rural low amenity counties, the typical farm sold to development is probably located in an urban area, a high amenity area, or both.

The average beef cattle ranching operation in Colorado is 1,379 acres and contributes \$92,196 in annual output of agricultural goods including agritourism and recreation. The majority of beef ranching operations are in low amenity counties; however, there are still 5,198,830 high amenity acres. On average a typical ranch operation supports \$130,976 in total output and one job. This, along with \$3,186 in nonmarket value, is lost when a typical ranch is developed. A 1,379 acre ranch has the potential to convert to 39 rural residential parcels at 35 acres each.

An average sheep and goat operation is 416 acres and generates \$81,237 in direct economic output. Closing it would reduce total regional output by \$110,601 and employment by 1 job. Land of this size also supports \$960 of nonmarket benefits on average. A typical sheep and goat operation affected will also be under producing and those that sell to developers are more likely to be in urban or high amenity areas, or both.

Table 19: Colorado farm and ranch characteristics by location and amenity score

	Counties	Farms/ranches	Hay *	Beef cattle	Sheep & Goat	Farms and ranches at a loss	Tourism & recreation
Urban/Low Amenity	7	9,619	1,391	2,811	350	6,198	119
Urban/High Amenity	10	5,729	637	1,667	275	4,260	123
Rural/Low Amenity	25	14,410	2,464	3,947	395	6,871	330
Rural/High Amenity	22	6,422	1,217	2,103	192	4,075	292
Total	64	36,180	5,709	10,528	1,212	21,404	864

Source: U.S. Department of Agriculture 2012 Census of Agriculture. * Hay farming statistics are estimated as a proportion of the larger category "sugarcane farming, hay farming, and all other crop farming" using the ratio of market value of agricultural products sold for hay operations to the total.

Colorado IMPLAN Analysis: Mixed Diversified Management (Low)

In this scenario the same number of urban farms and rural farms and ranches are disqualified from their agricultural tax status as under stricter enforcement. Like the stricter enforcement scenario, 50% of reclassified urban and rural farms and ranches increase production by 15% to meet agricultural valuation standards. Here, the disqualified farms and ranches that do not change management to come into compliance can choose to participate in diversified management instead of selling to developers. We assume that only those farms that would have been sold would be interested in alternative land management practices that could allow them to keep their farm; however, in practice farms that managed to the assessor may also be interested in diversified management as an alternative to increasing production.

In this example, based on our best estimate and for illustrative purposes, 50% of disqualified farms and ranches not managing for compliance engage in diversified management and the rest are sold to development. As a result 1,536 farms and ranches are sold, 1,536 farms and ranches participate in diversified management and 3,073 farms and ranches manage for compliance. Farms and ranches engaged in diversified management rather than development reduce

agricultural output by 15%, but still preserve \$100,198,486 in output of marketable farm products and direct on farm agritourism. An increase in 15% is used to remain consistent with the assumed decrease of 15% in a stricter enforcement scenario. The assumption is that farms and ranches managing to meet agricultural valuation standards are nearer to the threshold than farms and ranches sold. Similarly, farms and ranches foregoing agricultural production for diversified management are not likely to be giving up the most agriculturally productive lands. Agricultural activity that is not lost supports 580 agricultural sector jobs and 831 jobs could be saved overall. Total regional output supported by the agricultural activity that is not lost is \$144.3 million.

If disqualified farms and ranches managing for natural resource conservation or recreation land practices do so on half their acreage, they will create economic activity on 791,661 acres associated with these land management practices. These land use practices are not mutually exclusive from each other but are in addition to what is gained from providing the U.S. Fish and Wildlife survey recreation activities. The measure of benefit from these practices is in addition to what would have been generated in the status quo scenario. New land use management practices total \$11.4 million in spending by previously disqualified farms. This supports 75 jobs and close to \$18 million in total output.

Table 20: Simulated natural resource conservation practices in the Diversified Management scenario

Description	Percent of land participating	Average cost (per acre)	Acres (Hay)	Total Spending
Restoration of declining habitats	40%	\$34	100	\$3,434
Upland wildlife habitat management	40%	\$12	100	\$1,167
Access control	10%	\$255	50	\$841
Critical area planting	10%	\$334	25	\$8,362
Shallow water management for wildlife	5%	\$212	25	\$1,521
Wetland restoration	2%	\$34	25	\$2,583
Total				\$17,909

Additionally, farms and ranches that are not threatened by disqualification may engage in diversified management. These may be farmers that would benefit from the improved ecosystem services or land quality, have the opportunity to capitalize additional recreation and agritourism income, or have personal preference for natural resource conservation and land management. In this example, in addition to those farms and ranches

that go into diversified management above, a conservative 10% of urban high amenity acres are assumed to be conserved or managed for recreation, while 15% of rural high amenity and 5% rural low amenity acres participate. No urban farms and ranches in low amenity areas engage in diversified management. These assumptions reflect the idea that in order to engage in diversified management for natural resource conservation or

recreation activities there must be some benefit to be gained. Benefits here only mainly to high amenity areas, while all rural areas are favorable to natural resource conservation and recreation due to larger plot sizes and lower development pressures. The greatest benefits then accrue in rural high amenity areas. If these agricultural operations participating in low spending diversified management decrease output by 15% the net change in total output will be a loss of over \$8.8 million in direct agricultural output, 74 total jobs and almost \$13 million in total output. However, the land management practices associated with farms and ranches not subject to disqualification totals 796,959 acres and adds \$11.5 million to the natural resource conservation and recreation land management industries. These additional diversified farms and ranches support 76 jobs and \$17.8 million in total output. Overall, the 1,588,619 acres participating have an average cost of new land management practices of \$14.36 per acre. The new natural resource conservation and recreation land management activities will result in a gain of 151 jobs and almost \$37 million in total output. If diversified

management leads to a 10% increase in recreation days by nonresidents, recreation spending will increase by \$30.1 million, supporting 345 jobs and creating \$32 million in total regional output. Total tax generation under this scenario is approximately \$110 million which is just over \$4 million less than the baseline, but nearly \$13.5 million more than stricter enforcement alone.

Another benefit of not developing 1,583,321 acres under diversified management is that nearly \$3.7 million in farmland related nonmarket value is preserved. The 1,583,321 acres of developed land consists of 651,897 rural acres. Rural residential development is estimated to halve under diversified management as compared to stricter enforcement, creating 18,626 new 35 acre household parcels which cost \$1.64 to service per tax dollar raised. Statewide this constitutes a savings of nearly \$28 million for the of community services compared to a situation where all disqualified rural land not managing to the assessor were developed.

Table 21: Total natural resource conservation spending (low)				
Description	Percent of land participating	Low cost per acre	Acres	Total Spending
Restoration of declining habitats	40%	\$1	635,448	\$654,511
Upland wildlife habitat management	40%	\$7	635,448	\$4,136,765
Access control	10%	\$34	158,862	\$5,344,115
Critical area planting	10%	\$45	158,862	\$7,148,787
Shallow water management for wildlife	5%	\$64	79,431	\$5,116,943
Wetland restoration	2%	\$13	31,772	\$418,760
Total				\$22,819,880

Colorado IMPLAN Analysis: Mixed Diversified Management (Medium)

This scenario is the same as above, except farms and ranches engage in the average cost natural

resource conservation and recreation land management practices described in the table below. Average spending works out to \$71.63 per acre. These higher cost activities have the potential to support 775 jobs and \$180.7 million in total output.

Table 22: Total natural resource conservation spending (medium)				
Description	Percent of land participating	Average expenditure per acre	Acres	Total Spending
Restoration of declining habitats	40%	\$34	635,448	\$654,511
Upland wildlife habitat management	40%	\$12	635,448	\$4,136,765
Access control	10%	\$34	158,862	\$5,344,115
Critical area planting	10%	\$334	158,862	\$53,137,726
Shallow water management for wildlife	5%	\$122	79,431	\$9,667,543
Wetland restoration	2%	\$517	31,772	\$16,414,567
Total				\$113,800,900

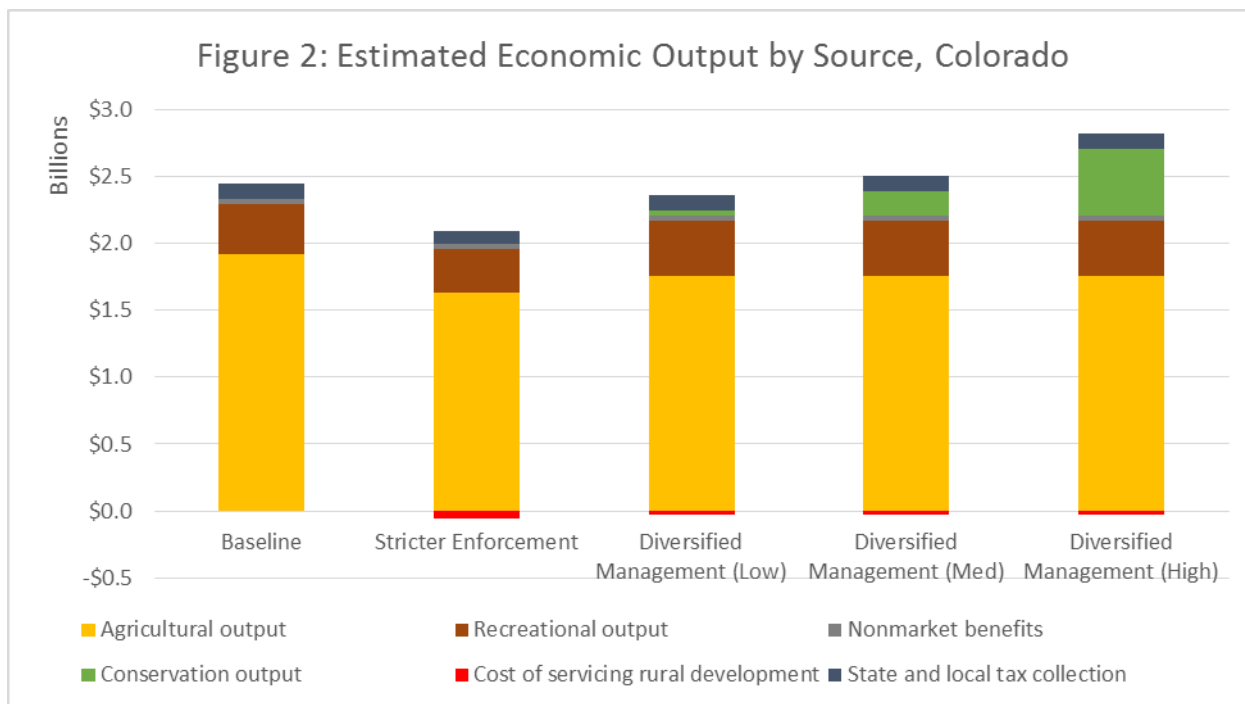
Colorado IMPLAN Analysis: Mixed Diversified Management (High)

This scenario is the same as above, except farms and ranches engage in high cost natural resource

conservation and recreation land management practices described in the table below. Average spending works out to \$196.11 per acre. These highest cost activities have the potential to support 2,146 jobs and nearly \$500 million in total output.

Table 23: Total natural resource conservation spending (high)				
Description	Percent of land participating	High cost per acre	Acres	Total Spending
Restoration of declining habitats	40%	\$104	635,448	\$65,914,991
Upland wildlife habitat management	40%	\$19	635,448	\$12,073,506
Access control	10%	\$34	158,862	\$5,344,115
Critical area planting	10%	\$1,105	158,862	\$175,564,670
Shallow water management for wildlife	5%	\$179	79,431	\$14,217,348
Wetland restoration	2%	\$1,210	31,772	\$38,436,643
Total				\$311,551,273

Figure 2: Estimated Economic Output by Source, Colorado



In every scenario the majority of relevant economic activity can be attributed to agriculture; however, the ability to engage in diversified management can make the difference between realizing a net social benefit or net social cost of a policy. While inclusion of activity conservation universally constitutes an improvement over stricter enforcement alone, at low levels of investment there is a net decrease in total economic activity in the state of \$118.5 million relative to the baseline. On the other hand, at high levels of investment this 5% decrease in activity has the potential to become a 14% increase. At the level of investment that is considered to be the average scenario diversified management is a \$25 million improvement over the baseline and a \$438 million improvement over tightened enforcement alone. Spending associated with medium levels of investment increase total output by 10% over the status quo and nearly 22% over stricter enforcement.

Colorado IMPLAN Analysis: Diversified Management – Representative Ranch

A representative farm or ranch operation engaging in diversified management is characterized as an operation conducting agricultural activity on half its acreage and devoting the other half to land management practices associated with either natural resource conservation or recreation. For farms and ranches engaged in

diversified management it is assumed that these land management practices provide more benefit than using the entire farm to produce agricultural market goods engaging in these practices; therefore, it is assumed that removing this land from production only reduces farm related output by 15%. The average farm engages in a bundle of land management practices, as described for the typical hay operation in Table 20, at the average cost for that activity. These activities can be assumed to be new practices the farm would not otherwise have engaged in or the net activity occurring on managed land. If the latter the IMPLAN figures can be interpreted to indicate what benefits the activity will support while if the former the activity can be seen as creating the benefits.

An average hay operation is 500 acres and produces \$45,668 in marketable goods and agritourism activity. In the diversified management scenario agricultural output is reduced by 15% to \$38,817 and spending on diversified land management activities increases by \$17,909 using the medium scenario from above. The net effect of the loss in agricultural output reduction in acres farmed of 208 acres leads to a reduction in output of \$12,185 and an increase in natural resource conservation spending of \$14,900. The change in total direct output of \$2,741 supports \$7,065 in regional economic activity.

Colorado IMPLAN Analysis: Pure Diversified Management at Average Spending

In the absence of stricter enforcement, the only loss in agricultural production comes from farms and ranches who choose to participate in diversified management reducing their output. In this situation 10% of urban high amenity acres are assumed to be conserved or managed for recreation, while 15% of rural high amenity and 5% rural low amenity acres participate. No urban farms and ranches in low amenity areas engage in diversified management. This is the same bundle of natural resource conservation as in the scenario above that included stricter enforcement. Reductions in agriculture total \$1,788,791 for hay operations, \$6,471,478 for beef ranching and \$611,256 for sheep and goat farming. The total reduction of \$8.9 million in agricultural output is counteracted by an increase of \$57 million in natural resource conservation and recreation land management practice activities. The net change in direct output increases employment in the state by 315 and there is a net gain in total output of almost \$80 million. Considering the same increase in recreation from nonresidents additional job support is 345 and \$32 million in regional output. Tax collection totals \$117 million, \$2.7 million more than under the current scenario. With no additional incentive for development no change in nonmarket value is measured from the baseline scenario; however, with the new practices it would be reasonable to assume some increase in value not measured by the study. Finally, as no development takes place there is no change in the cost of administering community services.

Summary of Colorado IMPLAN Analysis Results: Baseline vs Stricter Enforcement or Mixed Diversified Management

The contribution of the hay, beef, sheep and goat farming sectors to Colorado's economy is large. Together with the recreation industry it supports nearly \$2.5 billion in economic activity and over fourteen thousand jobs. The 17,881,746 acres of farm and ranch land support almost \$41.5 million in nonmarket benefits in the form of existence value, wildlife habitat and aesthetic beauty. The persistence of farm and ranchlands also provides an alternative to low density residential development, which can have high public services costs in rural areas and lead to land degradation

and loss of ecosystem services. Rather than being developed, underused farm land has the potential to support between 151 and 2,146 jobs and \$37 million and \$500 million in total output in new land management related activity, depending on the level of investment and the intensity of natural resource conservation practices under taken.

This analysis demonstrates that attempts to close the agricultural use tax loophole will likely reduce the size of the agricultural economy and attendant public benefits of extensive management of Colorado's private lands and increase, not decrease, the tax burden of the average household. The analysis supports the idea that allowing for alternative land uses in agriculture can provide substantial public benefits. It indicates that incorporating diversified management into a policy of stricter enforcement will lead to greater net public benefits than with stricter enforcement alone. The benefits of diversified management are shared throughout the economy, including agriculture, as more land is likely to stay in production and less land is likely to permanently convert to residential uses under these conditions. Agriculture sectors and support industries would see a smaller loss of employment and output as a result of stricter enforcement, with 757 jobs and \$131.4 million in total output saved at average levels. Moreover, diversified land management is likely to be more robust to general economic cycles and commodity price variation.

Additionally, keeping land out of development can lead to substantial savings in the cost of providing community services. Land that is not developed will continue to provide important nonmarket benefits. New industry activity in land management practices for natural resource conservation or recreation will also contribute to the state economy which further closes the gap created by stricter enforcement of agricultural regulations. The degree to which the contribution of new activity makes up for or adds to the economic activity of the state depends on the kinds of practices and level of investment actually engaged in by participants. At the low end, the activity is likely to at least offset the shift from agriculture, especially if this occurs on marginal lands. If either stricter enforcement of diversified management lead to a difference in recreation days, the implications for the state economy could be even larger.

Table 24: Summary of Colorado results

	Baseline	Stricter Enforcement	Mixed Diversified Management (Medium)
Agriculture (Net)			
Direct output	\$1,316,414,000	\$1,116,017,027	\$1,207,343,988
Total output supported	\$1,916,676,687	\$1,628,126,472	\$1,759,491,747
Total employment supported	11,082	9,420	10,177
Recreation (Net)			
Direct output	\$309,362,393	\$278,426,154	\$340,298,632
Total output supported	\$320,631,079	\$283,287,680	\$352,694,186
Total employment supported	3,445	2,868	3,790
Nonmarket benefits (Net)	\$41,456,270	\$34,141,325	\$37,798,797
Conservation (Relative)			
Direct output	0	0	\$113,800,900
Total output supported	0	0	\$180,665,648
Total employment supported	0	0	775
Cost of servicing rural development (Relative)	0	-\$55,739,228	-\$27,915,364
State and local tax collection	\$114,360,612	\$96,624,573	\$110,067,927
Total benefits supported	\$2,447,462,455	\$2,034,509,014	\$2,328,894,445
Total jobs supported	15,106	12,793	14,754

Table 25: Summary of Colorado results			
	Net of Baseline		Net of Stricter Enforcement
	Stricter Enforcement	Mixed Diversified Management (Medium)	Mixed Diversified Management (Medium)
Agriculture (Net)			
Direct output	-\$200,396,973	-\$109,070,012	\$91,326,961
Total output supported	-\$288,550,215	-\$157,184,940	\$131,365,275
Total employment supported	-1,662	-905	757
Recreation (Net)			
Direct output	-\$30,936,239	\$30,936,239	\$61,872,478
Total output supported	-\$37,343,399	\$32,063,107	\$69,406,506
Total employment supported	-577	345	922
Nonmarket benefits (Net)	-\$7,314,945	-\$3,657,473	\$3,657,472
Conservation (Relative)			
Direct output	\$0	\$113,800,900	\$113,800,900
Total output supported	\$0	\$180,665,648	\$180,665,648
Total employment supported	0	775	775
Cost of servicing rural development (Relative)	-\$55,739,228	-\$27,915,364	\$27,823,864
State and local tax collection	-\$17,736,039	-\$4,292,685	-\$4,292,685
Total benefits supported	-\$412,953,441	-\$118,568,010	\$25,112,077
Total jobs supported	-2,313	-352	272

Utah IMPLAN Analysis: Baseline

Parallel analyses employing the same methods and scenarios as the Colorado work were conducted for Utah and New Mexico. This section reviews the results for the Utah analyses.

In 2012, Utah's hay, beef, sheep and goat industries produced \$598,156,000 in market value of agricultural products, less than half of what was produced in Colorado. Additionally, 130 of the 10,864 total farms captured \$2.2 million in agritourism and recreation income; however, this does not include the output from 8 goat and sheep farms, which is excluded from the census in order to protect against identification of individual farms and ranches. These activities supported 7,336 jobs and \$886.9 million in total output.

Nonresident recreation spending, which totaled \$218 million in 2011, was also significantly less than Colorado and had a direct impact of \$123.5 million, supporting 2,798 jobs and \$230.2 million in total output. The 5,293,293 total acres of agricultural lands contributed an estimated \$12.2 million in nonmarket services (Table 26). Overall, Utah has a smaller agricultural base than Colorado and its land generates less in nonmarket benefits. Recreation income was less as well, but relatively speaking, it made up a larger proportion of the relevant economy.

In total, Utah's hay, beef, sheep and goat industries support \$1,176.5 million in public and private benefits including agricultural products, recreation, nonmarket benefits and tax revenues.

Table 26: Utah IMPLAN Analysis: Baseline

	Hay	Beef	Sheep & Goat	Total
Market value of agricultural products sold (US\$ millions)	\$279,034	\$286,408	\$32,723	\$598,165
Average market value of agricultural products sold	\$57,297	\$54,752	\$42,887	
Number of farms and ranches	4,870	5,231	763	10,864
Total acreage	1,479,123	3,300,591	513,579	5,293,293
Average size	304	631	673	
Farms and ranches with net losses	2,232	3,418	587	6,237
Total agritourism and recreation	\$213,938	\$1,937,000	-	\$2,150,938
Farms and ranches with agritourism and recreation income	28	94	8	130
Average agritourism income	\$7,588	\$20,606	-	
Average agritourism income per farm	\$44	\$370	-	
Urban low	1,530	1,551	172	3253
Urban high	682	752	117	1551
Rural low	2,322	2,554	423	5299
Rural high	337	374	51	762
Nonmarket value per acre	\$2.31	\$2.31	\$2.31	
Total	\$279,247,938	\$288,345,000	\$32,723,000	\$600,315,938
Average	\$57,340	\$55,122	\$42,887	
Total nonmarket value	\$3,416,774	\$7,624,365	\$1,186,367	\$12,227,507

Utah IMPLAN Analysis: Stricter Enforcement

Using the same scenarios at the Colorado example, if 50% of urban farms and ranches and 25% of rural farms and ranches were affected by stricter enforcement of current agricultural land use taxation regulations, a total of 3,917 farms and 1,903,157 acres would be disqualified. If half of disqualified farms and ranches stop producing, there would be a direct loss of \$108.3 million in agricultural and agritourism output, while a 15% production increase on the remaining farms and ranches in order to come into compliance will add \$16.2 million in direct output. This will result in a net loss of \$92.1 million, which supported 1,127 jobs, and \$136.1 million in total output (Table 27).

The loss of 951,578 acres of agricultural production reduces the public nonmarket benefits in the state by \$2.2 million, while the increase in

agricultural activity on the other 951,578 acres could lead to additional land degradation. The estimated 10% decrease in recreation-days would reduce direct spending by \$21.8 million potentially costing the state 467 jobs and over \$26.7 million in total output.

Rural residential development will take place on an estimated 371,745 acres of the former agricultural land leading to 10,621 new 35-acre households. This translates into an increase in rural population by 33,032 at the state average household size of 3.11. In 2013, Utah collected more than \$2.7 million in property taxes, or about \$940 per person. At a cost of providing rural community services of \$1.65 per dollar generated, this would cost public administrators \$51.2 million to administer, while raising only \$31.1 million in revenue; a net loss of \$20.1 million. Moreover, collection of state and local taxes would be reduced by an additional \$7.5 million due to the loss in local production.

Table 27: Utah IMPLAN Analysis: Rural-urban and high-low amenity farms and ranches

	Count ies	Farms & ranches	Hay farming *	Beef cattle	Sheep & Goat	Farms & ranches at a loss	Ag & rec
Urban Low Amenity	8	5,912	1,530	1,551	172	3,457	64
Urban High Amenity	2	2,955	682	752	117	1,922	22
Rural Low Amenity	16	7,934	2,322	2,554	423	4,787	110
Rural High Amenity	3	1,226	337	374	51	777	33
Total	29	18,027	4,870	5,231	763	10,943	229

* Hay farming statistics are estimated as a proportion of the larger category "sugarcane farming, hay farming, and all other crop farming" using the ratio of market value of agricultural products sold for hay operations to the total.

Utah IMPLAN Analysis: Stricter Enforcement – Representative Ranch

Without access to alternative management options an estimated 1,959 farms would be expected to leave agriculture all together. This constitutes a total loss of the output of a representative ranching operation in each industry. The average hay farm produced \$57,297 in agricultural output on 304 acres of land. Of all 4,870 hay operations, 28 reported agritourism and recreation income totaling \$213,938. This is an average of \$7,588 per farm reporting or \$44 per farm overall. Thus, the average farm produced \$57,340 in direct output and supported \$702 in nonmarket benefits. Statewide, this supported \$89,756 in output and one job. A typical 631-acre beef ranching operation supported \$77,843 in total output and just 0.4 jobs with its \$54,752 in direct agricultural output. It also preserved \$1,458 worth of nonmarket benefits. Of the 5,231 farms, 94 reported agritourism or recreation income totaling \$1,937,000, bringing the total contribution of an average farm to \$55,122, which supported \$78,369 in total output. Agritourism and recreation data for Utah's sheep and goat farming operations are not available, but the 763 farms generated \$32,723,000 in agricultural production. The average 763-acre farm then generated \$42,887 in direct output and supported \$1,555 in nonmarket benefits. Total, an average sheep and goat operation supported one employee and \$52,211 in statewide output. This economic activity generated \$47,216,676 in state and local tax revenue.

Another effect of stricter enforcement is that some farms will increase output to meet legal requirements and keep their preferred tax status. Increasing output by 15% will increase agricultural output and

agritourism income by \$8,601, \$8,268 and \$6,433 for hay, beef and sheep and goat farms, respectively. This increased activity would have practically no measurable impact on job support within Utah; however, due to the multiplier effect economic activity would increase by more than the value of new output produced. The average hay farm would contribute \$13,463 in total output while a representative beef ranch would add \$11,775. Sheep and goat operations that increase production would contribute a total of \$7,832 in total output to the state economy, but this excludes any change in agritourism output on the farm level. Overall, hay farms demonstrate the largest multipliers, contributing about \$1.57 for every dollar generated in direct output, while beef ranches contribute \$1.42 per dollar and sheep and goat operations contribute \$1.22.

Utah IMPLAN Analysis: Mixed Diversified Management (Low, Medium and High)

In the diversified management scenario, the same farms are subject to stricter enforcement, however only half the farms that previously went out of production now do, the other half chooses to participate in diversified land management. Investment in diversified land management practices preserves nearly \$1.1 million in nonmarket benefits, which could increase in quality with the new practices.

As was the case in Colorado, even setting aside half their land, farms and ranches participating in diversified land management only reduce agricultural production by 15% from the average. As a result, net reduction in agricultural production on the 237,895 acres is an estimated \$46 million.

If non-disqualified farms and ranches voluntarily participate at specified rates, an additional 177,479 acres will practice diversified management. The net loss in direct output is almost \$50 million, which would have supported 600 jobs and an additional \$23.4 million. At low levels of investment in natural resource conservation, this activity average spending per acre is \$14.26, generating \$5.70 million in direct output. This supports 58 jobs and \$9.8 million in total activity. At average levels of investment, this equates to \$69.77 investment per acre, \$27.8 million in direct output, \$50.7 million overall and 316 jobs. High levels of investment contribute \$198.15 per acre, almost \$80 million in direct spending, \$146.1 million in total output and 925 jobs. A 10% increase in recreation spending would support 280 jobs and \$23 million in total output.

Rural acres developed are half that of the stricter enforcement alone scenario. As a result, 5,311 new households are created, costing the local government \$25.6 million in the provision of community services and reducing the net loss of servicing rural development by \$10.1 million. State and local tax revenue actually increase by \$936,307 relative to the baseline, constituting an \$8.5 million gain over stricter enforcement alone.

Utah IMPLAN Analysis: Mixed Diversified Management – Representative Ranch

A representative Utah farm or ranch that participates in alternative land management practices for natural resource conservation on half of their farm land will decrease agricultural output by a projected 15%. This is then countered by conservation spending of \$69.77 per acre. For an average hay farm direct output is reduced by \$8,601 while conservation spending totals \$10,596 on approximately 150 acres. In total there is no change in net employment but statewide output generated increases by \$5,064. The typical 631 acre beef ranch will devote 315 acres to conservation while decreasing output by \$8,268. Total conservation spending minus the loss of agricultural output will increase employment by a fraction of a full time equivalent job while supporting an additional \$26,731 in statewide

economic activity. Sheep and goat operations tend to be the largest in the state, but add the least in direct output. As a result they have the greatest net impact under diversified management. For an average farm reduction in direct output totals \$6,433 while conservation on 337 acres is the largest average area by farm type. In total a representative sheep and goat ranch can support \$33,229 in total regional output and nearly one halftime job equivalent.

Utah IMPLAN Analysis: Pure Diversified Management

A scenario exploring the implications of 100% of affected acres investing in diversified rural land management is provided for completeness despite being unlikely to observe. This 'pure' diversified management on 261,980 acres of formerly agricultural areas reduces agricultural output by \$4.4 million. The diversified land management activities generate \$17.6 million in direct spending, supporting \$32 million of total economic activity and almost 200 jobs. The loss of agricultural production reduces total output by \$6.5 million and 54 jobs. Thus, the net gain is 145 jobs and \$25.4 million in statewide output. With the same 10% increase in non-resident recreation days, total state tax revenue would increase by \$1.4 million relative to baseline, an \$8.9 million improvement over only stricter enforcement (Table 28).

Utah IMPLAN Analysis: Summary of results

Like Colorado, the results from Utah indicate that diversified management is superior to stricter enforcement. However, unlike Colorado both scenarios are inferior to baseline. We judge this is likely due to a lack of relevant data. For example, Utah has a relatively low number of private acres available to support recreation, nonmarket benefits and alternative land management activities. Additionally, agritourism activities on sheep and goat farms and ranches is not accounted for due to a lack of data. Furthermore, recreation effects are underestimated across all states as non-residents logically should spend proportionately more than residents and IMPLAN does not factor retail margin into recreation spending, resulting in automatic leakage from the local economy (Table 29).

Table 28: Utah IMPLAN Analysis: Scenario Summary			
	Baseline	Tightened Enforcement	Diversified Management (Mid)
Agriculture (Net)			
Direct output	\$600,306,938	\$508,244,821	\$551,280,839
Total output supported	\$886,903,790	\$750,799,954	\$814,433,387
Total employment supported	7,336	6,209	6,736
Recreation (Net)			
Direct output	\$218,019,109	\$196,217,198	\$239,821,020
Total output supported	\$230,163,058	\$203,413,088	\$253,179,363
Total employment supported	2,798	2,331	3,078
Nonmarket benefits (Net)	\$12,227,507	\$10,029,361.00	\$11,128,434
Conservation (Relative)			
Direct output	\$0	0	\$27,831,656
Total output supported	\$0	0	\$50,675,676
Total employment supported	0	0	316
Cost of servicing rural development (Relative)	\$0	-\$20,182,552	-\$10,092,015
State and local taxes	\$47,216,676	\$39,680,374	\$48,152,983
Total benefits supported	\$1,176,511,031	\$983,740,225	\$1,119,324,845
Total jobs supported	10,134	8,540	10,130

Moreover, the average beef operation in Utah is less than half the size of the average in Colorado and is much closer to the size of hay farming and sheep and goat ranching operations. The implication is that results are not influenced as much by what types of operations are affected as by how many are affected. Since there are fewer farms in Utah, changes in output and public benefits are smaller, but this does not imply Utah farmers and ranchers are less responsive. Additionally, total acreage affected is smaller, which means a smaller nonmarket benefit from the land; however, the tradeoff remains essentially the same. Farmers and ranchers are able to continue farming so long as it is beneficial to do so. When stricter enforcement takes place affected farmers will increase production or sell to commercial or residential development. Residential or commercial land conversion removes both agricultural production and land benefits, while creating rural households that are expensive to service. Providing the option to man-

age for diverse uses in addition to agriculture allows farmers and ranchers to engage in alternative land management practices that offset total statewide losses from stricter enforcement by \$135.5 million. Although total benefits are still less than the status quo with average level investments in natural resource conservation, higher level investment in diversified management can lead to an improvement over the baseline of nearly \$40 million. Thus encouraging higher level investment in natural resource conservation on Utah's agricultural land is more important to increasing net benefits than in Colorado and New Mexico. Overall, the effect of any policy in Utah will provide fewer benefits at a lower cost compared to the other states due to the smaller extent of the agriculture sector; however, this also means that unforeseen increases in land degradation or losses of agricultural land and associated ecosystem benefits could be proportionately more costly, while potential gains from stricter enforcement alone are smaller.

Table 29: Utah IMPLAN Analysis: Comparative analysis of scenarios

	Net of Baseline		Net of Stricter Enforcement
	Stricter Enforcement	Diversified Management (Mid)	Diversified Management (Mid)
Agriculture (Net)			
Direct output	-\$92,062,117	-\$49,026,099	\$43,036,018
Total output supported	-\$136,103,836	-\$72,470,403	\$63,633,433
Total employment supported	-1,127	-600	527
Recreation (Net)			
Direct output	-\$21,801,911	\$21,801,911	\$43,603,822
Total output supported	-\$26,749,970	\$23,016,305	\$49,766,275
Total employment supported	-467	280	747
Nonmarket benefits (Net)	-\$2,198,146	-\$1,099,073	\$1,099,073
Conservation (Relative)			
Direct output	\$0	\$27,831,656	\$27,831,656
Total output supported	\$0	\$50,675,676	\$50,675,676
Total employment supported	0	316	316
Cost of servicing rural development (Relative)	-\$20,182,552	-\$10,092,015	\$10,090,537
State and local taxes	-\$7,536,302	\$936,307	\$8,472,609
Total benefits supported	-\$192,770,806	-\$57,186,186	\$135,584,620
Total jobs supported	-1,594	-4	1,590

New Mexico IMPLAN Analysis: Baseline

In New Mexico there were a total of 3,721 hay farms and ranches occupying 1,486,181 acres in 2012. Hay farming operations were 399 acres on average and produced \$47,644 in marketable agricultural products. Of these, 47 farms and ranches reported an additional \$361,633 in agritourism and recreation income. Overall, the average farm produced \$47,742 in goods and services, supporting one job and generating \$79,818 in total statewide output. The entire industry generated \$177.6 million in direct output and supported 2,513 jobs. Overall, 3,606 jobs are supported and statewide output totals \$297 million. The estimated total nonmarket value of all hay farming acreage was \$3.4 million; however, just over three-quarters of all operations are on low amenity lands. As a result, the average hay farm has a nonmarket value of only \$922, but this will vary by location (Table 30).

The 8,989 beef cattle ranching and farming operations contributed \$507,750,000 in agricultural products and almost \$4 million in agritourism and recreation income for an average of \$56,926 per farm. This activity supported \$80,461 in total output but only 0.4 total jobs. All beef cattle ranching operations directly support 2,325 jobs. Together all related activity supports 3,890 jobs and \$312.3 million in total output. The 29,141,305 acres of rangeland contribute \$67,316,415 in nonmarket land value. The average 3,242-acre operation has a nonmarket value of \$7,489. Just 20% of beef operations are in high amenity areas, but another 27% are located in urban areas.

Sheep and goat operations contribute, on average, \$109,304 in total market value of agricultural products and agritourism activity, which supports two jobs and \$159,332 in statewide activity. In total they produced \$5.7 million in agricultural products and generated \$84,000 in agritourism income, supporting 97 jobs and \$8.3 million in statewide output. The average 589-acre operation has a nonmarket value of \$1,361, while all 720,178 acres contribute \$1.7 million in non-market benefits.

Overall, the hay, beef, sheep and goat industries contributed \$695,021,616 in output and directly supported 4,914 jobs. The net contribution to the New Mexico state economy was 7,592 jobs and \$1,028.5 million in total output and all 31,347,764 acres support \$72.4 million in nonmarket benefits.

Table 30: New Mexico IMPLAN Analysis: Baseline

	Hay	Beef	Sheep and Goat	Total
Market value of agricultural products sold	\$177,285,000	\$507,750,000	\$5,582,000	\$690,617,000
Average market value of agricultural products sold	\$47,644	\$56,486	\$4,568	\$108,698
Number of farms and ranches	3,721	8,989	1,222	13,932
Total acreage	1,486,181	29,141,305	720,278	31,347,764
Average size	399	3,242	589	4,231
Farms and ranches with net losses	2,195	6,202	1,111	9,508
Total agritourism and recreation	\$361,633	\$3,959,000	\$84,000	\$4,404,633
Farms and ranches with agritourism and recreation income	47	261	10	318
Average agritourism income	\$7,693	\$15,169	\$8,400	\$31,262
Average agritourism income per farm	\$97	\$440	\$69	\$606
Urban low	1,259	2,408	469	4136
Urban high	214	123	19	356
Rural low	1,583	4,795	678	7056
Rural high	665	1,663	56	2384
Nonmarket value per acre	\$2.31	\$2.31	\$2.31	
Total	\$177,646,633	\$511,709,000	\$5,666,000	\$695,021,633
Average total output	\$47,742	\$56,926	\$4,637	\$109,304
Total nonmarket value	\$3,433,078	\$67,316,415	\$1,663,842	\$72,413,335

In total 7 of the 31 counties of New Mexico are classified as high amenity, with Dona Ana County being the only one that is also urban. High amenity counties account for 25% of all hay farm and beef, sheep and goat ranch land in the state, while 40% of all

farms are urban. This places nearly 55% of farms and ranches at risk of development due to either urban pressures, demand for natural amenities, or both (Table 31).

Table 31: New Mexico IMPLAN Analysis: Rural-urban and low-high amenity farms and ranches						
	Counties	Farms & ranches	Hay *	Beef cattle	Sheep & Goat	Ag & rec
Urban Low Amenity	6	7,574	1,259	2,408	469	122
Urban High Amenity	1	2,184	214	123	19	17
Rural Low Amenity	20	10,909	1,583	4,795	678	221
Rural High Amenity	6	4,054	665	1,663	56	129
Total	33	24,721	3,721	8,989	1,222	489
* Hay farming statistics are estimated as a proportion of the larger category "sugarcane farming, hay farming, and all other crop farming" using the ratio of market value of agricultural products sold for hay operations to the total.						

In New Mexico hunting, fishing and wildlife watching brought in an estimated \$93.1 million in direct spending from out of state participants 2011.⁴³ These activities supported 1,177 jobs and generated \$86.2 million in total regional output.⁴⁴ In general New Mexico has a modest agricultural sector that encompasses a relatively vast amount of land; most of this is in beef ranching operations.

New Mexico IMPLAN Analysis: Stricter Enforcement

As previously simulated for Colorado and Utah, here we describe a plausible scenario for New Mexico where 50% of urban farms and ranches and 25% of rural farms and ranches are affected by stricter enforcement. We reason that 50% of affected farms and ranches manage to current agricultural tax regulation by incrementally (by 15%) increasing output in order to come into compliance, while the other 50% are subdivided into non-productive (residential) uses.

Under this scenario, the total reduction in farm and ranch production, including agritourism and recreation income, of \$96.9 million results in a loss of 1,079 jobs and \$143.8 million in total output. The loss of non-market benefits totals \$11.7 million as 5,053,641 acres are sold or developed. Due to the nature of New Mexico's agricultural industry, much more acreage is lost than output. Rural acres lost to agricultural production total 2,783,300 on 1,180 farms and ranches. If they are divided into 35-acre plots, 79,523 new households

are possible. An average New Mexico household is 2.66, leading to an estimated increase in rural population of 211,531. In 2009 New Mexico's 1,984,356 residents generated \$1,517.1 million in tax revenue. This works out to an average of \$818 per person in 2012. Rural residents would then generate \$173 million in revenue and demand \$285.5 million in cost of community services, creating a service deficit of \$112.5 million.

If stricter enforcement leads to an estimated 10% reduction in recreation days, there will be a loss in nonresident spending of \$9.3 million. This results in a loss of 188 jobs and \$9.8 million in total output that would have been generated due to that spending (Table 32). While agricultural output is relatively modest, total acres in farms and ranches is large. This gives the impression of large total land benefits, high costs to development and the potential for the creation of many new households. While technically true, it highlights the weakness of using a statewide average value for non-market benefits and household size. In reality, many fewer new households may be created and total non-market benefits of land may be overestimated in all scenarios. On the other hand, the relatively small contribution of nonresident recreation and the large amount of available land suggests the opportunity for potentially large increases in recreation spending with new land management activities if new land uses can be marketed to the public.

⁴³National Survey of Fishing, Hunting, & Wildlife available online at: <http://www.census.gov/prod/www/fishing.html>

⁴⁴Total effects are less than direct effects because "when the products being purchased are unknown (as in the recreation spending), there is no way to determine what was produced to be sold, how the item or items were transported, or (relative to a retail purchase) what portion of the total sales cost went to a wholesaler. Since none of these items can be determined their local availability is also unknown. As a result of this, the only local impact that the model can apply to the Multipliers is the impact of the respective wholesale or retail operations related to those sales. Thus if you were to enter a million dollars of gross retail sales into a retail Sector where the retail Margin was 24%, then 76% or \$760,000 would be immediately leaked from the local economy and the remaining \$240,000 would be applied to purchases of commodities and services required to operate the retail or wholesale establishment." IMPLAN Support Team (2013)

Table 32: New Mexico IMPLAN Analysis: Comparison of scenarios

	Baseline	Stricter Enforcement	Diversified Management (Mid)
Agriculture (Net)			
Direct output	\$690,617,000	\$593,747,720	\$637,936,721
Total output supported	1,028,530,039	\$884,764,605	\$950,377,256
Total employment supported	7,592	6,513	7,007
Recreation (Net)			
Direct output	\$93,064,887	\$83,758,398	\$102,371,376
Total output supported	\$86,235,463	\$76,447,862	\$94,859,008
Total employment supported	1,177	989	1,295
Nonmarket benefits (Net)	\$72,413,335	\$60,739,423.84	\$66,576,380
Conservation (Relative)			
Direct output	\$0	\$0	\$187,079,556
Total output supported	\$0	\$0	\$298,630,672
Total employment supported	0	0	1,828
Cost of servicing rural development (Relative)	\$0	-\$112,471,033	-\$56,235,516
State and local taxes	\$53,615,556	\$46,065,602	\$50,527,136
Total benefits supported	\$1,240,794,393	\$955,546,460	\$1,404,734,936
Jobs supported	8,769	7,502	10,130

New Mexico IMPLAN Analysis: Stricter Enforcement – Representative Ranch

Of the 4,606 New Mexico farms affected by stricter enforcement half are modeled as a total loss of agricultural output as they leave production to engage in nonfarm uses. These representative ranches are profiled in the baseline scenario. The other half of affected farms are expected to increase production by 15% in order to come into compliance with state differential agricultural taxation laws. For an average farm this results in a direct increase in output of \$7,161, \$8,539 and \$696 for hay, beef and sheep and goat operations, respectively. As a result hay farms support \$11,972 in total output, cattle ranches support \$12,069 and sheep and goat operations support \$1,014. The net effect on employment per farm is small but positive in all cases. In total, these gains from stricter enforcement do not offset the loss from representative farms exiting the industry.

New Mexico IMPLAN Analysis: Mixed Diversified Management

Under this scenario, the same farms and ranches are affected by stricter enforcement; however, the number of farms and ranches sold to development is only half while the other half now engage in diversified natural resource management. This conserves 1,263,410 acres that would otherwise have been developed as low-density residential properties. Additionally, 15% of rural high amenity farms and ranches, 10% of urban high amenity farms and ranches, 5% of rural low amenity farms and ranches, and no urban low amenity farms and ranches voluntarily engage in diversified natural resource management, conserving 1,286,507 acres. To do this, agricultural output is decreased by 15% and 50% of land is under diverse management. As a result, \$5.8 million worth of nonmarket benefits are preserved on 2,526,821 acres, which are not developed.

Since much of New Mexico's agricultural land is rural, land conversion for residential development is also curtailed. The cost of providing community services to 105,766 new rural residents is \$56.2 million, just half of what it was with stricter enforcement alone. At average investment levels in natural resource conservation, this generates \$50.5 million in state and local sales taxes. The total tax effect compared with stricter enforcement alone includes \$5.8 million in additional tax revenue and \$56.2 million in service savings, making diversified management over \$60 million more cost effective for public administrators.

While agricultural production is reduced by \$52.7 million, this is counterbalanced by an increase in natural resource conservation related economic investments and activity. Overall, there is still a loss in agricultural production of \$78 million despite modest increases in production from those farms adjusting their operations to comply with agricultural tax requirements. In contrast with stricter enforcement, diversified management supports natural resource conservation and recreation activities that allow farmers and ranchers the flexibility to adapt to stricter enforcement by managing for alternative land uses instead of either selling or increasing output. This alternative saves almost 500 jobs and \$65.6 million of total output that would otherwise have been lost.

As was the case with Colorado and Utah, the contribution of natural resource conservation and recreation land management activities to the state economy depends on the level of investment and intensity of the practices undertaken. In total, 2,549,918 acres participate. At low levels of investment, average spending per acre is \$14.85. The total direct spending of \$37.9 million supports 339 jobs and \$58.2 million in total output. At average levels of investment, total spending rises to \$187.1 million, or \$73.37 per acre and supports 1,828 jobs and \$298.6 million in economic output. High levels of investment in natural resource conservation practices have the potential to generate \$558 million in direct spending at a cost of \$218.84 per acre. This level of investment would support 5,635 jobs and \$904.5 million in total output. Even at low levels of investment, diversified management would be an improvement over stricter enforcement alone. On the other hand, low levels of investment in diversified management would not be an improvement relative to the baseline, but both average and high value land management activities would be.

Recreation spending in New Mexico is relatively light, but if the increase in preservation of natural

amenities leads to a 10% increase in recreation, direct spending will increase by \$9.3 million, supporting 118 jobs and \$8.6 million in total output. Since agricultural land is abundant in the state, the potential for farmers and ranchers to engage in alternative land management practice is large. The abundance of land suggests that many new households could be created, but because much of the land is in rural, low amenity areas, demand for development may not be large. On the other hand, the vast amount of ranchland means that natural resource conservation and recreation land management practices could be undertaken on large tracts of land. The opportunity cost of doing so depends on how efficiently the land is being utilized. Since land is less scarce, it is likely that improvements are possible. This suggests that diversified management could be had with low impacts to agricultural production. If this is the case, there could be opportunity to create recreation space if demand for these activities can be generated. The low levels of current recreation participation also suggest room for growth and it may be possible to have the best of both agriculture and recreation worlds. If demand for either recreation or development are increased, the opportunity to capitalize on the demand for new land uses is large; however, the baseline suggests this has not happened yet.

New Mexico IMPLAN Analysis: Mixed Diversified Management – Representative Ranch

At average spending levels New Mexico farms and ranches are projected to spend \$73.37 per acre on natural resource land management activities. A representative 399 acre hay farm will reduce output by \$7,161 and spend just under \$15,000 on conservation. Thus, while the average farm will produce less in agricultural goods and services and negligible change in employment but direct statewide output will increase by \$7,094 and total \$11,413 in natural resource conservation investments. The average cattle ranch has the potential to support more than one full time job and \$177,738 in statewide economic activity by engaging in diversified management. This is result is due to the large expanses of land currently engaged in beef cattle ranching. The average 3,242 acre farm support conservation activities on an estimated 1,621 acres which makes it the sector most capable of investing in natural resource conservation practices. Sheep and goat operations on the other hand can support the most natural resource conservation activity per dollar reduction in agricultural output. The average 589 acre operation will only reduce output by \$696 but conservation spending totaling \$21,036 on 295 acres adds \$30.22 in spending for every dollar reduction in agricultural output. This

supports almost one halftime job equivalent and \$33,495 in total statewide output. While total numbers for cattle ranches are impressive they generate only \$14 in spending per dollar reduction in agricultural output. Hay farming has the smallest gain in natural resource conservation spending gain per dollar reduction in agricultural production of only about \$2. Nevertheless, all industries are projected to support both additional employment and economic activity by undertaking diversified management of their natural resources as compared with net losses under strict enforcement alone.

New Mexico IMPLAN Analysis: Pure Diversified Management

As described previously, this is a scenario of diversified management alone where no farms and ranches are incentivized to sell to rural residential development and all affected lands are put under diversified management.

Under this scenario, New Mexico farms and ranches voluntarily conserve 1,731,862 acres. This results in a decrease in agricultural production of \$5.7 million with a corresponding increase in natural resource conservation spending of \$127.1 million at average levels. The net effect is support for an additional 1,179 jobs and \$194.3 million in total output. Total nonmarket benefits do not change relative to the baseline; however, this may not reflect an increase in environmental quality due to the new land management practices, which is expected.

The potential benefits of diversified management in New Mexico are large. Compared with the baseline allowing for diversified management practices could add nearly \$4.5 million in state and local tax revenues and nearly \$160 million in statewide output. This would also support nearly 1,400 new jobs. Relative to stricter enforcement alone, total benefits could be almost \$450 million and 2,628 jobs. In contrast to Colorado, much of this is driven by land use change as opposed to agricultural output. As a result, the contribution of nonmarket benefits, the cost of servicing rural communities and diversified management practices drive significantly larger improvements over stricter enforcement than those over the baseline.

Overall synthesis of results

Across all scenarios, agricultural output remains as the most important driver of economic

activity in these states. However, in general, improvements in the local economic outlook can be realized through recognition of a broader portfolio of natural resource benefits within the use value taxation legislation. In sum, in the most likely scenario, we find net improvements in the Colorado state economy of about \$25 million and 250 jobs, in Utah of \$150 million and 1,500 jobs, and in New Mexico about a half billion dollars and 2,500 jobs per year due to a more comprehensive treatment of natural resource values from rural lands under the tax law.

Stricter enforcement of current laws is expected to reduce nonmarket natural resource values and increase the net tax burden due to conversion from agriculture to residential development. Due to market forces (e.g., the number of farms and ranches currently losing money, located in high growth and high natural amenity areas), in no case is stricter enforcement of current agricultural taxation standards expected to increase agricultural output or jobs in agriculture. In all cases, diversified management constitutes a significant improvement over stricter enforcement, primarily driven by increases in investments in natural resource conservation activities and avoidance of costly conversion of open lands into residential properties (Figure 3).

In all cases our estimates indicate diversified management is superior to stricter enforcement. With diversified management, Utah would experience a gain in public and privately captured benefits of 16% relative to stricter enforcement. Diversified management is an estimated 5% below the baseline in Utah. In New Mexico, diversified management would result in an increase in net benefits of 47% over stricter enforcement alone, which is also a 13% increase over baseline. New Mexico also has the potential to experience the largest loss in net benefits from stricter enforcement with a 23% decrease relative to baseline. In Colorado, stricter enforcement could decrease net benefits by 17% relative to baseline, while diversified management would increase total statewide benefits by 1%, a 22% improvement over stricter enforcement. While the potential harm that stricter enforcement can impose on the economy is similar to Utah, Colorado is expected to realize a net gain from average levels of investment in natural resource conservation due to the number of acres available for diversified management.

Employment estimates also favor diversified management over stricter enforcement (Figure 4). Additionally, in all states except Utah, diversified management is estimated to support more jobs than the baseline. In Utah a loss of four jobs is projected to

occur with diversified management. The majority of job support comes from the conservation sectors. Overall, stricter enforcement alone is projected to reduce job support in Colorado, Utah and New Mexico by 15%, 16% and 14%, while medium level investment in diversified management leads to a 2% increase, essentially no change and an 18% increase, respectively. Compared to the baseline, diversified management becomes even more favorable. Natural resource conservation accounts for between 3% and 18% of job support in the medium level investment in diversified management

scenario and is driven mainly by the number of acres conserved; however, increasing the level of investment substantially increases job support. The portion of agricultural sector jobs ranges from 73% to 87% in the baseline scenario but falls to between 66% and 69% with diversified management. However, since employment is greater overall under diversified management, this indicates a more diverse workforce that could be more resilient to economic fluctuations. Recreation related job support is consistently between 13% and 30%, with New Mexico having the smallest portion.

Table 33: New Mexico IMPLAN Analysis: Relative comparison of scenarios

	Net of Baseline		Net of Stricter Enforcement
	Stricter Enforcement	Diversified Management (Mid)	Diversified Management (Mid)
Agriculture (Net)			
Direct output	-\$96,869,280	-\$52,680,279	\$44,189,001
Total output supported	-\$143,765,434	-\$78,152,783	\$65,612,651
Total employment supported	-1,079	-585	494
Recreation (Net)			
Direct output	-\$9,306,489	\$9,306,489	\$18,612,978
Total output supported	-\$9,787,601	\$8,623,545	\$18,411,146
Total employment supported	-188	118	306
Nonmarket benefits (Net)	-\$11,673,911	-\$5,836,955	\$5,836,956
Conservation (Relative)			
Direct output	\$0	\$187,079,556	\$187,079,556
Total output supported	\$0	\$298,630,672	\$298,630,672
Total employment supported	0	1828	1,828
Cost of servicing rural development (Relative)	-\$112,471,033	-\$56,235,516	\$56,235,517
State and local taxes	-\$7,549,954	-\$3,088,420	\$4,461,534
Total benefits supported	-\$285,247,933	\$163,940,543	\$449,188,476
Jobs supported	-1,267	1,361	2,628

Figure 3: Estimated economic activity by source

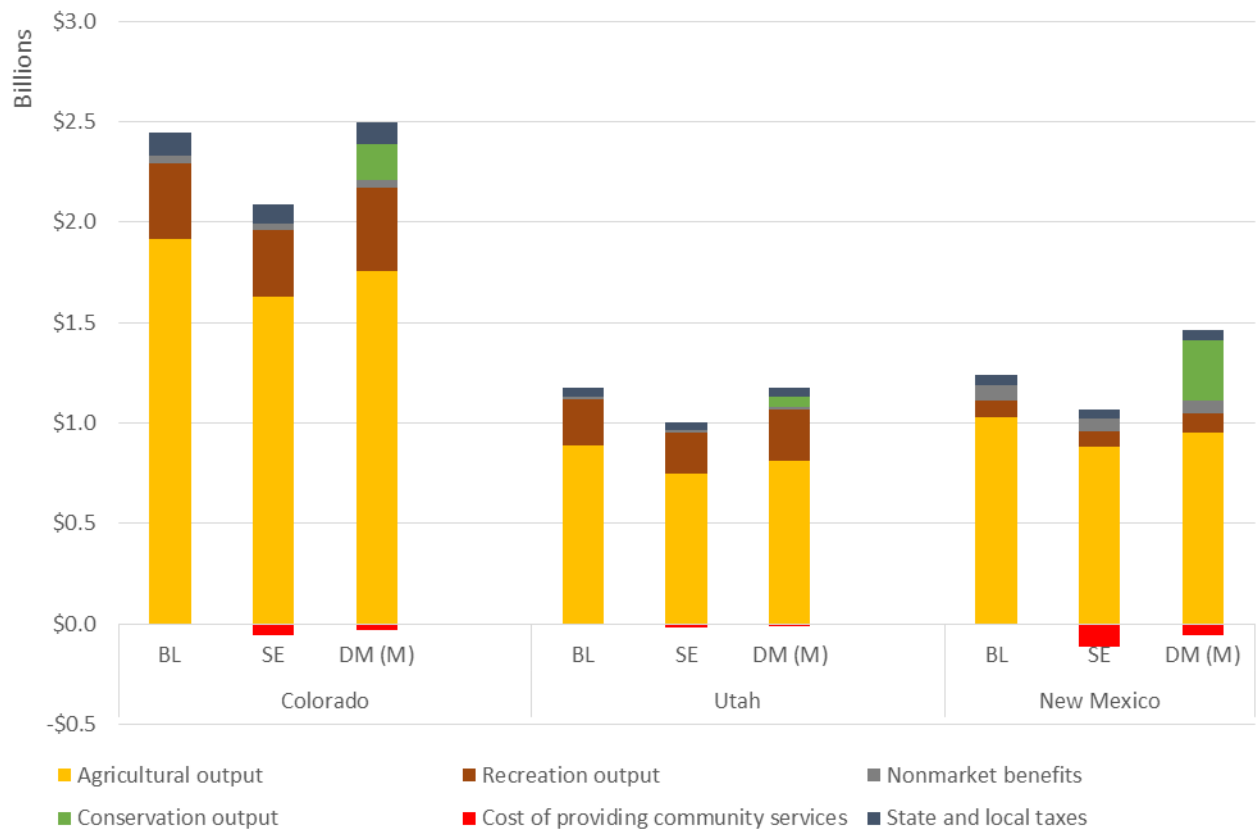
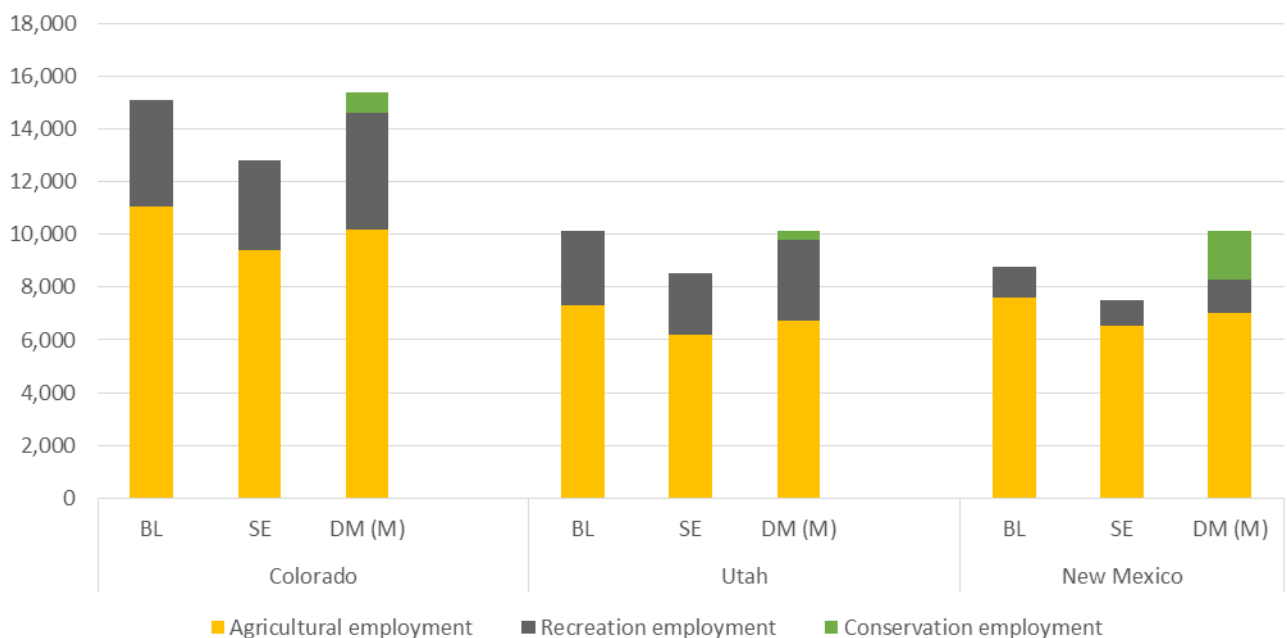


Figure 4: Estimated employment effect by source



Caveats and data challenges

Shifts in industry output will alter spending between sectors due to varying production functions, the demand for inputs changes other industries will alter their demand for inputs, which will result in changes to economic output and employment throughout the region. This can accurately describe the effect of losing agricultural production; however, when adding spending on alternative land management activities it is necessary to view the spending as a supporting but not creating economic benefits. For example, \$1 million in alternative land management may support 100 jobs and \$1.5 million in total output, however, unless the money would not otherwise have been spent it is taking input from another sector. Thus in order to interpret the new land activities as creating benefits it is necessary to assume that all of the alternative land uses are new and wouldn't have occurred anyway, otherwise they must be interpreted as an assessment of what the economic activity the new practices will support rather than an estimate of net benefits. This is why the scenarios are evaluated relative to a baseline.

The 2013 IMPLAN data release incorporates both the 2007 BEA benchmark and the 2012 Census of Agriculture to determine these linkages and the Bureau of Labor Statistics Covered Employment and Wages (CEW) data series. The use of these data by IMPLAN creates both benefits and challenges. All federal data have been moving to the use of standard industry codes defined by the North American Industry Classification System (NAICS) making data from nearly all datasets comparable; however, the industry sectors in IMPLAN are often aggregations of one or more related NAICS industry. This does not affect the use of production statistics from the Agriculture Census; however, it does not allow for unique production functions for each sector within an aggregate industry. As a result a change in beef cattle ranching output will affect the economy in a manner consistent with the production

function for the aggregate industry which includes beef cattle feedlots. This may have a small effect if the aggregate industry is composed of similar sectors or dominated by the sector of interest in the region which is often the case. Another shortcoming of the way IMPLAN compiles its data is through the use of the CEW for the calculation of annual employment and income data. Since the data only capture employees covered by unemployment insurance the CEW series misses data on self-employed workers. Because much of farm employment is self-employment total farm employment and labor income generated are likely understated in the model; any effects inferred from this data will accrue only to covered employment and wages. Therefore while estimates on employment and wages will have internal validity and may be compared across scenarios they will likely underestimate the full effect on employment and wages in the region.

Importantly, the analyses were based upon the likely effect of changes in state policy at the state level and are, therefore, to be interpreted at a certain level of abstraction as broadly representative, but not highly precise. In many cases, the 'average' farm or ranch is the unit of analysis that is scaled to the industry level. If underperforming farms and ranches really are more likely to be affected by tightened enforcement or are more likely to engage in diversified management the study could overestimate the negative effects to agriculture. The value of nonmarket natural amenities and ecosystem services are also taken at state average but can vary greatly for an individual community. High growth, high natural amenity rural communities where relatively few large properties lay in the balance will be well advised to conduct their own analysis reflecting their own specific case. The Intermountain West is abundant with exceptional communities, noteworthy investors and agricultural operators. The further from the state average the community is, the more care that should be exercised in applying these results to a specific situation in a specific location.

Conclusions

The analysis supports the contention that allowing for diversified management in agriculture can provide substantial public benefits over stricter enforcement alone. The agriculture sectors could see a smaller impact on employment and output as compared with stricter enforcement alone. Additionally, keeping land out of development can lead to substantial savings in the cost of providing community services. Land that is not developed will continue to provide important nonmarket benefits. Since land will be restored or conserved it is reasonable to think that nonmarket benefits may increase; however, this is not taken into consideration in the numbers. New industry activity in land management practices for natural resource conservation or recreation will also contribute to the state economy, which further closes the gap created by the stricter enforcement of agricultural regulations. The degree to which the contribution of new activity makes up for or even adds to the economic activity of the state depends on the kinds of practices and level of investment actually engaged in by participants. At the low end the activity is likely to at least offset the shift from agriculture, especially if this occurs on marginal lands. If either stricter enforcement of diversified management lead to a difference in recreation days the implications for the state economy could be large. In any case, this analysis supports the conclusion that diversified management is a better and more flexible outcome than stricter enforcement alone.

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