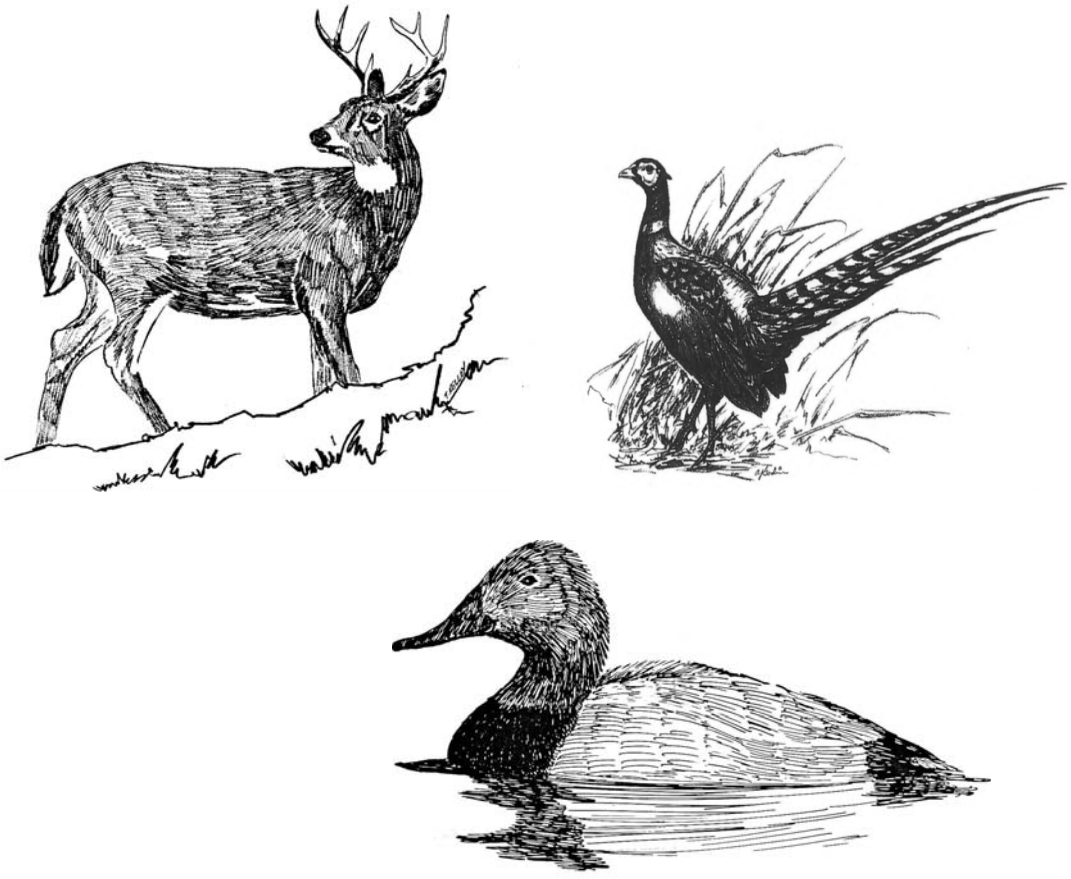
Economic Contribution, Impacts, and Economic Benefits of Deer, Waterfowl and Upland Game Bird Hunting in North and South Dakota: Relationship to CRP Lands

Dr. John Loomis and Dr. Michelle Haefele in cooperation with Dr. Rebecca Hill,

Colorado State University, Fort Collins, CO 80523-1172

Dr. Michael Miller, South Dakota State University

September 15, 2015



Economic Contribution, Impacts, and Economic Benefits of Deer, Waterfowl and Upland Game Bird Hunting in North and South Dakota: Relationship to CRP Lands

Dr. John Loomis, PI in cooperation with Dr. Michelle and Dr. Rebecca Hill, Colorado State University and Dr. Michael Miller, South Dakota State University

September 15, 2015

EXECUTIVE SUMMARY

This report estimates the economic contribution, impacts, and economic benefits of deer, waterfowl and upland game bird hunting in North and South Dakota during 2014/2015 hunting season. The dependence of the economic contribution and economic benefits to CRP is explored, and how these two economic effects would be reduced if there was a 50% reduction in CRP lands in these two states.

Economic **contribution** is defined as all forms of employment income (wages and proprietor income), value added (wages, rents and profits) and employment supported in the respective state due to **all** (resident and non-resident) hunter expenditures regardless of whether the hunter is a resident of the state or not. Economic **impacts** are defined as the income and employment in the respective state due to the inflow of non-resident hunter expenditures. This non-resident inflow is considered "new money" to the states that would not occur if non-residents did not hunt in the state for any reason (for example due to a reduction of the quality or being unable to obtain a non-resident hunting permit). Both economic contribution and economic impacts include the multiplier effects.

The expenditures by hunters are a contribution to local businesses but these expenditures represent a cost, not a benefit to the hunters themselves. The benefits to the hunter is represented by the amount of money he or she would pay over and above their expenditures for the opportunity to hunt their target species in the state of their choosing. A hunter's **consumer surplus** represents the amount of their net "willingness to pay" after left over after paying their hunting expenditures. This is the measure of economic **benefits** used by economists and the federal government for benefit-cost analysis (Loomis and Walsh, 1997; U.S. Water Resources Council, 1983).

Deer Hunting in North Dakota: The results indicate that in North Dakota the economic **contribution** of resident and non-resident deer hunting represents $15.7 million in value added, with $10.7 million of that being labor income in the form of wages (from the estimated 333 jobs). The economic **impact** of only non-resident hunting is $317,262 in value added with $236,308 of that being labor income associated with about 6 jobs. Economic **benefits to hunters** is $129 per day. Expanding this up by the number of days and the number of deer hunters yields $65 million. About 42% of deer hunters indicated they hunted on CRP lands. Therefore, nearly half the economic contribution, impacts and benefits are associated with CRP lands. However, if there were a 50% reduction in CRP lands in North Dakota about 20% would take fewer trips. When combined with the 80% that would not change trips there would be about a 7% reduction in hunter trips, and hence in the economic contribution, economic impacts and economic benefits.

Deer Hunting in South Dakota: The results indicate that in South Dakota the economic **contribution** of resident and non-resident deer hunting represents $20 million in value added, with $11.6 million of that being labor income in the form of wages (from the estimated 473 jobs). The economic **impact** of only non-resident hunting is $2.85 million in value added with $1.27 million of that being labor income associated with about 52 jobs. Economic **benefits to hunters** are $164 a day. Expanding this up by the number of days and the number of deer hunters yields $88 million. About 23% of deer hunters indicated they hunted on CRP lands. Therefore, about one-quarter of the economic contribution, impacts and

benefits are associated with CRP lands. However, if there were a 50% reduction in CRP lands in South Dakota about one-quarter of hunters would take fewer trips. When combined with the 75% that would not change trips there would be about a 12% reduction in hunter trips, and hence in the economic contribution, economic impacts and economic benefits.

Upland Game Bird Hunting in North Dakota: The results indicate that in North Dakota the economic **contribution** of resident and non-resident upland game bird hunting represents $41.2 million in value added, with $26.8 million of that being labor income in the form of wages (from the estimated 819 jobs). The economic **impact** of only non-resident hunting is $23 million in value added with $13.8 million of that being labor income associated with about 400 jobs. Economic **benefits to hunters** is $138 per day. Expanding this up by the number of days and the number of upland game hunters yields $133 million in benefits to hunters annually.

Based on our survey about 69% of North Dakota upland game bird hunters hunt on CRP land, so about $16 million of the overall North Dakota non-resident upland game hunting economic impact (i.e., value added) and $92 million in hunter benefits is associated with hunters using CRP land.

Hunters were asked in the survey how they would change their hunting trips with a 50% reduction in CRP lands. There would be a 24% **reduction** in trips in North Dakota. Applying the 24% reduction to the economic impact yields a **reduction** of $5.5 million reduction and a reduction of 96 jobs. Applying that 24% reduction to the WTP benefits of hunting in North Dakota results in the estimates indicates about a $32 million reduction in upland game bird hunting benefits in North Dakota.

Upland Game Bird Hunting in South Dakota: The results indicate that in South Dakota the economic **contribution** of resident and non-resident upland game bird hunting represents $87 million in value added, with $49 million of that being labor income in the form of wages (from the estimated 1,989 jobs). The economic **impact** of only non-resident hunting is $63.3 million in value added with $32.5 million of that being labor income associated with about 1,303 jobs. Economic **benefits to hunters** is $317 per day. Expanding this up by the number of days and the number of upland game bird hunters yields $488.7 million in benefits to hunters annually.

Based on our survey about 56% of South Dakota upland game bird hunters hunt on CRP land, so about $35.4 million of the overall South Dakota non-resident upland game hunting economic impact (i.e., value added) and $273.7 million in hunter benefits is associated with hunters using CRP land.

A 50% reduction in CRP lands would result in a **reduction** 20% in upland game bird hunting trips. The corresponding reduction in the economic contribution, economic impacts and economic benefits amounts to a **reduction** of $17.4 million in economic contribution, $12.66 million in economic impact and $97.74 million in hunter benefits lost each year.

Waterfowl Hunting in North Dakota: The results indicate that in North Dakota the economic **contribution** of resident and non-resident waterfowl hunting represents $27.144 million in value added, with $18.3 million of that being labor income in the form of wages (from the estimated 558 jobs). The economic **impact** of only non-resident hunting is $15.5 million in value added with $10.2 million of that being labor income associated with about 296 jobs. Economic **benefits to hunters** is $159 per day. Expanding this up by the number of days and the number of waterfowl hunters yields $85 million in benefits to hunters annually. Our survey indicates 23% of waterfowl hunters hunt on CRP lands in North Dakota. This suggests that $3.6 million in economic impact, 68 jobs and $19.5 million of waterfowl hunting benefits are directly associated with CRP lands in North Dakota.

However, if there were a 50% reduction in CRP lands in North Dakota there would be a 17.6% **reduction** in waterfowl hunting trips in North Dakota. This translates into a **reduction** of $2.73 in economic impact 52 jobs and $15 million in hunter benefits.

Waterfowl Hunting in South Dakota: The results indicate that in South Dakota the economic **contribution** of resident and non-resident waterfowl hunting represents $21.6 million in value added, with $14 million of that being labor income in the form of wages (from the estimated 527 jobs). The economic **impact** of only non-resident hunting is $6.67 million in value added with $3.56 million of that being labor income associated with about 140 jobs. Economic **benefits to hunters** is $124 per day. Expanding this up by the number of days and the number of waterfowl hunters yields $72 million in benefits to hunters annually. Our survey indicates 21% of waterfowl hunters hunt on CRP lands in South Dakota. This suggests that $1.4 million in economic impact, 29 jobs and $15.12 million of waterfowl hunting benefits are directly associated with CRP lands in South Dakota.

However, if there were a 50% reduction in CRP lands in South Dakota there would be a 17.3% **reduction** in waterfowl hunting trips in South Dakota. Applying that percentage reduction to economic impact results in a **loss** of $1 million in economic impact, 24 jobs and $12.5 million in waterfowl hunter benefits. Table E-1 summarizes results North Dakota and South Dakota for the three types of hunting.

Table E-1. Overall Summary of Results

	North Dakota			South Dakota		
	All Lands	**CRP Lands**	**-50% CRP Lands**	**All Lands**	**CRP Lands**	**-50% CRP Lands**
Deer						
Contribution of All Hunters [a]	$15.70	$6.59	-$1.10	$20	$4.60	-$2.40
Impacts of Non-Residents [a]	$0.32	$0.13	-$0.02	$2.85	$0.66	-$0.34
Jobs from Non-Residents	6	3	-0.42	52	12	-6
Benefits to Hunters [a]	$65	$27.30	-$4.55	$88	$20.24	-$10.56
Upland Game Birds						
Contribution of All Hunters [a]	$41.20	$28.43	-$9.89	$87	$48.72	-$17.40
Impacts of Non-Residents [a]	$23	$15.87	-$5.52	$63.30	$35.45	-$12.66
Jobs from Non-Residents	400	276	-96	1303	730	-261
Benefits to Hunters [a]	$133	$91.77	-$31.92	$488.70	$273.67	-$97.74
Waterfowl						
Contribution of All Hunters [a]	$27.14	$6.24	-$4.78	$21.60	$4.54	-$3.74
Impacts of Non-Residents [a]	$15.50	$3.57	-$2.73	$6.67	$1.40	-$1.15
Jobs from Non-Residents	296	68	-52	140	29	-24
Benefits to Hunters [a]	$85.00	$19.55	-$14.96	$72	$15.12	-$12.46

[a] Millions of 2014 dollars

The results shown in Table E-1 make economic sense. The loss in jobs and benefits to hunters if ***all*** CRP lands were lost is larger than if 50% of CRP lands were lost. Nonetheless the losses with a 50% reduction in CRP lands are sizeable especially for upland game bird hunting in both North and South Dakota, totally $18 million annually in economic impact of money brought into the two states by non-resident upland game bird hunters. The loss in jobs would total 357 jobs, with the majority of these jobs being in South

Dakota. Economic benefits to resident and non-resident upland game bird hunters that would be lost totals $130 million annually.

Non-resident hunters currently bring in new money from outside the two states that support a total of 2,197 jobs in both states. CRP lands in total support 1,118 of those jobs. A 50% reduction in CRP lands would reduce the total number of jobs by 440. The economic benefits to the resident and non-resident hunters themselves in the two states amounts to $932 million annually. Of this total $448 is supported by CRP lands in the two states. If there were a 50% reduction in CRP lands in the two states, benefits to hunters would fall by $172 million annually.

Table of Contents

CHAPTER I: STUDY PURPOSE AND DATA COLLECTION

A. Purpose

The **purposes of study** is to quantify the economic contribution and economic impact (jobs and state income) provided by CRP lands from deer hunting, waterfowl and upland game bird hunting in North Dakota and South Dakota. The specific **objectives** include:

- Identify the role that CRP lands play for hunting in North Dakota and South Dakota
- Quantify the economic contribution of all hunters and economic impacts (jobs and state income) of non-resident hunters arising from CRP lands in terms of jobs and state income.
- Quantify how this economic contribution and economic impact would change with a 50% decrease in CRP lands
- Estimate the current economic value to hunters from hunting on CRP lands and how that would change with a 50% decrease in CRP lands and reduction in animals harvested.

B. Surveys

Six survey versions (three each for North Dakota (ND) and South Dakota (SD) deer, waterfowl and upland game birds) were drafted, pretested, and subject to intense scrutiny by the U.S. Office of Management and Budget (OMB), and finally approved by them. Appendix A provides one copy each of the deer, waterfowl and upland game birds (the two state surveys are essentially identical except for some state specific terminology).

C. Survey Mailing

Lists of resident and non-resident hunter license holders in ND and SD were obtained for the three species. Personalized cover letters and return postage paid envelopes were sent with the first and second mailings of the surveys. Initial mailing lists were 1000 each, and was reduced after screening for bad addresses (by CSU mail production using the National Change of Address database (NCOA). Response rates are calculated from the final number of surveys sent to good addresses, and are shown in Table 1.

Issues with North Dakota Waterfowl and Upland Game Bird Resident Hunters

After contacting the ND Game and Fish Department we learned that they do not require state resident hunters to have separate licenses for waterfowl and upland game birds, but rather issue either a resident "combination" license (which includes waterfowl, upland birds, small game, fishing and other species), or a "small game" license (which covers waterfowl, migratory birds and upland birds).

In order to try to avoid sending surveys to hunters who did not hunt for birds we sent a screening postcard asking respondents to indicate whether they hunted for upland birds, waterfowl or both. We began with a larger sample of 2,480 ND resident hunters (1,860 combo license holders and 620 small game license holders).

A total of 197 of the screening postcards were returned prior to the survey mailing (21 additional postcards came in after the surveys had been mailed). Of these, only 98 hunters indicated that they hunted for waterfowl. These hunters were combined with the sample of non-resident waterfowl licensees for a smaller than expected sample for this species.

The remaining resident hunters who returned postcards as well as a sample of the original resident hunters (non-respondents to the postcard) were combined with a sample of non-resident small game licensees for the ND upland bird sample.

The North Dakota upland game bird survey has had the smallest overall response rate of the six. This is probably due to the non-specific nature of the North Dakota hunting licenses which probably meant that several hunters who did not hunt for upland birds received this survey. For this survey only we followed the second mailing of the upland game bird survey with a reminder postcard in order to try and boost the response rate.

Table 1. CRP Hunter Survey Response Rates

	South Dakota			***North Dakota***		
	Total surveys			***Total surveys***		
	Sent	***Returned***	***Response rate***	***Sent***	***Returned***	***Response rate***
Deer	964	378	39.21%	959	333	34.72%
Waterfowl	956	319	33.37%	605	278	45.95%
Upland Game Birds	942	332	35.24%	985	267	27.11%

D. Data Quality Control

Data entry occurred from the paper surveys. A survey was coded with variable names that the data coders could follow. Three people performed data entry. When questions about responses arose, these individuals consulted with each other to develop consistent rules for data coding.

After coding, the data were screened by the PI (John Loomis) using maximums, minimums, averages, and three and five standard deviations from the mean. Based on these five variables, any outliers were identified. While there were no obvious coding errors (values outside preset question ranges, e.g., all 0,1 variables were either 0 or 1), several possible outliers were identified. When this occurred, the PI (John Loomis) reviewed the entire observation for consistency of answers. When responses seemed dubious, they were flagged. After this process was done, observation by observation, the spreadsheet was sent back to data coders to be checked against the original survey. Any discrepancies were corrected, although there were very few. This original file was saved as is.

Once we were convinced there were no obvious data entry errors, then logical consistency checks of remaining potential outliers were examined again. For example one question asked number of trips to the county and the next question asked days per trip. In a few cases respondents put, for example, 20 deer hunting trips, and 20 days per trip when asked about hunting in a county. Since this would clearly exceed the length of the deer hunting season, it seemed clear that the hunter misinterpreted the days per trip question and filled in total days. This seemed likely especially since earlier in the survey, they were asked total days of hunting in the state. So the 20 days of deer hunting was sent to 1 day of deer hunting per trip in order to correspond with the 20 deer hunting trips. In other cases, expenditures on durable goods (e.g., rifles) seemed quite high and websites were checked to verify that, yes indeed these types of deer hunting rifles may cost that much. However, in other cases hunters reported they spent $1,000 on gasoline (which was more than 5 standard deviations from the mean), but reported travel distances of 20 miles, travel time of half an hour and they only took five trips. The gasoline costs were then set at the average of the sample in this case. Other spending on restaurants of $1,000+ were checked against group size and length of stay. Nearly all of these seemed reasonable and were not changed. Other extremely large expenses that were

more than 5 standard deviations from the mean that were inconsistent with their other trip characteristics were set at 5 standard deviations.

CHAPTER II: INCOME AND EMPLOYMENT RESULTS

A. METHODOLOGY

Regional economic analysis is a commonly used technique to determine the effects of an activity (e.g., deer hunting) on a region (e.g., North Dakota). In regional economic analysis it is typical for an industry's economic effects to originate from participants spending in the regional economy. We use the reported expenditure data from the hunter surveys to estimate the economic impacts of hunting in North Dakota and South Dakota separately. The analysis follows the standard approach for evaluating the economic impacts and economic contributions of tourism as outlined in "Approaches to estimating the Economic Impacts of Tourism; Some Examples" (Stynes, 1999). Economic effects include changes in wages to employees, profits and rents to businesses, indirect business taxes paid to state and local governments, and jobs.

Economic Impact analysis looks at net changes to the regional economy associated with an industry or event, in this instance hunting in North Dakota or South Dakota. Because economic impact analysis looks at net changes in an economy (as opposed to gross changes) the impact must be a result of either new revenues to the region that otherwise would not have occurred, or revenues that would otherwise be lost to the region (Watson et al., 2007). In our impact analysis we look at new dollars brought into the region that otherwise would not have occurred, to determine this we distinguish between spending by resident hunters and hunters from outside the state. Distinguishing between resident and non-resident hunters allows us to only examine new dollars brought into the state due to hunting. We assume that expenditures from non-resident hunters are new dollars that would not have occurred otherwise, but we cannot make the same assumption of resident hunters. If hunting for the species of interest (here deer, upland game birds and waterfowl), were not available in the state, the assumption is that resident hunters would choose instead to spend their money on other local activities, for example fishing or attending a college football game. In this case, the economic impacts generated through hunting would simply be substituting for other local economic activity and are thus not new dollars into the economy.

The economic impact is not limited to just hunter expenditures in the region, because hunter expenditures have spinoff effects. These spinoff effects arise from additional activity that the hunter spending generates. We refer to this additional spending as the economic multiplier effect. An economic multiplier measures how the value of a dollar of initial sales is multiplied throughout the economy. For example, when a hunter spends $20 on lunch at a local restaurant that $20 ripples through the economy effecting other business and households in addition to the restaurant. The restaurant purchases inputs from food suppliers, as well as paying employees who then spend their wages at other business in the region.

Economic Contribution: Economic **contribution** is defined as the labor income (wages), value added (wages, rents and profits) and employment supported in the respective state due to **all** (resident and non-resident) hunter expenditures regardless of whether the hunter is a resident of the state or not. Since it includes all hunter spending this is naturally a larger economic effect, especially for hunting activities that are primarily engaged in by resident hunters (e.g., deer hunting). However, care must be taken in interpreting and applying an economic contribution number. First, economic contribution and economic impacts cannot be added, since economic contribution includes the expenditures of non-residents which is already reflected in the economic impact analysis.

Further, the loss of resident hunting in a state will only result in a loss to the state if that resident shifts their spending to some other state. That is, the loss of resident hunter expenditures is only that fraction of current spending by resident hunters that is diverted to another state. See Watson, et al. 2007 for a thorough discussion of the difference between economic impacts and economic contribution.

We calculate the economic impact or economic contribution of hunting as a combination of the following multiplier effects:

- ***Direct effects***: These effects are a result of actual hunter expenditures which were estimated using the survey data. For example, a purchase of $20 for supplies would be a $20 direct effect of hunting.

- ***Indirect effects***: These effects arise due to linkages in the supply chain, such as local industries buying goods and services from other local industries. The cycle of spending works its way backward through the supply chain. For example, the store from which a hunter buys supplies will use part of that money elsewhere in the economy, such as buying more inventories, paying rent or hiring more sales clerks.

- ***Induced effects***: These effects are a result of employee household spending. For example, when a hunter buys supplies, some small portion of that dollar amount goes toward paying the wages of the sales attendant, who then re-circulates those wages in the form of household purchases of things such as clothing or groceries.

The most common approach for estimating these multiplier effects and the economic impact and economic contribution of an activity, for recreation related activities is the use of the IMPLAN software model which was originally developed by the U.S Forest Service. IMPLAN establishes the characteristics of economic activity in terms of 528 unique economic sectors. Drawing on data collected by federal and state government agencies, the IMPLAN model uses regional industry purchasing patterns to examine how changes in one industry will affect others. We use the most recent version of IMPLAN, 2013, to determine the economic impact and contribution of hunting in North Dakota and South Dakota. Appendix B presents the mapping or "cross-walking" of the categories of hunter expenditures reported in the survey with the IMPLAN economic sectors. For more detail on IMPLAN please visit their website, www.implan.com.

Results of the IMPLAN analysis are quantified in terms of:

- ***Employment (jobs):*** is total number of wage and salary employees and self-employed jobs in a region. It includes both full-time and part-time workers and is measured in total jobs.
- ***Labor Income:*** All forms of employment income, including wages, benefits and proprietor income
- ***Total Value Added:*** is the broadest measure and includes not only labor income but also payment to business owners, investors, landlords and government. This is the same measure as Gross Domestic Product. Because Value Added includes labor income, labor income and value added *cannot* be added together.

B. DEER HUNTING

The regional economic analysis consists of a two-step process 1) approximate total expenditures by category based on our survey responses and; 2) apply the approximated total expenditures to the IMPLAN model in order to estimate the economic activity generated, including the multiplier effects. For step one we use reported expenditures from the North Dakota Deer Hunting Survey to estimate what a typical deer hunter spends on average in a season. Due to the detail of the survey we are able to break out expenditures by category. For economic impact analysis we focus only on non-resident hunters. On average non-

resident North Dakota deer hunters spend $897.37 in a season, with 25% of total expenditures being attributed to licenses. For the economic contribution analysis, both non-resident and resident expenditures are included. Table 1 displays resident and non-resident average seasonal expenditures by category.

North Dakota Deer Hunting Regional Economic Analysis Results

Tables 2 and 3 presents the per season average expenditures (Table 2) and total season expenditures of resident and non-resident deer hunters. The sum of resident and non-resident spending is used in the economic contribution analysis. Just the non-resident spending is used in the economic impact analysis, as it is only non-resident hunters that bring "new money" into the state.

Table 2. Average, Per Hunter Seasonal Expenditures by Category, North Dakota Deer Hunting.

Expenditure Category	*Non-Resident*	*Resident*
Gasoline/travel costs	$ 188.37	$ 204.67
Restaurants/bars/taverns	$ 137.24	$ 61.13
Grocery stores/liquor stores	$ 64.45	$ 60.84
Rental Car	$ 14.69	$ -
Lodging	$ 86.47	$ 19.04
Access/leasing fees	$ -	$ 3.32
Ammunition	$ 22.44	$ 36.35
Guns/bows used for deer hunting	$ 85.71	$ 164.39
Hunting licenses	$ 228.37	$ 45.97
Taxidermy	$ 12.14	$ 35.19
Repairs to equipment	$ 5.10	$ 7.25
Special clothing used for deer hunting	$ 28.55	$ 58.22
Non-clothing gear used for deer hunting	$ 18.28	$ 55.61
Other	$ 5.88	$ 21.74
Total: per Hunter per Season	$ 897.69	$ 773.71

In order to calculate the total aggregate deer hunter expenditures in North Dakota these per hunter expenditures have to be expanded up to the total number of resident and non-resident deer hunters. According to North Dakota Game and Fish Department (email correspondence with Randy Meissner, April 17, 2015) there were 51,729 resident deer hunters and 575 non-resident deer hunters. Table 3 presents the aggregated state total of deer hunter expenditures.

Table 3. Total Expenditures of Resident and Non-Resident North Dakota Deer Hunters by Category.

Expenditure Category	*Non-Resident*	*Resident*
Gasoline/travel costs	$ 108,311	$ 10,587,431
Restaurants/bars/taverns	$ 78,915	$ 3,162,339
Grocery stores/liquor stores	$ 37,058	$ 3,147,184
Rental Car	$ 8,448	$ -
Lodging	$ 49,719	$ 984,669
Access/leasing fees	$ -	$ 171,756
Ammunition	$ 12,902	$ 1,880,531
Guns/bows used for deer hunting	$ 49,285	$ 8,503,627
Hunting licenses	$ 131,311	$ 2,377,917
Taxidermy	$ 6,982	$ 1,820,214
Repairs to equipment	$ 2,933	$ 374,833
Special clothing used for deer hunting	$ 16,416	$ 3,011,597
Non-clothing gear used for deer hunting	$ 10,508	$ 2,876,415
Other	$ 3,379	$ 1,124,499
Total Expenditures	$ 516,174	$ 40,023,016

The direct, indirect, induced and total effects of deer hunting in North Dakota are reported in Table 4. Note that Value Added of $17 million is less than total hunter expenditures calculated from the survey reported in Table 2. This difference is due to margining to reflect the fact that not all initial expenditures stay in the region, the retail margin only includes the amount of expenditures that stay in the region.

The total value added economic **contribution of all** deer hunting to North Dakota is $15.7 million and supports 333 jobs to the North Dakota economy.

Table 4. Direct, Indirect, Induced and Total Economic Contribution of Resident and Non-resident Deer Hunters in North Dakota.

	Employment	*Labor Income*	*Total Value Added*
Direct Effect	269.7	$7,652,089	$10,735,482
Indirect Effect	30.7	$1,651,443	$2,472,767
Induced Effect	33.1	$1,448,785	$2,528,272
Total Effect	333.5	$10,752,317	$15,736,522

The total value added economic **impact** of **non-resident** deer hunting to North Dakota is $317,262. Non-resident deer hunting in North Dakota also contributes 5.9 jobs to the North Dakota economy. Only about

10% of total deer hunters in North Dakota are non-residents, which explains the relatively small economic impacts.

Table 5. Direct, Indirect, Induced and Total Impacts of Non-resident Deer Hunters in North Dakota.

	Employment	***Labor Income***	***Total Value Added***
Direct Effect	4.2	$159,017	$192,849
Indirect Effect	0.8	$40,188	$61,014
Induced Effect	0.9	$36,103	$63,400
Total Effect	5.9	$232,308	$317,262

Based on our survey, about 42% of North Dakota deer hunters hunted on CRP lands. Therefore about $133,250 of deer hunting economic impacts in North Dakota are associated with CRP lands.

How Deer Hunters Would Change Their Hunting Trips with a 50% Reduction in CRP Lands

Seventy-one percent of deer hunters would not change the number of deer hunting trips if there were 50% fewer CRP acres. However, about almost a quarter (24%) would take an average of almost two fewer trips per season (1.9 fewer trips). When we take the number of hunters who would not change their trips plus those who would reduce their trips, there is a reduction of 0.46 trips per hunter overall. Given that the typical hunter takes 3.73 deer hunting trips, this means that new level of deer hunting would be 3.27 trips, or a reduction of 12%.

Applying this 12% reduction in deer hunting trips to the original estimated IMPLAN **contribution**, we estimate that a 50% reduction in CRP acreage would result in a reduction of $1.9 million in value added, of which $1.29 million is labor income, and a loss of about 40 deer hunting related jobs.

South Dakota Deer Hunting Regional Economic Analysis Results

Tables 6 presents the average per season, per hunter expenditures and Table 7 shows the total season expenditures of resident and non-resident deer hunters. The sum of resident and non-resident spending is used in the economic contribution analysis, but only the non-resident spending is used in the economic impact analysis, as it is only non-resident hunters who bring “new money” into the state.

Table 6. Average, Per Hunter Seasonal Expenditures by Category, South Dakota Deer Hunting.

Expenditure Category	*Non-Resident*	*Resident*
Gasoline/travel costs	$ 239.47	$ 156.02
Restaurants/bars/taverns	$ 152.89	$ 55.65
Grocery stores/liquor stores	$ 123.68	$ 51.79
Rental Car	$ 49.21	$ -
Lodging	$ 186.97	$ 29.64
Access/leasing fees	$ 314.47	$ 36.99
Ammunition	$ 85.71	$ 34.06
Guns/bows used for deer hunting	-	$ 273.03
Hunting licenses	$ 231.71	$ 60.13
Taxidermy	$ 23.95	$ 70.37
Repairs to equipment	$ 12.71	$ 33.97
Special clothing used for deer hunting	$ 34.61	$ 74.48
Non-clothing gear used for deer hunting	$ 25.53	$ 103.76
Other	$ 129.74	$ 6.03
Total: per Hunter per Season	$ 1,610.65	$ 985.92

Table 7. Total Expenditures of Resident and Non-Resident South Dakota Deer Hunters by Category.

Expenditure Category	*Non-Resident*	*Resident*
Gasoline/travel costs	$ 825,453	$ 7,999,613
Restaurants/bars/taverns	$ 527,011	$ 2,853,342
Grocery stores/liquor stores	$ 426,324	$ 2,655,428
Rental Car	$ 169,626	-
Lodging	$ 644,485	$ 1,519,731
Access/leasing fees	$ 1,083,978	$ 1,896,588
Ammunition	$ 295,442	$ 1,746,358
Guns/bows used for deer hunting	-	$ 13,999,067
Hunting licenses	$ 798,704	$ 3,083,045
Taxidermy	$ 82,555	$ 3,608,081
Repairs to equipment	$ 43,813	$ 374,833
Special clothing used for deer hunting	$ 119,284	$ 3,011,597
Non-clothing gear used for deer hunting	$ 87,989	$ 2,876,415
Other	$ 447,202	$ 1,124,499
Total Expenditures	$ 5,551,872	$ 50,551,076

Table 8 presents the economic **contribution** of resident and non-resident deer hunter spending in South Dakota. When taken together residents (the vast majority of deer hunters in South Dakota) and non-residents contribute $20 million in total value added (payments to all factors of production including profit, rents, wages, indirect business taxes). Of that amount, $11.6 million is wages to the 473 workers who are directly or indirectly supported by resident and non-resident deer hunter spending.

Table 8. Direct, Indirect, Induced and Total Economic Contribution of Resident and Non-resident Deer Hunters in South Dakota.

	Employment	***Labor Income***	***Total Value Added***
Direct Effect	365.9	$7,612,623	$13,762,132
Indirect Effect	63.2	$2,201,715	$3,302,330
Induced Effect	44.3	$1,759,206	$3,145,858
Total Effect	473.4	$11,573,544	$20,210,321

Table 9 presents the economic **impact** of non-resident deer hunter spending in South Dakota. Non-resident deer hunters contribute $2.8 million in total value added (payments to all factors of production including profit, rents, wages, indirect business taxes). Of that amount, $1.27 million is wages to the 52 workers who are directly or indirectly supported by the new money brought into the state by non-resident deer hunter spending.

Table 9. Direct, Indirect, Induced and Total Impacts of Non-resident Deer Hunters in South Dakota.

	Employment	***Labor Income***	***Total Value Added***
Direct Effect	39.2	$784,354	$1,952,580
Indirect Effect	6.9	$268,064	$481,646
Induced Effect	5.9	$216,703	$401,143
Total Effect	52.0	$1,269,123	$2,835,369

Based on our survey, about 23% of South Dakota deer hunters hunted on CRP lands. Therefore about $652,000 of deer hunting total value added, $291,870 in wages and 12 jobs in South Dakota are associated with non-resident hunting on CRP lands.

How Deer Hunters Would Change Trips with a 50% Reduction in CRP Lands

About three-quarters of deer hunters (78%) would not change their deer hunting trips with 50% fewer CRP acres. However, about one-fifth (19.5%) would take an average of 1.4 fewer trips, resulting in an overall average reduction of 0.28 trips per hunter. or a 7% reduction in total deer hunting trips.

Applying this 7% reduction to the original IMPLAN **contribution** results, we estimate that a 50% reduction in CRP acres would result in a $1.4 million reduction in value added, of which $810,000 is a reduction in labor income, and a loss of about 33 deer hunting related jobs.

C. UPLAND GAME BIRD HUNTING

The regional economic analysis consists of a two-step process: 1) approximate total expenditures by category based on our survey responses and; 2) apply the approximated total expenditures to the IMPLAN model in order to estimate the economic activity generated, including the multiplier effects. For step one we use reported expenditures from the North Dakota Upland Game Hunting Survey to estimate what a typical upland game bird hunter spends on average in a season. Due to the detail of the survey we are able to break out expenditures by category. For economic impact analysis we focus only on non-resident hunters.

North Dakota Upland Game Bird Hunting Regional Economic Analysis Results

On average, non-resident North Dakota upland game bird hunters spend $1,386 in a season, with lodging and travel costs being the two major expenditures, followed by access fees and hunting licenses. For residents, travel costs ($244) are by far the largest category of their average $842 seasonal expenditures. For the economic contribution analysis, both non-resident and resident expenditures are included. Table 10 displays resident and non-resident average seasonal expenditures by category.

Table 10. Average Per Hunter Seasonal Expenditures by Category, North Dakota Upland Game Bird Hunting

Expenditure Category	*Non-Resident*	*Resident*
Gasoline/travel costs	$271.05	$243.70
Restaurants/bars/taverns	$167.58	$117.61
Grocery stores/Liquor stores	$120.49	$69.17
Rental car	$6.59	--
Lodging	$273.45	$37.74
Access/leasing fees	$154.19	$7.18
Ammunition	$98.31	$86.89
Guns purchased for upland game hunting	$37.09	$67.79
Hunting License	$151.61	$34.50
Taxidermy	$5.45	$12.56
Repairs to equipment	$8.71	$12.91
Special Clothing	$23.76	$85.04
Dog Gear, Veterinarian	$10.11	$11.54
Other	$39.67	$55.93
Total: per Hunter per Season	$1,368.06	$842.55

In order to calculate the total aggregate upland game bird hunter expenditures in North Dakota, these per hunter expenditures have to be expanded up to the total number of resident and non-resident upland game bird hunters. According to North Dakota Game and Fish Department (email correspondence with Randy Meissner, April 17, 2015) there were 26,110 non-resident upland game hunters and 53,944 resident upland game hunters. Table 11 presents the aggregated state total of deer hunter expenditures.

Table 11. Total Expenditures of Resident and Non-Resident North Dakota Upland Game Bird Hunters by Category.

Expenditure Category	*Non-Resident*	*Resident*
Gasoline/travel costs	$7,077,115.50	$9,162,421.03
Restaurants/bars/taverns	$4,375,513.80	$4,421,664.27
Grocery stores/Liquor stores	$3,145,993.90	$2,600,619.84
Rental car	$172,064.90	--
Lodging	$7,139,779.50	$1,418,724.40
Access/leasing fees	$4,025,900.90	$269,927.18
Ammunition	$2,566,874.10	$3,266,761.56
Guns purchased for upland game hunting	$968,419.90	$2,548,562.45
Hunting License	$3,958,537.10	$1,296,935.83
Taxidermy	$142,299.50	$472,372.56
Repairs to equipment	$227,418.10	$485,226.24
Special Clothing	$620,373.60	$3,197,351.71
Dog Gear, Veterinarian	$263,972.10	$433,811.54
Other	$1,035,783.70	$433,811.54
Total Expenditures	$35,720,046	$31,677,239

Table 12 presents the results obtained from running the total resident and non-resident hunter spending in Table 11 through the IMPLAN input-output model to calculate the economic **contribution** that the combined resident and non-resident upland game bird hunters' spending provides to the economy of North Dakota.

Table 12. Direct, Indirect, Induced and Total Economic Contribution of Resident and Non-resident Upland Game Bird Hunters in North Dakota.

	Employment	*Labor Income*	*Total Value Added*
Direct Effect	653.0	$18,974,632	$28,454,214
Indirect Effect	83.6	$4,276,518	$6,425,445
Induced Effect	83.1	$3,626,492	$6,327,025
Total Effect	819.8	$26,877,637	$41,206,518

As can be seen in Table 12, combined spending by resident and non-resident upland game bird hunters makes a sizeable economic contribution to North Dakota. In terms of employment, 820 jobs are supported, $27 million in wages are paid to these employees, and about $41.2 million of total payments

(wages, profits, rents, payment to government) in North Dakota economy rely on money spent in North Dakota by resident and non-resident upland game bird hunters.

Table 13 provides the results obtained by running just the non-resident upland game bird hunter expenditures through the IMPLAN input-output model to calculate economic **impact.**

Table 13. Direct, Indirect, Induced and Total Impacts of Non-resident Upland Game Bird Hunters in North Dakota

	Employment	***Labor Income***	***Total Value Added***
Direct Effect	296.3	$9,147,686	$15,161,573
Indirect Effect	51.7	$2,532,385	$4,057,661
Induced Effect	51.8	$2,120,084	$3,723,044
Total Effect	399.8	$13,800,155	$22,942,278

As can be seen in Table 13, non-resident upland game bird hunters have a substantial positive economic impact on North Dakota. About 400 jobs are supported, $13.8 million in wages are paid to these employees, and nearly $23 million in total payments (wages, profits, rents, payment to government) in North Dakota economy rely on money brought to the state by non-resident upland game bird hunters.

Based on our survey about 69% of North Dakota upland game bird hunters hunt on CRP land, so about $16 million of the overall North Dakota non-resident upland game hunting economic impacts (i.e., value added) are associated with hunters using CRP land.

Effect of a 50% Reduction in CRP Lands

Slightly more than half (54%) of upland game bird hunters reported that they would not change their hunting trips if there were 50% fewer CRP acres. However, 44% would take an average of almost two (1.93) fewer trips. When we take the number of hunters who would not change their trips plus those who would reduce their trips, there is an overall average reduction of 0.856 trips per hunter. This is an average reduction of 24% in upland game bird hunting trips.

Applying this 24% reduction in trips to economic impacts reported in Table 13, yields a reduction in Total Value Added

South Dakota Upland Game Bird Hunting Regional Economic Analysis Results

Table 14 provides the average per season resident and non-resident upland game bird hunter expenditures.

According to South Dakota Game, Fish and Parks, there were 82,992 non-resident and 83,733 resident upland game bird hunters in South Dakota. Scaling up the resident and non-resident average hunter expenditures yields total hunter expenditures shown in Table 15.

Table 14. Average Per Hunter Seasonal Expenditures by Category, South Dakota Upland Game Bird Hunting

Expenditure Category	*Non-Resident*	*Resident*
Gasoline/travel costs	$ 214.10	$ 171.41
Restaurants/bars/taverns	$ 179.51	$ 102.04
Grocery stores/Liquor stores	$ 90.73	$ 63.05
Rental car	$ 28.82	$ 2.02
Lodging	$ 318.13	$ 56.01
Access/leasing fees	$ 169.07	$ 30.15
Ammunition	$ 36.48	$ 54.96
Guns purchased for upland game hunting	$ 32.86	$ 107.58
Hunting License	$ 106.37	$ 44.64
Taxidermy	$ 11.73	$ 1.01
Repairs to equipment	$ 26.40	$ 18.18
Special Clothing	$ 34.27	$ 60.76
Dog Gear, Veterinarian	$ 17.36	$ 71.77
Other	$ 53.97	$ 7.07
Total: per Hunter per Season	$ 1,319.81	$ 790.65

Table 15. Total Expenditures of Resident and Non-Resident South Dakota Upland Game Bird Hunters by Category.

Expenditure Category	*Non-Resident*	*Resident*
Gasoline/travel costs	$ 17,768,543	$ 14,353,020
Restaurants/bars/taverns	$ 14,898,150	$ 8,544,149
Grocery stores/Liquor stores	$ 7,530,111	$ 5,279,407
Rental car	$ 2,391,994	$ 169,157
Lodging	$ 26,402,318	$ 4,689,893
Access/leasing fees	$ 14,031,731	$ 2,524,676
Ammunition	$ 3,027,687	$ 4,601,931
Guns purchased for upland game hunting	$ 2,727,117	$ 9,007,640
Hunting License	$ 8,827,785	$ 3,737,536
Taxidermy	$ 973,309	$ 84,578
Repairs to equipment	$ 2,191,249	$ 1,522,418
Special Clothing	$ 2,843,888	$ 5,087,414
Dog Gear, Veterinarian	$ 1,440,410	$ 6,009,322
Other	$ 4,478,960	$ 592,051
Total Expenditures	$ 109,533,580	$ 66,203,200

These expenditure data were run through the IMPLAN software for South Dakota and yielded the economic **contributions** of resident and non-resident upland game bird hunters in South Dakota shown in Table 16.

Table 16. Direct, Indirect, Induced and Total Economic Contribution of Resident and Non-resident Upland Game Bird Hunters in South Dakota.

	Employment	*Labor Income*	*Total Value Added*
Direct Effect	1,551.6	$32,678,562	$60,268,222
Indirect Effect	200.3	$8,880,469	$13,537,081
Induced Effect	186.5	$7,414,059	$13,280,136
Total Effect	1,938.5	$48,973,091	$87,085,441

The economic contribution of resident and non-resident upland game bird hunters is sizeable in South Dakota. Total Value Added (payments to all factors of production: labor, rents, profits and indirect business taxes) is $87 million, with $49 million of that being payment to labor of 1,938 jobs directly or indirectly related to resident and non-resident upland game bird hunters.

Table 17 presents the economic **impacts** associated with money brought into the state of South Dakota by only non-resident upland game bird hunters.

Table 17. Direct, Indirect, Induced and Total Impacts of Non-resident Upland Game Bird Hunters in South Dakota

	Employment	*Labor Income*	*Total Value Added*
Direct Effect	985.0	$20,194,612	$41,259,707
Indirect Effect	167.9	$6,729,318	$11,720,656
Induced Effect	150.4	$5,549,670	$10,273,148
Total Effect	1,303.3	$32,473,600	$63,253,511

As can be seen in Table 17, the economic **impact** of non-resident hunters is sizeable. Total Value Added amounts to $63.253 million, of which $32.473 million is wages associated with more than 1,300 workers directly and indirectly supported by the new money brought into the state of South Dakota by non-resident upland game bird hunters.

Our data indicates that nearly 56% of upland game bird hunters use CRP lands. Therefore 56% of the economic impact is attributable to CRP lands. Specifically, $34.86 million in total value added, $18 million in wages and 730 jobs are dependent on CRP lands in South Dakota.

How Trips Change with a Reduction in CRP Land

Hunters were asked to assess how their hunting trips would change with a 50% reduction in CRP acreage in the county where they hunted most frequently. This information is relevant to assess how the economic impacts and economic contribution of hunting would change from its current levels if current CRP lands are not re-enrolled or new acres added to replace those lands that do not re-enroll.

More than half (57%) of upland game bird hunters would not change their hunting trips with 50% fewer CRP acres. However, 42% would take an average of 1.28 fewer trips. When we take the number of

hunters who would not change their trips plus those who would reduce their trips, there is an overall average reduction of 0.53 trips per hunter. Given the typical hunter takes about 2.68 upland game bird hunting trips, this means that new level of upland game bird hunting would be 2.15 trips, for a reduction of 20% in upland game bird hunting trips.

Thus, a 50% reduction in CRP land in South Dakota would result in a $12.65 million reduction in total value added, a $6.5 million reduction in total wages, and the loss of 260 jobs in South Dakota.

D. WATERFOWL HUNTING

The regional economic analysis consists of a two-step process 1) approximate total expenditures by category based on our survey responses and; 2) apply the approximated total expenditures to the IMPLAN model in order to estimate the economic activity generated, including the multiplier effects. For step one we use reported expenditures from the North Dakota Waterfowl Hunting Survey to estimate what a typical upland game bird hunter spends on average in a season. Due to the detail of the survey we are able to break out expenditures by category. For economic impact analysis we focus only on non-resident hunters.

North Dakota Waterfowl Hunting Regional Economic Analysis Results

On average, non-resident North Dakota upland game bird hunters spend $1,106 in a season, with lodging and travel costs being the two major expenditures, followed by hunting licenses. For residents, travel costs ($285) are by far the largest category of their $1,529 seasonal expenditures. For the economic **contribution** analysis, both non-resident and resident expenditures are included. Table 18 displays resident and non-resident average seasonal expenditures by category.

Table 18. Average Per Hunter Seasonal Expenditures by Category, North Dakota Waterfowl Hunting

Expenditure Category	*Non-Resident*	*Resident*
Gasoline/travel costs	$ 252.62	$ 285.23
Restaurants/bars/taverns	$ 129.44	$ 97.61
Grocery stores/liquor stores	$ 86.41	$ 62.81
Rental car	$ 6.85	$ -
Lodging	$ 231.36	$ 30.31
Access/leasing fees	$ 19.32	$ 1.72
Guns purchased for waterfowl hunting	$ 83.32	$ 243.45
Ammunition	$ 41.95	$ 123.75
Hunting license & “Duck Stamp”	$ 130.11	$ 43.73
Taxidermy	$ 8.39	$ 29.69
Repairs to equipment	$ 7.26	$ 26.91
Dog gear/veterinarian	$ 11.36	$ 69.61
Special clothing	$ 43.78	$ 121.72
Non-clothing gear	$ 43.29	$ 249.11
Other	$ 10.78	$ 143.20
Total: per Hunter per Season	$ 1,106.25	$ 1,528.86

In order to calculate the total aggregate waterfowl hunter expenditures in North Dakota these per hunter expenditures have to be expanded up to the total number of resident and non-resident waterfowl hunters. According to North Dakota Game and Fish Department (email correspondence with Randy Meissner, April 17, 2015) there were 24,184 non-resident waterfowl hunters and 20,434 resident waterfowl hunters. Table 19 presents the aggregated state total of deer hunter expenditures.

Table 19. Total Expenditures of Resident and Non-Resident North Dakota Waterfowl Hunters by Category.

Expenditure Category	***Non-Resident***	***Resident***
Gasoline/travel costs	$ 6,109,468.25	$ 1,165,752.89
Restaurants/bars/taverns	$ 3,130,353.37	$398,929.52
Grocery stores/liquor stores	$ 2,089,851.51	$ 256,714.69
Rental car	$ 165,748.88	-
Lodging	$ 5,595,233.83	$ 123,887.19
Access/leasing fees	$ 467,164.10	$ 7,024.53
Guns purchased for waterfowl hunting	$ 2,014,940.10	$ 994,992.92
Ammunition	$ 1,014,430.32	$ 505,766.25
Hunting license & "Duck Stamp"	$ 3,146,633.33	$ 178,742.39
Taxidermy	$ 202,791.69	$ 121,332.81
Repairs to equipment	$ 175,658.42	$ 109,965.84
Dog gear/veterinarian	$ 1,058,787.32	$ 497,464.53
Special clothing	$ 274,753.83	$ 284,493.52
Non-clothing gear	$ 260,715.32	$ 585,271.17
Other	$ 1,046,990.24	$ 1,018,110.02
Total Expenditures	$ 26,753,520	$ 6,248,448

Combined expenditures of resident and non-resident waterfowl hunters in North Dakota make a large economic contribution to employment (557 jobs) and associated labor income of $18 million annually (Table 20). Payments to labor, profits to business owners, rents and payment to government (i.e., value added) supported resident and non-resident waterfowl hunters is nearly $27 million annually.

Table 20. Direct, Indirect, Induced and Total Economic Contribution of Resident and Non-resident Waterfowl Hunters in North Dakota.

	Employment	***Labor Income***	***Total Value Added***
Direct Effect	443.4	$12,943,084	$18,493,948
Indirect Effect	57.9	$2,890,101	$4,356,826
Induced Effect	56.3	$2,456,691	$4,293,616
Total Effect	557.5	$18,289,877	$27,144,390

As can be seen in Table 21, non-resident waterfowl hunters have a substantial positive economic impact on North Dakota. About 300 jobs are supported, $10 million in wages are paid to these employees, and

about $15 million of total payments (wages, profits, rents, payment to government) in North Dakota economy rely on money brought to the state by non-resident waterfowl hunters.

Table 21. Direct, Indirect, Induced and Total Impacts of Non-resident Waterfowl Hunters in North Dakota

	Employment	***Labor Income***	***Total Value Added***
Direct Effect	219.5	$6,801,060	$9,758,138
Indirect Effect	38.3	$1,860,929	$2,981,719
Induced Effect	38.4	$1,571, 025	$2,758,838
Total Effect	296.1	$10,233,014	$15,498,695

Based on our survey about, 23% of North Dakota upland game bird hunters hunt on CRP land, so about $3.56 million of the overall North Dakota non-resident waterfowl hunting economic impacts (i.e., value added) are associated with waterfowl hunters using CRP land.

How Trips Change with a Reduction in CRP Land

Hunters were asked to assess how their hunting trips would change with a 50% reduction in CRP acreage in the county where they hunted most frequently. This information is relevant to assess how the economic impacts and economic contribution of hunting would change from its current levels if current CRP lands are reduced.

About 62% of North Dakota waterfowl hunters would not change their hunting trips with 50% fewer CRP acres. However, 37% would take an average of 1.22 fewer trips. When we take the number of hunters that would not change their trips plus those that would reduce their trips, there is an overall average reduction of 0.453 trips per hunter. Given the typical hunter takes 2.74 trips hunting trips, this means that new level of hunting would be 2.28 trips, for a reduction of 16.6% in waterfowl hunting trips as a result of a 50% loss in CRP lands.

A 50% reduction in CRP lands would result in a reduction of $2.57 million in total value added, $1.7 million in wages, and 49 jobs.

South Dakota Waterfowl Hunting Regional Economic Analysis Results

Table 22 presents the average per season resident and non-resident hunting expenditures. With 5,297 non-resident waterfowl hunters and 31,844 resident waterfowl hunters, Table 23 presents total waterfowl hunter expenditures in South Dakota.

Table 22. Average Per Hunter Seasonal Expenditures by Category, South Dakota Waterfowl Hunting

Expenditure Category	*Non-Resident*	*Resident*
Gasoline/travel costs	$ 204.81	$ 263.97
Restaurants/bars/taverns	$ 145.93	$ 112.07
Grocery stores/liquor stores	$ 105.19	$ 70.49
Rental car	$ 11.11	$ 0.00
Lodging	$ 319.63	$ 31.70
Access/leasing fees	$ 207.41	$ 13.82
Guns purchased for waterfowl hunting	$ 34.26	$ 199.48
Ammunition	$ 11.11	$ 155.78
Hunting license & "Duck Stamp"	$ 103.96	$ 56.78
Taxidermy	$ 8.33	$ 27.85
Repairs to equipment	$ 8.52	$ 24.32
Dog gear/veterinarian	$ 14.07	$ 194.17
Special clothing	$ 11.67	$ 65.50
Non-clothing gear	$ 45.63	$ 147.53
Other	$ 92.59	$ 5.90
Total: per Hunter per Season	$ 1,324.22	$ 1,369.38

Table 23. Total Expenditures of Resident and Non-Resident South Dakota Waterfowl Hunters by Category.

Expenditure Category	*Non-Resident*	*Resident*
Gasoline/travel costs	$1,084,904	$8,405,710
Restaurants/bars/taverns	$772,969	$3,568,739
Grocery stores/liquor stores	$557,165	$2,244,780
Rental car	$58,849	$0.00
Lodging	$1,693,078	$1,009,499
Access/leasing fees	$1,098,637	$440,066
Guns purchased for waterfowl hunting	$58,855	$6,352,214
Ammunition	$181,475	$4,960,658
Hunting license & "Duck Stamp"	$550,691	$1,808,031
Taxidermy	$44,141	$886,988
Repairs to equipment	$45,122	$774,428
Dog gear/veterinarian	$74,550	$6,183,264
Special clothing	$61,798	$2,085,782
Non-clothing gear	$241,700	$4,698,095
Other	$490,462	$187,968
Total Expenditures	$7,014,405	$43,606,377

The sum of resident and non-resident expenditures were entered into the IMPLAN input-output model to estimate economic **contribution** that is shown in Table 24. Resident and non-resident waterfowl hunters spending in South Dakota generates $21 in total value added (wages, rents, profits and indirect business taxes), of which $14 million goes to wages paid to 527 workers.

Table 24. Direct, Indirect, Induced and Total Economic Contribution of Resident and Non-resident Waterfowl Hunters in South Dakota.

	Employment	***Labor Income***	***Total Value Added***
Direct Effect	423.5	$9,724,353	$14,485,069
Indirect Effect	50.4	$2,173,345	$3,337,980
Induced Effect	53.4	$2,120,732	$3,799,012
Total Effect	527.2	$14,018,431	$21,622,062

Non-resident waterfowl hunter expenditures were also entered into IMPLAN to estimate the economic **impact** of their spending in South Dakota. Those results are shown in Table 25. Non-resident waterfowl hunters spending in South Dakota provide $6.6 million in total value added, of which $3.564 million goes to wages of 141 workers.

Table 25. Direct, Indirect, Induced and Total Impacts of Non-resident Waterfowl Hunters in South Dakota

	Employment	***Labor Income***	***Total Value Added***
Direct Effect	108.0	$2,300,640	$4,339,784
Indirect Effect	16.2	$654,547	$1,205,488
Induced Effect	16.5	$608,812	$1,126,984
Total Effect	140.7	$3,564,000	$6,672,258

Our survey data indicates that 21% of waterfowl hunters hunted on CRP land in South Dakota. Therefore 21% of the economic impact or $1.42 million in Total Value Added, $748,440 in wages and 30 workers directly depend on CRP lands in South Dakota.

Nearly 60% of waterfowl hunters would not change their hunting trips with 50% fewer CRP acres. However, 40% would take fewer trips. Of the 82 hunters that would take fewer trips, they would average about 2.18 fewer trips. When we take the number of hunters that would not change their trips plus those that would reduce their trips, there is a reduction of .854 trips per hunter overall. Given the typical hunter takes about 4.94 waterfowl hunting trips, this means that new level of waterfowl hunting would be 4.08 trips, for a reduction of 17.3% in waterfowl hunting trips.

Applying the -17.3% reduction in waterfowl hunting trips to the economic impact results in Table 18, indicates there would be a reduction of $1.15 million reduction in Total Value Added, $616,572 in wages and 24 jobs would be lost.

CHAPTER III: TRAVEL COST METHOD (TCM) HUNTER DEMAND MODELS TO CALCULATE VALUE OF DEER HUNTING

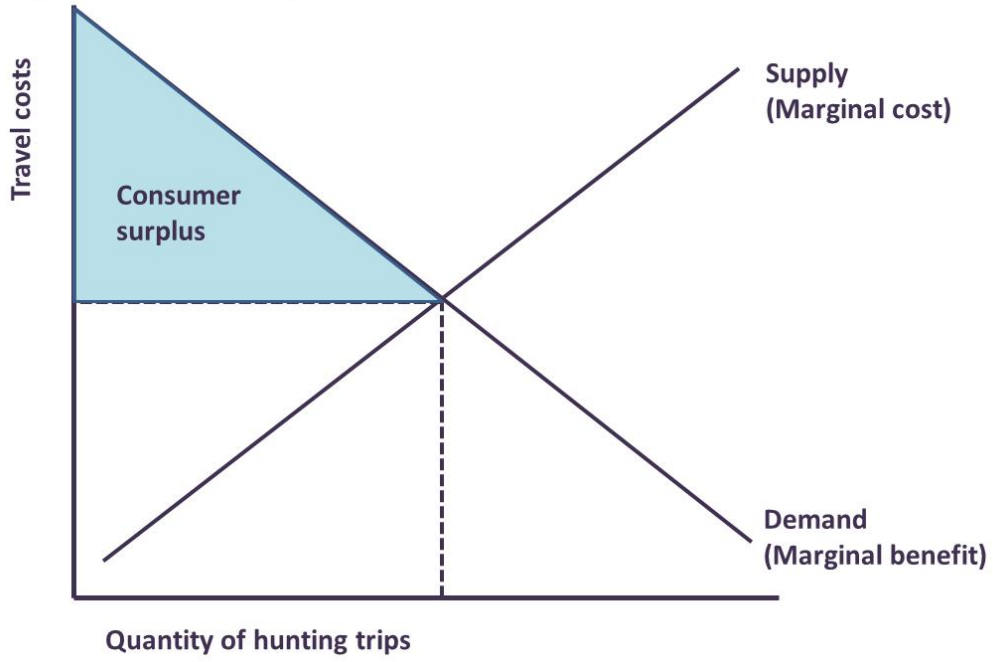
A. Travel Cost Methodology

While the economic effects of hunter expenditures on the economies of North and South Dakota are of primary interest to many in state and county governments, the actual economic value to the hunters themselves should not be ignored. Hunter expenditures are, after all, a cost not a benefit to the hunter. The federal government has adopted economists' definition of benefits as the maximum amount *over and above* the user's costs that they would pay to engage in a recreation activity. Economists' short hand expression for this is net willingness to pay (WTP). However, given that the actual number of trips taken by a hunter is constrained by income, this net WTP reflects not only willingness but also ability to pay. Another term for net WTP is consumer surplus. This is the benefit to the hunter that remains after they have paid the travel costs, ammunition, supplies and any lodging expenses for the hunting activity.

While hunter expenditures are directly reported in the survey by hunters (and then entered into the IMPLAN input-output model), in order to estimate the residual benefits that the hunter retains as consumer surplus requires we must statistically estimate their demand curve for hunting. This is accomplished by using variations in the number of trips hunters take each season as a function of hunter travel costs and other travel distance-related trip costs. The travel costs act as a proxy for the "price" of hunting trips. In the case of hunting on public lands or on one's own or friends private lands there is often not an explicit price paid. Even when an entrance fee exists it is not always a competitively determined price. In most cases the entrance fee or access fee paid does not reflect the maximum amount the hunter would pay.

However, by using variations in the number of trips taken as a function of the cost of a trip, the demand curve for hunting can be statistically estimated. From this demand curve the amount over and above cost (i.e. the net WTP or consumer surplus) can be calculated (see Figure 1).

Figure 1. Consumer surplus



B. Specification of the Travel Cost Demand (TCM) Models

The travel cost method (TCM) demand estimating approach has been in use by economists since the early 1960s (Loomis and Walsh, 1997) and endorsed for use by federal government agencies since 1983 (US Water Resources Council, 1983). At this most elemental level, the general formulation of the TCM is the same as estimating the demand curve for anything: quantity "consumed or bought" is a function of the price per unit and the consumer's income. In the travel cost method the quantity is the number of trips taken by the hunter to a particular area in a given season. Price is approximated by the trip-related costs. But one thing unusual about recreation, is that unlike buying a shirt at a nearby store, recreation involves substantial travel time to and from the site. Therefore travel time is also a separate component of price.

Defining the "price of hunting" in a hunting demand model

Defining the price of a hunting trip as trip related travel costs may not be as straightforward as it seems, although there are some basic principles. One of these is the "with the trip vs without the trip" costs. Thus in absence of taking a trip, the hunter would have eaten anyway, so food costs may not a trip related costs. Also, what matters in the TCM estimate of the demand curve is how trips change with trip related travel costs (i.e., the slope of the demand curve with respect to price is the major determinant of the consumer surplus). Since all hunters regardless of whether they live 100 miles or 250 miles are going to eat three meals a day, the cost of groceries doesn't vary with distance. In contrast, obviously gasoline costs to visit a particular area for hunting do vary directly with the distance the hunter travels to the recreation site. For hunters who travel great distances from home (e.g., 250-500 miles one way) lodging costs are a travel related trip costs which those who hunt close to home (e.g., 20-50 miles) don't incur. Likewise the travel time for those hunting close to home is a small part of the time cost. In contrast those traveling great distances from home to the hunting area, travel time is another significant cost and is routinely included as a separate cost variable in the TCM demand model.

TCM model empirical specification

We started with a rather full specification of the TCM demand model including variables that either the past literature or economic principles of consumer demand would suggest would influence the number of trips taken. Our model with these candidate variables includes:

Trips by hunter i to county$_j$ = βo - β1(Trip Related Travel Costs$_{ij}$) - β2(Travel Time$_{ij}$) + β3(Income$_i$) + β4(HuntOrgMember) + β5(Harvest) + β6(CRP) + β7(Travel Cost*CRP)

Where

Trip Related Travel Costs$_{ij}$ are the gasoline purchases plus lodging costs (if any) (called TGASLODGETRIP)

Travel Time$_{ij}$ is the one way travel time of hunter i to county j

Income$_i$ is the household income of hunter i

HuntOrgMember indicates whether hunter is a member of a hunting organization (this is a proxy for strength of preferences toward hunting)

Harvest is the number of deer harvested (including zero's for those who did not harvest any)

CRP indicates whether the hunter hunted on CRP lands

Travel Cost*CRP is an interaction term between CRP lands and travel cost to test whether the travel cost (price) slope of the demand curve is different for hunting on CRP lands. This was important because if hunting on CRP lands resulted in a statistically different slope it would result in differences in the estimated consumer surplus per trip between CRP lands and non CRP lands.

Regression model functional form

Since trips are non-negative intergers (e.g., 1, 4, 6, etc) it is typical to use what is referred to as a count data model. This model has a functional form similar to a semi-log functional form, in which the dependent variable (trips) is logged. Either a *Poisson* model or a more general Negative Binomial model can be estimated. Since the mean number of trips for our data does not equal the variance of trip numbers, we used the more general Negative Binomial model. Since we sampled from hunter license list, the probability of a hunter being selected was **not** related to how many trips they took. Thus our data and model does not have any avidity bias and does not need to be corrected for that.

Initial models were estimated using the specification described above, and then variables found to be repeatedly insignificant were dropped. Including non-significant variables can lead to inefficient estimators increasing the variance of the remaining estimators. However, if a variable had the correct sign and was sometimes significant and sometimes not in different specifications it was retained to avoid the risk of omitted variable bias.

C. TCM RESULTS FOR DEER HUNTING

South Dakota Deer Hunting –TCM Results

As can be seen in Table 26 the average number of trips to the county that respondents hunted in most frequently is about 4. A typical trip costs $119.76 in terms of gas and lodging (if any). While the average travel time was over two hours, the half of the hunters had travel times of an hour or less. About one-third of hunters belonged to a hunting organization. Their household income average $75,525. South Dakota deer hunters were quite successful this year, with 85% getting one, or more deer.

Table 26 Descriptive Statistics for Sample of South Dakota Deer Hunters

	CNTY_TRPS	*TGASLODGETRIP*	*TRAV_TIME*	*HUNT_ORG*	*INCOME*	*NUM_DEER HARVEST*
Mean	4.131313	$119.76	2.359239	0.329966	72.52525	0.851852
Median	2.000000	60.00000	1.000000	0.000000	50.00000	1.000000
Maximum	31.00000	3325.000	19.00000	1.000000	350.0000	4.000000
Minimum	1.000000	0.000000	0.000000	0.000000	15.00000	0.000000
Std. Dev.	5.154334	236.0842	3.404101	0.470994	58.81447	0.743170
Observations	297	297	297	297	297	297

Table 27 presents the results for the full sample of all South Dakota deer hunters who reported complete observations for the variables specified in the TCM.

Table 27. All Deer Hunting Trips in South Dakota

Dependent Variable: Deer hunting trips to county (CNTY_TRPS)
Method: Negative Binomial Count
Complete observations: 297

Variable	Coefficient	Std. Error	t-Statistic	Probability
Constant	1.532259	0.096254	15.91888	0.0000
TGASLODGETRIP	-0.002473	0.000623	-3.969395	0.0001
TRAV_TIME	-0.111107	0.028629	-3.880870	0.0001
HUNT_ORG	0.098380	0.117007	0.840806	0.4005
INCOME	0.001382	0.000799	1.730374	0.0836
NUM_Deer Harvest	0.131241	0.066585	1.971026	0.0487
		Overdispersion Parameter		
SHAPE:C(7)	-0.751511	0.120323	-6.245801	0.0000

R-squared: 0.187218	Mean dependent variable: 4.131313
Adjusted R-squared: 0.170402	S.D. dependent variable: 5.154334
S.E. of regression: 4.694684	
Log likelihood: -701.8854	Likelihood Ratio (LR) statistic: 718.0200
Restricted Log likelihood: -1060.895	Probability (LR statistic): 0.000000

Overall the results indicate five of the six variables are statistically significant at the 10% significance level (90% confidence level) or better. The number of white tailed deer harvested is statistically significant and positive indicating that, at least when the bag limit is not constraining hunter behavior, that higher hunting success leads to more trips being taken. About one-third of hunters did not harvest any deer, 56% harvested one deer and a small fraction of hunters reported harvesting two, three and even four deer. Thus increasing harvest has a positive effects on trips, meaning that there is an increase in hunting value to additional harvest.

The absence of CRP and Travel Cost*CRP variables reflects the fact these variables were not statistically significant (p values of 0.29 and 0.52, quite far from the usual 0.1(10%) or 0.05 (5%)). This indicates that if there are differences between hunts/hunters on CRP land and those not, this cannot be captured solely in a shift variable or travel cost interaction variable. As a result we estimated a separate TCM model for hunters hunting on CRP lands. Unfortunately, for the state of South Dakota this is a small subset of the sample at just 52. These results are presented in Table 28.

Table 28. South Dakota CRP Deer Hunters Only

Dependent Variable: CNTY_TRPS
Method: ML - Negative Binomial Count
Complete observations: 52

Variable	Coefficient	Std. Error	t-Statistic	Probability
Constant	1.770434	0.227919	7.767811	0.0000
TGASLODGETRIP	-0.003054	0.001310	-2.331992	0.0197
TRAV_TIME	-0.071230	0.056475	-1.261269	0.2072
HUNT_ORG	-0.085525	0.261244	-0.327378	0.7434
INCOME	0.000694	0.001660	0.417923	0.6760
NUM_Deer Harvest	0.069125	0.146961	0.470362	0.6381
		Overdispersion Parameter		
SHAPE:C(7)	-0.895729	0.300150	-2.984270	0.0028

R-squared: 0.196414	Mean dependent variable: 4.134615
Adjusted R-squared: 0.089269	S.D. dependent variable: 5.118321
S.E. of regression: 4.884527	
Log likelihood: -121.1377	Likelihood Ratio (LR) statistic: 118.8870
Restricted Log likelihood: -180.5812	Probability (LR statistic): 0.000000

Despite the small sample, the trip travel cost variable (TGASLODGETRIP) has a statistically significant coefficient at the 5% level. This will allow us to calculate a net WTP or consumer surplus for CRP land hunts. Despite the other slope coefficients not being significant, collectively this set of independent variables as a group result in an overall model that is statistically significant (as evidenced by the Probability of the Likelihood Ratio Statistic being significant at the 1% level).

North Dakota Deer Hunting – TCM Results

Table 29 presents the basic descriptive statistics used in the ND deer hunting trips.

Table 29. Descriptive Statistics for Sample of Deer North Dakota Hunters

	CNTY_TRPS	***TGASLODGETRIP***	***TRAV_TIME***	***INCOME***
Mean	4.003731	131.4366	2.442399	77.44403
Median	2.000000	72.50000	1.250000	50.00000
Maximum	31.00000	2100.000	19.00000	350.0000
Minimum	1.000000	0.000000	0.000000	15.00000
Std. Dev.	5.157808	198.2634	3.060834	70.09956
Observations	268	268	268	268

Table 30 presents the TCM model for North Dakota deer hunting trips throughout the state. The travel cost coefficient is highly significant as is travel time. North Dakota deer hunting trips appear to be an income normal good where the number of trips increases with income. Deer hunter harvest was not statistically significant and therefore omitted. This may be due to the bag constraint that limits hunter take, and hence hunter trips.

Table 30. All Deer Hunting Trips in North Dakota

Dependent Variable: Deer hunting trips to county (CNTY_TRPS)
Method: Negative Binomial Count
Complete observations: 268 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Probability
Constant	1.657237	0.088203	18.78900	0.0000
TGASLODGETRIP	-0.003002	0.000565	-5.311119	0.0000
TRAV_TIME	-0.103743	0.027046	-3.835738	0.0001
INCOME	0.002099	0.000676	3.105020	0.0019
Overdispersion Parameter				
SHAPE:	-0.868994	0.130722	-6.647665	0.0000

R-squared: 0.208272	Mean dependent variable: 4.003731
Adjusted R-squared: 0.196231	S.D. dependent variable: 5.157808
S.E. of regression: 4.624139	
Log likelihood: -616.2133	Likelihood Ratio (LR) statistic: 645.2263
Restr. log likelihood: -938.8264	Probability (LR statistic): 0.000000

Table 31 presents the TCM model for ND deer hunting trips taken by hunters who stated they hunted on CRP lands. The same pattern of results as with the full state results is evident here: the travel cost coefficient is highly significant as is travel time. ND deer hunting trips appear to be an income normal good where the number of trips increases with income. Deer hunter harvest was not statistically significant and therefore omitted. This may be due to the bag constraint that limits hunter take, and hence hunter trips.

Table 31. North Dakota CRP Deer Hunters Only

Dependent Variable: Deer hunting trips to county (CNTY_TRPS)
Method: Negative Binomial Count
Complete observations: 93

Variable	Coefficient	Std. Error	t-Statistic	Probability
Constant	1.683312	0.135474	12.42534	0.0000
TGASLODGETRIP	-0.003501	0.000840	-4.167401	0.0000
TRAV_TIME	-0.106147	0.039078	-2.716312	0.0066
INCOME	0.002656	0.001082	2.455489	0.0141
Overdispersion Parameter				
SHAPE:	-1.475477	0.289033	-5.104870	0.0000

R-squared: 0.344133	Mean dependent variable: 3.806452
Adjusted R-squared: 0.314321	S.D. dependent variable: 4.482473

S.E. of regression: 3.711746	
Log likelihood: -197.7251	Likelihood Ratio (LR) statistic: 184.5587
Restr. log likelihood: -290.0044	Probability (LR statistic): 0.000000

WTP/Consumer Surplus Benefit Estimates For Deer Hunting

Calculation of WTP/Consumer Surplus Benefit Estimates from TCM

In order to calculate how much more a hunter would pay to hunt their particular target species using the TCM depends on the functional form of the demand equation. Since the consumer surplus is the area below the demand curve and above the trip cost paid until the vertical axis of the demand curve, it would normally involve integrating the demand function between these two points. However, with our semi-log demand function, this integration simplifies to taking the reciprocal of the trip cost coefficient times the number of trips taken (Creel and Loomis, 1990):

WTP or Consumer Surplus/trip= $1/\beta_{TC}$

Where β_{TC} is the coefficient on Trip Cost

Calculating the 90% confidence intervals on the consumer surplus per trip involves adding and subtracting 1.645 standard errors on the β_{TC} coefficient.

Table 32 presents the results of consumer surplus per trip and the respective confidence intervals for North Dakota and South Dakota deer hunting. The row labeled All Trips are all hunting trips in North and South Dakota. The row labeled CRP trips is just deer hunting trips taken on CRP lands (as reported by the hunters).

Table 32. Hunter Consumer Surplus for North and South Dakota Deer Hunting Trips

North Dakota	**CS/Trip**	**Upper CI**	**Lower CI**	**CS/day**	**Upper CI**	**Lower CI**
All Trips	$333	$254	$482	$129	$98	$186
CRP trips	$286	$205	$472	$103	$74	$170
South Dakota	**CS/Trip**	**Upper CI**	**Lower CI**	**CS/day**	**Upper CI**	**Lower CI**
All Trips	$404	$286	$691	$164	$116	$281
CRP trips	$327	$192	$1,112	$133	$78	$452

As is evident from Table 32, the economic value of deer hunting to the hunters themselves are substantial in these two states. The per day values indicate a deer hunter would pay upwards of a hundred dollars *more* per trip than their trip costs to hunt deer in the respective states. Values of hunting on CRP lands are somewhat lower than the All Trip averages, in both North and South Dakota. (The very large confidence intervals on the CRP trips in South Dakota is a result of the very small sample size (only 52)of hunters who reported they hunted on CRP lands).

The comparability of the values per trip are hard to judge since most of the literature is expressed in values per day. The literature on deer hunting on a per day suggests, the values per day are somewhat higher than the average of other intermountain states, but well within the upper level of the range of deer hunting values found there (see Loomis and Richardson, 2007).

Seasonal hunting benefits per deer hunter are calculated taking the average value per trip times the number of trips reported by deer hunters. In South Dakota the average number of trips per season by deer

hunters is 3.98, so seasonal benefits are $1,608. In North Dakota hunters take an average of 3.73 trips per season, so seasonal benefits are $1,242.

Expansion of Sampled Deer Hunter Benefits to Statewide Deer Hunter Benefits

In South Dakota, information from Game, Fish and Parks indicates there were 54,720 deer hunters. Applying the per seasonal benefits per South Dakota deer hunter yields a total annual hunting value of $88 million. **Based on our survey, about 23% of South Dakota deer hunters hunted on CRP lands. Therefore about $ 20 million of deer hunting benefits in South Dakota are associated with CRP lands.**

In North Dakota, Game and Fish indicates there are 52,304 deer hunters. Thus, applying the per seasonal benefit per deer hunter in ND to the 52,304 deer hunters yields an annual benefit of $65 million. **Based on our survey, about 42% of North Dakota deer hunters hunted on CRP lands. Therefore about $27 million of deer hunting benefits in North Dakota are associated with CRP lands.**

How Trips Change with a Reduction in CRP Land

As noted in the chapter on Income and Employment, hunters were asked in the survey how they would change their hunting trips with a 50% reduction in CRP lands in South Dakota and a 50% reduction in CRP lands in North Dakota. As described in that chapter, there would be a 7% reduction in South Dakota and a 12% reduction in North Dakota. Applying those reductions to the WTP benefits of deer hunting in South Dakota and North Dakota results in a $6 million loss and $8 million in deer hunting benefits, respectively, with a 50% loss in CRP lands.

D. TCM RESULTS FOR UPLAND GAME BIRD HUNTING

North Dakota Upland Game Bird Hunting – TCM Results

Table 33 presents the TCM results for ND upland game bird hunting. As can be seen in this table all the coefficients, with one exception are statistically significant at the 90% confidence level or higher. The negative sign on the travel cost coefficient (TGASLODGETRIP) is statistically significant at the 99% level. The two other highly significant coefficients are for number of pheasant and number of grouse harvested. Thus, the quality of the hunt has a positive effect on the number of trips taken.

Table 33. All Upland Game Bird Hunting Trips in North Dakota

Dependent Variable: Upland game bird hunting trips to county (CNTY_TRPS)
Method: Negative Binomial Count
Complete observations: 196

Variable	Coefficient	Std. Error	t-Statistic	Probability
Constant	1.028070	0.095389	10.77761	0.0000
TGASLODGETRIP	-0.002010	0.000344	-5.844139	0.0000
TRAV_TIME	-0.012769	0.010409	-1.226673	0.2199
PHEASANT HVST	0.033561	0.004848	6.922397	0.0000
GROUSE HVST	0.046098	0.015711	2.934074	0.0033
		Overdispersion Parameter		
SHAPE:	-1.671809	0.225015	-7.429754	0.0000

R-squared: 0.045289	Mean dependent variable: 3.285714
Adjusted R-squared: 0.020165	S.D. dependent variable: 4.420233
S.E. of regression: 4.375440	
Log likelihood: -382.2926	Likelihood Ratio (LR) statistic: 395.3146
Restricted log likelihood: -579.9499	Probability (LR statistic): 0.000000

PHEASANT HVST is number of pheasants harvested by the hunter
GROUSE HVST is the number of grouse harvested by the hunter

Table 34 presents the results for ND upland game bird hunters who hunted on CRP land. Several things are worth noting. While the same pattern of statistical significance for the coefficients is apparent the goodness of fit (R square) is much higher for the CRP only hunters than for the model including all hunters. In addition, on average, CRP hunters take about a half a trip more per season than all upland game bird hunters. However, a comparison of the magnitude of the travel cost coefficient shows a great deal of similarity. As will be shown below, this results in near identical values per hunter day between the two groups.

Table 34. North Dakota CRP Upland Game Bird Hunters Only

Dependent Variable: Upland game bird hunting trips to county (CNTY_TRPS)
Method: Negative Binomial Count
Complete observations: 109

Variable	Coefficient	Std. Error	t-Statistic	Probability
Constant	1.252579	0.138696	9.031138	0.0000
TGASLODGETRIP	-0.002082	0.000410	-5.073096	0.0000
TRAV_TIME	-0.014268	0.012337	-1.156544	0.2475
PHEAS HVST	0.021648	0.006322	3.424493	0.0006
GROUSE HVST	0.060555	0.016880	3.587303	0.0003
		Overdispersion Parameter		
SHAPE:	-1.769450	0.307957	-5.745768	0.0000

R-squared: 0.456263
Adjusted R-squared: 0.429868
S.E. of regression: 3.856015
Mean dependent variable: 3.706422
S.D. dependent variable: 5.106827

Log likelihood: -217.5089
Restricted log likelihood: -356.8288
Likelihood Ratio (LR) statistic: 278.6399
Probability (LR statistic): 0.000000

PHEASANT HVST is number of pheasants harvested by the hunter
GROUSE HVST is the number of grouse harvested by the hunter

South Dakota Upland Game Bird Hunting – TCM Results

Table 35 presents the result of the SD upland game bird hunting TCM. The travel cost coefficient (TGASLODGETRIP) is statistically significant at the 99% level, as is the coefficient on number of pheasants harvested. Thus the higher pheasant harvest, the more trips are taken. The number of grouse and partridge had no significant effect on the number of trips. The explanatory power (as judged by the R square) is reasonably good for individual level cross The test whether CRP hunters take more trips or have a significantly different travel cost coefficient found no statistically significant difference for either of the coefficients. Thus number of trips and consumer surplus per day are not statistically different between those that hunted on CRP lands and those section data. that did not in South Dakota.

Table 35. All Upland Game Bird Hunting Trips in South Dakota

Dependent Variable: Upland game bird hunting trips to county (CNTY_TRPS)
Method: Negative Binomial Count
Complete observations: 253

Variable	Coefficient	Std. Error	t-Statistic	Probability
Constant	1.346624	0.115689	11.64005	0.0000
TGASLODGETRIP	-0.000904	0.000220	-4.113713	0.0000
TRAV_TIME	-0.060894	0.011939	-5.100272	0.0000
INCOME	-0.001230	0.000688	-1.788377	0.0737
PHEASANT HVST	0.026062	0.004972	5.241524	0.0000
		Overdispersion Parameter		
SHAPE:	-1.143749	0.165852	-6.896206	0.0000

R-squared: 0.328431	Mean dependent variable: 2.604743
Adjusted R-squared: 0.314836	S.D. dependent variable: 4.228810
S.E. of regression: 3.500381	
Log likelihood: -467.5810	Likelihood Ratio (LR) statistic: 512.8360
Restricted log likelihood: -723.9990	Probability (LR statistic): 0.000000

PHEASANT HVST is number of pheasants harvested by the hunter

WTP/Consumer Surplus Benefit Estimates for Upland Game Bird Hunting

Calculation of WTP/Consumer Surplus Benefit Estimates from TCM

To calculate how much more a hunter would pay to hunt their particular target species from the TCM depends on the functional form of the demand function. Since the consumer surplus is the area below the demand curve above the trip cost paid until the vertical axis of the demand curve, it would normally involve integrating the demand function between these two points. However, with our semi-log demand function, this integration simplifies to taking the reciprocal of the trip cost coefficient times the number of trips taken (Creel and Loomis, 1990):

WTP or Consumer Surplus/trip= $1/\beta_{TC}$

Where β_{TC} is the coefficient on Trip Cost

Calculating the 90% confidence intervals on the consumer surplus per trip involves adding and subtracting 1.645 standard errors on the β_{TC} coefficient.

Table 36 presents the results of consumer surplus per trip and the respective confidence intervals for North Dakota and South Dakota upland game bird hunting. The row labeled All Trips are all hunting trips in North and South Dakota. The row labeled CRP trips is just upland game bird hunting trips taken on CRP lands (as reported by the hunters).

Table 36. Consumer Surplus for North and South Dakota Upland Game Bird Hunting Trips

North Dakota	CS/Trip	Upper CI	Lower CI	CS/day	Upper CI	Lower CI
All Trips	$498	$692	$388	$138	$192	$108
CRP trips	$480	$710	$363	$133	$197	$101
South Dakota	**CS/Trip**	**Upper CI**	**Lower CI**	**CS/day**	**Upper CI**	**Lower CI**
All Trips	$1106	$1845	$790	$317	$529	$226
CRP trips	N/A	N/A	N/A	N/A	N/A	N/A

The comparability of the values per trip are hard to judge since most of the literature is expressed in values per day. The literature on upland game bird hunting on a per day suggests, the values per day are significantly higher than the average of other intermountain states. Nonetheless the North Dakota values are on a par with valuation studies in Pacific Coast states (CA, OR, WA) and the Southeastern U.S. (Loomis and Richardson, 2007). The values in South Dakota are at the upper limit of what has been found in the literature for the intermountain states and Pacific Coast states.

Expansion of Sampled Hunter Benefits to Statewide Upland Game Hunter Benefits

In South Dakota, information from Game, Fish and Parks indicates there were 166,725 resident and non-resident small game hunters. Applying the per season benefits per South Dakota upland game bird hunter yields a total annual hunting value of $488.7 million in benefits to the hunters themselves. **Based on our survey, about 56% of South Dakota upland game bird hunters hunted on CRP lands. Therefore about $234 million of upland game hunting benefits in South Dakota are associated with CRP lands.**

In North Dakota, Game and Fish indicates there are 80,054 resident and non-resident upland game hunters. Thus, applying the per season benefit per upland game bird hunter in ND to the 80,054 upland game hunters yields an annual benefit of $133 million annually in benefits to the hunters themselves. **Based on our survey about 69% of North Dakota upland game bird hunters hunt on CRP land, so about $92 million of the North Dakota upland game hunting benefits are associated with hunters using CRP land.**

How Upland Game Bird Hunting Trips and Benefits Change with a Reduction in CRP Land

As noted in the Chapter II on Income and Employment, hunters were asked in the survey how they would change their hunting trips with a 50% reduction in CRP lands in South Dakota and a 50% reduction in CRP lands in North Dakota. As described in that chapter, there would be a 20% reduction in upland game bird hunting trips South Dakota and a 24% reduction in upland game bird hunting trips in North Dakota. Applying those reductions to the WTP benefits of hunting in South Dakota and North Dakota indicates that a 50% reduction in CRP lands would result in an estimated reduction of about a $97.74 million in small game hunting benefits in South Dakota, and a $32 million reduction in small game hunting benefits in North Dakota.

E. TCM Results for Waterfowl Hunting

North Dakota Waterfowl Hunting – TCM Results

Table 37 presents the results of the ND waterfowl hunting TCM model. The travel cost coefficient (TGASLODGETRIP), number of geese harvested and number of ducks harvested all have a statistically significant effect on the number of trips taken. Including an intercept shifter variable for whether the hunter hunted on CRP lands is positive and statistically significant, indicating these hunters took more trips than hunters that did not hunt on CRP lands. The interaction term between hunting on CRP and the travel cost coefficient is statistically significant, indicating a differential price slope of the demand curve for CRP hunters. However, the combined effect of the TGASLODGETRIP plus the TGASLODGECRP coefficients for CRP hunters increases absolute value of the travel cost coefficient resulting a lower consumer surplus per trip for hunters hunting on CRP land. The magnitude of the difference will be presented when the consumer surplus results are provided below.

Table 37. All Waterfowl Hunting Trips in North Dakota

Dependent Variable: Waterfowl hunting trips to county (CNTY_TRPS)
Method: Negative Binomial Count
Complete observations: 180

Variable	Coefficient	Std. Error	t-Statistic	Probability
Constant	1.035936	0.156153	6.634119	0.0000
TGASLODGETRIP	-0.001442	0.000302	-4.771156	0.0000
TRAV_TIME	-0.017753	0.011555	-1.536396	0.1244
INCOME	-0.000409	0.000758	-0.539920	0.5893
DUCK HVST	0.013907	0.003955	3.516520	0.0004
GEESE HVST	0.015709	0.006288	2.498214	0.0125
CRP_HUNT	0.446195	0.200432	2.226167	0.0260
TGASLODGECRP	-0.001589	0.000747	-2.127448	0.0334
		Overdispersion Parameter		
SHAPE:	-1.670042	0.281391	-5.934944	0.0000

R-squared: 0.448224	Mean dependent variable: 2.511111
Adjusted R-squared: 0.422410	S.D. dependent variable: 3.282745
S.E. of regression: 2.494865	
Log likelihood: -320.4656	Likelihood Ratio (LR) statistic: 264.7682
Restricted log likelihood: -452.8497	Probability (LR statistic): 0.000000

DUCK HVST is the number of ducks harvested by the hunter
GEESE HVST is the number of geese harvested by the hunter

South Dakota Waterfowl Hunting - TCM Results

Table 38 presents the results of the SD waterfowl hunting TCM model. The travel cost coefficient (TGASLODGETRIP) is statistically significant at the 99% confidence level as are the coefficients on number of ducks and number of geese harvested. Thus as travel costs increase, trips are reduced (i.e., the law of demand holds) and as duck and geese hunting success improves, more trips are taken per season. This model has a very high explanatory power with about 60% of the variation in trips taken explained by the five independent variables.

Table 38. All Waterfowl Hunting Trips in South Dakota

Dependent Variable: xxx hunting trips to county (CNTY_TRPS)
Method: Negative Binomial Count
Complete observations: 181

Variable	Coefficient	Std. Error	t-Statistic	Probability
Constant	1.409956	0.101405	13.90414	0.0000
TGASLODGETRIP	-0.002531	0.000417	-6.065327	0.0000
TRAV_TIME	-0.029986	0.014448	-2.075376	0.0380
INCOME	-0.001280	0.000727	-1.760967	0.0782
DUCK HVST	0.025383	0.003239	7.837509	0.0000
GEESE HVST	0.018579	0.002732	6.800462	0.0000
		Overdispersion Parameter		
SHAPE:	-1.624400	0.213874	-7.595113	0.0000

R-squared: 0.601149	Mean dependent variable: 5.033149
Adjusted R-squared: 0.587396	S.D. dependent variable: 6.600421
S.E. of regression: 4.239732	
Log likelihood: -402.3917	Likelihood Ratio (LR) statistic: 739.8947
Restricted log likelihood: -772.3390	Probability (LR statistic): 0.000000

DUCK HVST is the number of ducks harvested by the hunter
GEESE HVST is the number of geese harvested by the hunter

We tested for differences between South Dakota CRP waterfowl hunters and all South Dakota waterfowl hunters and found no statistical difference in terms of an intercept shifter variable nor for the price slope of the demand curve. So consumer surplus will be calculated for all SD waterfowl hunters as a group.

WTP/Consumer Surplus Benefit Estimates for Waterfowl Hunting

Calculation of WTP/Consumer Surplus Benefit Estimates from TCM

To calculate how much more a hunter would pay to hunt their particular target species from the TCM depends on the functional form of the demand equation. Since the consumer surplus is the area below the demand curve and above the trip cost paid until the vertical axis of the demand curve, it would normally involve integrating the demand function between these two points. However, with our semi-log demand function, this integration simplifies to taking the reciprocal of the trip cost coefficient times the number of trips taken (Creel and Loomis, 1990):

WTP or Consumer Surplus/trip= $1/\beta_{TC}$

Where β_{TC} is the coefficient on Trip Cost

The 90% confidence intervals on the consumer surplus per trip involves adding and subtracting 1.645 standard errors on the β_{TC} coefficient.

Table 39 presents the results of consumer surplus per trip and per day along with the respective confidence intervals for North Dakota and South Dakota waterfowl hunting. The row labeled All Trips are all hunting trips in North and South Dakota. The row labeled CRP trips is just upland game bird hunting trips taken on CRP lands (as reported by the hunters).

Table 39. Consumer Surplus for North and South Dakota Waterfowl Hunting Trips

North Dakota						
	CS/Trip	**Upper CI**	**Lower CI**	**CS/day**	**Upper CI**	**Lower CI**
All Trips	$693	$1058	$516	$159	$242	$118
CRP trips	$330	N/A	N/A	$75	N/A	N/A
South Dakota						
	CS/Trip	**Upper CI**	**Lower CI**	**CS/day**	**Upper CI**	**Lower CI**
All Trips	$395	$542	$311	$124	$170	$97
CRP trips	N/A	N/A	N/A	N/A	N/A	N/A

While it is difficult to compare the values per trip from this study to the literature because of the variation in the number of days hunted per trip, the values per day are available in the literature. The values in North Dakota and South Dakota in Table 39 are significantly higher than the averages for the other waterfowl studies across the U.S. (Loomis and Richardson, 2007). However, values from this study are within the upper values of studies found in the literature.

Expansion of Sampled Waterfowl Hunter Benefits to Statewide Waterfowl Hunter Benefits

In South Dakota, information from Game, Fish and Parks indicates there were 37,141 waterfowl hunters. Applying the per season benefits of $1,936 per South Dakota waterfowl hunter yields a total annual waterfowl hunting value of $72 million to the waterfowl hunters themselves. Our survey indicates 21% of waterfowl hunters hunt on CRP lands in South Dakota. This suggests that $15 million of waterfowl hunting benefits are associated with CRP lands in South Dakota.

In North Dakota, Game and Fish indicates there are 44,618 waterfowl hunters. Thus, applying the per season benefit of $1900 per waterfowl hunter in ND to the 44,618 waterfowl hunters yields an annual benefit of $85 million in annual benefits to the hunters themselves. Our survey indicates 23% of waterfowl hunters hunt on CRP lands in North Dakota. This suggests that $19.5 million of waterfowl hunting benefits are associated with CRP lands in North Dakota.

How Trips Change with a Reduction in CRP Land

As noted in the chapter on Income and Employment, hunters were asked in the survey how they would change their hunting trips with a 50% reduction in CRP lands in South Dakota and a 50% reduction in CRP lands in North Dakota. As described in that chapter, there would be a 17.3% reduction in South Dakota and a 17.6% reduction in waterfowl hunting trips in North Dakota. Applying those reductions to the WTP benefits of hunting in South Dakota and North Dakota results in a reduction in waterfowl hunting benefit estimates of $12.5 and $14.5 million, respectively.

CHAPTER IV: CONCLUSION

Hunting is an economically important activity in North and South Dakota. Non-resident hunters bring in new money from outside the two states that support a total of 2,197 jobs in both states. CRP lands in total support 1,118 of those jobs. A 50% reduction in CRP lands would reduce the total number of jobs by 440.

The economic benefits to the resident and non-resident hunters themselves in the two states amounts to $932 million annually. Of this total $448 is supported by CRP lands in the two states. If there were a 50% reduction in CRP lands in the two states, benefits to hunters would fall by $172 million annually.

This information should prove useful to USDA economists, policy makers, administration officials and congressional representatives as they debate efforts to continue and enhance CRP lands. While there are certainly costs to the American taxpayers of the CRP program, the economic benefits to the states with significant CRP land, and too upland game bird, waterfowl and deer hunters in just two states are sizeable. Similar studies in the other states with significant CRP acreage would no doubt show economic impacts and benefits of the similar magnitudes.

REFERENCES

Creel, M. and J. Loomis. 1990. Theoretical and Empirical Advantages of Truncated Count Data Estimators for Analysis of Deer Hunting in California. *American Journal of Agricultural Economics*, Volume 72(2): 434-441.

Loomis, J. and R. Walsh. 1997. Recreation Economic Decisions: Comparing Benefits and Costs, 2nd Edition, Venture Publishing, State College, PA .

Loomis, J. and L. Richardson. 2007. Benefit Transfer and Visitor Use Estimating Models for Wildlife Recreation, Species and Habitats. Dept. of Agricultural and Resource Economics, Colorado State University, Fort Collins, CO. http://dare.agsci.colostate.edu/outreach/tools/#BTT

Stynes, Daniel. 1999. *Approaches to Estimating the Economic Impacts of Tourism; Some Examples.* Michigan State University. https://www.msu.edu/course/prr/840/econimpact/pdf/ecimpvol2.pdf.

U.S. Water Resources Council. 1983. Economic and Environmental Principles and Guidelines for Water and Related Land Resource Implantation Studies. U.S. Government Printing Office, Washington DC.

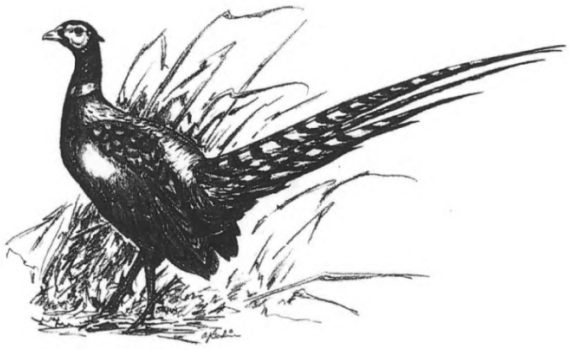
Watson, P., Wilson, J., Thilmany, D., & Winter, S. (2007). Determining Economic Contributions and Impacts: What is the Difference and why do we Care? *The Journal of Regional Analysis and Policy*, 37(2), 1-15.

APPENDIX A. EXAMPLE SURVEY

OMB No. 0560-0282
Approval Expires: 07/31/2017

UPLAND BIRD HUNTING IN SOUTH DAKOTA

A survey of individuals who hunted upland birds in South Dakota in the 2014/2015 season



A study conducted by the U.S. Department of Agriculture Farm Service Agency, being carried out by Colorado State University. This survey is conducted under authorities provided by Food Security Act of 1985 (Pub. L. 99–198), as amended.

Under Title 7 of the U.S. Code and CIPSEA (Public Law 107-347), facts about your operation are kept **confidential** and used only for statistical purposes. Your help on this study is greatly appreciated!

Please return your completed questionnaire in the self-addressed pre-paid envelope included. Thanks!

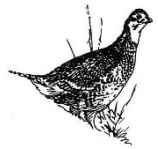
PUBLIC BURDEN STATEMENT

This voluntary survey contains information collections that are covered by the Office of Management and Budget clearance number 0560-0282, which expires 07/31/2017. The burden to the public for these voluntary information collections is estimated to average 15 minutes per response, including the time for reviewing instructions, gathering the data needed, and completing and submitting the information collection. Send comments regarding this burden estimate or any other aspect of these information collections, including suggestions for reducing the burden, to Skip Hyberg, Stop 0508, 1400 Independence Avenue, SW, Washington, DC 20250, or by email to skip.hyberg@wdc.usda.gov.

Colorado State University
Knowledge to Go Places

FSA
FARM SERVICE AGENCY

Department of Agriculture and Resource Economics
Colorado State University
Fort Collins, CO 80525
970-491-6325
John.Loomis@colostate.edu



I. YOUR 2014/2015 UPLAND BIRD HUNTING SEASON IN SD

You have been contacted because you purchased a upland bird hunting license in 2013. The information you provide will help the South Dakota Game, Fish & Parks Department, farmers/ranchers as well as U.S. Department of Agriculture Farm Service agency to improve hunting opportunities for you.

1. Did you hunt upland birds during the 2014/2015 hunting season in SD? Circle one:

   Yes (please continue with the survey)

   No (please return the uncompleted survey in the postage paid envelope***. Returning the envelope provides essential information even if you did not hunt***)

When we ask about your South Dakota **Hunting Season** in the following questions we mean just <u>your</u> upland bird hunting activity in early, regular and late seasons (pheasant, partridge, grouse, and other upland bird) combined during the 2014/2015 season.

When we talk about a **Hunting Trip**, we mean a trip taken for the primary purpose of hunting upland bird.

2. How many upland bird hunting trips did you make during this 2014/2015 Hunting Season?

   _____ # of Trips

3. In total, about how many days of upland bird hunting did you take this Hunting Season?

   _____# of Days

4. During the hunting season what percent of your time upland bird hunting was spent on:

Private Lands (including Walk-In Areas*) _____% Public Lands _____% Right of Ways_____% = 100%

*Walk-In Areas are privately owned acres with public hunting access.

5. ***If you did NOT hunt upland bird on Private Lands go to II. YOUR UPLAND HUNTING EXPERIENCE on page 2***.

IF you DID hunt upland bird on Private Lands please tell us about the type of lands you hunted. This will help farmers, ranchers, other landowners and SD Game, Fish & Parks better manage for upland birds.

5a. Percent of your time this hunting season spent upland bird hunting on each of the following land cover types:

Cropland ____% (Type(s)_____) Grassland_____ % Wetland/Buffer surrounding wetland_____% Other_____% = 100%

5b. Percent of your time this season spent upland bird hunting on private land enrolled in the state Walk-In Area Program? _____%

6. Did you hunt upland birds on lands enrolled in the Conservation Reserve Program (CRP)* lands during the 2014/2015 upland bird hunting season? (check one) ____Yes ____No ____Unsure

*CRP land typically resemble tracts of perennial grasses and/or wooded shelter belts occasionally with wetlands intermixed

If **No** or **Unsure** please go to Question #7.

If **Yes**,

6a. What percent of your time spent upland bird hunting this season was spent:
Directly on lands enrolled in CRP _____% Lands **adjacent** to CRP _____%

7. Is the availability of CRP lands an important factor in your decision of **where to hunt upland birds**? Circle one:

Not at all Important	Slightly Important	Important	Very Important	Extremely Important

8. Is the availability of CRP lands an important factor in the **quality of upland bird hunting** in the county you hunt most often? Circle one:

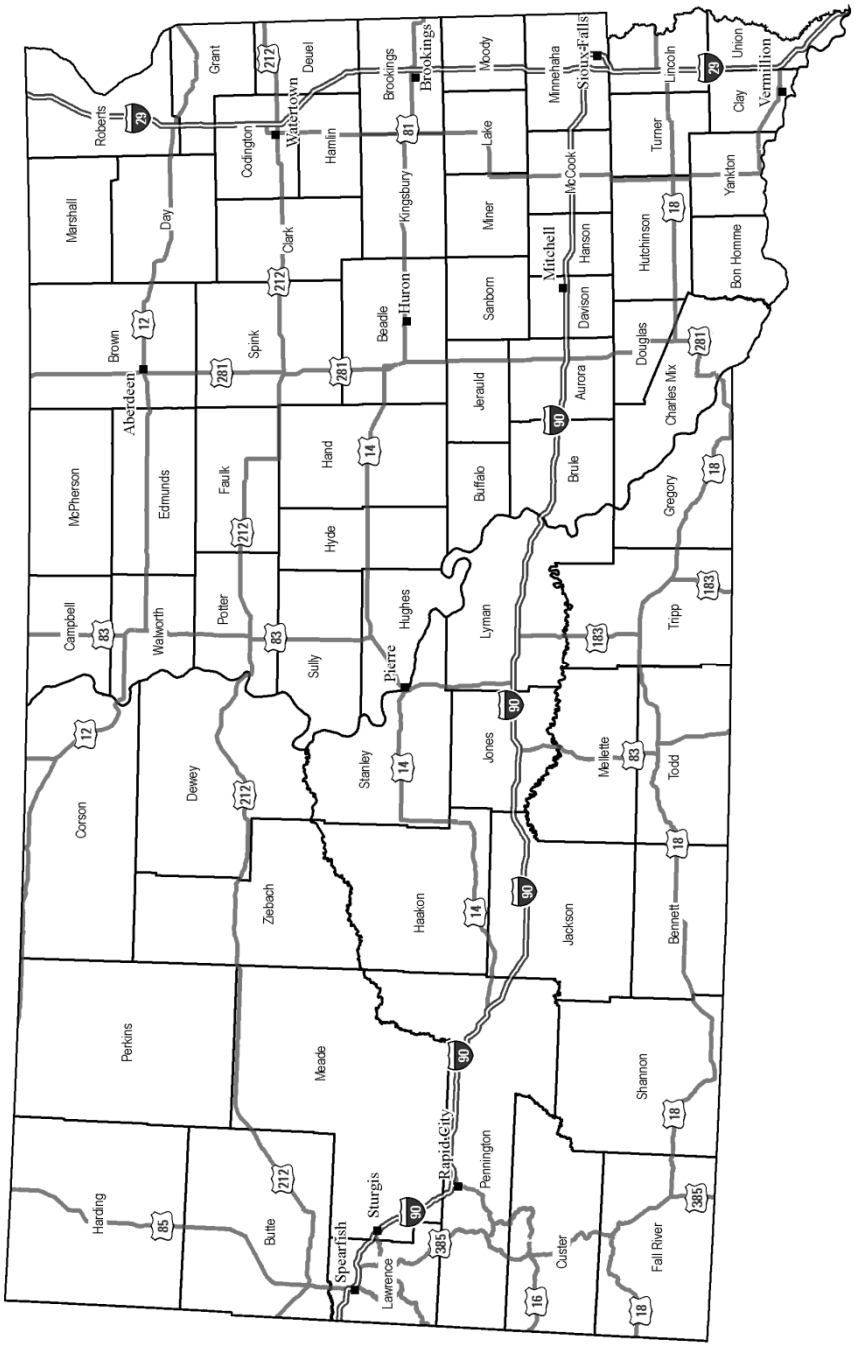
Not at all Important	Slightly Important	Important	Very Important	Extremely Important

II. YOUR UPLAND BIRD HUNTING EXPERIENCE

Please tell us what factors influence your decisions on how often you hunt upland birds.

Please circle one number for each item	**Would the following factors increase the amount of upland bird hunting you do in a season?**			
	No Change	Not Likely	Likely	Very Likely
1. More free time	1	2	3	4
2. Higher upland game bird populations/success rates	1	2	3	4
3. More areas to hunt & greater access	1	2	3	4
4. Less hunters & fewer crowds	1	2	3	4
5. Lower cost	1	2	3	4
6. Longer hunting seasons	1	2	3	4
7. Other reason (Please list)_____	1	2	3	4

PLEASE USE MAP FOR FOLLOWING QUESTIONS REGARDING HUNTING LOCATION.



III. YOUR TYPICAL UPLAND BIRD HUNTING TRIP IN SOUTH DAKOTA

A typical hunting trip is a trip to go upland bird hunting where you go most often.

1. In which county did you most frequently hunt upland birds in during the 2014/2015 season? (See map)

   County Name _____

In answering these next few questions, please answer with upland bird hunting trips to this county in mind.

2. How many **trips** did you take to this county to hunt upland birds? _____ # of trips
3. About how many **days** did you spend upland bird hunting on a typical trip? _____# of days per trip
4. How many of each major category of upland birds did you harvest throughout the course of the 2014/2015 season in this county?

   # of Pheasant _____ # of Grouse _____ # of Partridge _____ # of Other Upland bird _____

5. What is your one-way **travel time** from your home on a typical hunting trip? _____ # of hours
6. What is your one-way **travel distance** from your home on a typical hunting trip? _____ # of miles
7. On a typical trip to this county, how many hunters were in your party? _____ # of hunters.

In South Dakota, the number of acres enrolled in the Conservation Reserve Program (CRP) has declined by nearly 500,000 from 2007 to 2012; a 28 percent decline. Additional CRP acres are set to expire in the next few years, and if not re-enrolled, could be converted back to crop production.

8. If CRP acres were to decline by an additional 50% in the county you hunt most frequently, would you expect the number of hunting trips you take over the course of the season to this county to change in some way? Check one:

   ____No Change in Trips

   ____Yes, Fewer Trips ➔ _____# of fewer upland bird hunting trips each season

   ____Yes, More Trips ➔ _____# of additional upland bird hunting trips each season

IV. SEASONAL UPLAND BIRD HUNTING EXPENDITURES IN SOUTH DAKOTA

To understand the economic impact that hunting has on the state, it is important we have an idea of what you spent on upland bird hunting during the 2014/2015 hunting season **in the state of South Dakota ONLY.** Please estimate the expenditures you made for only for yourself, not for others.

	$ Spent in the County Where you Hunted Most Frequently	**$ Spent in Rest of State of South Dakota**
1. Gasoline/travel costs		
2. Restaurants/Bars/Taverns		
3. Grocery stores/liquor stores		
4. Rental Car		
5. Lodging		
6. Access/leasing fees		
7. Guns purchased for upland game hunting		
8. Ammunition		
9. Hunting License		
10. Taxidermy		
11. Repairs to equipment		
12. Special clothing and gear used for upland bird hunting		
13. Dog gear/vet care specifically for upland bird hunting		
14. Other? Please List: _____		

15. Were there any other items purchased out of state specifically for upland game bird hunting in South Dakota? (such as catalog, internet, out of state travel en route, etc.)

    Yes→ $_____ Please list item_____
    Yes→ $_____ Please list item_____
    Yes→ $_____ Please list item_____
    No

V. DEMOGRAPHIC INFORMATION

Please tell us a little something about yourself. These last few questions will help us in evaluating how well our sample represents hunters in the state. **Your answers will be kept strictly confidential and will only be used for the analysis of this study. Statistics will only be reported as an average of overall responses, and <u>you will not be identified in any way</u>.**

1. Are you? ☐ Male ☐ Female
2. In what year were you born? _____
3. Are you employed? ☐ Yes (Go to #3a.) ☐ No (Skip to #3d.)

   3a. Do you work part time or full time? ☐ Full-time ☐ Part-time

   3b. Do you take time off from work to participate in hunting? ☐ Yes ☐ No

   3c. How many weeks of paid vacation do you receive each year? # _____ of weeks (Go to #4.)

   3d. Are you retired? ☐ Yes ☐ No
4. What is the zip code in which you live? _____ County Name _____
5. Are you a member of a hunting or sportsman's organization? ☐ Yes ☐ No
6. Are you a member at a Private Hunting Club? ☐ Yes ☐ No

   6a. If you belong to a hunting club(s) or sportsman's organization(s) what is the sum of your <u>annual dues</u>? $_____ Annually
7. Your highest level of formal education completed? (Please circle one)

High School Or Less	**Associates Degree**	**College (B.S./B.A) or Technical School**	**Graduate or Professional School**

8. Was **your** own income from all sources (before taxes) last year?

☐ less than $19,999	☐ $20,000-$29,999	☐ $30,000-$39,999
☐ $40,000-$59,999	☐ $60,000-$79,999	☐ $80,000-$99,999
☐ $100,000-$149,999	☐ $150,000-$299,999	☐ more than $300,000

Thank you for completing the survey!
If you have any comments please write them on the back of the survey.
Please return in the postage paid return envelope we provided.

COMMENTS?

Please feel free to write any comments you have about wildlife management in SD. When you are finished, please place the survey in the postage paid return envelope and mail it back to us.

----------Fold Here----------

----------Fold Here----------

ID-SD-UPGB#

APPENDIX B. MAPPING OF HUNTER EXPENDITURES TO IMPLAN SECTOR

Table B1. Mapping of Survey Categories to IMPLAN Sectors	
SURVEY CATEGORY	***IMPLAN SECTOR***
Gasoline/travel costs	402: Retail - Gasoline stores
Restaurants/bars/taverns	501: Full-service restaurants
Grocery stores/Liquor stores	400: Retail - Food and beverage stores
Rental car	442: Automotive equipment rental and leasing
Lodging	499: Hotels and motels, including casino hotels
Ammunition	404: Retail - Sporting goods, hobby, musical instrument and book stores
Guns/Bows	404: Retail - Sporting goods, hobby, musical instrument and book stores
Hunting License	523: Other state government enterprises
Taxidermy	492: Independent artists, writers, and performers
Repairs to equipment	442: Automotive equipment rental and leasing
Special Clothing	404: Retail - Sporting goods, hobby, musical instrument and book stores
non-clothing gear	404: Retail - Sporting goods, hobby, musical instrument and book stores
Other	404: Retail - Sporting goods, hobby, musical instrument and book stores

Note that many of the hunter expenditures are retail expenditures, and as part of our analysis, retail expenditures need to be margined. The reason for this is related to the nature of retail purchases. Retail items are often manufactured outside the region, and the cost (producer price) to the retailer or wholesaler of the good itself will leak immediately out of the region's economy and cannot be considered a local impact. For example, when a hunter purchases a gun, that gun was likely purchased by the retailer from outside of the region. The margin, the difference between the price the retailer paid for the gun and the price the consumer paid for the gun, is the economic impact to the region. Thus, only the retail margin (or "markup") portion of the retail expenditure is used for our calculation.