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Resident and Nonresident Hunter and Angler Expenditures, Characteristics, and Economic Effects, North Dakota, 2017-2018

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Abstract

The purpose of this study was to estimate the economic effects of hunting and fishing activities during the 2017-2018 season on the North Dakota economy, and to compare current information to previous studies to identify trends in hunting and angling activities. A mail survey of 24,451 resident hunters and anglers and 7,914 nonresident hunters and anglers was conducted to solicit information on 19 hunting and fishing activities during the 2017-2018 season.

Total spending by hunters and anglers in North Dakota during the 2017-2018 season was estimated at $974.4 million, excluding purchases of licenses. Resident hunter and angler expenditures were estimated at $846.8 million, and nonresident hunter and angler expenditures were estimated at $127.6 million. Hunting expenditures were estimated at $186.6 million, and fishing expenditures were estimated at $787.8 million. Residents spent a total of $486.4 million in rural areas while nonresidents spent $89.6 million.

Total direct expenditures ($974.4 million) from hunting and fishing in North Dakota generated $1,139.1 million in secondary economic effects. Gross business volume (direct and secondary effects) of hunting and fishing in North Dakota was estimated at $2.1 billion. Hunting and fishing activities were estimated to generate $48.2 million in general state tax collections and support 3,263 full-time equivalent jobs throughout the state.

As a result of increased average per person spending in most hunting and fishing activities and increased number of participants in some activities, total spending in North Dakota increased by $267.3 million or 38 percent from 2011-12 to 2017-2018. Total spending by resident hunters and anglers increased by $290.2 million or 52 percent, while nonresident spending increased by $41.4 million or 48 percent over the period. Hunter expenditures adjusted for inflation decreased by $52.7 million or 22 percent decline, while angler expenditures increased by $320.0 million or 68 percent over the period. Gross business volume from all hunting and fishing activities increased by $595.9 million (39 percent) over the period.

Despite the loss of a substantial amount of wildlife habitat since the previous study (2011/2012), collective spending by hunters and anglers is larger than previous estimates and remains an economically important industry in North Dakota. Key observations from this study are that hunters are spending less money afield—primarily driven by fewer opportunities linked to large declines in deer populations—but collectively hunters are spending more on equipment and gear than observed in previous studies despite diminished in-state hunting opportunities. The number of anglers has increased substantially (both resident and nonresident) as well as the per-person spending on gear and equipment. The increase in fishing expenditures, both open water and ice fishing, has completely offset reductions in hunting expenditures.

Key Words: hunting, fishing, expenditures, economic effects, North Dakota

Highlights

The process of evaluating hunter and angler expenditures in North Dakota is now in its fourth decade. These studies not only measure the overall level of spending, but also collect data on how spending might be changing among the hunting and angling activities and within any particular activity. Data collection processes and evaluation methods have remained relatively unchanged allowing valid comparisons over time, and this consistency among studies boosts the confidence that the changes observed in this study accurately represent shifts hunter and angler spending.

The ND Game and Fish Department conducted a mail survey of licensed hunters and anglers in the state in 2017. A random sample of 24,451 resident hunters and anglers and 7,914 nonresident hunters and anglers was used to solicit information on characteristics and hunting and fishing expenditures. Hunting and fishing activities were divided into 19 different categories based on license type (i.e., resident, nonresident, gratis), game type (e.g., deer, turkey, small game), and, when applicable, by weapon type (i.e., archery, firearm, muzzleloader).

Average spending per resident participant varied substantially among the survey groups. Average season spending per day by fall turkey, resident deer (archery, firearm, gratis), and special big game hunters ranged from $77 to $170. Per person daily spending for resident furbearer, pronghorn, upland game, and waterfowl hunters ranged from $50.5 to $280.3. Nonresident archery and firearm deer hunters spent $202 and $243 per day, respectively. Resident special big game and waterfowl hunters had the highest season spending of any resident participant, $1,687 and $1,226, respectively. Nonresident archery deer hunters and small game hunters had the highest spending for any nonresident participant, $1,332 and $1,248, respectively.

The average resident open water angler spent $4,344 per year, compared to nonresident anglers who spent $1,239 per year. Participants in darkhouse spearing averaged $670 per season in total expenditures.

Total spending by hunters and anglers in North Dakota during the 2017-2018 season was estimated at $974.4 million, excluding purchases of licenses. Resident hunter and angler expenditures were estimated at $846.8 million and nonresident hunter and angler expenditures were estimated at $127.6 million. Expenditures from hunting were estimated at $186.6 million and expenditures from fishing were estimated at $787.8 million.

Small game hunting accounted for 39 percent ($52.5 million) of all resident hunter expenditures. Deer and furbearer hunting accounted for 37 percent ($50.2 million) and 21 percent ($28.6 million) of all resident hunter expenditures, respectively. Special big game and turkey hunting collectively accounted for about 2 percent of all resident hunter expenditures. Nonresident small game hunting expenditure were valued at $46.8 million accounting for 89 percent of all nonresident hunting expenditures. Furbearer and archery deer hunting represented 11 percent of nonresident hunting expenditures. Resident open water fishing expenditures were estimated at $626.9 million, representing over 88 percent of total resident angler spending. Expenditures for open water fishing by nonresidents were estimated at $75.3 million.

Total direct expenditures ($974.4 million) from hunting and fishing in North Dakota generated $1,139.1 million in secondary economic effects. Gross business volume (direct and

secondary effects) of hunting and fishing in North Dakota was estimated at $2.1 billion. Hunting and fishing activities generated $48.2 million in general state tax collections and supported 3,263 full-time equivalent jobs throughout the state.

Total spending in rural areas (i.e., towns less than 2,500 in population) by residents was estimated at $486.4 million while nonresidents contributed $89.6 million. Total spending by residents and nonresidents were comparable for similar activities; however, nonresidents generally spent fewer days hunting in the state, and as a result, daily expenditures were slightly higher for nonresidents relative to residents. Average daily expenditures for nonresidents were higher for lodging, meals, and other day-to-day expenses, while residents had higher average daily expenses for gear-related items (equipment, clothing, weapons) and other services (i.e., meat processing, repairs, veterinarian care, taxidermy).

Total spending in North Dakota increased by $267.3 million or 38 percent from 2011-2012 to 2017-2018. Resident hunter and angler spending increased by $290.2 million or 52 percent, while nonresident spending increased by $41.4 million or 48 percent over the period. Hunter expenditures adjusted for inflation decreased by $52.7 million or a 22 percent decline, while angler expenditures increased by $320.1 million or 68 percent over the period. Gross business volume from all hunting and fishing activities increased by $595.9 million (39 percent) over the period.

Despite the loss of a substantial amount of wildlife habitat since the previous study (2011/2012), collective spending by hunters and anglers is larger than previous estimates and remains an economically important industry in North Dakota. Key observations from this study are that hunters are spending less money afield—primarily driven by fewer opportunities linked to large declines in deer populations—but collectively hunters are spending more on equipment and gear than observed in previous studies even while in-state hunting opportunities have diminished.

Fishing in the state has always been a popular outdoor activity. The season is long, and popularity is high, leading to a considerable amount of spending in the state. The number of anglers has increased substantially (both resident and nonresident) as well as the per-person spending on gear and equipment. The increase in fishing expenditures, both open water and ice fishing, has completely offset reductions in hunting expenditures.

Resident and Nonresident Hunter and Angler Expenditures, Characteristics, and Economic Effects, North Dakota, 2017-2018

Elvis Ndembe, Dean A. Bangsund and Nancy M. Hodur*

Introduction

A number of issues are currently confronting sportsmen, policymakers, businesses, wildlife groups, wildlife biologists, and landowners regarding wildlife management in North Dakota. Many of the issues pertain to balancing the demand for wildlife-related recreation arising from diverse interest groups. The demand for wildlife-related recreation must be balanced with the supply of wildlife-related resources. Policies, which affect either the demand or supply of wildlife-related resources, will affect those diverse interests within the state.

This study is a continuation of a series of studies that have periodically assessed various aspects of hunting and angling activities in North Dakota. Information on the characteristics, expenditures, and economic effects of hunters and anglers in North Dakota can provide insights on the impacts and trends associated with hunting and fishing in the state. While policy decisions affecting wildlife management should not be based solely on socio-economic information, this information can be useful in 1) understanding current hunter and angler characteristics in the state, 2) identifying trends in hunter and angler activities, and 3) evaluating the economic effects of alternative hunter/angler-management policies.

The first study sponsored by the ND Game and Fish Department to assess socio-economic information on hunters and anglers in North Dakota was conducted in 1976. That study only gathered information on nonresident hunters and anglers (Leitch and Scott 1978). Seven additional studies have been conducted since 1978 at approximately five- to ten-year intervals to assess socio-economic characteristics of both resident and nonresident hunters and anglers. Studies in 1981 and 1982 collected information on resident hunters and anglers (Kerestes and Leitch 1983, Leitch and Kerestes 1982). Another study conducted in 1983 collected information on nonresident hunters and anglers (Anderson and Leitch 1984). Baltezore et al. (1987) collected information on resident hunters and anglers in 1986. The 1991 study surveyed both resident and nonresident hunters and anglers (Baltezore and Leitch 1992). Lewis et al. (1998) again surveyed both resident and nonresident hunters and anglers in North Dakota in 1996. Bangsund and Leistritz (2003) studied spending by both resident and nonresident hunters and anglers in North Dakota during the 2001-2002 season. Taylor, Bangsund and Hodur (2011) studied spending by both resident and nonresident hunters and anglers in North Dakota during the 2011-2012 season.

The purpose of this study was to estimate the characteristics, expenditures, and economic effects of hunters and anglers in North Dakota during the 2017-2018 season. Current information was compared to previous studies to identify trends in hunting and angling activities.

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Methods

A survey of resident and nonresident hunters and anglers was undertaken to estimate current expenditures and characteristics. Input-output analysis was used to estimate the economic contribution of hunters and anglers to the state's economy. Information from previous studies was compared to current data to illustrate and identify trends in hunters' expenditures, characteristics, and economic effects.

Survey Design

The ND Game and Fish Department conducted a mail survey of hunters and anglers in North Dakota to solicit information on hunting and fishing expenditures during 2018. A random sample of licensed hunters and anglers,[1] divided into 19 different categories were mailed a survey beginning in January of 2018. The survey groups were divided by license type (i.e., resident, nonresident, gratis), game type (i.e., special big game, deer, furbearers, pronghorn, turkey, upland, waterfowl, and fish), and, when applicable, by weapon type (i.e., archery, firearm, muzzleloader). The survey groups represented most of the hunting and angling activities in North Dakota during 2018 (Table 1).

Sampling techniques were largely based on procedures used by Kerestes and Leitch (1983). Sample rates associated with the expenditure survey were consistent with rates used in past expenditure studies. The number and type of hunting and fishing activities surveyed in 2018 were similar to previous studies. An exception is that pronghorn was included in 2018.

Expenditure questionnaires were specific to each sample (see Appendix A for a representative questionnaire). The type of information requested and the questionnaire format were relatively unchanged from previous studies to allow for comparison with past data.

Administration of the survey varied slightly from previous studies. Participants receiving mailed questionnaires were provided the opportunity to participate via the mail questionnaire or to complete the survey on the Internet. In past studies, most survey participants did not have the option to complete the survey electronically.

Several statistical methods (e.g., listing of any expenditure entries exceeding 99.9 percent of all entries in any particular expense category) were used to examine for data outliers. Expenditures were also evaluated by considering days participated, miles traveled, and/or other qualifying data to eliminate outliers that could not be considered defendable or reasonable. Examples of what might be considered an unreasonable level of spending would be $5,000 for ammunition for one day of hunting or $2,000 for food expense for two days of hunting.

[1]The list of license holders for some sample groups was relatively straightforward as current (2011) license holders were obtained through license or lottery application records (e.g., firearm deer, special big game, and turkey licenses are only distributed through the ND Game and Fish Department's Bismarck office). However, several other, more general hunting licenses (e.g., small game, sportsman, furbearer, fishing) are available from vendors distributed throughout the state. Vendors do not provide names and addresses of individuals obtaining general licenses from retail vendors in time to compile a mailing list for surveying purposes in the year the license was purchased.

Sample rates for the survey groups ranged from 195 individuals for nonresident firearm deer to 3,087 individuals for resident darkhouse spearing (Table 1). Response rates[2] for survey groups varied from 20 percent for nonresident fishing and furbearer to 71 percent for nonresident firearm deer. Overall response rate for the survey was 45 percent.

Table 1. Sample Size, Undelivered Mailings, Returned Questionnaires and Response Rates by Survey Group, North Dakota, 2018

Survey Group	Sample Size	Undelivered Questionnaire	Returned	Response Rate (%)
Resident				
Deer				
Archery	1,460	40	720	49
Firearm	1,488	12	708	48
Muzzleloader	1,018	7	648	64
Gratis	1,497	3	803	54
Special Big Game[a]	649	4	441	68
Pronghorn	410	0	223	54
Furbearer	2,470	30	577	23
Small Game				
Upland Game	1,467	33	789	54
Waterfowl	1,451	49	681	47
Turkey				
Fall Turkey	1,686	9	918	54
Spring Turkey	1,986	14	626	32
Fishing				
Open Water	2,881	119	652	23
Ice	2,901	99	754	26
Darkhouse Spearing	3,087	28	1,060	34
Total Resident	24,4251	447	9,600	45.0
Nonresident				
Deer				
Archery	1,390	41	765	55
Firearm	195	3	138	71
Small Game	1,480	20	818	55
Furbearer	1,970	30	397	20
Fishing	2,879	121	573	20
Total Nonresident	7,914	215	2,691	44.2
Total, all groups	32,365	662	12,291	45

[a] Includes elk, moose, and bighorn sheep.

[2]Response rate was calculated as useable questionnaires returned divided by mailed questionnaires less undeliverable addresses [returns/(mailed-undeliverables)].

Expenditures

Estimating the amount and type of recreational expenditures associated with hunting and fishing activities in North Dakota was one of the primary goals of the study. Questionnaires for each survey group (e.g., archery deer, ice fishing) were designed to solicit information on expenditures specific to that activity. For example, fishing participants were not asked questions about ammunition or firearm purchases. Questionnaires specifically requested only information on purchases made 1) within North Dakota, 2) for the activity and season specified on the questionnaire, and 3) purchases made via the Internet. The questionnaires were structured to sort expenditures into durable goods or fixed expenses and nondurable goods or variable expenses (Table 2).

Durable Goods/Fixed Expenses

Durable goods usually represent items that can be used over several seasons or can be used numerous times over extended periods before replacing. A few examples of durable goods for hunting and fishing include optics, weapons, fishing rods, clothing, boats, knives, decoys, ice augers, and so on. Purchases of durable goods are often classified as fixed expenses, since the cost of the item is not dependent upon activity levels (the cost of a knife is the same if an individual hunts 2 days or 20 days). Most durable goods will eventually wear out, become obsolete, breakdown in the long term (e.g., over 20 years). However, rather than trying to estimate the annualized expense[3] for durable goods, the full purchase cost of all durable goods (except vehicles) was allocated to the hunting/fishing category for the study.

The treatment of fixed expenses in this study is consistent with past studies and based on the premise that not all hunters and anglers incur all of their fixed expenses in any given year. For example, in any given year, only some anglers will purchase a new boat and only some firearm deer hunters will purchase a new rifle. Thus, an approximation of overall level of annual purchases for durable goods is calculated by multiplying the number of individuals participating in survey category by average expenses for corresponding group.

Durable good purchases were credited to the activity for which those items/goods were initially purchased. However, in reality, the purchase of some durable goods for a specific activity does not preclude the possible use of those items for other types of recreational activities. For example, binoculars purchased for a deer hunt could also be used for other hunting activities or other non-hunting uses. Given the scope of this study, and the need to maintain consistency with previous studies, no attempt was made to determine the percentage use of durable goods (except vehicle purchases) for only the activity surveyed.

[3]Annualizing expenses is a technique to spread out fixed expenditures over the life of an item or good. In the case of hunting and fishing, the difficulty in annualizing fixed expenditures prevents treating durable good purchases on annual use or anticipated useful life basis.

Table 2. Expenditure Categories for Survey Groups, North Dakota, 2017-2018	
Category	Description
Variable Expenditures	
Access	Expenses paid to gain access to land or to launch boats
Ammunition	Expenses for cartridges, shot shells, and reloading components
Bait	Purchases of bait (live, frozen, or otherwise) used for fishing
Equipment Fuel	Expenses for fuel for boats, ice house heaters, and/or other equipment
Food	Purchases of food and beverages
Guide	Expenses for guide services (hunting and/or fishing)
Lodging	Expenses paid for overnight stays while hunting or fishing
Meat	Expenses for meat processing, packing, and/or fish cleaning
Rentals	Expenses for rental of boat, motor, fish house, and/or other equipment
Repairs	Expenses for repair of hunting or fishing equipment
Taxidermy	Fees or material costs for mounting fish, birds, or animals
Transportation	Expenses for gas, oil, air fare, or other transportation costs
Veterinarian	Fees for veterinarian care of animals used while hunting
Other	Any other variable expenses not included in the above categories
Fixed Expenditures	
Auger	Purchases of ice augers, saws, and/or chisels used for ice fishing
Binoculars	Purchases of binoculars, scopes, range finders, and/or other optics
Boat	Purchases of boats, motors, and boat trailers for hunting/fishing
Calls	Purchases of predator calls
Camera	Purchases of underwater cameras for fishing
Camping	Purchases of camping equipment used while hunting/fishing
Clothing	Purchases of clothing used primarily for hunting/fishing
Decoy	Purchases of decoys for hunting and spearing
Dogs	Purchases of hunting dogs
Finders	Purchases of electronic depth or fish finders
Ice House	Purchases of ice fishing houses, shelters, and/or heaters
Rods	Purchases of fishing rods
Skinning Equipment	Purchases of stretchers, knives, and/or other tools for use on hides/fur
Spears	Purchases of ice fishing spears
Tackle	Purchases of fishing tackle
Traps	Purchases of traps, snares, and/or trapping supplies (lures, scents)
Vehicles	Purchases of vehicles, campers, ATVs primarily for hunting/fishing
Weapons	Purchases of rifles, shotguns, bows, arrows, accessories
Other	Any other durable goods not included in the above categories

Nondurable Goods/Variable Expenses

Nondurable goods generally represent items/services consumed or used in direct proportion to activity levels. A few examples of nondurable goods for hunting and fishing include bait, ammunition, gas, food, guide services, and so on. Purchases of nondurable goods are often classified as variable expenses, since expenses for those items are dependent upon activity levels (gas purchases should be proportional to the number of miles traveled). Most nondurable goods are consumed completely within a short period. Unlike some durable good purchases which may not reflect activity levels (i.e., they could potentially be used for other recreational activities and are not likely consumed in one use), nondurable goods/services closely match hunting/fishing activity levels and are usually directly attributable to only one activity. For example, lodging expenses incurred while pheasant hunting should not be transferable to darkhouse spearing activities.

Estimation of Average Expenditures

The method for determining average season variable expenses used in this study was identical to the methods used by Lewis et al. (1998) and Bangsund and Leistritz (2003). Average season (total) variable expenditures, in each survey group, were estimated by summing the average of the individual expenditure categories (e.g., gas, food, lodging). Alternatively, the average expenses for gas, food, lodging, etc., were summed to estimate average season variable expenses in each survey group. However, the calculation of average vehicle, average season fixed, and average season total expenditures in this study differed from the methods used by Lewis et al. (1998). The procedures and adjustments developed by Bangsund and Leistritz (2003) for those expenditures were used in this study.

Lewis et al. (1998) and prior studies included the average value of vehicle purchases in average fixed season expenses for each survey group. This method produced two problems. First, the full value of the vehicle was attributed to the hunting/fishing activity--this likely overstates the true amount of vehicle expense attributable to hunting/fishing activities. Second, vehicle expenses were estimated separately for each hunting and fishing survey group--this resulted in substantial differences in vehicle expenses among groups, as the average value was greatly influenced by relatively small sample sizes (i.e., observations) in each group. As a result, some hunting and fishing survey groups had very high average vehicle expenses (e.g., the Lewis study implied that every resident archery Pronghorn hunter spent on average over $1,200 for vehicle purchases in 1996), while other groups had very low average vehicle expenses (e.g., gratis turkey and deer hunters were estimated to have $0 in vehicle purchases). To address these concerns, vehicle expenses in this study were estimated using techniques developed by Bangsund and Leistritz (2003).

Determining an appropriate amount of vehicle expense to include in the expenditure estimates for the various survey groups is difficult. The data limitation problem associated with each survey group in previous studies were also present in this study. To correct for too few observations, the survey groups were condensed into five categories for purposes of estimating vehicle expenses. The five categories included gratis hunters, resident hunters, resident anglers, nonresident hunters, and nonresident anglers. However, condensing the 19 survey groups into 5

categories did not address the issue of applying an appropriate amount of vehicle expense to hunting and fishing activities.

Arguably, most individuals use vehicles for much more than just hunting and fishing. After hunting or fishing seasons are over, individuals continue to use their vehicles for a host of transportation and/or recreation needs. Even in the case of all-terrain vehicles (ATVs), whose primary use might be associated with hunting or ice fishing, ATVs are often used throughout the year. In light of the multiple-use nature of vehicles, applying the full purchase cost of a vehicle to a single, short-term (i.e., few days to several weeks) activity is not appropriate. Further, individual purchase decisions are not entirely based on participation in hunting or fishing activities.[4] It is unlikely someone would rush to buy a new vehicle due to a deer tag drawing, or because of scheduled pheasant hunting later in the year. Since vehicles (e.g., pickups, sport utilities, ATVs) represent durable goods that are likely to be used extensively outside of hunting and fishing activities, a weighting procedure developed by Bangsund and Leistritz (2003) was used to allocate a percentage of all vehicle purchases. This was done for each of the five groups using days participated by individuals (see Appendix B for a complete discussion of how allocated vehicle expense was estimated).

Given these adjustments, vehicle expenses and average season fixed expenses differed from those estimated by Lewis et al. (1998) but were consistent with estimates produced by Bangsund and Leistritz (2003). The average vehicle expenses in the five categories are allocated to the remaining 19 survey groups (see Appendix B for discussion of how vehicle expenses were allocated to each survey group). Purchases of all other durable goods were averaged using the same methods employed on variable expenses. Average season fixed expenses represented the sum of allocated vehicle expense and average expenses for all other durable goods.

Lewis et al. (1998) and prior studies treated total season expenses as the sum of only those observations that had both variable and fixed expenses. However, as was the case in this study, not all respondents 1) purchased both nondurable (variable) and durable (fixed) goods for the activity surveyed or 2) reported both types of purchases. As a result, the number of observations with both variable and fixed expenses was less than the number of observations that had either variable or fixed expenses. In addition, the average for only those observations with variable and fixed expenses did not match the sum of each group's average variable and average fixed expenses. This creates the potential for overestimated expenditure. In that case, the average total expense can be higher than the sum of average variable and fixed expenses. Bangsund and Leistritz (2003) addressed this issue by estimating average variable season and average fixed season expenses separately for each survey group, and then combining those estimates to represent average total season expenditures. This method utilized all expenditure observations in the data set to arrive at an estimate for total season expenditures.

[4]Many individuals purchase vehicles which will suit their needs while hunting or fishing (e.g., four wheel drive, cargo space, passenger room, towing capacity), but buying decisions are influenced by a host of factors not associated with hunting/fishing (e.g., age, condition, reliability of existing vehicle, personal finances, personal preferences and desires, etc.). Granted, some individuals do purchase vehicles exclusively for hunting/fishing pursuits, but these situations were considered few, and were not addressed in this study.

Average daily variable and fixed expenses were estimated by dividing individuals' total variable and total fixed expenses by the number of days participated, and then averaging individuals' average daily variable and average daily fixed expenses for each survey group. Average daily total expenditures was the sum of average daily variable and average daily fixed expenses.

Economic Impacts

Economic effects of a project, program, policy, has two main impacts including direct and secondary impacts. Direct impacts are those changes in economic output, employment, or income that represent the initial or first effects of a project, program, or event. Secondary impacts (sometimes categorized as indirect and induced effects) result from subsequent rounds of spending and responding within the economy. This process of spending and responding is sometimes termed the multiplier process, and the resultant secondary effects are sometimes referred to as multiplier effects (Leistritz and Murdock 1981).

Traditionally, economic measures of industry impacts or project-type impacts are based on revenues that represent "new wealth" to an economy and the subsequent rounds of spending and re-spending associated with those "new revenues." New wealth generally comes from the sale of materials, goods, or services to entities outside of an economy (Leistritz 1998). An *economic contribution* analysis measures all revenues associated with an industry or activity, even if not all of the economic activity represents new wealth to an economy. Alternatively, an *economic impact* analysis is usually based on the economic activity created only from new wealth. Both approaches measure total economic activity using direct and secondary effects.

Hunting and angling activities in the state generate revenues for recreational businesses and individuals (e.g., landowners through access fees). For the businesses and individuals affected by hunter and angler expenditures, the source (i.e., in-state, out-of-state) of those revenues is not likely important. For example, a bait store selling fishing supplies makes the same level of earnings regardless if the sale is to a resident or nonresident angler. However, at an aggregate level, the source of spending has implications for measuring the amount of "new wealth" created within an economy. Generally, out-of-state sources (i.e., nonresidents) of spending are considered "new wealth" to the state economy. However, measuring the amount of "new wealth" to the state economy from in-state sources (i.e., resident spending) is difficult. Some of the money spent by residents on hunting and fishing in North Dakota would be spent in the state regardless if hunting and fishing opportunities did not exist. Alternatively, some of the money spent on hunting and fishing in North Dakota would leave the state in the absence of those hunting and fishing opportunities. Resident expenditures would be considered "new money" when in-state opportunities reduce the amount of expenditures that would otherwise leave the state. The availability of hunting and angling opportunities within the state keeps resident expenditures from "leaking" to other states.

In the North Dakota economy, the amount of new wealth created by hunter and angler expenditures is difficult to measure. New wealth considerations become even more complicated when an economy becomes smaller, such as a single or multi-county area. In small, rural economies new wealth (i.e., increase in primary sector revenues) can come from both in-state

and out-of-state sources, even if the spending from in-state sources does not represent new wealth to the state. Thus, even though not all resident hunter and angler spending represents new wealth to the state economy, that spending can have different implications for rural economies (see Appendix C for a more thorough discussion of new wealth considerations in rural areas). The difficulties in applying multiple new wealth criteria to various categories of hunter and angler spending based on state versus rural economies as well as the information requirements to develop those criteria are the primary reasons why economic contribution analyses have been used for measuring the economic size of hunting and fishing activities in the state. Recreational spending in rural economies is important regardless of the source (i.e., resident, nonresident). This study will use an economic contribution approach, which is consistent with the methods used in previous studies.[5]

Direct Effects

Direct effects (also termed in this report as total direct expenditures) were the sum of all resident and nonresident hunting and fishing expenditures. Total direct expenditures was defined as average expenditures for each survey group multiplied by the total number of participants in each activity during 2017-2018.

Secondary Effects

The secondary effects of hunter and angler expenditures in North Dakota were estimated using the North Dakota Input-Output Model and represent additional economic activity generated from the re-spending of hunter/angler expenditures. Input-output (I-O) analysis is a mathematical tool that traces linkages among sectors of an economy and calculates the total business activity resulting from a direct impact in a basic sector (Coon et al. 1985). An economic sector is a group of similar economic units (e.g., *Communications and Public Utilities* sector would include activities associated with communication, electricity, gas, and other utility activities). The North Dakota I-O Model has 17 economic sectors, is closed with respect to households (households are included in the model), and was developed from primary (survey) data from firms and households in North Dakota.

Total direct expenditures by hunters and anglers for durable and nondurable goods were allocated to three sectors of the North Dakota I-O Model (Table 3). The sectors of North Dakota's economy that capture hunter expenditures were *Retail Trade*, *Business and Personal Services*, and *Households*. Secondary effects were combined with direct effects to estimate the gross business volume of hunting and angling activities in the state.

[5]The term "economic impact" has often been used loosely in past studies to describe the overall economic effect of hunter and angler expenditures in the state. The analyses performed in past studies measured all economic activity associated with hunter and angler expenditures and represent economic contribution analyses.

Table 3. Treatment of Hunter and Angler Expenditures within the North Dakota Input-Output Model	
Economic Sectors	Expenditure Categories
Retail Trade	ammunition, bait, equipment fuel, film, food, transportation, ice auger, optics, boats, calls, cameras, camping equipment, clothing, decoys, 2/3 of dog purchases, fish finders, ice houses, rods, skinning equipment, spears, fishing tackle, traps, vehicles, and weapons
Business and Personal Services	guide services, lodging, meat processing, rental equipment, repairs, taxidermy, veterinarian, and 1/3 of dog purchases
Households	access fees

State-level Tax Collections

Tax collections are another important measure of the economic effect of an industry, activity, or event on an economy. State-level tax collections resulting from direct and secondary economic activity associated with hunting and fishing in the state were estimated for sales and use taxes, personal income taxes, and corporate income taxes. Total economic activity (direct and secondary effects) in the *Retail Trade* sector were used to estimate revenue from sales and use taxes. Economic activity in the *Households* sector was used to estimate personal income tax collections. Similarly, corporate income tax revenue was estimated from the economic activity in all business sectors (excluding the *Households, Government,* and *Agriculture* sectors).

Expenditures in Rural Areas

Previous studies have defined North Dakota communities with a population of 2,500 or less as rural and estimated the amount of spending that occurs in those communities. This study also asked participants to estimate the percentage of their total seasonal spending that occurs in rural communities. Rural spending was not estimated for each expense item (e.g., gas, clothing, lodging, food), but rather was estimated as average season expenditures per rural and urban individual in the various survey groups. Average season expenditures in rural areas for rural and urban participants were then multiplied by the number of active rural and urban participants in each survey group to estimate total expenditures made by hunters and anglers in rural areas of North Dakota.

Hunter and Angler Characteristics

Age, residence, and income characteristics were solicited from survey participants. Information on days participated, miles traveled, ownership of land hunted, and value per day of hunting/fishing were also collected from survey participants. Hunter and angler characteristics of participants in 2018 were compared to respondent characteristics in previous studies.

Residents

The typical (on average) resident hunter was 49 years old, hunted 7 days per year in North Dakota, lived in a community over 2,500 population, and had a gross household income of over $150,000. The typical resident angler was 49 years old, fished 11 days per year in the state, lived in an urban community, and had a gross household income of between $75,000 and $99,000. Characteristics for all hunting and fishing groups are included in the following sections.

Age

The majority of hunters and anglers surveyed were between 46 and 65 years of age (Table 4). Generally, gratis hunters were the oldest group. Archery hunters were the youngest group. The average age for Archery deer hunters was 43 years old while that for gratis deer hunters were 57 years old on average. There was a slight difference in age among small game hunters. Upland hunters were on four years older than waterfowl hunters on average. Fishing activities had the lowest percentage of participants 18 years of age or younger of all the survey groups.[6]

Residence

Population trends in North Dakota indicate an increasing percentage of the state's population lives in urban communities (U.S. Bureau of the Census 2010). For example, in 1990 the four largest North Dakota metro areas (i.e., Fargo-West Fargo, Grand Forks, Bismarck-Mandan, Minot) had 37 percent of the state's population. In 2000, those same cities had 41 percent of the state's population and in 2010, those cities had 45 percent of the state's population. From 2000 to 2010, population in the four largest metro areas increased by 15.6 percent, compared to an increase of 4.6 percent statewide (U.S. Bureau of the Census 2010). In 2017, North Dakota population base increased by approximately 12.3 percent from the 2010 population base. Given the population distribution, if the rural versus urban divide does not affect participation in hunting activities, an increase would be observed in the number of hunters living in urban areas.

The percentage of hunters and anglers in rural and urban communities was determined from survey respondents. The questionnaire asked respondents to choose among five categories describing the size of the community they resided in.

[6]Data from survey respondents may not represent the true age distribution of hunting and fishing activities due to licensing requirements and sampling methods. Residents and nonresidents younger than 16 years of age were not surveyed and do not need a license to fish and hunt small game in North Dakota. Also, licensing requirements for resident youth differ for firearm versus archery hunting (e.g, deer and big game). Similar licensing requirements and exemptions exist for nonresident youth.

Table 4. Average Age and Distribution of Resident Hunters and Anglers by Age Categories, North Dakota, 2017-2018					
Activity	Average Age[a]	18 Years or Less	19 to 45 Years	46 to 65 Years	Over 65 Years
		---------- % ----------			
Deer					
Archery	43	2	54	36	8
Firearm	47	5	40	40	15
Muzzleloader	52	1	33	47	19
Gratis	57	2	20	47	31
Special Big Game	48	3	42	40	15
Pronghorn	51	1	37	44	18
Furbearer	51	2	30	53	15
Small Game					
Upland	51	1	37	43	19
Waterfowl	47	5	40	43	12
Fall Turkey	49	5	34	42	19
Spring Turkey Regular	46	13	32	39	16
Fishing					
Open Water	53	1	30	47	22
Ice	49	1	40	42	17
Darkhouse Spearing	46	3	44	39	14

Note: Percentages may not total due to rounding.

[a]May not reflect true average age due to licensing requirements for youth and sampling methods which did not include participants under 16 years of age.

Overall, 50.2 percent of resident hunters responding to the survey lived in communities 2,500 or greater in population. Similarly, 51.3 percent of resident anglers responding to the survey lived in communities 2,500 or greater in population.

Spring turkey hunters had the highest percentage of urban participants at 63 percent (Table 5). Gratis deer hunters had highest percentage of rural participants (78%). However, because gratis licenses are issued to landowners, gratis survey groups would be expected to have a high percentage of rural hunters. More hunters lived in urban settings than rural except for gratis deer.

Of all the fishing survey groups, open water fishing had the highest percentage of urban participants (57 percent), while 55 percent of ice fishing participants lived in urban areas (Table 5). The majority of participants in darkhouse spearing lived in rural areas (55 percent), but participants were essentially distributed evenly among all the residence categories (Table 5).

Some differences were noted between the residence of hunters and anglers in 2017-2018 and the residence of participants in the 2011-2012 study. Firearm deer and archery deer hunters showed slight increases (1 percent) in the number of urban participants in 2017-2018. Special big game had the same percentage (51) of urban participants in 2011-2012 as well as in 2017-2018. Urban participant for upland (55 percent) and waterfowl (60 percent) hunters dipped in 2017-2018 compared to 2011-2012 period while participants in rural increased comparatively in 2017-2018.

The percentage of rural participants in gratis deer and archery deer hunting also increased in 2017-2018. Fewer open water fishing participants were urban in 2018 than in 2011-2012 (57 percent to 63 percent). The percentage of ice fishing participants who live in rural areas increased from 2011-2012 to 2017-2018 (38 percent to 45 percent). Although not uniform across all survey groups, overall a slightly greater percentage of participants were from urban areas (50.4 percent) in 2018.

Income

Pronghorn hunting generally had the highest percentage (89 percent) of participants with gross annual household incomes over $50,000. Between 77 to 89 percent of participants in all other hunting categories had gross incomes over $50,000 (Table 6). In contrast, all hunting categories had less than 10 percent of participants with gross incomes under $25,000. Less than 20 percent of participants in all hunting categories had gross incomes between $25,000 and $50,000. Nearly 80 percent of participants in open water fishing had gross household incomes over $50,000. Participants in darkhouse spearing had slightly lower incomes than the other fishing groups. Approximately 80 percent of participants in open water and ice fishing had household incomes over $50,000 while 78 percent of darkhouse fishing participants had over $50,000 in household income (Table 6). Less than 20 percent of fishing participants had gross incomes between $25,000 and $50,000.

A comparison between participant incomes in 2017-2018 and incomes in 2011-2012 indicates that average income had increased amongst participants (not accounting for inflation). For example, among the two categories of deer hunting (archery and firearm), the number of participants with incomes of $50,000 or more increased from 76 percent to 78 percent for archery and 71 percent to 77 percent for firearm. The percentage of upland participants with incomes of $50,000 or more remained the same (83 percent) from the 2011-2012 evaluation to the 2017-2018 period while that for waterfowl increased by 5%. The percentage of open water anglers with income over $50,000 in 2011-2012 was 50 percent compared to 80 percent in 2017-2018.

Table 5. Residence of Survey Respondents, Resident Hunters and Anglers, by Activity, North Dakota, 2017-2018								
	Urban				Rural			
Activity	City over 50,000	City 2,500 to 50,000	Total Urban		Community under 2,500	Farm or Ranch	Rural Nonfarm	Total Rural
	%							
Deer								
Archery	28	21	49		21	15	15	51
Firearm	30	27	57		19	14	10	43
Muzzleloader	25	23	48		25	14	13	52
Gratis	10	12	22		15	58	5	78
Special Big Game	26	25	51		18	18	13	49
Pronghorn	29	18	47		15	28	10	53
Furbearer	27	21	48		22	19	11	52
Small Game								
Upland	32	23	55		20	16	9	45
Waterfowl	35	25	60		18	11	11	40
Fall Turkey	28	31	59		14	15	12	41
Spring Turkey	36	27	63		18	9	10	37
Fishing								
Open Water	30	27	57		20	12	11	43
Ice	25	30	55		22	11	12	45
Darkhouse Spearing	21	24	45		27	16	12	55

Note: Percentages may not total due to rounding.

Ownership of Land Hunted

Resident hunters primarily hunt on private land (Table 7). Excluding gratis hunters, who are required to hunt on their own land, fall turkey hunters and furbearers spent the most time on private land (79 percent). Muzzleloader deer hunters and waterfowl spent 75 percent of their time hunting on private land. All other groups, excluding gratis, pronghorn, and special big game hunters, spent between 70 to 76 percent of their time hunting on private land (Table 7). Excluding pronghorn that was not included in 2011-2012 study, hunters in 2017-2018 spent similar amounts of time (77 percent) hunting private land compared to hunters in 2011-2012. However, hunting in public lands (federal and state) was lower in 2017-2018 (8 percent) relative to 2011-2012 (20 percent) on average.

Days Participated

The average resident hunter spent 7.6 days hunting in the state. Furbearer hunters spent, on average, the most days hunting (averaged 19 days). Special big game hunters spent 10 days hunting on average (Table 8). Anglers in open water fishing averaged 16 days of participation in 2017-2018, while those only participating in darkhouse spearing averaged 5 days per year (Table 8).

Over the past 30 plus years (1981 to 2018), the average number of days participated has remained relatively stable for most hunting and fishing activities (Table 8). Subtle changes in the number of days participated have occurred in some categories, for example, archery deer hunters spent more days hunting in 1996 than in the other survey years. Furbearer hunters spent more time hunting in 2018 than in other survey years, and anglers spent more days participating in open water fishing in the early 1980s and in 2001, than in the late 1980s and mid-1990s. However, in other categories, except special big game and furbearer, the average number of days spent hunting/fishing by participants has remained relatively unchanged. Number of days fishing has fell to 5 days on average compared to 2001, the only other year with data on this category of fishing. Open water fishing in 2017-2018 was higher than in three other studies (2011-2012, and 1986).

Table 6. Gross Household Income, Resident Hunters and Anglers, by Activity, North Dakota, 2017-2018								
Activity	Over $150,000	$125,000 -$150,000	$100,000- $124,999	$75,000 - $99,999	$50,000- $74,999	$25,000 - $49,999	$10,000 - $24,999	Under $10,000
	%							
Deer								
Archery	17	10	15	20	16	16	3	3
Firearm	11	9	14	21	22	14	5	4
Muzzleloader	17	11	15	17	20	15	3	2
Gratis	26	6	11	18	16	16	5	2
Special Big Game	19	10	19	18	16	13	4	1
Pronghorn	27	13	16	20	13	9	2	0
Furbearer	22	8	16	16	17	13	3	5
Small Game								
Upland	18	9	18	19	19	12	3	2
Waterfowl	23	8	12	21	15	14	4	3
Fall Turkey	20	10	15	18	19	11	5	2
Spring Turkey	20	12	17	18	16	9	2	5
Fishing								
Open Water	16	9	14	19	22	12	6	2
Ice	14	10	16	27	13	12	6	2
Darkhouse Spearing	18	9	14	20	17	15	3	3

Note: Percentages may not total due to rounding.

Table 7. Resident Hunting by Land Ownership, by Activity, North Dakota, 2017-2018				
	Land Ownership			
Activity	Federal	State	Private	Unknown
	---------- % of time spent hunting ----------			
Deer				
Archery	12	10	74	4
Firearm	8	9	73	10
Muzzleloader	8	9	75	7
Gratis	0	0	98	2
Special Big Game	17	16	61	5
Pronghorn	12	11	64	13
Furbearer	5	8	79	8
Small Game				
Upland	4	6	76	13
Waterfowl	8	9	75	8
Fall Turkey	7	8	79	5
Spring Turkey	9	13	76	2

Note: Percentages may not total due to rounding.

Table 8. Average Days Spent Hunting and Fishing, by Residents, by Activity, North Dakota, 1981, 1982, 1986, 1990, 1996, 2001, 2011 and 2018								
Activity	1981	1982	1986	1990	1996	2001	2011	2018
	---------- days ----------							
Pronghorn								
Archery	na	4	7	8	6	5	na	na
Firearm	na	2	2	2[a]	2	2	na	2
Gratis	na	na	na	–	2	2	na	na
Deer								
Archery	13	14	13	14	16	13	11	9
Firearm	4	4	5	4[a]	4	4	4	4
Muzzleloader	na	na	na	4	4	na	6	6
Gratis	na	na	na	–	3	4	6	5
Special Big Game	4	5	4	5	5	5	6	10
Furbearer	17	12	12	12	13	11	12	19
Small Game								
Upland	6	5	9	13	8	9	8	7
Waterfowl	7	6	8	11	8	8	8	7
Fall Turkey								
Regular	2	2	2	2[a]	2	3	4	3
Gratis	na	na	na	–	2	4	na	na
Spring Turkey	na	na	na	na	na	na	3	3
Fishing								
Open Water	22	18	13	13	17	18	14	16
Ice	na	na	12	11	10	13	9	11
Darkhouse Spearing	na	na	na	na	na	8	na	5

[a] Includes gratis hunters. na=not available

Miles Traveled

Excluding gratis hunters, fall turkey hunters traveled the least, 254 miles. In contrast, special big game hunters averaged over 1,232 miles traveled in 2017-2018 (Table 9). Waterfowl game averaged around 957 miles traveled in 2018, which was about 46 percent greater than the number of miles traveled in 2011. Likewise, furbearer hunters traveled, on average, 716 miles in 2017-2018, which was 30 percent greater than the number of miles traveled in the 2011. Average miles traveled by participants all fishing categories increased in 2018 compared to 2011. In fact, mile travelled for fishing in 2018 were the largest relative to previous studies (Table 9).

Table 9. Average Miles Traveled by Residents, North Dakota, by Hunting and Fishing Activity, 1981, 1982, 1986, 1990, 1996, 2001, 2011, and 2018								
Activity	1981	1982	1986	1990	1996	2001	2011	2018
	----------miles----------							
Pronghorn								
Archery	na	467	688	777	737	824	na	na
Firearm	na	513	366	418[a]	637	691	na	629
Gratis	na	na	na	–	91	83	na	na
Deer								
Archery	437	164	465	654	674	678	757	712
Firearm	270	205	338	335[a]	375	356	422	445
Muzzleloader	na	na	na	na	247	215	293	381
Gratis	na	na	na	–	112	122	256	219
Special Big Game	397	567	583	1,131	970	1,081	1,080	1,232
Furbearer	796	612	636	625	694	530	549	716
Small Game								
Upland	415	na	521	869	878	870	1,216	578
Waterfowl	476	na	480	904	779	778	654	957
Fall Turkey								
Regular	249	207	232	340[a]	277	324	261	284
Gratis	na	na	na	–	128	101	na	na
Spring Turkey	na	na	na	na	na	na	210	254
Fishing								
Open Water	na	103	649	860	815	974	628	1,011
Ice	na	na	651	672	495	648	441	625
Darkhouse Spearing	na	na	na	na	na	453	299	407

na=not available

[a] Includes gratis hunters.

Value of a Day of Hunting and Fishing

Survey respondents were asked to place a monetary value on a single day spent either hunting or fishing. These values do not imply spending levels or have any effect on hunter/angler impacts within the economy, but rather indicate a measure of the importance for the participant of time spent hunting or fishing in the state.

Special big game hunters placed the highest value on a day of hunting than participants in other hunting categories (Table 10). Spring turkey hunters placed the lowest value per day of hunting. Excluding big game and spring turkey hunters, the average value of a day of hunting in the remaining hunting categories ranged from $73 to $169. Resident anglers valued a day of ice fishing at $74 and a day of open water fishing at $107. Trends in the value per day of fishing are mixed—open and ice water fishing values are down while dark house spearing values are up.

Table 10. Average Value of a Day Spent Hunting or Fishing, North Dakota, by Residents, by Activity, 1981, 1982, 1986, 1990, 1996, 2001 2011, and 2018								
Activity	1981	1982	1986	1990	1996	2001	2011	2018
	----------2018 dollars----------							
Pronghorn								
Archery	na	na	108	94	101	112	na	na
Firearm	na	na	na	160[a]	139	146	na	169
Gratis	na	na	na	--	93	76	na	na
Deer								
Archery	1,118	na	93	89	67	59	116	99
Firearm	271	na	115	101[a]	76	88	136	119
Muzzleloader	na	na	na	320	55	na	na	77
Gratis	na	na	na	--	53	67	81	141
Special Big Game	1,901	761	565	210	215	213	191	563
Furbearer	264	215	98	95	59	66	64	73
Small Game								
Upland	101	na	159	72	89	83	98	89
Waterfowl	101	na	144	98	76	74	111	141
Fall Turkey								
Regular	259	na	415	84[a]	83	72	66	95
Gratis	na	na	na	--	49	72	na	na
Spring Turkey	na	na	na	na	na	na	70	68
Fishing								
Open Water	115	na	725	71	178	77	178	107
Ice	na	na	72	65	48	93	76	74
Darkhouse Spearing	na	na	na	na	na	44	55	81

na = not available

[a] Includes gratis hunters.

Gender

Most resident hunters are male. Waterfowl hunting had the fewest women participants with 5 percent, while special big game had the highest level of women participants with 18 percent (Table 11). As a group, female anglers had a higher relative participation levels relative to female hunting participants s. Female anglers averaged about 18 percent of all participants in open water and ice water fishing (Table 11).

Table 11. Gender of Resident Hunters and Anglers, North Dakota, 2017-2018		
Activity	Male	Female
	----------%----------	
Deer		
Archery	92	8
Firearm	86	14
Muzzleloader	94	6
Gratis	87	13
Special Big Game	82	18
Pronghorn	93	7
Furbearer	92	8
Small Game		
Upland	93	7
Waterfowl	95	5
Fall Turkey	92	8
Spring Turkey	89	11
Fishing		
Open Water	82	18
Ice	82	18
Darkhouse Spearing	92	8

Nonresidents

The typical nonresident hunter was 51 years old, hunted nearly 7 days per year in North Dakota, lived in a community with a population of 2,500 or more, and had a gross household income over $150,000. The typical nonresident angler was 58 years old, fished 7 days per year in the state, lived in an urban community, and had a gross household income around $75,000 and $99,000. Characteristics for all hunting and fishing groups are included in the following sections.

Age

The majority of nonresident hunters and anglers were between the ages of 46 to 65 (Table 12). Archery deer hunters had the highest percentage of participants in the 19 to 45 years age category (45 percent). Nonresident anglers were older than nonresident hunters on average, with more than half of all participants (52 percent) between 46 and 65 years of age (Table 12).

Table 12. Average Age and Distribution of Nonresident Hunters and Anglers by Age Categories, North Dakota, 2017-2018					
Activity	Average Age[a]	18 Years or Less	19 to 45 Years	46 to 65 Years	Over 65 Years
		---------- % ----------			
Deer					
Archery	46	3	45	42	10
Firearm	52	3	34	40	23
Small Game	53	1	27	52	20
Furbearer	51	2	27	58	13
Fishing	58	1	16	52	31

[a] May not reflect true average age due to licensing requirements for youth and sampling methods which did not include participants under 16 years of age.

Residence

Nonresident firearm deer hunters had the highest percentage of urban participants (63 percent), while archery deer hunters had the lowest percentage of urban participants (48 percent) (Table 13). All other hunting/angling groups except furbearers had a majority of participants living in urban areas (Table 13).

Income

Close to ninety percent of nonresident hunters had incomes of $50,000 or greater (Table 14). Seventy-nine percent of nonresident small game hunters had incomes over $75,000. Less than 5 percent of all nonresident hunters and anglers had incomes under $25,000 (Table 14).

Ownership of Land Hunted

The majority of hunting by nonresidents was conducted on private land. Approximately 79 percent of nonresident firearm deer hunting was conducted on private land (Table 15). About one-fifth of archery deer hunting occurred on public lands (state and federal). Firearm deer hunters spent considerably less time (half) hunting on public land in 2018 than in 2011 (Table 15).

Table 13. Residence of Survey Respondents, Nonresident Hunters and Anglers, by Activity, North Dakota, 2017-2018								
	Urban				Rural			
Activity	City over 50,000	City 2,500 to 50,000	Total Urban		Community under 2,500	Farm or Ranch	Rural Nonfarm	Total Rural
	%							
Deer								
Archery	18	30	48		17	14	21	52
Firearm	35	28	63		12	13	12	37
Small Game	30	31	61		14	9	16	39
Furbearer	22	27	49		16	15	20	51
Fishing	20	34	54		20	10	16	46

Note: Percentages may not total due to rounding.

Table 14. Gross Household Income, Nonresident Hunters and Anglers, by Activity, North Dakota, 2017-2018								
Activity	Over $150,000	$125,000-$150,000	$100,000-$124,999	$75,000 - $99,999	$50,000 - $74,999	$25,000 - $49,999	$10,000 - $24,999	Under $10,000
	%							
Deer								
Archery	27	10	15	17	18	10	2	1
Firearm	31	9	19	17	17	6	1	0
Small Game	36	9	15	19	13	6	1	1
Furbearer	28	14	13	16	16	10	2	1
Fishing	19	8	13	22	21	14	2	1

Note: Percentages may not total due to rounding.

Table 15. Nonresident Hunting by Land Ownership, by Activity, North Dakota, 1976, 1983, 1990, 1996, 2001, 2011and 2018							
Activity	1976	1983	1990	1996	2001	2011	2018
	----------% of time spent hunting----------						
Pronghorn							
Federal	14	na	40	12	34	na	na
State	21	na	10	17	12	na	na
Private	61	na	47	71	51	na	na
Unknown	4	na	3	1	2	na	na
Deer Archery							
Federal	18	19	25	21	14	17	6
State	25	19	14	7	10	1	13
Private	56	59	60	71	76	68	77
Unknown	1	3	1	1	1	0	4
Deer Firearm							
Federal	11	12	8	6	4	6	5
State	9	7	9	7	8	14	5
Private	78	78	81	84	85	77	79
Unknown	2	3	2	3	2	1	9
Furbearers							
Federal	na	na	na	na	na	9	10
State	na	na	na	na	na	14	9
Private	na	na	na	na	na	76	70
Unknown	na	na	na	na	na	2	11
Small Game							
Federal	12	12	10	10	9	6	7
State	12	9	11	13	18	14	10
Private	72	75	76	75	71	77	69
Unknown	4	4	3	3	2	1	14

na=not available

Note: Percentages may not total due to rounding.

Days Participated

Except for furbearers, nonresident archery deer hunters and fishing spent more time hunting (7 days) in the state than participants in any other nonresident hunting or angling group (Table 16). Nonresident firearm deer hunters spent the least amount of time hunting (4 days) in the state of all the nonresident groups.

Between 1976 and 2018, the amount of time-spent hunting has remained stable for most categories. The amount of time spent fishing by nonresident anglers has fluctuated from 6 to 9 days from 1983 to 2018.

Table 16. Average Days Spent Hunting and Fishing, by Nonresidents, by Activity, North Dakota, 1976, 1983, 1990, 1996, 2001, 2011, and 2018

Activity	1976	1983	1990	1996	2001	2011	2018
	----------days----------						
Pronghorn Archery	9	na	7	6	6	na	na
Deer							
Archery	7	8	8	7	8	7	7
Firearm	4	4	4	3	3	4	4
Small Game	5	4	5	6	6	5	6
Furbearers	na	na	na	na	na	12	9
Fishing	na	8	6	9	6	9	7

na=not available

Miles Traveled

Small game hunters traveled, on average, more miles than other nonresident hunting and fishing participants (Table 17). Firearm deer hunting averaged the fewest miles traveled (about 1,020 miles).

Comparing the number of miles traveled over time is difficult because past studies only requested the one-way mileage from the respondent's home to where they hunted or fished. In more recent studies, total mileage was requested, which included miles traveled while hunting within the state. With only three surveys collecting information on total mileage, an increase in the number of miles traveled by archery deer hunters was the only evident trend.

Table 17. Average Miles Traveled by Nonresidents, by Activity, North Dakota, 1976, 1983, 1990, 1996, 2001, 2011, and 2018							
Activity	1976[a]	1983[a]	1990	1996[b]	2001[b]	2011[b]	2018
Pronghorn Archery	535	na	1,529[b]	1,897	1,706	na	na
Deer							
Archery	373	502	1,169[b]	1,357	1,627	1,116	1,391
Firearm	588	639	567[a]	993	1,001	951	1,020
Small Game	482	701	610[a]	1,369	1,251	628	1,479
Furbearer	na	na	na	na	na	441	1,329
Fishing	na	696	489[a]	1,047	1,031	718	1,034

na=not available

[a] One-way distance from respondents' home to where they hunted.

[b] Miles traveled for all trips rather than just the one-way distance from the respondents' homes to where they hunted/fished.

Value of a Day of Hunting and Fishing

Nonresidents were asked to place a monetary value on a day of hunting/fishing. The figure does not necessarily represent the amount of money spent, but instead provides a measure of the worth of a day hunting or fishing. Nonresident firearm deer hunters placed the highest value on a day ($305) of hunting (Table 18). Furbearers placed the lowest value on a day ($114) of hunting. From 1990 to 2018, values placed on a day of hunting increased for archery, firearm deer hunters, and small game (Table 18). The value per day of fishing decreased between 1990 and 2011 for fishing participants.

Table 18. Average Value of a Day Spent Hunting or Fishing, by Nonresidents, by Activity, North Dakota, 1983, 1990, 1996, 2001, 2011 and 2018						
Activity	1983	1990	1996	2001	2011	2018
----------2018 dollars----------						
Pronghorn Archery	na	167	103	102	na	na
Deer						
Archery	300	139	163	171	161	186
Firearm	357	188	163	151	277	305
Small Game	302	165	148	138	113	180
Furbearer	na	na	na	na	110	114
Fishing	297	115	135	113	276	164

Gender

Most nonresident hunters are male. Furbearer had the lowest level of women participants with 1 percent, while firearm deer had the highest level of women participants with 8 percent (Table 19). Fishing had higher levels of women participation than hunting. Nine percent of all fishing participants were women (Table 19).

Table 19. Gender of Nonresident Hunters and Anglers, North Dakota, 2017-2018

Activity	Male	Female
	---- % ----	
Deer		
Archery	96	4
Firearm	92	8
Small Game	98	2
Furbearer	99	1
Fishing	91	9

Hunter and Angler Expenditures in the 2017-2018 Season

Average expenditures for hunting and fishing participants in North Dakota were estimated for several activities (see Appendix D for detailed average spending per participant). Average season total expenditures were used with estimates of the number of active participants to project total direct spending by hunters and anglers during 2017-2018. Total direct expenditures were applied to the North Dakota Input-Output Model to estimate secondary economic effects, gross business volume, secondary employment, and state tax collections.

Season Expenditures

Among all of the activities examined, spring turkey hunters had the lowest average total season expenditures followed by fall turkey hunters (Table 20). Average total season expenditures for resident firearm deer, gratis deer, and muzzleloader deer hunters were ($657.1, $428.6, and $425.4 respectively), while special big game hunters spent $1,686.8 total on average. Resident furbearer, upland game, and waterfowl hunters spent on average $978.9, $795.8, and $1,225.6 per season in total on average respectively (Table 20). Of all resident hunting activities, special big game had the highest total season expenditures ($1,686.8).

Average season expenditures for nonresident archery deer and nonresident firearm deer was $1,331.6 and $1,067.8, respectively. Nonresident small game hunters, which included spending for both upland and waterfowl hunting activities, was $1,247.8 per season in total expenditure on average. Nonresident furbearers spent in total $995.6 in total on average for the season. Nonresident small game hunters had the second highest total expenditure on average for nonresident hunters[7]

The average resident angler participating in open water fishing spent about $4,344 per season on average (Table 20). Average total season expenditures for ice fishing were $1,272.5 per participant. Residents participating in darkhouse spearing had $670.2 in total expenditures on average. Nonresident anglers spent on average $1,239.4 per year for fishing activities (Table 20) (see Appendix D for the approximate split in expenditures by activity).

[7]See Appendix E for a detailed discussion of the difference between resident and nonresident small game hunter expenditures.

Table 20. Average Season Expenditures, by Activity, North Dakota, 2018			
Residence/Activity	Average Season Expenditures		
	Variable	Fixed	Total
	---------- $ ----------		
Resident			
Deer			
Archery	468.8	500.32	969.12
Firearm	435.05	222.02	657.07
Gratis	269.74	158.92	428.66
Muzzleloader	275.10	150.32	425.42
Special Big Game	1,272.4	414.42	1,686.82
Pronghorn	485.80	186.92	672.72
Furbearer	467.33	511.52	978.85
Small Game			
Upland	466.30	329.52	795.82
Waterfowl	622.60	603.02	1,225.62
Turkey			
Fall Regular	166.33	121.42	287.75
Spring Regular	138.42	110.92	249.34
Fishing			
Open Water	1,329.70	3,014.17	4,343.97
Ice	523.90	748.6	1,272.50
Darkhouse Spearing	337.10	333.10	670.20
Nonresident			
Deer			
Archery	1,066.60	264.95	1,331.55
Firearm	943.60	124.15	1,067.75
Small Game	1,116.90	130.85	1,247.75
Furbearer	715.10	277.45	992.55
Fishing	1,003.60	235.83	1,239.43

Daily Expenditures

Average daily expenditures represent total spending over a season divided by the number of days of participation. Average daily expenditures are helpful when comparing spending among activities. Given variations in season lengths, harvest opportunities, and typical activities required for some types of hunting/fishing, total expenditures are not always an appropriate comparison. For example, firearm deer hunters have a relatively short season (16½ days) and are generally limited to one or two animals per season while upland game hunters may hunt for several months and can harvest birds throughout the season.[8]

Generally, pronghorn hunters had the highest average daily expenditures (Table 21). Among the hunting categories, pronghorn had the highest total daily expenditures of $280 in 2018 followed by nonresident firearm hunters, with total daily expenditures of $242.7 on average. Nonresident archery deer hunters spent on average $201.8 per day on average. Nonresident small game hunters spent about $215.1 per day on average. Resident upland and waterfowl hunters spent about $110.5 and $188.6 per day on average, respectively, during 2018 (Table 21). Furbearer and muzzleloader hunters had the lowest average total daily expenditures of all hunting activities ($50.5 and $77.3, respectively).

Average daily expenditures for open water fishing was the highest average daily expenditure ($276.7) followed by nonresident fishing ($169.8) as shown in Table 21. Average daily expenditures for resident ice fishing ($116.7) was the lowest among anglers with darkhouse spearing average daily expenditures being the second lowest ($124.1) as shown in (Table 21).

Total season expenditures for residents and nonresidents were comparable for similar activities; however, nonresidents generally spent fewer days hunting in the state than residents. As a result, daily expenditures were slightly higher for nonresidents relative to residents. Average daily expenditures for nonresidents were higher for lodging, meals, and other day-to-day expenses, while residents had higher average daily expenditures for equipment-related items (e.g., clothing, weapons, decoys) and other services (e.g., meat processing, veterinarian care, repairs, taxidermy).

[8]Upland game hunters can harvest birds throughout the season providing they do not exceed daily and seasonal possession limits. Personal consumption of game birds during the season can allow hunters to take numerous daily limits over the course of an entire season.

Table 21. Average Daily Expenditures, by Activity, North Dakota, 2018				
Residence/Activity	Average Days Participated	Average Daily Expenditures		
		Variable	Fixed	Total
		---------- $ ----------		
Resident				
Deer				
Archery	9.3	50.41	53.80	104.21
Firearm	4.4	98.88	50.46	149.33
Gratis	5	53.95	31.78	85.73
Muzzeloader	5.5	50.02	27.33	77.35
Special Big Game	9.9	128.53	41.86	170.38
Pronghorn	2.4	202.42	77.88	280.30
Furbearer	19.4	24.09	26.37	50.46
Small Game				
Upland	7.2	64.76	45.77	110 .53
Waterfowl	6.5	95.78	92.77	188.56
Turkey				
Fall Turkey	2.9	57.36	41.87	99.22
Spring Turkey	2.5	55.37	44.37	99.74
Fishing				
Open Water	15.7	84.69	191.99	276.68
Ice	10.9	48.06	68.68	116.74
Darkhouse Spearing	5.4	62.43	61.69	124.11
Nonresident				
Deer				
Archery	6.6	161.61	40.14	201.75
Firearm	4.4	214.45	28.22	242.67
Small Game	5.8	192.57	22.56	215.13
Furbearer	8.5	84.13	32.64	116.77
Fishing	7.3	137.48	32.31	169.78

Participation Rates

The ND Game and Fish Department (2018a) provided the number of licenses sold. However, not all individuals who purchase a license actually hunt or fish during the season. The number of active participants was based on using data from the participation and expenditure surveys (see the section on **Survey Design** on page 2) to estimate the percentage of individuals that indicated they had participated in the activity for which they were licensed. Participation was based on several criteria. Affirmative response to questions on the participation survey regarding if they purchased a license, if they actively participated in the activity, if they harvested any animal(s), where they hunted/fished, or if they provided information from the expenditure or participation questionnaire on days participated and/or listed expenses incurred during the season were all used to determine participation rates.

Participation rates was estimated for all survey categories (Table 22). Participation rates vary among the various hunting and fishing categories for several reasons. Typically, licenses which are difficult to obtain (e.g., the odds of drawing a lottery special big game license are low) have higher participation rates. Resident firearm deer, gratis, muzzleloader, special big game, pronghorn and waterfowl had participation rates over 85 percent. Resident archery and spring turkey hunting had participation rates between 70 and 81 percent (Table 22). Across all categories, participation rates for nonresident hunters and anglers were generally 77 percent or higher (Table 22). Participation rate for resident open water fishing was 95 percent while participation rate for ice fishing was 43 percent, the second lowest with the resident small waterfowl category representing the lowest participation rates among all survey categories (Table 22).

Table 22. License Sales, Active Participants, and Participation Rates, Hunters and Anglers, North Dakota, 2018

Activity	License Sales	Participation Rate	Active Participants[a]
		---------- % ----------	
Resident			
Deer			
Archery	26,114	81	21,042
Firearm	40,904	91	37,306
Gratis	13,402	85	11,426
Muzzleloader	1,025	89	910
Special Big Game	653	95	620
Pronghorn	410	90	370
Furbearer	66,675	44	29,253
Small Game			
Upland	71,197	56	39,732
Waterfowl	71,197	24	17,016
Turkey			
Fall Regular	3,524	62	2,200
Spring Regular	5,662	78	4,401
Fishing			
Open Water	151,913	95	144,317
Ice	151,913	43	65,323
Darkhouse Spearing[b]	5,387	69	3,717
Nonresidents			
Deer			
Archery	2,367	93	2,202
Firearm	198*	88*	175
Furbearer	3,131	77*	2,397
Small Game	40,025	94	37,486
Fishing	62,958	97	60,755

[a] Based on the percentage of survey respondents indicating participation in each activity during the 2017 season, and does not include participants under 16 years of age.

[b] A separate license is not required for darkhouse spearing; however, participants must comply with state fishing license requirements and register their name and address with the ND Game and Fish Department.

Some hunting categories, such as furbearer, will have lower participation rates, due to licensing structures. For example, a resident sportsman license enables the license holder to fish and hunt furbearer, upland game, and waterfowl; however, not all individuals purchasing that license intend to pursue game in all of the categories for which the license allows. Nonresident participation rates are high because no single license enables the holder to pursue all hunting or fishing activities in North Dakota. Nonresident hunters must purchase a specific license for each

hunting activity. Those purchasing a specific license are more likely to participate in that activity, resulting in higher participation rates than if the licenses were more general. Participation rates might be influenced by other factors, such as personal conflicts, adverse weather, family emergencies, and changes in individual preferences that may occur prior to hunting/fishing.

Open water fishing (residents) had the most participants of all hunting and fishing activities in North Dakota in 2018 with about 144,317 individuals (Table 22). When the five categories of resident deer hunting were combined (including pronghorn), those activities collectively had 71,304 active participants[9], the third highest category. Resident small game hunting, which is comprised of upland game and waterfowl hunting, combined for nearly 56,748 participants.[9] Nonresident small game had about 37,486 participants. Nonresident fishing with 60,755 active participants was the highest among nonresident hunting/angler categories (Table 22). Individuals can participate in more than one hunting and fishing activity; however, it is impossible given current records to estimate the number of individuals participating in any hunting and fishing activity in the state (i.e., it is impossible to only count the individual, for example, who hunted deer, upland game, and turkeys as one active participant).

Projected Total Direct Expenditures

The amount of total expenditures incurred in North Dakota by hunters and anglers is a function of the number of active participants and average total season expenditures per participant. Total participants in each hunting and fishing activity were multiplied by the average season total expenditures to arrive at an estimate of total hunter and angler expenditures.

Total direct expenditures by hunters and anglers in North Dakota during 2017 were estimated at $974.4 million (Table 23). Resident hunter and angler expenditures were $846.8 million and represented 87 percent of the total (Table 23). Nonresident hunter and angler expenditures were $127.6 million and represented 13 percent of the total. Resident and nonresident hunter expenditures were estimated at $186.6 million (19 percent of all expenditures). Resident and nonresident angler expenditures were $787.8 million and accounted for 81 percent of the total (Table 23).

[9]Active participants may not equal number of individuals. Total participants can include individuals who participate in more than one activity.

Table 23: Total Direct Expenditures, Residents and Nonresidents Hunters and Anglers, North Dakota, 2017-2018						
Activity	Resident		Nonresident		Total	
	Total	Percent	Total	Percent	Total	Percent
	- 000s $ -		- 000s $ -		- 000s $ -	
Hunting	134,324	16	52,271	41	186,595	19
Percent of hunting	72		28			
Fishing	712,509	84	75,302	59	787,811	81
Percent of fishing	90		10			
Total hunting/fishing	846,833		127,573		974,406	100
Percent of total	87		13			

Resident small game (including upland and waterfowl) accounted for 39 percent ($52.5 million) of all resident hunter expenditures (Table 24). Following small game, deer hunting contributed 37 percent ($50.2 million) while furbearer contributed 21 percent ($28.6 million) of all resident hunter expenditures (Table 24). Turkey and special big game hunting collectively accounted for about 2.0 percent of all resident hunter expenditures.

Nonresident expenditures related to small game were estimated at $46.7 million or about 89 percent of all nonresident hunter expenditures (Table 24). Deer and archery hunting collectively accounted for 6 percent of all nonresident hunter expenditures. Furbearer accounted for the remaining 5 percent or $2.4 million of nonresident hunting expenditures.

Resident open water fishing expenditures were e stimated at $626.9 million, representing over 88 percent of total resident angler expenditures (Table 24). Collectively, ice fishing and darkhouse spearing expenditures represented about 12 percent of all resident angler spending. Expenditures for open water fishing by nonresidents were estimated at $75.3 million (Table 24).

Expenditures for open water fishing generated the most spending with $702.2 million or 72 percent of all resident and nonresident hunting and angling expenditures (Table 24). Resident and nonresident small game was the second largest expenditure group with $99.3 million representing close to 10.2 percent of all spending. This was followed by resident and nonresident ice fishing with 9 percent of total expenditures. Deer hunting activities (resident and nonresident) accounted for 5.5 percent of all expenditures (Table 24).

Table 24. Total Direct Expenditures (excluding license purchases), by Hunting and Fishing Activity, Residents and Nonresidents, North Dakota, 2017-2018

Activity	Resident		Nonresident		Total	
	Total	Percent	Total	Percent	Total	Percent
	- 000s $ -		- 000s $ -		- 000s $ -	
Hunting						
Deer	50,190	37	3,119	6	53,309	5.5
Archery	20,392	15	2,932	6	23,324	2.4
Firearm	24,513	18	187	0	24,700	2.5
Gratis	4,898	4			4,898	0.5
Muzzeloader	387	0			387	0
Special Big Game	1,046	1	na		1,046	0.1
Pronghorn	249	0	na		249	0
Turkey[a]	1,731	1	na		1,731	0.2
Furbearer	28,634	21	2,379	5	31,013	3.2
Small Game[b]	52,475	39	46,773	89	99,248	10.2
Upland	31,620	23.5	na	na	31,620	8
Waterfowl	20,855	15.5	na	na	20,855	2.1
Total	134,324	100	52,271	100	186,595	19
Fishing						
Open Water[c]	626,894	88	75,302	100	702,196	72
Ice[d]	83,124	12	na		83,124	9
Darkhouse Spearing	2,491	0	na		2,491	0
Total	712,506	100		100	787,811	81
Total Hunting/Fishing	846,833		127,573		974,406	

Note: Percentages and totals may not add due to rounding. na = not applicable.

[a] Includes fall regular, fall gratis, spring regular, and spring gratis hunter expenditures.

[b] Resident upland game and waterfowl hunters were surveyed separately. Nonresident upland game and waterfowl hunters were surveyed as one group. The split in spending between nonresident upland game and waterfowl hunting was based on a survey question requesting the percentage of total expenses attributable to each game type.

[c] Resident open water fishing, ice fishing, and darkhouse spearing activities were surveyed separately. Nonresident anglers were surveyed as one group.

Total Economic Effects

The North Dakota Input-Output Model was used to develop estimates of secondary economic effects (i.e., multiplier effects), gross business volume (i.e., sum of direct and secondary effects in all economic sectors), secondary employment, and state-level tax revenues. Total direct expenditures from all hunting and fishing activities were allocated to the appropriate sectors of the North Dakota Input-Output Model (see Table 3).

Total direct expenditures ($974.4 million) from all hunting and fishing activities in North Dakota for the 2017-2018 season generated $1.1 billion in secondary economic effects. The total economic contribution (direct and secondary effects) of hunting and fishing in North Dakota was estimated at $ 2.1 billion (Table 25).

Resident and nonresident hunters spent $186.6 million on hunting activities in the state in 2017, which generated an additional $227.6 million in secondary economic effects in the state economy. Hunting activities generated $88.8 million in economy-wide personal income and $206.6 million in statewide retail trade. Hunting activities in 2017 generated $414.2 million in gross business volume (Table 25).

Resident and nonresident anglers spent $787.8 million on fishing activities in the state in 2017, which generated an additional $911.5 million in secondary economic effects in the state economy. Fishing activities generated $345.3 million in economy-wide personal income and $931.0 million in statewide retail trade. Fishing activities in 2017 generated $1,699.3 million in gross business volume (Table 25).

Resident hunters and anglers spent about $847.0 million in the state in 2017. Direct expenditures from resident hunters and anglers generated an additional $972.0.0 million in secondary economic effects within the state economy. Economy-wide personal income and statewide retail trade activity resulting from resident hunter and angler spending in the state was estimated at $367.8 million and $1,012.1 million, respectively. The gross business volume resulting from resident hunters and anglers was estimated at nearly $1.8 billion (Table 25).

Nonresident hunters and anglers spent about $127.4 million in the state in 2017. Direct expenditures from nonresident hunters and anglers generated an additional $167.1 million in secondary economic effects within the state economy. Economy-wide personal income and statewide retail trade activity resulting from nonresident hunter and angler spending in the state was estimated at $66.3 million and $125.4 million, respectively. The gross business volume resulting from nonresident hunters and anglers was estimated at nearly $294.5.7 million (Table 25).

Direct expenditures and secondary economic effects from resident hunters, resident anglers, and nonresident hunters and anglers in 2017-18 generated about $6.5 million, $36.0 million, and $5.7 million in state-level tax collections, respectively (Table 25). Total state-level sales and use, personal income tax, and corporate income tax collections from resident hunting and fishing and nonresident hunting and fishing were estimated at $8.9 million and $39.3 million respectively. Total state-level tax collections were estimated at $48.2 million (Table 25)

Table 25. Total Economic Contribution of Resident and Nonresident Hunting and Fishing Activities in North Dakota, 2017-2018			
Activity	Resident	Nonresident	Total[a]
Hunting	---------- 000s $ ----------		
Direct Expenditures	134,511	52,084	186,595
Secondary Effects	158,998	68,588	227,586
Gross Business Volume	293,509	120,672	414,181
Personal Income	61,196	27,613	88,809
Retail Trade	155,202	51,374	206,576
Secondary Employment[b]	459	196	655
State tax collections[c]	6,510	2,351	8,861
Fishing			
Direct Expenditures	712,523	75,302	787,825
Secondary Effects	813,004	98,508	911,512
Gross Business Volume	1,525,527	173,810	1,699,337
Personal Income	306,611	38,688	345,299
Retail Trade	856,961	74,063	931,024
Secondary Employment[b]	2,344	264	2,608
State tax collections[c]	35,965	3,338	39,303
Total Hunting and Fishing			
Direct Expenditures	847,034	127,386	974,420
Secondary Effects	972,002	167,096	1,139,098
Gross Business Volume	1,819,036	294,482	2,113,518
Personal Income	367,807	66,301	434,108
Retail Trade	1,012,163	125,437	1,137,600
Secondary Employment[b]	2,803	460	3,263
State tax collections[c]	42,475	5,689	48,164

[a] Totals may not add due to rounding.

[b] Secondary employment was measured as full-time equivalent jobs.

[c] State tax collections included sales and use, personal income, and corporate income taxes.

Expenditures in Rural Areas

Hunters and anglers were asked to indicate the percentage of expenditures made in rural areas in an attempt to understand the distribution of hunter and angler spending within the state. The percentage of expenditures made in rural areas was applied to average season expenditures for both rural and urban, and resident and nonresident hunters and anglers to determine total rural spending in 2017-2018.

Rural Participants

The percentage of season expenditures incurred in rural areas by rural resident hunters ranged from 66 percent to 85 percent (Table 26). Nonresident hunters generally had similar percentage of seasonal spending in rural areas (76 percent on average) across all hunting groups.

Rural resident anglers participating in open water fishing had the highest average total season spending in rural areas of all rural participants ($3,171.1). Rural nonresident big game hunters had the second highest average total season spending in rural areas ($1,197.6), followed by ice fishing and waterfowl with $979.8 and $919.2, respectively. Rural resident deer archery hunters spent $668.7 in rural areas of the state. Rural resident upland game hunters spent $644.6 in rural areas of the state. Rural nonresident and rural resident firearm deer hunters spent $998.6 and $512.5, respectively in rural areas of the state. Rural gratis deer hunters and pronghorn spent $325.8 and $531.5 per season in rural areas, respectively (Table 26).

Total season expenditures in rural areas were highest for rural resident anglers participating in open water fishing ($196,787.1 million). The next highest groups were rural resident ice fishing, and resident furbearer with $28,802.1 million, $12,209.5 total expenditures in rural areas, respectively (Table 26). Nonresident firearm and pronghorn spent the least in rural areas, $49.6 thousand and $104.3 thousand, respectively. Total rural expenditures by resident and nonresident rural hunters and anglers totaled an estimated $316,642.2 million (Table 26).

Table 26. Hunter and Angler Expenditures in Rural Areas by Rural Participants, North Dakota, 2017-2018						
Activity	Average Season Spending[a]	Breakout of Rural Participants for Each Activity[b]		Average Rural Spending per Season per Person		Total Season Expenditures in Rural Areas
Resident	--- $ ---	- % -	- total -	- % -	-- $ --	-- $ --
Deer						
Archery	969.12	51	10,731	69	668.69	7,175,884
Firearm	657.07	43	16,042	78	512.51	8,221,563
Gratis	428.66	78	8,912	76	325.78	2,903,411
Muzzleloader	425.42	52	473	75	319.07	150,971
Special Big Game	1,686.82	49	304	71	1,197.64	363,868
Pronghorn	672.72	53	196	79	531.45	104,263
Furbearer	978.85	52	15,211	82	802.66	12,209,52
Small Game						
Upland	795.85	45	17,879	81	644.64	11,525,683
Waterfowl	1,225.62	40	6,806	75	919.22	6,256,575
Turkey						
Fall	287.75	41	902	79	227.32	205,016
Spring	249.34	37	1,628	71	177.03	288,266
Fishing						
Open Water	4,343.97	43	62,056	73	3,171.10	196,787,124
Ice	1,272.50	45	29,395	77	979.83	28,802,118
Darkhouse Spearing	670.20	55	2,044	78	522.76	1,068,696
Nonresident						
Deer						
Archery	1,331.55	52	1,145	75	998.66	1,143,437
Firearm	1,067.75	37	65	72	768.78	49,625
Small Game	1,247.75	39	14,620	85	1,060.59	15,505,473
Furbearer	992.55	51	1,223	84	833.74	1,019,384
Fishing	1,239.43	46	27,947	66	818.02	22,861,357
Total, all groups	na	48	217,516	76	na	316,642,236

[a] Average season expenditures for all participants (rural and urban).

[b] Percentage of all participants that were rural and the number of active participants that were rural.

[c] Simple average and does not reflect weighting by dollar volume or number of participants.

Urban Participants

The percentage of season expenditures incurred in rural areas by urban resident hunters ranged from 33 percent to 80 percent (Table 27). Urban nonresident small game and furbearer hunters generally spent the highest percentage of their season expenditures in rural areas, while urban resident spring turkey spent the lowest percentage of their season expenditures in rural areas. Urban resident hunters, averaged across all hunting groups, spent about 49 percent of their total season expenditures in rural areas.

Urban resident open water anglers had the highest average total season spending in rural areas of all urban participants ($1,954.8) (Table 27). The next highest groups were urban nonresident small game hunters and resident special big game hunters with $998.2 and $894, respectively. Four other groups, urban nonresident archery, nonresident urban deer firearm, urban resident waterfowl, urban resident furbearer, nonresident fishing, and urban resident ice fishing all spent on average over $500 per person in rural areas. Urban resident upland game and urban nonresident furbearer hunters spent $461.6 and $734.5, respectively, in rural areas. Urban spring turkey hunters spent the lowest total amount per season in rural areas $82.3 (Table 27).

Total season expenditures in rural areas were highest for urban resident anglers participating in open water fishing ($160,802.5 million). The next highest groups were nonresident fishing ($24,397.5 million), nonresident small game ($22,825.6 million), resident ice fishing ($20,572.9 million), resident furbearer ($12,209 million) and upland ($10,087 million). (Table 27). Pronghorn and urban resident muzzleloader deer hunters had the least total spending in rural areas, $76.1 thousand and $74.3 thousand, respectively. Total rural expenditures by resident and nonresident urban hunters and anglers were estimated at $266.912.3 million (Table 27).

All Participants

Rural resident hunters, across all hunting groups, spent about $49.4 million in rural areas of North Dakota during the 2017-2018 season (Table 28). Urban resident hunters spent about $36.0 million in rural areas. Rural and urban resident hunters combined spent about $85.4 million in rural areas of the state in 2017. Rural expenditures by rural hunters represented 57.8 percent of all resident hunter expenditures in rural areas. Rural and urban hunter expenditures in rural areas represented 14.6 percent of all rural hunting and fishing expenditures in the state in 2018.

Rural resident anglers spent about $226.7 million in rural areas of North Dakota during the 2071-2018 season (Table 28). Urban resident anglers spent about $181.8 million in rural areas. Rural and urban resident anglers combined spent about $408.5 million in rural areas of the state in 2017. Rural expenditures by rural anglers represented 55.5 percent of all resident angler expenditures in rural areas. Rural and urban angler expenditures in rural areas represented 70.0 percent of all rural hunting and fishing expenditures in the state in 2017.

Rural resident hunters and anglers spent about $276.1 million in rural areas of North Dakota in 2017. Urban resident hunters and anglers spent $217.9 million in rural areas of the

state in 2017 (Table 28). Rural and urban resident hunters and anglers spent $493.9 million in rural areas in 2017, representing 84.6 percent of all rural expenditures (Table 28).

Nonresident hunters spent $42.4 million in rural areas of the state during the 2017-2018 season. Nonresident anglers spent $47.3 million in rural areas of the state in 2017. Rural and urban nonresident hunters and anglers spent $89.6 million in rural areas in 2017, representing 15.4 percent of all rural expenditures (Table 28).

Total rural expenditures for all groups, resident and nonresident, were estimated at $583.6 million in North Dakota during the 2017-2018 season (Table 28). Rural expenditures represented 54.3 percent of all expenditures made by resident and nonresident hunters and anglers in the state in 2018.

Table 27. Hunter and Angler Expenditures in Rural Areas by Urban Participants, North Dakota, 2017-2018

Activity	Average Season Spending[a]	Breakout of Rural Participants for Each Activity[b]		Average Rural Spending per Season per Person		Total Season Expenditures in Rural Areas
Resident	--- $ ---	- % -	- total -	- % -	-- $ --	-- $ --
Deer						
Archery	969.12	49	10,310	40	387.65	3,996,798
Firearm	657.07	57	21,264	51	335.11	7,125,844
Gratis	428.66	22	2,514	52	222.90	560,307
Muzzleloader	425.42	48	437	40	170.17	74,324
Special Big Game	1,686.82	51	316	53	894.01	282,706
Pronghorn	672.72	47	174	65	437.27	76,074
Furbearer	978.85	48	14,041	55	538.37	12,209,522
Small Game						
Upland	795.85	55	21,852	58	461.59	10,086,949
Waterfowl	1,225.62	60	10,210	47	576.04	5,881,181
Turkey						
Fall	287.75	59	1,298	42	120.86	156,848
Spring	249.34	63	2,773	33	82.28	228,133
Fishing						
Open Water	4,343.97	57	82,261	45	1,954.7	160,802,476
Ice	1,272.50	55	35,927	45	572.63	20,572,941
Darkhouse Spearing	670.20	45	1,673	41	274.78	459,614
Nonresident						
Deer						
Archery	1,331.55	48	1,057	63	838.88	886,603
Firearm	1,067.75	63	110	65	694.04	76,282
Small Game	1,247.75	61	22,867	80	998.20	22,825,553
Furbearer	992.55	49	1,175	74	734.49	862,812
Fishing	1,239.43	54	32,807	60	743.66	24,397,496
Total, all groups	na	52	262,956	53	na	266,912,309

[a] Average season expenditures for all participants (rural and urban).

[b] Percentage of all participants that were urban and the number of active participants that were urban.

[c] Simple average and does not reflect weighting by dollar volume or number of participants.

Table 28. Hunter and Angler Expenditures in Rural Areas, All Participants, North Dakota, 2017-2018				
	Rural Spending			
Group	Rural Participants	Urban Participants	All Participants	Share of All Rural Spending
	----------000s $ ----------			-- % --
Resident Hunters	49,405	36,029	85,434	14.6
group percent	57.8	42.2		
Resident Anglers	226,658	181,835	408,493	70.0
group percent	55.5	44.5		
Total Resident	276,063	217,864	493,927	84.6
group percent	55.9	44.1		
Nonresident Hunters	17,718	24,651	42,369	7.3
group percent	41.8	58.2		
Nonresident Anglers	22,861	24,398	47,259	8.1
group percent	48.4	51.6		
Total Nonresident	40,579	49,049	89,628	15.4
group percent	45.3	54.7		
Total, all groups	316,642	266,912	583,555	100.0
group percent	54.3	45.7		

Comparison of Spending in 2011 and 2018

Average season expenditures, total expenditures by hunting and fishing survey groups, and statewide economic effects from hunter and angler expenditures in 2011 were compared to those in 2017. Expenditures made in 2011 were adjusted to reflect 2018-dollar equivalents using the CPI (U.S. Department of Labor 2018).

Total direct expenditures, which represent the sum of all hunter and angler spending, are a function of the number of hunters and anglers and average season spending. Changes in either component will affect total direct expenditures. When comparing total direct expenditures between periods, changes in both participation levels and average season spending was examined.

Season Expenditures

Resident archery deer, gratis hunters and muzzleloader decreased their average season spending from 2011-2012 to 2017-2018 (Table 29). Archery deer hunters decreased their average spending by about 27 percent while a 12 percent decrease in average season spending observed for gratis hunters. The decrease in average season spending for muzzleloader (-1.6 percent) was comparatively lower over the period. Firearm resident deer hunters had a modest 2 percent increase in average spending while special big game and furbearers hunters had 27.8 percent and 18.2 percent increase in average season spending between 2011-2012 and 2017-2018.

Resident upland spent about 6.1 percent less on average in 2017-2018 than in 2011-2012 (Table 29). Resident waterfowl hunters on the other hand witnessed a 24.1 percent increase in spending on average in 2017-2018 relative to 2011-2012 period. Fall turkey hunters (13.8 percent) had noticeable increases in average season spending between the 2011-2012 and 2017-2018 periods. Increase in average season spending for spring turkey (7.7 percent) was about half that for fall turkey.

Nonresident archery deer posted increases in average season spending of 25.5 percent (Table 29). Similarly, nonresident firearm deer hunters increased their average season spending in the 2017-2018 season by nearly $198.1 or 22.8 percent more than average spending in the 2011-2012 season. Nonresident anglers spent more on average (1.7 percent) during the 2017-2018 season than in the 2011-2012 season. Nonresident small game hunters in 2017-2018 increased their average spending by 13.4 percent over 2011-2012 season spending levels. Overall, 14 of the 19 hunting and fishing groups (with the exception of pronghorn that was not available in the 2011-2012) examined increased average season expenditures from 2011-2012 to 2017-2018 seasons (Table 29).

Table 29. Comparison of Average Variable, Fixed, and Total Season Expenditures, by Activity, North Dakota, 2011-2012 and 2017-2018							
	2011-2012 Season Expenditures[a]			2017-2018 Season Expenditures			Change in Total
Category	Variable	Fixed	Total	Variable	Fixed	Total	
	----------2018 $----------						
Resident							
Deer							
Archery	677.04	658.50	1,335.54	468.8	500.32	969.12	-27.4%
Firearm	447.30	195.73	643.04	435.05	222.02	657.07	2.2%
Gratis	328.86	158.85	487.71	269.74	158.92	428.66	-12.1%
Muzzleloader	271.12	161.19	432.31	275.10	150.32	425.42	-1.6%
Special Big Game	988.78	331.46	1,320.24	1,272.4	414.42	1,686.82	27.8%
Pronghorn	na	na	na	485.80	186.92	672.72	na
Furbearer	403.73	424.18	827.92	467.33	511.52	978.85	18.2%
Small Game							
Upland	602.37	244.87	847.24	466.30	329.52	795.82	-6.1%
Waterfowl	635.59	351.77	987.36	622.60	603.02	1,225.62	24.1%
Turkey							
Fall	170.43	82.34	252.77	166.33	121.42	287.75	13.8%
Spring	148.04	83.57	231.61	138.42	110.92	249.34	7.7%
Fishing							
Open Water	926.60	2,395.73	3,322.33	1,329.7	3,014.17	4,343.97	30.7%
Ice	420.49	329.55	750.04	523.9	748.6	1,272.50	69.7%
Darkhouse	240.33	222.37	462.69	337.1	333.10	670.20	44.8%
Nonresident							
Deer							
Archery	908.51	152.17	1,060.69	1,066.6	264.95	1,331.55	25.5%
Firearm	726.11	143.56	869.67	943.6	124.15	1,067.75	22.8%
Small Game	912.96	187.65	1,100.61	1,116.9	130.85	1,247.75	13.4%
Furbearer	769.38	258.49	1,027.87	715.1	277.45	992.55	-3.4%
Fishing	725.08	493.46	1,218.54	1,003.6	235.83	1,239.43	1.7%

[a] Adjusted for inflation to reflect 2018 dollars using the Consumer Price Index (U.S. Department of Labor 2017).
na = not available

Hunter and Angler Participation

Except for resident waterfowl hunters and pronghorn (season was closed in 2011-2012) the number of active participants generally paralleled changes in license sales (Table 30). Waterfowl hunters had a 10 percent decrease in licenses while the number of hunters decreased 32 percent. The number of special big game hunters decreased by 8 percent, declining from 675 hunters in 2011-2012 to 620 hunters in 2017-2018. Sales of all types of resident deer licenses decreased from 2011-2012 to 2017-2018, except for resident archery hunters that increases 41 percent (Table 30).

While the total number of licenses sold that would allow individuals to pursue furbearers decreased by 9 percent from 2011-2012 to 2017-2018, the number of individuals actively hunting furbearers in the state decreased by 31 percent. The sales of licenses that would allow residents to hunt upland game in the state over the period declined (-10 percent) as well as the number of resident upland game hunters decreased by 24 percent from 2011-2012 to 2017-2018 (Table 30).

Fall and spring turkey license sales and number of resident turkey hunters both decreased from 2011-2012 to 2017-2018. The number of resident anglers participating in open water fishing in 2017-2018 dipped relative to the 2011-2012 period. Resident anglers participating in ice fishing was higher in 2017-2018 compared to 2011-2012 (Table 30).

The number of nonresident deer hunters, both firearm and archery decreased by 95 percent and 22 percent, respectively from 2011-2012 to 2017-2018. Nonresident small game hunters decreased by 6 percent over the period. The number of nonresident anglers increased by (66 percent) over both periods (Table 30). Overall, only resident and nonresident angler licenses and participants increased over the 2011-2012 and 2017-2018 period.

Table 30. Comparison of License Sales and Active Participants, by Activity, North Dakota, 2011-2012 and 2017-2018

	2011-2012 Season		2017-2018 Season		Percentage Change 2011-2012 to 2017-2018	
Activity	Licenses	Participants	Licenses	Participants	Licenses	Participants
Resident						
Deer						
Archery	18,515	16,478	26,114	21,042	41	28
Firearm	91,935	82,830	40,904	37,306	-56	-55
Gratis	14,789	12,541	13,402	11,426	-9	-9
Muzzleloader	2,106	1,790	1,025	910	-51	-49
Special Big Game	689	675	653	620	-5	-8
Pronghorn	na	na	410	3 70	na	na
Furbearer	73,523	42,643	66,675	29,253	-9	-31
Small Game						
Upland	78,715	51,952	71,197	39,732	-10	-24
Waterfowl	78,715	25,189	71,197	17,016	-10	-32
Turkey						
Fall Regular	4,708	3,154	3,524	2,200	-25	-30
Spring Regular	6,672	4,804	5,662	4,401	-15	-8
Fishing						
Open Water	125,286	116,516	151,913	144,317	21	24
Ice	127,286	46,356	151,913	65,323	19	41
Darkhouse Spearing	1,842	1,326	5,387	3,717	192	180
Nonresident						
Deer						
Archery	2,884	2,826	2,367	2,220	-18	-22
Firearm	4,045	3,641	198	175	-95	-95
Small Game	42,049	39,947	40,025	37,486	-5	-6
Furbearer	4,310	2,500	3,131	2,397	-27	-4
Fishing	28,197	36,669	62,958	60,755	123	66

na = not available

Total Direct Expenditures

Total direct expenditures in North Dakota adjusted for inflation increased by $267.3 million or 37.8 percent from 2011-2012 to 2017-2018 (Table 31). Expenditures for nondurable goods increased by about 29.7% percent and purchases of durable goods increased by 44.3 percent. The greatest increase in spending between 2011-2012 and 2017-2018 came from durable good purchases, which increased by nearly $173.8 million and represented 65 percent of the increase in total spending by all hunters and anglers.

Total direct expenditures by resident hunters and anglers in 2017-2018 increased by $234.3 million or about 38.3 percent from 2011-2012. Total direct expenditures by nonresident hunters and anglers in 2017-2018 increased by $32.9 million or 34.9 percent from 2011-2012 (Table 31). Expenditures for hunting (resident and nonresident) decreased by $52.7 million or 22 percent from 2011-2012 to 2017-2018. Expenditures for fishing (resident and nonresident) increased by $320 million or 68.4 percent over the period (Table 31).

The relative contribution of various hunting and fishing categories to total expenditures from all hunting and fishing activities was examined for the 2011-2012 and 2017-2018 seasons (Table 32). In 2011-2012, spending by hunters comprised 34 percent of all direct expenditures, compared to 19.1 percent of all direct expenditures in 2017-2018. Spending by resident hunters comprised 27 percent all direct expenditures in 2011-2012 compared to 14 percent of all expenditures in 2017-2018. The share of total direct expenditures by nonresident hunters was 7 percent in 2011-2012 and 5 percent in 2017-2018.

In 2011-2012, spending by resident and nonresident anglers comprised 66 percent of all direct expenditures, compared to 81 percent of all direct expenditures in 2017-2018. Spending by resident anglers comprised 60 percent all direct expenditures in 2011-2012, which increased to 73 percent in 2017-2018. The share of total direct expenditures by nonresident anglers was about 7 percent 2011-2012 and 8 percent in 2017-2018 (Table 32).

Total spending by resident hunters and anglers represented 86.3 percent of all hunter and angler direct expenditures in 2011-2012 and 86.9 percent in 2017-2018. Nonresident spending was 14 percent of total expenditures in 2011-2012 and 13 percent in 2017-2018 (Table 32).

Table 31. Comparison of Total Direct Expenditures, by Residence and Activity, North Dakota, 2011-2012 and 2017-2018				
Category	Total Direct Expenditures		Change from 2011-2012 to 2017-2018	
	2011-2012	2017-2018	Dollars	Percent
All Activities	---------- 000s 2018 $ ----------			
Variable Expenses	315,098	408,606	93,508	29.7
Fixed Expenses	391,490	565,799	174,309	44.5
Total	706,589	974,406	267,817	37.9
All Activities				
Residents	612,508	846,323	234,325	38.3
Nonresidents	94,080	127,573	33,492	35.6
All Hunting	239,419	186,595	-52.824	-22.1
Residents	190,021	134,324	-55,697	-29.3
Nonresidents	49,398	52,271	2,873	5.8
All Fishing	467,170	787,811	320,641	68.6
Residents	422,487	712,509	290,022	68.7
Nonresidents	44,683	75,302	30,619	68.5

Note: Totals may not add due to rounding

Changes in total direct expenditures for the various hunter and angler survey groups ranged from a decrease of 94 percent for nonresident firearm to a 285 percent increase in resident darkhouse fishing from 2011-2012 to 2017-2018 (Table 33). Apart from pronghorn not reported in the last study, eleven survey groups out of eighteen had less total spending in 2017-2018 than in 2011-2012. Corresponding closely with decreased number of participants, total direct expenditures dropped for resident and nonresident categories. These include all resident deer hunting categories, resident furbearer, resident small game, and turkey. Declines for nonresident categories include firearm and furbearer.

Resident anglers participating in ice fishing spent $239.7 million more in 2017-2018 than in 2011-2012, which was the largest monetary increase of any hunting or angling survey group. Among the hunting categories, total direct expenditures for special big game increased by 17.4 percent or $155 thousand in 2017-2018 compared to 2011-2012.

Resident fishing activities in general represented the largest percentage of total expenditures in both the 2017-2018 and 2011-2012 periods. Resident open water and ice fishing represent 64.3 percent and 8.5 percent of total direct expenditures in 2017-2018 respectively. In fact all resident fishing activities combined (open, ice, darkhouse spearing) for about 73.1 percent of total direct expenditures in 2017-2018, while that proportion was about 60 percent in 2011-2012 (Table 33).

Table 32. Resident and Nonresident Expenditures as a Percentage of Total Direct Expenditures and Percentage of Activity, North Dakota, 2011-2012 and 2017-2018		
	Percentage of All Direct Expenditures	
Category	2011-2012	2017-2018
Hunting	33.8	19.1%
Resident	26.6	13.8%
Nonresident	7.2	5.4%
Fishing	66.2	80.9%
Residents	59.8	73.1%
Nonresidents	6.5	7.7%
All Resident Expenditures	86.3	86.9%
All Nonresident Expenditures	13.7	13.1%
	Percentage of Category by Residence	
	2011-2012	2017-2018
Hunting		
Residents	78.7	72.0
Nonresidents	21.3	28.0
Fishing		
Residents	90.2	90
Nonresidents	9.8	10

Table 33. Comparison of Total Direct Hunter and Angler Expenditures, by Hunting and Fishing Activity, North Dakota, 2011-2012 and 2017-2018

Activity	Total Direct Expenditures		Change from 2011-12 to 2017-18		Percentage of Total Direct Expenditures	
	2011-2012	2017-2018	Dollars	Percent	2011-2012	2017-2018
Resident	---------- 000s 2018 $ ----------					
Deer						
Archery	22,007	20,392	-1,614	-7.3	3.1	2.1
Firearm	53,271	24,513	-28,758	-54.0	7.5	2.5
Gratis	6,131	4,898	-1,234	-20.1	0.9	0.5
Muzzleloader[a]	773	387	-386	-49.9	0.1	0.0
Special Big Game	891	1,046	155	17.4	0.1	0.1
Pronghorn	na	249	na	na	na	na
Furbearer	35,305	28,634	-6,670	-18.9	5.0	2.9
Small Game						
Upland	44,864	31,620	-13,244	-29.5	6.3	3.2
Waterfowl	24,871	20,855	-4,016	-16.1	3.5	2.1
Turkey						
Fall Turkey	798	633	-164	-20.6	0.1	0.1
Spring Turkey[a]	1,113	1,097	-16	-1.4	0.2	0.1
Fishing						
Open Water	387,104	626,894	239,790	61.9	54.7	64.3
Ice	34,769	83,124	48,355	139.1	4.9	8.5
Darkhouse Spearing	647	2,491	1,844	285.1	0.1	0.3
Nonresident						
Deer						
Archery	2,778	2,932	155	5.6	0.4	0.3
Firearm	3,167	187	-2,980	-94.1	0.5	0.0
Small Game	40,664	46,773	6,109	15.0	5.8	4.8
Furbearer	2,487	2,379	-108	-4.3	0.4	0.2
Fishing	45,287	75,302	30,015	66.3	6.4	7.7

[a] These groups were not surveyed in 2001. Average season expenditures in 2001 were set to the 1996 average expenditures after adjusting for inflation. The change in total direct expenditures depicted in the table for these groups between 2011 and 2017 is due only to a change in hunter participation. na=not available

Total Economic Effects

The North Dakota Input-Output Model was used to develop estimates of secondary economic effects (i.e., multiplier effects), gross business volume (i.e., sum of direct and secondary effects in all economic sectors), secondary employment, and state-level tax collections. Total direct expenditures from all hunting and fishing activities were allocated to various sectors of the North Dakota Input-Output Model (see Table 3).

Generally, the percentage change in secondary and total economic effects between the 2011-2012 and 2017-2018 seasons paralleled the percentage change in total direct expenditures in those seasons (Table 34).Total direct expenditures increased about 38 percent from 2011-2012 to 2017-2018. Secondary and total economic effects increased by 41 percent and 39 percent respectively.

Total direct expenditures from all hunting and fishing activities in North Dakota for the 2017-2018 season generated about $1,139.1 million in secondary economic effects. By comparison, hunting and fishing activities generated $810.5 million in secondary economic effects in the 2011-2012 season. Secondary or multiplier effects throughout the North Dakota economy increased $328.6 million from 2011-2012 to 2017-2018 (Table 34).

The total economic effect (i.e., direct and secondary effects in all sectors) of resident and nonresident hunter and angler expenditures in North Dakota in 2017-2018 was estimated to be about $2.1 billion. By comparison, the total economic effect from the same activities in 2011-12 were estimated at $1.5 billion. Hunting and fishing activities produced an increase of $595.9 million in total business activity within the state over the period (Table 34).

The gross business volume (i.e., direct and secondary effects) resulting from hunting activities in the state from 2011-2012 to 2017-2018 decreased 21 percent or a 109.3 million decline (Table 34). The gross business volume from fishing activities over the period increased 71 percent or by $705.2 million.

Other key economic measures, such as statewide retail trade activity and economy-wide personal income also changed proportionally to the increase in total direct expenditures (Table 34). Retail trade activity in the state, resulting from hunting and fishing activities, increased by $290.9 million from 2011-12 to 2017-18. Economy-wide personal income (i.e., wages, salaries, retained earnings from business owners) increased $127 million or 41 percent over the period. Collections of state taxes increased by $4.1 million over the period (Table 34).

Table 34. Comparison of Total Economic Contribution of Resident and Nonresident Hunting and Fishing Activities in North Dakota, 2011-2012 and 2017-2018				
Activity	2011-2012 Season[a]	2017-2018 Season	Change 2011-2017	
Hunting	---------- 000 2018 $ ----------			---- % ----
Direct Expenditures	239,337	186,595	-52,742	-22.0
Secondary Effects	284,119	227,586	-56,533	-20.0
Gross Business Volume	523,456	414,181	-109,275	-21.0
Personal Income	109,398	88,809	20,589	-19.0
Retail Trade	274,459	206,576	67,883	-25.0
State tax collections[b]	14,480	8,861	5,619	-39.0
Fishing				
Direct Expenditures	467,775	787,825	320,050	68%
Secondary Effects	526,403	911,512	385,109	73%
Gross Business Volume	994,178	1,699,337	705,159	71%
Personal Income	197,629	345,299	147,670	75%
Retail Trade	572,219	931,024	358,805	63%
State tax collections[b]	29,589	39,303	9,714	33%
Total Hunting and Fishing				
Direct Expenditures	707,112	974,420	267,308	38%
Secondary Effects	810,522	1,139,098	328,576	41%
Gross Business Volume	1,517,634	2,113,518	595,884	39%
Personal Income	307,028	434,108	127,080	41%
Retail Trade	846,678	1,137,600	290,922	34%
State tax collections[b]	44,070	48,164	4,094	9%

[a] Adjusted for inflation to reflect 2017 dollars using the CPI (U.S. Department of Labor 2012).

[b] State tax collections include sales and use, personal income, and corporate income taxes.

Summary

This study is a continuation of a series of studies that have periodically assessed the socio-economic aspects of hunting and angling in North Dakota. The purpose of this study was to estimate the characteristics, expenditures, and economic effects of hunters and anglers in North Dakota during the 2017-2018 season and compare current information to previous studies to identify trends in hunting and angling activities.

The ND Game and Fish Department conducted a mail survey of 24,451 resident hunters and anglers and 7,914 nonresident hunters and anglers to solicit information on their expenditures during the 2017-2018 season. Hunting and fishing activities were divided into 19 different categories, based on license type (i.e., resident, nonresident, gratis), game type (i.e., special big game, deer, furbearers, pronghorn, turkey, upland, waterfowl, and fish), and, when applicable, by weapon type (i.e., archery, firearm, muzzleloader). Across all hunting and fishing categories, 12,291 individuals responded to the survey and 662 mailings were undeliverable, resulting in an overall response rate of 45 percent.

Each survey group was mailed a questionnaire requesting information on purchases made within North Dakota in 2018 for a specific hunting or fishing activity. Additional information on residence, age, income, and other characteristics also was solicited. Expenses were categorized into variable or nondurable goods/services and fixed or durable goods. Average variable, fixed, and total (variable and fixed) expenditures per hunter and angler were estimated for each survey group.

To project total direct spending by hunters and anglers during the 2017-2018 season, average expenditures by hunting and fishing participants were multiplied by number of active participants. Total direct expenditures were applied to the North Dakota Input-Output Model to generate estimates of secondary economic effects, gross business volume, secondary employment, and state tax collections.

The following sections provide highlights of the characteristics of hunting and fishing participants, average expenditures, total economic effects of hunting and fishing activities, and comparisons of key economic measures between 2011 and 2018.

Hunter and Angler Characteristics

- The typical resident hunter was 49 years old, lived in a community over 2,500 population, hunted 7 days per season in the state, and had a gross household income over $150,000.

- The typical resident angler was 49 years old, fished 11 days per year in the state, lived in an urban community, and had a gross household income between $75,000 and $99,000.

- The typical nonresident hunter was 51 years old, hunted 7 days per season in the state, lived in a community over 2,500 population, and had a gross household income over $150,000.

- The typical nonresident angler was 58 years old, fished 7 days per year in the state, lived in an urban community, and had a gross household income between $75,000 and $99,000.

Average Season Expenditures

Average individual spending for hunting and fishing participants was estimated for the 2017-2018 season. Average individual spending varied substantially across the survey groups. Spring turkey, as a group, had the lowest average total season expenditures and resident open water fishing had the highest average total season spending.

- The lowest average season spending ($249) was for spring turkey hunters.
- The highest average season spending ($4,344) was for resident open water anglers.

Average season expenditures by resident and nonresident small game hunters were different. Resident upland game hunters averaged $796 per season, resident waterfowl hunters averaged $1,226 per season, and nonresident small game hunters (which included expenses for both upland and waterfowl hunting) averaged $1,248 per season.

- Average season expenditures by resident firearm deer hunters were $657 and nonresident firearm deer hunters were $1,068.

- Average season expenditures by resident and nonresident archery deer hunters were $969 and $1,332 per season, respectively. Special big game had the highest average per person spending of all hunting groups.

- Resident open water anglers spent considerably more than their nonresident counterpart: $4,344 versus $1,239 per season, respectively.

- Special big game hunters had average spending of $1,687 per season.

Average Daily Expenditures

Average daily expenditures represent average total spending divided by the number of days of participation. Due to differences in season lengths, harvest opportunities, and typical activities required for some types of hunting/fishing, average daily expenditures can be useful in providing a comparative measure of spending among activities.

- The lowest average daily spending ($50.46) was for furbearer.

- The highest average daily spending ($280) was for nonresident pronghorn.

- Average daily expenditures for nonresident small game hunters were higher than for resident small game hunters: nonresident small game hunters averaged $150 per day

(which included spending for both upland and waterfowl hunting), resident waterfowl hunters averaged $189 per day, and resident upland game hunters averaged $111 per day.

- Average daily expenditures by resident and nonresident archery deer hunters were $104 and $202 per day, respectively.

- Average daily expenditures by resident and nonresident firearm deer hunters were similar with $149 and $243, respectively.

- Average daily expenditures for resident and nonresident open water anglers were $277 and $170, respectively.

- Fourteen of the 19 survey groups had average daily expenditures above $100 and $200.

Total Direct Expenditures

The amount of total expenditures incurred in North Dakota by hunters and anglers is a function of the number of participants and average spending per participant. Total participants in each hunting and fishing activity were multiplied by the average season expenditures to arrive at an estimate of total hunter and angler expenditures.

- Resident hunters spent $134 million in North Dakota in 2017-2018.
- Small game hunters spent $52.5 million and accounted for 39 percent of all resident hunter expenditures.
- Deer hunters spent $50.2 million and accounted for 37 percent of all resident hunter expenditures.
- Furbearer hunters spent $28.6 million and accounted for 21 percent of all resident hunter expenditures.
- Turkey and special big game hunters accounted for 2 percent of all resident hunter expenditures and spent 1.7 million and $1 million respectively.

- Resident anglers spent $712.5 million in North Dakota in 2017-2018.
- Open water fishing accounted for 88 percent of all resident angler spending.
- Ice fishing accounted for 12 percent of all resident angler spending.

- Nonresident hunters spent $52.3 million in North Dakota in 2017-2018.
- Small game hunters spent 46.8 million accounting for 89 percent of all nonresident hunter expenditures in 2017-2018.

- Nonresident anglers spent $75.3 million in North Dakota in 2017-2018.

- Total resident hunter and angler spending was estimated at $846.8 million in North Dakota in 2017-2018.

- Total nonresident hunter and angler spending was estimated at $127.6 million in North Dakota in 2017-2018.

- All hunter and angler spending was estimated at nearly $974.4 million (excluding license purchases) in North Dakota in 2017-2018.

Total Economic Effects

Total direct expenditures from hunting and fishing were used in the North Dakota Input-Output Model to develop estimates of secondary economic effects (i.e., multiplier effects), gross business volume (i.e., sum of direct and secondary effects in all economic sectors), secondary employment, and state-level tax revenues. These key economic measures are used to highlight the economic importance of hunting and fishing to the state economy.

Expenditures by resident hunters generated:
- $159 million in secondary economic effects
- $293.5 million in gross business volume
- 459 full-time equivalent jobs
- about $7 million in state tax collections

Expenditures by resident anglers generated:
- $813 million in secondary economic effects
- $1,525.6 million in gross business volume
- 2,344 full-time equivalent jobs
- $36 million in state tax collections

Expenditures by nonresident hunters generated:
- $69 million in secondary economic effects
- $121 million in gross business volume
- 196 full-time equivalent jobs
- $2.4 million in state tax collections

Expenditures by nonresident anglers generated:
- $99 million in secondary economic effects
- $174 million in gross business volume
- 264 full-time equivalent jobs
- $3.3 million in state tax collections

Expenditures associated with all hunting activities generated:
- $228 million in secondary economic effects
- $414 million in gross business volume
- 655 full-time equivalent jobs
- about $9 million in state tax collections

Expenditures associated with all fishing activities generated:
- $912 million in secondary economic effects
- $1,699 million in gross business volume

- about 2,608 full-time equivalent jobs
- about $39 million in state tax collections

The total economic effects of all hunting and fishing activities in the state in 2017-2018 were estimated at:

- $974.4 million in direct expenditures
- $1,139 million in secondary economic effects
- $2.1 billion in gross business volume
- 3,263 full-time equivalent jobs
- $48 million in state tax collections

Spending in Rural Areas

Hunters and anglers were asked to indicate the percentage of expenditures made in rural areas in an attempt to better understand the distribution of hunter and angler spending within the state. The percentage of expenditures made in rural areas was applied to average season expenditures for both rural and urban resident and nonresident hunters and anglers to determine total rural spending in 2017-2018.

- Resident hunters spent $85 million in rural areas of North Dakota.
- Resident anglers spent $408 million in rural areas of the state.
- Nonresident hunters spent $42 million in rural areas of the state.
- Nonresident anglers spent $47 million in rural areas of the state.
- Total expenditures by hunters and anglers in rural areas in 2017-2018 were estimated at $584 million or about 60 percent all direct expenditures made in the state.

Comparison of Spending in 2011 and 2012

Average season expenditures, total expenditures by hunting and fishing survey groups, and statewide economic effects from hunter and angler expenditures in 2017 were compared to those in 2011. Expenditures made in 2011 were adjusted to reflect 2018 dollar equivalents using the Consumer Price Index. Changes in total direct expenditures and the number of hunters and anglers from 2011 to 2017 also were examined.

- License sales increased for only 5 of the 19 survey (pronghorn was not available in 2011).
- The number of participants decreased for all hunting groups except resident archery from 2017 to 2018.
  - Resident turkey hunter numbers declined aby a combined 38 percent.
  - Resident special big game hunter numbers decreased 8 percent.
  - Resident firearm deer hunter numbers increased 28 percent.

- Resident small game hunter numbers decreased a combined 56 percent.
  - Upland declined by 24 percent
  - Waterfowl declined 32 percent
- Resident angler numbers all increase
  - Open water increased 24 percent
  - Ice fishing increased 41 percent
  - Darkhouse spearing increased 180 percent
- Nonresident deer hunter numbers decreased combined 117 percent.
  - Archery decreased 22 percent
  - Firearm decreased 95 percent
- Nonresident small game hunter numbers decreased 6 percent.
- Nonresident angler numbers increased 66 percent.

Average spending per participant with the exception of pronghorn, not available in previous study increased in all but five survey groups from 2017 to 2018.

- Average season spending increased for resident categories including firearm deer, special big game, furbearer hunters, waterfowl, turkey and all three fishing categories.
- Spending decreased for resident archery, gratis, muzzleloader, upland game hunters and nonresident furbearer.
- Average season spending increased for nonresident firearm, archery, small game hunters.
- Average season spending increased for resident and nonresident anglers.

Total direct expenditures from hunting activities decreased by $53 million or 22 percent decline from 2011 to 2017.

Total direct expenditures from fishing activities increased by $320 million or by 68 percent from 2011 to 2017.

Total direct expenditures from all hunting and fishing activities increased by $267 million or by 38.0 percent from 2011 to 2017.

Gross business volume (direct and secondary effects) in North Dakota from all hunting and fishing activities increased by $596 million or by 39 percent from 2011 to 2017.

Conclusions

The popularity of hunting and fishing in the state remains high even though the state has seen a reduction in wildlife habitat over the last decade. New challenges are emerging in the state as wildlife management officials and policymakers attempt to mitigate the loss of wildlife habitat. The population of most wildlife species increased during the 1990s and 2000s, contributing to an increase in hunter and angler participation. Spending associated with hunting and fishing increased along with number of hunters and anglers. Socio-economic data on hunters and anglers in the state has been periodically collected and assessed since the late 1970s. This study represents a continuation of those efforts, and provides insights into hunter and angler characteristics and the economic effects of hunting and fishing on the state and rural economies.

The process of evaluating hunter and angler expenditures in North Dakota is now in its fourth decade. Over that period, the data collection process has improved with efforts using consistent survey instruments and sampling protocols. However, for the three previous studies dating back to the late 1990's, the studies captured data on spending trends relating to increasing participation and increasing hunting and angling opportunities in the state. During that period, overall spending in the state continued to increase as the number of individuals pursuing hunting and fishing recreation in the state continued to grow and individual spending also continued to increase. However, that paradigm is no longer present in the state, and this assessment of hunter and angler spending is the first study to examine spending patterns and levels reflective of less hunting opportunity, or at least, less convenience in most hunting categories. As expected, the spending is reflective of some changes in hunter and angler responses to the changing conditions in the state.

Hunting

Hunting conditions in the state continue to reflect the loss of wildlife habitat, primarily due to reduction in Conservation Reserve Program acreage, as well as higher commodity prices in previous years that facilitated the shift of some agricultural lands back into tilled crop production. The observable effect of this was with firearm deer hunting. Deer tags available in 2017-2018 season were considerably lower than levels observed in 2011-2012, which translated into 49,000 fewer resident and nonresident deer firearm hunters. Other observations included a sizable decline in resident small game hunters (i.e., waterfowl decreased by 8,100 individuals and upland hunting declined by 13,200 individuals) along with declines in days participated for both categories. While the number of nonresident small game hunters remained steady, nonresident small game hunters in 2017-2018 days of participation substantially declined (i.e., average declined by 3.3 days per person or 28%) than observed in the 2011/2012 season. Even deer archery, which has been growing in popularity over the past two decades, showed a reduction in the average number of days participated for both resident and nonresident hunters. This study did not evaluate success rates or hunter perceptions on hunting quality so it is unclear if the reduction in days of participation was linked to perceptions or simply reduced opportunities tied primarily to lower game populations.

Overall, spending by resident hunters fell by 29 percent or $55 million from levels observed in the 2011-2012 study. The primary factor is fewer individuals participating in deer

hunting due to substantially reduced availability of tags. Non-resident hunting expenditures in the state increased by 6 percent but that only represented a change of $2.9 million. The reduction in overall spending may not match the perceived decline in revenues for individuals and rural businesses used to benefiting from hunter spending. This is because individual spending for gear and equipment appears to have offset some of the reduction in spending for food, transportation, lodging, and other expenses while afield.

An interesting observation from the current assessment is that expenditures for durable goods have remained steady or actually increased on a per capita basis. Despite reduction in time participated, fixed expenses increased in seven hunting categories that had reductions in variable expenses. It would appear that hunters have shifted some of the reduction in spending associated with fewer days hunting into spending on gear and equipment. These shifts in spending have acted to offset reductions in other categories, such as lodging, transportation, and food expenditures.

Fishing

Fishing remains the dominant source of expenditures among angling and hunting in North Dakota. While per-person average number of days spent fishing for resident and nonresident open water anglers actually declined slightly between 2011/2012 to 2017/2018, dollars invested on fixed or durable goods increased 67 percent. In fact, the average per person expense for resident anglers in 2017/2018 for boat/motor/trailers ($2,420/person) was in excess of all durable purchases estimated in the 2011/2012 study after adjusting for inflation ($1,920/per person). To put this in perspective, boat/motor/trailer purchases by resident anglers accounted for $350 million of the $847 million in all hunting and angling expenditures in the state. In addition to a substantial increase in boat/motor/trailer purchases, durable goods/fixed expenses for resident ice anglers more than doubled since 2011/2012.

Several underlying factors have contributed to the large increase in fishing expenditures over levels observed in 2011-2012. While average days spent fishing by resident and nonresident anglers declined slightly from the last study, the number of resident anglers and nonresident anglers have increased by 19% and 40%, respectively, for a combined 205,000 participants. By comparison, resident and nonresident anglers totaled 153,000 in 2011/12.

Over the past decade, there is a prevalence of large, powerful mixed-species fiberglass boats. Boat capacities continue to increase concurrently outboard motors horsepower. Fiberglass boats generally carry a price premium over aluminum boats of similar size and features, and larger outboard motors add to boat prices for the large-size segment of the boat market. The average expense for boat/motor/trailers in this study exceeds the average for all fixed expenses in the 2011/2012 study. Expenditures for boat gas increased over the period, reflecting the expense of operating large outboard motors, as well as, increased transportation expenditures, reflective on towing larger boats.

Another trend in the survey data is the increase in average spending for ice fishing houses/huts. The popularity of multi-use permanent or wheeled fish houses has increased. These fish houses also can serve as campers, toy haulers, hunting shacks, and other uses outside

of ice fishing—adding to their popularity. Several brands are now available from commercial builders, providing a large variety of sizes, amenities, and features. These ice fishing houses are considerably more expensive than portable, flip over or tent-style houses, and add to the average expenditures by ice anglers.

Motorized tracked fishing machines, such as a SnoBear©, have also increased in popularity. Those machines are among the most expensive options available for ice fishing, and require a stout trailer to transport when not operating on the ice, adding to associated expense. While equipment options and prices have increased for open water and ice fishing, another possible factor affecting the increase in fishing expenditures is that outdoor enthusiasts have devoted more disposable income into fishing than hunting due to declines in deer, upland game, and waterfowl populations. To what extent this may be driving increases in fishing expenditures cannot be determined from the data collected in this study.

Final Thoughts

The process of evaluating hunter and angler expenditures in North Dakota is now in its fourth decade. These studies not only measure the overall level of spending, but also collect data on how spending might be changing among the hunting and angling activities and within any particular activity. Data collection processes and evaluation methods have remained relatively unchanged allowing valid comparisons over time, and this consistency among studies boosts the confidence that the changes observed in this study accurately represent shifts hunter and angler spending.

Despite the loss of a substantial amount of wildlife habitat since the previous study (2011/2012), collective spending by hunters and anglers is larger than previous estimates and remains an economically important industry in North Dakota. Key observations from this study are that hunters are spending less money afield—primarily driven by fewer opportunities linked to large declines in deer populations—but collectively hunters are spending more on equipment and gear than observed in previous studies even while in-state hunting opportunities have diminished. Hunters remain passionate about their recreational activities.

Fishing in the state has always been a popular outdoor activity. The season is long, and popularity is high, leading to a considerable amount of spending in the state. The number of anglers has increased substantially (both resident and nonresident) as well as the per-person spending on gear and equipment. The increase in fishing expenditures, both open water and ice fishing, has completely offset reductions in hunting expenditures. Whether the substantial increase is due in part to shifts in discretional income moving from hunting into fishing or simply represents anglers dedicating more resources to gear and equipment cannot be answered in this study. What is clear is that spending for fishing gear and equipment now dominates all spending by hunters and anglers.

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APPENDIX A

Representative Expenditure Questionnaire

2017 RESIDENT DEER GUN
HUNTER EXPENDITURE QUESTIONNAIRE
North Dakota Game and Fish Department

NOTICE
PLEASE return this survey within 5 days.

YOU MAY COMPLETE YOUR SURVEY AT
www.esurvey.cc/nddeer

PLEASE USE DARK INK
Special Note: If you hunted deer with a gratis license, please disregard Question 2.

SORT CODE - PLEASE DO NOT WRITE IN THIS SPACE

1. Did you hunt deer during the 2017 Deer Gun Season?
☐ Yes ☐ No..... (If No, please stop here and return your survey)

2. Indicate the percentage of deer gun hunting you did on each land ownership type.
Federal ___ % State ___ % Private ___ % PLOTS ___ % Total = 100%

Please Answer BOTH Questions 3 & 4 placing zero's in categories with no expenses.

3. Please provide your best estimate of the money you spent while deer gun hunting in North Dakota in 2017.
Include your share of group expenses.

Food and beverages..... $ ___ .00
Transportation..... $ ___ .00
(gas, oil, vehicle repairs)
Miles traveled..... ___ miles
(for all trips)
Lodging..... $ ___ .00
(Hotel, motel, campground fees)
Ammunition..... $ ___ .00
Taxidermy..... $ ___ .00
Land access fees..... $ ___ .00
Guiding fees..... $ ___ .00
Meat processing..... $ ___ .00
Other..... $ ___ .00
(please specify)

4. Please provide the cost of any of the following items that you purchased in North Dakota specifically for the ***2017 Deer Gun Season***.

Firearms..... $ ___ .00
(Rifles, muzzleloaders, handguns, etc.)
Binoculars..... $ ___ .00
(spotting scope, rifle scope)
Clothing..... $ ___ .00
(Used primarily for hunting)
Pickup, motorhome..... $ ___ .00
or other vehicle
Camping equipment..... $ ___ .00
Other hunting equipment.... $ ___ .00
(please specify)

5. For the expenditures listed in **Questions 3 & 4**, what was the total dollar amount **purchased online**? $ ___ .00

6. What percentage of your total expenditures listed in **Questions 3 & 4** above was spent in rural areas of North Dakota? (communities under 2,500 in population) ___ %

7. If you could put a **dollar value** on a typical day of deer gun hunting in North Dakota, what would that dollar amount be?
$ ___ .00

8. Would you associate your primary residence with.....? (Check one)
☐ City over 50,000 population ☐ Community under 2,500 population ☐ Rural non-farm
☐ City between 2,500 and 50,000 pop. ☐ Farm or ranch

9. What is your age? ___ What is your gender? ☐ Male ☐ Female

10. What is your approximate annual household income? (before taxes and deductions)
☐ $150,000 or more ☐ $75,000-$99,999 ☐ $10,000-$24,999
☐ $125,000-$149,999 ☐ $50,000-$74,999 ☐ Under $10,000
☐ $100,000-$124,999 ☐ $25,000-$49,999

Draft

THANK YOU! If you have any suggestions or comments on how the North Dakota Game and Fish Department could improve deer hunting or deer management in the state, please enclose them on a separate sheet of paper.

APPENDIX B

Procedure for Estimating Vehicle Expenses

The questionnaire mailed to hunters and anglers asked for the cost of vehicle(s) and campers purchased during the season for which the vehicle(s) or camper was used. However, the questionnaire did not ask any additional information regarding the purchase, such as, if the vehicle and camper was used exclusively for hunting/fishing or if the vehicle and camper were used for other hunting or fishing activities not addressed by the questionnaire. For example, an individual who was mailed an upland game questionnaire and indicated a vehicle purchase could have also used the vehicle for waterfowl, turkey, deer, and pronghorn hunting, and the vehicle could also have been used for both summer and winter fishing (similarly with a camper not used exclusively for open water fishing). Given the shortcomings of the information provided by the questionnaire, a procedure to allocate a portion of vehicle purchases to specific hunting and fishing activities and camper purchases to resident open water fishing was developed.

Relatively few individuals purchase a vehicle and camper each year compared to the number of individuals purchasing other hunting and fishing related gear. To avoid the problem of having too few observations (i.e., survey respondents that indicated a vehicle purchase), vehicle and camper purchases were averaged over large groups. The groups included all resident hunters, resident anglers, resident gratis hunters, nonresident hunters, and nonresident anglers. Camper adjustments were performed for resident open water fishing only. The average vehicle expense in each of those groups was then assigned to the individual hunting or fishing categories in that group. For example, for resident hunters, the estimated average amount of vehicle purchases attributable to hunting was allocated to individual hunting categories, such as turkey, upland, waterfowl, deer, big game, pronghorn, and furbearer groups.

The process of determining an appropriate expense for vehicle purchases and camper also used information on the number of days participated. The total purchase value (i.e., sum of all vehicle purchases) in each group was determined (Appendix Table B1). Total purchase value was then divided by the number of observations containing a vehicle purchase. Average purchase cost for resident hunters, resident anglers, gratis hunters, nonresident hunters, and nonresident anglers was $13,254, $12,678, $16,618, $9,896 and $6,034, respectively (Appendix Table B1). Average purchase value for campers for resident open water anglers was $1,887 (Appendix Table B2).

Average purchase price per group was then divided by the total number of observations in each group to arrive at an estimate of average purchase value per group respondent. Average vehicle purchase value per respondent for resident hunters, resident anglers, gratis hunters, nonresident hunters, and nonresident anglers was $411, $1,059, $344, $284, and $121, respectively (Appendix Table B1). Average for campers for resident open water anglers was $356.

The total number of days of participation for each group was summed. Total days of participation for the groups were 24,892, 13,288, 2,900, 12,558, and 3,850 for resident hunters, resident anglers, gratis hunters, nonresident hunters, and nonresident anglers, respectively. Total participation days for resident open water anglers was 7,472. Days per year (365) was

multiplied by the number of respondents with vehicle purchases to arrive at the total respondent-days per year. Total days of participation was divided by the total respondent-days per year to determine the average percentage of time per year that the vehicles and campers were used for hunting and fishing. The percentage was then doubled, to account for potential multiple hunting/fishing uses, and because hunting/fishing use may be more demanding than other normal uses. The percentage was then multiplied by the average vehicle and camper purchase value per respondent to arrive at an allocated vehicle expense per person for the five groups. Average vehicle purchase costs attributable to resident hunters, resident anglers, gratis hunters, nonresident hunters, and nonresident anglers were $14.02, $56.44, $9.42, $10.35, and $4.63, respectively (Appendix Table B1). For resident open water anglers average camper purchase was $31.17 (Appendix Table B2).

Appendix Table B1. Vehicle Expense Estimates for Resident Hunters, Resident Anglers, Gratis Hunters, Nonresident Hunters, and Nonresident Anglers, North Dakota, 2017-2018

Resident Groups			Nonresident Groups				
Gratis	Hunting	Fishing	Hunting	Fishing	Id	Formula	Explanation
786	6,195	2,462	2,120	570	a	count	Total survey respondents in each group
12	124	114	54	11	b	count	Survey respondents with positive vehicle expense
580	3,999	1,366	1,885	550	c	count	Survey respondents that answered vehicle purchase portion of questionnaire
$19,415	$1,643,529	$1,446,305	$534,377	$66,374	d	sum of “b”	Total value of vehicle purchases
2%	3%	8%	3%	2%	e	b / c	Percentage of total survey respondents that made a vehicle purchase
$16,618	$13,254	$12,687	$9,896	$6,034	f	d / b	Average purchase value
$344	$411	$1,059	$284	$121	g	d / c	Average spent on vehicle purchases
2,900	28,892	13,288	12,559	3,850	h	sum of “c”	Total days participated in hunting/fishing activities
211,700	1,459,635	498,590	688,025	200,750	I	c * 365	Total person-year days of participation
1.4%	1.7%	2.7%	1.8%	1.9%	j	h / I	Percentage of total yearly vehicle ownership time that vehicle was used for hunting and fishing
$9.42	**$14.02**	**$56.44**	**$10.35**	**$4.63**	k	2 * j * g	Allocated vehicle expense per hunter and angler in each respective group

Appendix Table B2. Camper Expense Estimates for Resident Open Water Anglers, North Dakota, 2017-2018

Open Water Fishing	Id	Formula	Explanation
651	a	count	Total survey respondents in each group
88	b	count	Survey respondents with positive vehicle expense
467	c	count	Survey respondents that answered vehicle purchase portion of questionnaire
$166,038	d	Sum of “b”	Total value of vehicle purchases
19%	e	b/c	Percentage of total survey respondents that made a vehicle purchase
$1,887	f	d/b	Average purchase value
$356	g	d/c	Average spent on vehicle purchases
7,472	h	Sum of “c”	Total days participated in hunting/fishing activities
170,455	I	C*365	Total person-year days of participation
4%	j	h/I	Percentage of total yearly vehicle ownership time that vehicle was used for hunting and fishing
$31.17	k	2*J*G	Allocated vehicle expense per hunter and angler in each respective group

APPENDIX C

New Wealth in Rural Areas

One approach to assessing outdoor recreation expenditures in rural areas is using an economic base approach. Economic base describes the industries, sectors, or common economic activities that bring "new" money into an area. Economic base data represent sales of goods and services produced within an area to entities outside the area (Leistritz 1998). The area in question can be any reasonable geographical unit--county, multi-county region, state, multi-state area, etc. Goods and services considered "sales to final demand" vary by area definition.

Economic base activities represent only a portion of all economic activity in an area. Other industries (sometimes called derivative or residentiary) result from the presence of basic (primary sector) industries (Hertsgaard et al. 1984). The spending and corresponding economic base or primary sector dollars creates spillover (multiplier) effects, which in turn support other sectors of the economy. Outdoor recreation expenditures are part of the tourism sector. At the state level, the tourism sector includes expenditures by out-of-state visitors for retail items (e.g., souvenirs, meals, clothing, gas, convenience items) and sales of business and personal services (e.g., tours, motel/hotel accommodations, campgrounds, guide fees). In North Dakota, the role outdoor recreation expenditures play in contributing to the economic base of the state largely stems from whether resident or nonresident hunters and anglers in the case of this study made the expenditures. However, when an economy becomes smaller, such as a multi-county area, new wealth (i.e., increase in primary sector revenues) can come from within the state as well as out-of-state sources.

Generally, all expenditures made by nonresident hunters would be considered new wealth, both to the local and state economy. Expenditures made by resident hunters can also be considered new wealth to a rural economy if the hunters do not live in the immediate region where the expenditures were made. In this case, resident expenditures would represent new wealth to the rural economy, but not necessarily to the state economy. For example, spending by a resident hunter, who lives in eastern North Dakota, but hunts in western North Dakota, would represent new wealth for the western region, but not new wealth for the state. The retention of hunting expenditures that would otherwise leave the state in the absence of in-state hunting opportunities, would also be considered new wealth to the state. For example, if a resident hunter normally pursued upland game in another state but instead choose to pursue similar opportunities in North Dakota, their expenditures would be considered new wealth to the local and state economy. Similarly, if residents decide to pursue hunting activities rather than spend their discretionary income pursuing other recreation activities outside of the state, those expenditures would be considered new wealth to both the local and state economy. For example, if a hunter decides to pursue upland game in the state instead of traveling to Minnesota for a football game, then those expenditures incurred while upland game hunting would be considered new wealth. Alternatively, if a resident decides to go hunting rather than participating in another recreational activity within the state, those expenditures would be considered a shift in discretionary spending and would not represent new wealth to the state. While a shift in discretionary spending would not represent new wealth for the state, the expenditures could represent new wealth to a local/rural economy. For example, rather than attending a music concert in a major trade center, an individual instead decides to hunt upland game within the state. A number of factors must be considered in determining how much of the recreational expenditures captured in the state and in local economies can be considered new wealth versus a shift in discretionary spending. In most

cases, the rules governing the use of hunter expenditures discussed above would also apply to expenditures from other outdoor recreational activities (e.g., fishing, birdwatching).

Even though not all of the economic activity reported in this study represents new wealth to the North Dakota economy, especially in the case of resident hunter and angler spending, in-state opportunities for hunting and fishing can be credited with capturing/retaining much of the economic activity described in this report. In the absence of hunting and fishing opportunities existing within the state, residents would likely seek similar, and in some cases, alternative opportunities for recreation from out-of-state sources and the reduction in economic activity that would ensue would be considered an economic loss (leakage) to the state.

Considering that about $974 million was spent in North Dakota on hunting and fishing activities in 2017-18, even if a small percentage of those individuals decided to spend the discretionary income currently used for hunting and fishing in other states (i.e., either for hunting/fishing or in pursuit of other recreation), the economic loss to the state could be substantial. Economic leakage (loss of current spending) would especially affect rural economies, as a considerable percentage (54 percent in 2017-2018) of spending from both rural and urban resident hunters and anglers occurs in rural areas of the state.

APPENDIX D

Expenditure Listings for Hunting and Fishing Survey Groups

Measuring the amount and type of recreational expenditures associated with hunting and fishing activities within North Dakota was one of the primary goals of the study. Questionnaires for each survey group (e.g., archery deer, pronghorn, ice fishing) were designed to solicit information on expenditures specific to that activity. For example, open water fishing participants were not asked questions about ammunition or firearm purchases. Each group's questionnaire was specific in requesting only information on purchases made 1) within North Dakota and 2) for the activity and season specified on the questionnaire.

Durable goods usually represent items that can be used over several seasons or can be used numerous times over extended periods before replacement items are required. A few examples of durable goods for hunting and fishing include optics, weapons, fishing rods, clothing, boats, knives, decoys, ice augers, and so on. Purchases of durable goods are often classified as fixed expenses, since the cost of the item is not dependent upon activity levels (the cost of a knife is the same if the individual hunts 2 days or 20 days).

Nondurable goods generally represent items/services consumed or used in direct proportion to activity levels. A few examples of nondurable goods for hunting and fishing include bait, ammunition, gas, food, guide services, and so on. Purchases of nondurable goods are often classified as variable expenses, since the cost of the item is dependent upon activity levels (gas purchases should be proportional to the number of miles traveled).

Average season (total) variable expenditures, in each survey group, were determined by summing the average of the individual expenditure categories for each variable expense. Alternatively, expenses for gas, food, lodging, etc., were summed and then divided by the number of observations to estimate average expense for each expenditure item. Those average expenses were then summed to arrive at average season variable expenses. Observations in the data set also included zeros for no spending. Those observations were included in the averages. The method for determining average season variable expenses used in this study was identical to the method used by Lewis et al. (1998) and Bangsund and Leistritz (2003). However, the calculation of average vehicle, average season fixed, and average season total expenditures developed by Bangsund and Leistritz (2003) were used in this study. Please refer to Estimation of Average Expenditures section on page 7.

Average daily variable and fixed expenses were estimated by dividing individuals' total variable and total fixed expenses by the number of days participated, and then averaging individuals' average daily variable and average daily fixed expenses for each survey group. Average daily total expenditures were the sum of average daily variable and average daily fixed expenses. Average daily spending estimates in the following tables will not equal seasonal expenses (variable, fixed, and total) divided by average days participated for the group due to differences in the number of observations within the data set that had both expenditure information and information on days participated. Average days participated was estimated for the entire survey group, and may not be the same as the average days participated for only those observations with variable, fixed, or variable and fixed expenditures.

Table D1. Resident Special Big Game Hunter Expenditures, 2017	
Expenditure Category	Average per Hunter
Variable Expenses	---$---
Access Fee	15
Ammunition	46.4
Food and Beverages	173.0
Guide	5.0
Lodging	127.0
Meat Processing	275.0
Taxidermy	266.0
Transportation	354.0
Other	11.0
Total Season Variable	**1,272.4**
Daily Season Variable	**128.5**
Fixed Expenses	
Binoculars/Optics	131.0
Camping Equipment	16.00
Clothing	66.4
Vehicle	14.02
Weapons	146.0
Other	41.0
Total Season Fixed	**414.4**
Daily Season Fixed	**41.9**
Total Season Expenses	**1,686.82**
Daily Season Total	**170.4**
Amount of Internet purchases	202.0
Share of expenses spent in rural	62.0%
Average expenses in rural areas	1,043.0
Average days participated	**9.9**

Table D2. Resident Archery Deer Hunter Expenditures, 2017	
Expenditure Category	Average per Hunter
Variable Expenses	---$---
Access Fee	7.0
Food and Beverages	95.3
Guide	0.0
Lodging	22.0
Meat Processing	49.4
Taxidermy	36.0
Transportation	251.1
Other	8.0
Total Season Variable	**468.8**
Daily Season Variable	**50.41**
Fixed Expenses	
Binoculars/Optics	88.1
Camping Equipment	35.0
Clothing	115.0
Vehicle	14.02
Weapons	193.2
Other	55.0
Total Season Fixed	**500.32**
Daily Season Fixed	**53.80**
Total Season Expenses	**969.12**
Daily Season Total	**104.21**
Amount of Internet purchases	164.40
Share of expenses spent in rural	54.0%
Average expenses in rural areas	531.0
Average days participated	9.3

Table D3. Resident Firearm Deer Hunter Expenditures, 2017	
Expenditure Category	Average per Hunter
Variable Expenses	---$---
Access Fee	1.1
Ammunition	32.0
Food and Beverages	85.4
Guide	0.2
Lodging	28.0
Meat Processing	100.0
Taxidermy	36.2
Transportation	148.0
Other	4.2
Total Season Variable	**435.1**
Daily Season Variable	**99.0**
Fixed Expenses	
Binoculars/Optics	63.3
Camping Equipment	8.0
Clothing	44.4
Vehicle	14.02
Weapons	76.3
Other	16.0
Total Season Fixed	**222.02**
Daily Season Fixed	**50.5**
Total Season Expenses	**657.1**
Daily Season Total	**149.3**
Amount of Internet purchases	116.3
Share of expenses spent in rural	63.0%
Average expenses in rural areas	411.0
Average days participated	4.4

Table D4. Resident Gratis Deer Hunter Expenditures, 2017	
Expenditure Category	Average per Hunter
Variable Expenses	---$---
Access Fee	0.0
Ammunition	23.0
Food and Beverages	55.3
Guide	0.04
Lodging	6.0
Meat Processing	72.0
Taxidermy	27.0
Transportation	81.0
Other	5.4
Total Season Variable	**269.7**
Daily Season Variable	**54.0**
Fixed Expenses	
Binoculars/Optics	34.0
Camping Equipment	1.1
Clothing	30.0
Vehicle	9.42
Weapons	72.0
Other	12.4
Total Season Fixed	**158.9**
Daily Season Fixed	**32.0**
Total Season Expenses	**429.0**
Daily Season Total	**86.0**
Amount of Internet purchases	82.5
Share of expenses spent in rural	71.0%
Average expenses in rural areas	303.0
Average days participated	5

Table D5. Resident Furbearer Expenditures, 2017	
Expenditure Category	Average per Hunter
Variable Expenses	---$---
Access Fee	0.9
Ammunition	69.2
Food and Beverages	98.0
Guide	0.0
Lodging	22.0
Taxidermy	28
Transportation	240.2
Other	9.0
Total Season Variable	**467.3**
Daily Season Variable	**24.1**
Fixed Expenses	
Binoculars/Optics	105.0
Predator Calls	48.0
Camping Equipment	2.0
Clothing	77.0
Skin Equipment	14.0
Traps	27.4
Vehicle	14.02
Weapons	217.1
Other	7.0
Total Season Fixed	**512.0**
Daily Season Fixed	**26.4**
Total Season Expenses	**979.0**
Daily Season Total	**51.0**
Amount of Internet purchases	218.0
Share of expenses spent in rural	69.4%
Average expenses in rural areas	676.0
Average days participated	19.4

Table D6. Resident Open Water Fishing Expenditures, 2017	
Expenditure Category	Average per Angler
Variable Expenses	---$---
Bait	81.20
Fuel (boat)	226.10
Food and Beverages	253.0
Guide	6.3
Lodging	154.0
Rental (equipment)	26.0
Repairs	167.0
Taxidermy	15.10
Transportation	378.0
Other	23.0
Total Season Variable	**1,330.0**
Daily Season Variable	**85.0**
Fixed Expenses	
Boat, Motor, Trailer	2,421.0
Underwater Camera	12.0
Camping Equipment	31.17
Clothing	49.0
Fish/Depth Finders	180.4
Fishing Rods	124.3
Tackle	117.0
Vehicle	56.4
Other	23.0
Total Season Fixed	**3,014.3**
Daily Season Fixed	**192.0**
Total Season Expenses	**4,344.0**
Daily Season Total	**277.0**
Amount of Internet purchases	438
Share of expenses spent in rural	57.0%
Average expenses in rural areas	2,478
Average days participated	15.7

Table D7. Resident Ice Fishing Expenditures, 2017	
Expenditure Category	Average per Angler
Variable Expenses	---$---
Bait	39.0
Fuel (heater)	52.3
Food and Beverages	111.1
Guide	7.1
Lodging	31.1
Rental (equipment)	3.0
Repairs	39.2
Taxidermy	20.0
Transportation	193.1
Other	28.0
Total Season Variable	**524.0**
Daily Season Variable	**48.1**
Fixed Expenses	
Ice Auger	90.2
Underwater Camera	19.0
Clothing	65.0
Fish/Depth Finders	73.0
Fish Houses/Heaters	310.0
Fishing Rods	53.0
Tackle	54.0
Vehicle	56.4
Other	28.0
Total Season Fixed	**749.0**
Daily Season Fixed	**69.0**
Total Season Expenses	**1,273.0**
Daily Season Total	116.7
Amount of internet purchases	316.3
Share of expenses spent in rural	59.0%
Average expenses in rural areas	756.0
Average days participated	10.9

Table D8. Resident Darkhouse Spearing Expenditures, 2017	
Expenditure Category	Average per Angler
Variable Expenses	---$---
Bait	6.0
Fuel (boat)	31.3
Food and Beverages	75.0
Guide	8.0
Lodging	18.0
Rental (equipment)	22.3
Repairs	30.3
Taxidermy	13.2
Transportation	132.0
Other	1.0
Total Season Variable	**337.1**
Daily Season Variable	**62.4**
Fixed Expenses	
Ice Auger, Saw, Chisels	72.0
Clothing	23.3
Fish/Depth Finders/Underwater Camera	31.0
Fish Houses/Heaters	65.0
Spears	31.0
Tackle	34.0
Vehicle	56.4
Other	20.4
Total Season Fixed	**333.1**
Daily Season Fixed	**62.0**
Total Season Expenses	**670.2**
Daily Season Total	**124.1**
Amount of internet purchases	104.0
Share of expenses spent in rural areas	61.0%
Average expenses in rural areas	411.0
Average days participated	5.4

Table D9. Resident Fall Turkey Hunter Expenditures, 2017	
Expenditure Category	Average per Hunter
Variable Expenses	---$---
Access Fee	0.22
Ammunition	14.1
Food and Beverages	45.0
Guide	0.0
Lodging	8.0
Meat Processing	1.41
Taxidermy	1.40
Transportation	87.0
Repair	8.0
Other	1.20
Total Season Variable	**166.3**
Daily Season Variable	**57.4**
Fixed Expenses	
Binoculars/Optics	22.3
Camping Equipment	3.0
Clothing	29.0
Vehicle	14.02
Weapons	36.0
Decoys	8.0
Other	9.1
Total Season Fixed	**121.4**
Daily Season Fixed	**42.0**
Total Season Expenses	**288.0**
Daily Season Total	**99.2**
Amount of Internet purchases	75.1
Share of expenses spent in rural	57.1%
Average expenses in rural areas	165.0
Average days participated	2.9

Table D10. Resident Spring Turkey Hunter Expenditures, 2017	
Expenditure Category	Average per Hunter
Variable Expenses	---$---
Access Fee	1.1
Ammunition	10.4
Food and Beverages	35.0
Guide	0.02
Lodging	5.0
Meat Processing	1.0
Taxidermy	2.0
Transportation	78.1
Repair	6.0
Other	0.2
Total Season Variable	**138.4**
Daily Season Variable	**55.4**
Fixed Expenses	
Binoculars/Optics	24.0
Camping Equipment	1.0
Clothing	14.2
Vehicle	14.02
Weapons	24.3
Decoys	17.0
Other	16.4
Total Season Fixed	**111.0**
Daily Season Fixed	**44.4**
Total Season Expenses	**249.3**
Daily Season Total	**100.0**
Amount of Internet purchases	47.0
Share of expenses spent in rural	47.1%
Average expenses in rural areas	117.0
Average days participated	2.5

Table D11. Resident Upland Game Hunter Expenditures, 2017	
Expenditure Category	Average per Hunter
Variable Expenses	---$---
Access Fee	14.0
Ammunition	50.0
Food and Beverages	110.1
Guide	0.0
Lodging	21.0
Meat Processing	14.2
Taxidermy	12.0
Transportation	179.2
Veterinarian/Dog care	61.0
Other	4.8
Total Season Variable	**466.30**
Daily Season Variable	**65.0**
Fixed Expenses	
Binoculars/Optics	35.1
Camping Equipment	12.0
Clothing	67.0
Vehicle	14.02
Weapons	105.2
Fixed dog expenses	80.0
Other	16.2
Total Season Fixed	**330.0**
Daily Season Fixed	**46.0**
Total Season Expenses	**796.0**
Daily Season Total	**111.0**
Amount of Internet purchases	303.2
Share of expenses spent in rural	67.0%
Average expenses in rural areas	544.0
Average days participated	7.2

Table D12. Resident Waterfowl Hunter Expenditures, 2017	
Expenditure Category	Average per Hunter
Variable Expenses	---$---
Access Fee	3.4
Ammunition	110.3
Food and Beverages	117.1
Guide	10.2
Lodging	29.1
Meat Processing	21.8
Taxidermy	17.7
Repairs	40.0
Transportation	230.0
Veterinarian/Dog care	41.4
Other	1.8
Total Season Variable	**623.0**
Daily Season Variable	**96.0**
Fixed Expenses	
Binoculars/Optics	39.0
Camping Equipment	7.4
Clothing	114.1
Decoys	133.3
Duck Boat/Canoe/Motors	21.7
Hunting Dogs	43.2
Vehicle	14.02
Weapons	148.0
Other	82.3
Total Season Fixed	**603.0**
Daily Season Fixed	**93.0**
Total Season Expenses	**1226.0**
Daily Season Total	**189.0**
Amount of Internet purchases	289.0
Share of expenses spent in rural	57.0%
Average expenses in rural areas	713.0
Average days participated	6.5

Table D13. Nonresident Archery Deer Hunter Expenditures, 2017	
Expenditure Category	Average per Hunter
Variable Expenses	---$---
Access Fee	75.0
Food and Beverages	228.0
Guide	198.0
Lodging	180.0
Meat Processing	30.1
Taxidermy	52.2
Transportation	288.0
Other	24.2
Total Season Variable	**1,067.0**
Daily Season Variable	
Fixed Expenses	
Binoculars/Optics	32.0
Camping Equipment	11.4
Clothing	78.0
Vehicle	10.35
Weapons	91.0
Other	42.2
Total Season Fixed	**265.0**
Daily Season Fixed	**40.1**
Total Season Expenses	**1,332.0**
Daily Season Total	**202.0**
Amount of Internet purchases	197.0
Share of expenses spent in rural	69.0%
Average expenses in rural areas	**922.0**
Average days participated	6.6

Table D14. Nonresident Firearm Deer Hunter Expenditures, 2017	
Expenditure Category	Average per Hunter
Variable Expenses	---$---
Access Fee	17.0
Ammunition	23.0
Food and Beverages	168.0
Guide	268.0
Lodging	111.1
Meat Processing	65.0
Taxidermy	53.3
Transportation	222.0
Other	16.2
Total Season Variable	**944.0**
Daily Season Variable	**215.0**
Fixed Expenses	
Binoculars/Optics	23.0
Camping Equipment	1.4
Clothing	44.0
Vehicle	10.35
Weapons	29.2
Other	16.2
Total Season Fixed	**124.2**
Daily Season Fixed	**28.2**
Total Season Expenses	**1,068.0**
Daily Season Total	**243.0**
Amount of Internet purchases	169.3
Share of expenses spent in rural	69.0%
Average expenses in rural areas	**722.0**
Average days participated	4.4

Table D15. Nonresident Angler Expenditures, 2017	
Expenditure Category	Average per Hunter
Variable Expenses	---$---
Bait	42.2
Fuel (boat, heater)	88.0
Food and Beverages	210.0
Guide	95.0
Lodging	294.0
Rental (equipment)	14.0
Repairs	28.0
Taxidermy	5.1
Transportation	221.2
Other	6.1
Total Season Variable	**1,004.0**
Daily Season Variable	**138.0**
Fixed Expenses	
Boat, Motor, Trailer	99.2
Ice Augers	8.0
Underwater Camera	1.2
Camping Equipment	8.3
Clothing	24.0
Fish/Depth Finders	20.0
Fishing Rods	21.4
Ice House, Heaters	7.0
Tackle	36.0
Vehicle	4.63
Other	6.10
Total Season Fixed	**236.0**
Daily Season Fixed	**32.3**
Total Season Expenses	**1,239.4**
Daily Season Total	**170.0**
Amount of Internet purchases	314.0
Share of expenses spent in rural	63.0%
Average expenses in rural areas	778.0
Average days participated	7.3

Table D16. Nonresident Small Game Hunter Expenditures, 2017	
Expenditure Category	Average per Hunter
Variable Expenses	---$---
Access Fee	21.0
Ammunition	77.0
Food and Beverages	265.0
Guide	60.30
Lodging	306.0
Meat Processing	7.0
Repairs	27.0
Taxidermy	11.2
Transportation	302.0
Veterinarian/Dog care	11.40
Other	29.0
Total Season Variable	**1,117.0**
Daily Season Variable	**193.0**
Fixed Expenses	
Binoculars/Optics	4.0
Camping Equipment	3.2
Clothing	46.0
Decoys	19.0
Vehicle	10.35
Weapons	27.0
Duck Boat/Canoe/Motor	2.0
Hunting Dogs	4.3
Other	15.0
Total Season Fixed	**131.0**
Daily Season Fixed	**23.0**
Total Season Expenses	**1,248.0**
Daily Season Total	**215.1**
Amount of Internet purchases	183.4
Share of expenses spent in rural	82.0%
Average expenses in rural areas	1,023.0
Average days participated	5.8

Table D17. Resident Muzzeloader Deer Hunter Expenditures, 2017	
Expenditure Category	Average per Hunter
Variable Expenses	---$---
Access Fee	7.0
Ammunition	23.4
Food and Beverages	48.0
Guide	0.1
Lodging	7.0
Meat Processing	32.4
Taxidermy	32.0
Transportation	123.0
Other	2.2
Total Season Variable	**275.10**
Daily Season Variable	**50.0**
Fixed Expenses	
Binoculars/Optics	30.1
Camping Equipment	4.0
Clothing	29.0
Vehicle	14.02
Weapons	58.2
Other	15.0
Total Season Fixed	**150.3**
Daily Season Fixed	**27.3**
Total Season Expenses	**425.4**
Daily Season Total	**77.4**
Amount of Internet purchases	159.0
Share of expenses spent in rural	58.0%
Average expenses in rural areas	248.0
Average days participated	5.5

Table D18. Nonresident Furbearer Expenditures, 2017	
Expenditure Category	Average per Hunter
Variable Expenses	---$---
Access Fee	3.0
Ammunition	46.1
Food and Beverages	172.0
Guide	11.0
Lodging	171.0
Taxidermy	9.0
Transportation	297.0
Other	6.0
Total Season Variable	**715.1**
Daily Season Variable	**84.1**
Fixed Expenses	
Binoculars/Optics	41.1
Predator Calls	24.0
Camping Equipment	5.1
Clothing	54.0
Skinning Equipment	7.2
Traps	24.4
Vehicle	10.35
Weapons	102.0
Other	9.3
Total Season Fixed	**278.0**
Daily Season Fixed	**33.0**
Total Season Expenses	**993.0**
Daily Season Total	**117.0**
Amount of Internet purchases	253.0
Share of expenses spent in rural areas	79.1%
Average expenses in rural areas	785.0
Average days participated	8.5
Percent expenses for coyote	89.5%
Percent expenses for fox	8.4%
Percent expenses for land fur	2.0%
Percent expenses for water fur	1.0%

Table D19. Resident Pronghorn Expenditures, 2017	
Expenditure Category	Average per Hunter
Variable Expenses	—$---
Access Fee	0.3
Ammunition	19.0
Food and Beverages	99.0
Guide	0.0
Lodging	83.0
Meat Processing	50.1
Taxidermy	68.0
Transportation	158.0
Other	8.4
Total Season Variable	**486.0**
Daily Season Variable	**202.4**
Fixed Expenses	
Binoculars/Optics	57.3
Camping Equipment	15.2
Clothing	21.3
Vehicle	14.02
Weapons	67.1
Other	12.0
Total Season Fixed	**187.0**
Daily Season Fixed	**78.0**
Total Season Expenses	**673.0**
Daily Season Total	**280.3**
Amount of Internet purchases	97.0
Share of expenses spent in rural	72.4%
Average expenses in rural areas	487.0
Average days participated	2.4

APPENDIX E

Clarification of Average Spending by Nonresident Small Game Hunters

Small game hunting in North Dakota is comprised of upland game, waterfowl, and other migratory birds (e.g., doves). Both resident and nonresident small game license holders were surveyed to obtain information on upland game and waterfowl hunting, although the two groups were surveyed differently. In past studies and in this study, two samples of resident small game license holders were compiled. One survey sample was sent a questionnaire specifically asking about upland hunting activities and expenditures, while the other survey sample was sent a questionnaire specifically asking about waterfowl hunting activities and expenditures. For purposes of estimating total direct expenditures, average upland game hunting expenses were applied to the estimated number of resident upland game hunters and average waterfowl hunting expenses were applied to the estimated number of waterfowl hunters. This method of sampling and expenditure analysis provides a reasonable estimate of total spending by resident small game hunters. However, since many resident small game hunters pursue both game types, this method cannot provide an overall average per person spending estimate that can be applied to all resident small game hunting participants.

By comparison, nonresident small game hunters were surveyed as one group (i.e., only one survey sample) and asked to report all expenses pertaining to upland game and waterfowl hunting. As a result, some nonresident small game hunters would report expenses associated only with upland game hunting, providing they did not hunt waterfowl. Similarly, some nonresident small game hunters would report expenses associated only with waterfowl hunting, providing they did not hunt upland game. However, as is the case with resident small game hunters, many nonresident small game hunters pursue both upland game and waterfowl while hunting in North Dakota. For individuals that hunted both game types, the expenses reported would reflect spending for both upland game and waterfowl hunting. Similar spending estimates for resident small game hunters was not collected (i.e., they were only asked to report expenses for only one of the two possible hunting activities). To clarify, the average spending per nonresident small game hunter of $1,248 reported in the main document reflects a composite average of spending for not only those who only hunted upland game or only hunted waterfowl, but also spending from those who hunted both game types. Thus, average per person spending estimates for nonresident small game hunters cannot be directly compared to the two separate averages developed for resident small game hunters.

As discussed above, the data collected in this study cannot be used to estimate an overall average spending per resident small game hunter.

APPENDIX F

Total Spending by Expenditure Type for Hunting and Fishing Groups

Appendix Table F1. Spending by Expenditure Type, Resident and Nonresident Hunting, North Dakota, 2017			
	Resident	Nonresident	
	----------$000----------		
Variable Expenditures	**74,163**	**46,096**	**120,259**
Access fees	851	963	1,813
Ammunition	7,478	3,001	10,479
Bait	0	0	0
Food	15,498	10,878	26,375
Fuel Heat	0	0	0
Fuel Boat	0	0	0
Guide Services	183	2,750	2,933
Lodging	3,705	12,297	16,001
Meat Processing	6,754	340	7,094
Rentals	0	0	0
Repairs	721	1,012	1,733
Taxidermy	4,243	566	4,809
Transportation	30,716	12,706	43,421
Veterinarian	3,128	427	3,555
Other	887	1,158	2,044
Fix Expenditures	**60,161**	**6,175**	**66,337**
Augers	0	0	0
Binoculars/optics	10,018	323	10,341
Boat, Motor, Trailer	369	75	444
Calls (electronic predator)	1,404	58	1,462
Camera (underwater)	0	0	0
Camping Equipment	1,739	158	1,896
Clothing	11,477	2,033	13,510
Decoys	2,361	712	3,073
Dogs	3,914	161	4,075
Fish/Depth 'Finders	0	0	0
Ice 'Houses	0	0	0
Skinning Equipment	410	17	427
Spears	0	0	0
Rods	0	0	0
Tackle	0	0	0
Traps	802	58	860
Vehicle	2,251	437	2,688
Weapons	21,138	1,462	22,600
Other	4,280	680	4,961

**numbers might not match with others in main document due to rounding*

Appendix Figure F2. Spending by Expenditure Type, Resident and Nonresident Fishing, North Dakota, 2017			
	Resident	Nonresident	
	----------$000----------		
Variable Expenditures	**227,374**	**60,974**	**288,348**
Access fees	0	0	0
Ammunition	0	0	0
Bait	14,288	2,564	16,852
Food	44,048	12,759	56,807
Fuel Heat	32,630	5,346	37,977
Fuel Boat	3,533	0	3,533
Guide Services	1,403	5,772	7,174
Lodging	24,323	17,862	42,185
Meat Processing	0	0	0
Rentals	4,031	851	4,882
Repairs	27,774	1,701	28,475
Taxidermy	3,535	310	3,845
Transportation	67,656	13,439	81,095
Veterinarian	0	0	0
Other	5,152	371	5,523
Fix Expenditures	**485,149**	**14,328**	**499,477**
Augers	6,160	486	6,646
Binoculars/optics	0	0	0
Boat, Motor, Trailer	349,391	6,027	355,418
Calls (electronic predator)	0	0	0
Camera (underwater)	2,973	73	3,046
Camping Equipment	4,498	504	5,003
Clothing	11,404	1,458	12,862
Decoys	0	0	0
Dogs	0	0	0
Fish/Depth 'Finders	30,919	1,215	32,134
Ice 'Houses	20,492	425	20,917
Skinning Equipment	0	0	0
Spears	115	0	115
Rods	21,401	1,300	22,701
Tackle	20,539	2,187	22,726
Traps	0	0	0
Vehicle	12,033	281	12,315
Weapons	0	0	0
Other	5,224	371	5,595

**numbers might not match with others in main document due to rounding*

Appendix Table F3. Spending by Expenditure Type, Resident and Nonresident, All Activities, North Dakota, 2017			
Category	Resident		Nonresident
	----------$000----------		
Variable Expenditures	**301,537**	**107,070**	**408,606**
Access fees	851	963	1,813
Ammunition	7,478	3,001	10,479
Bait	14,288	2,564	16,852
Food	59,546	23,636	83,182
Fuel Heat	3,533	0	3,533
Fuel Boat	32,630	5,346	37,977
Guide Services	1,586	8,522	10,107
Lodging	28,028	30,159	58,186
Meat Processing	6,754	340	7,094
Rentals	4,031	851	4,882
Repairs	27,495	2,713	30,209
Taxidermy	7,778	876	8,653
Transportation	98,372	26,145	124,517
Veterinarian	3,128	427	3,555
Other	6,039	1,528	7,567
Fix Expenditures	**545,311**	**20,503**	**565,814**
Augers	6,160	486	6,646
Binoculars/optics	10,018	323	10,341
Boat, Motor, Trailer	349,761	6,102	355,863
Calls (electronic predator)	1,404	58	1,462
Camera (underwater)	2,973	73	3,046
Camping Equipment	6,237	662	6,899
Clothing	22,881	3,491	26,372
Decoys	2,361	712	3,073
Dogs	3,914	161	4,075
Fish/Depth 'Finders	30,919	1,215	32,134
Ice 'Houses	20,492	425	20,917
Skinning Equipment	410	17	427
Spears	115	0	115
Rods	21,401	1,300	22,701
Tackle	20,539	2,187	22,726
Traps	802	58	860
Vehicle	14,284	719	15,003
Weapons	21,138	1,462	22,600
Other	9,505	1,051	10,556

**numbers might not match with others in main document due to rounding*

APPENDIX G

Statistical Analysis of Survey Data

Figures G1 through G19 show the distributions for total spending for the various categories of hunters and anglers in the data set. All of the figures are similar in that the distribution of total spending is skewed (not normally distributed). For example, Figure G1, resident archery deer, shows that most of the spending is concentrated in the left tail with expenditures of between $0 and $2,000 making up a greater percentage of total season expenditures. Outliers, like those above $3,000 represent a lower percentage of total season expenditure.

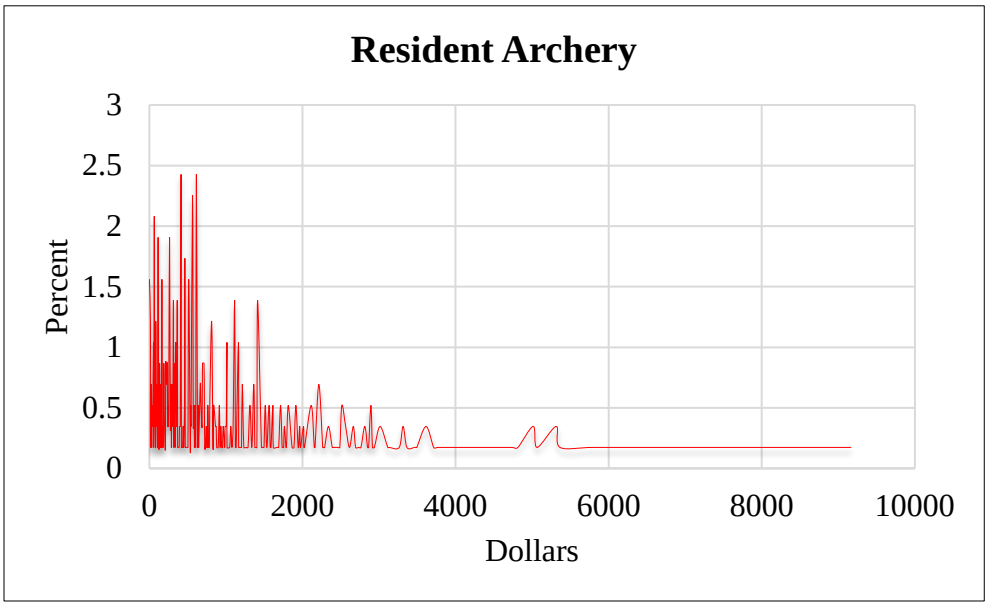

Figure G1. Sample Distribution for Resident Archery Deer Total Spending

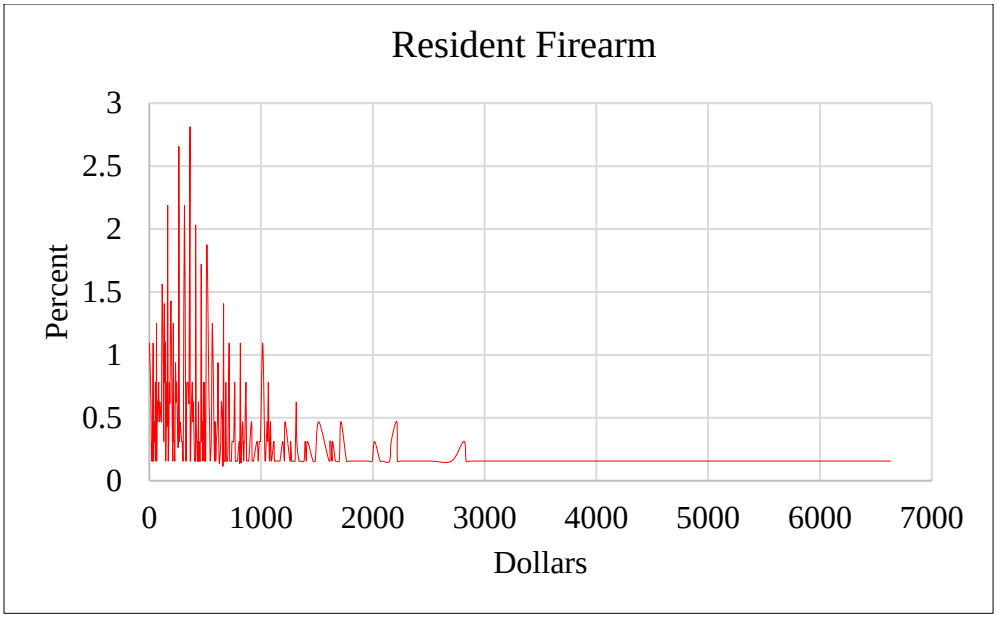

Figure G2. Sample Distribution for Resident Firearm Deer Total Spending

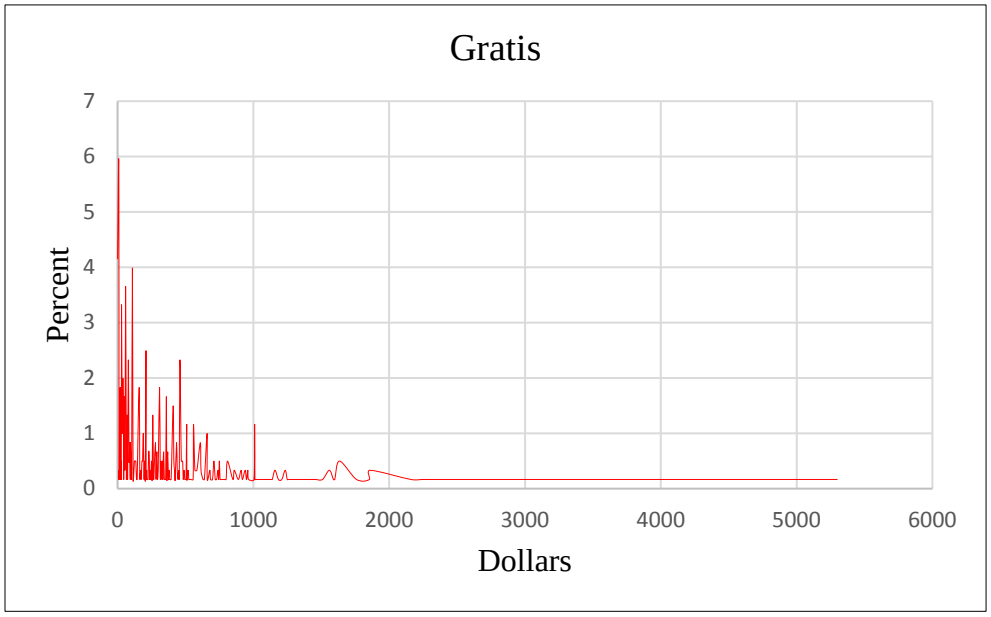

Figure G3. Sample Distribution for Resident Gratis Deer Total Spending

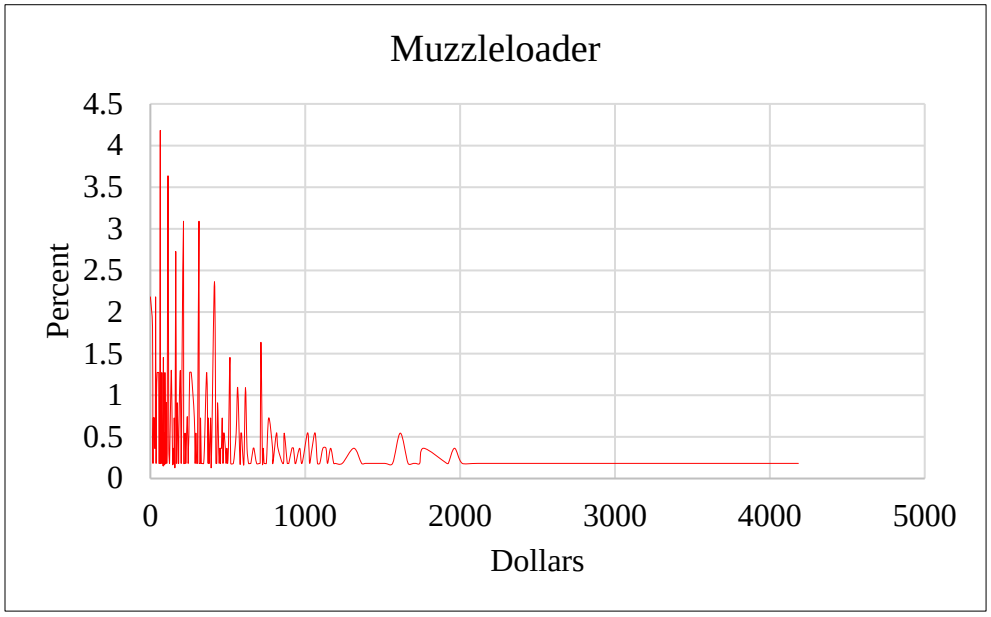

Figure G4. Sample Distribution for Resident Muzzleloader Deer Total Spending

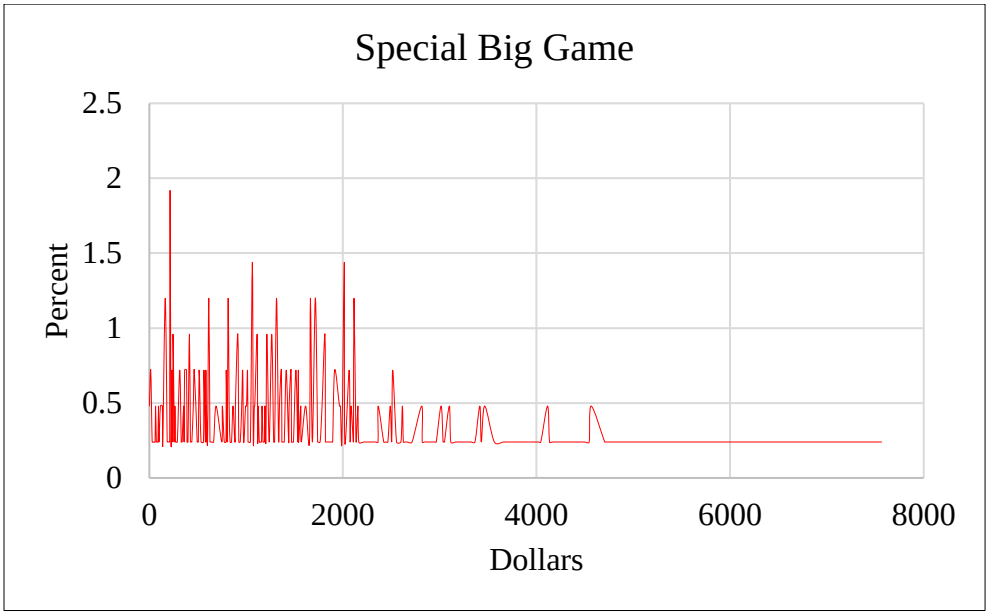

Figure G5. Sample Distribution for Resident Special Big Game Total Spending

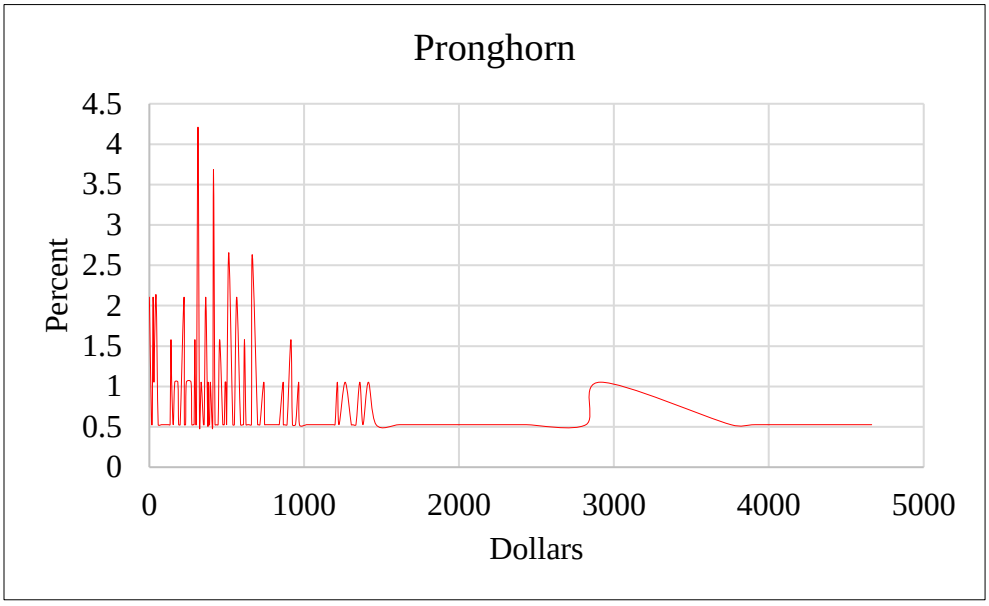

Figure G6. Sample Distribution for Pronghorn Total Spending

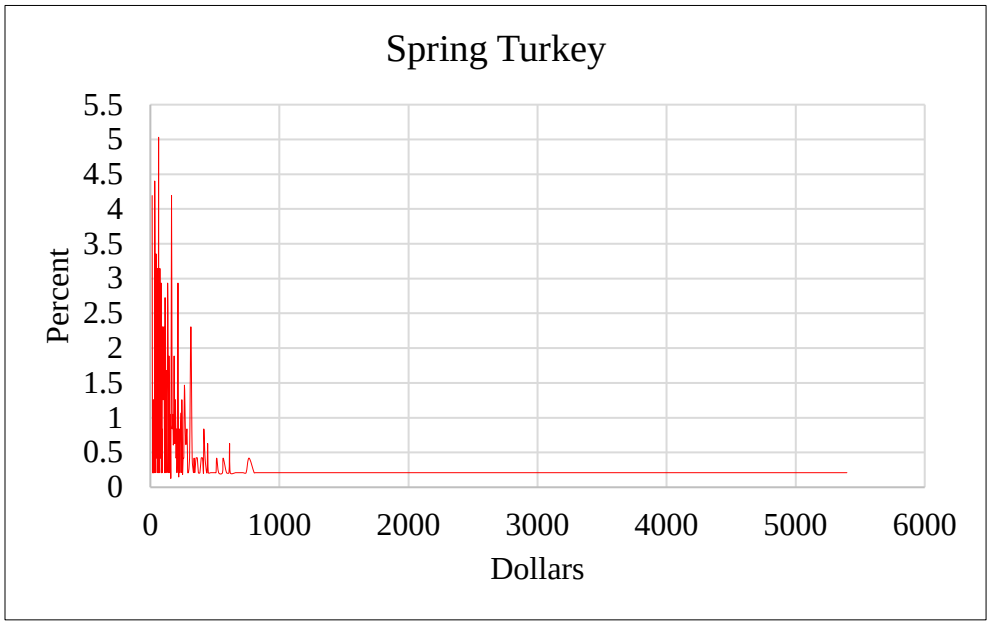

Figure G7. Sample Distribution for Resident Spring Turkey Total Spending

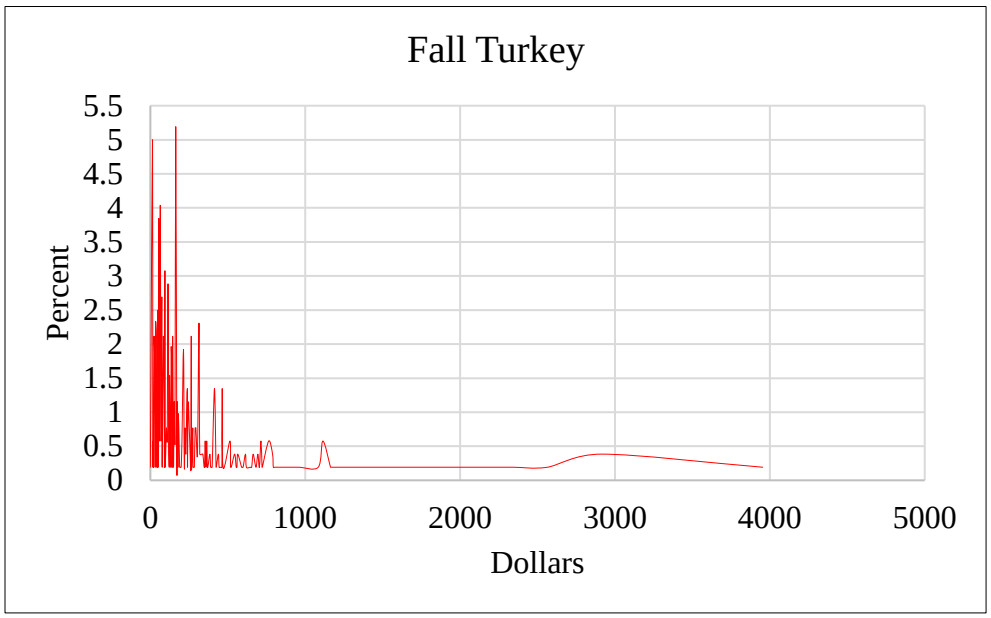

Figure G8. Sample Distribution for Resident Fall Turkey Total Spending

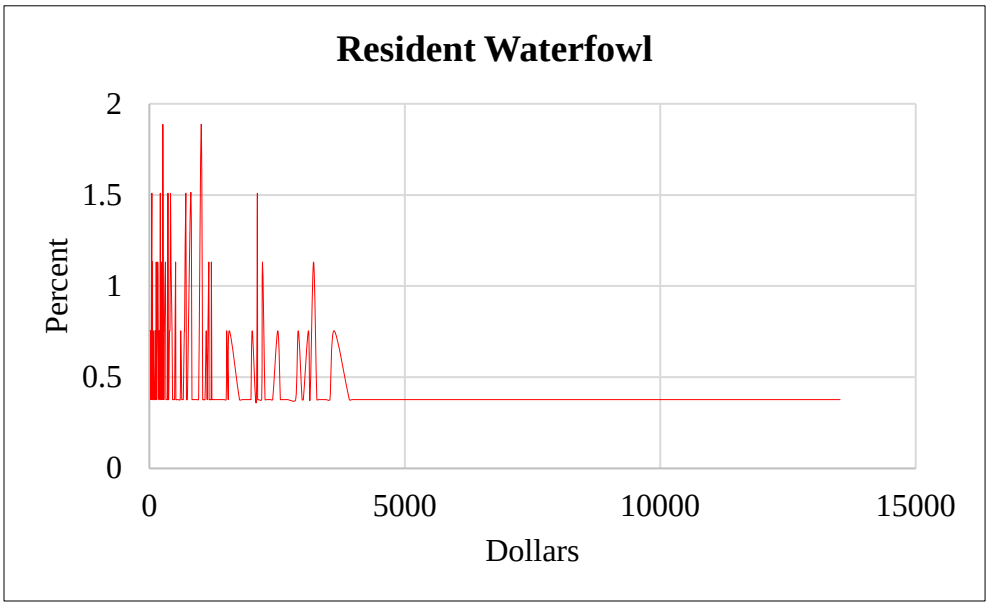

Figure G9. Sample Distribution for Resident Waterfowl Total Spending

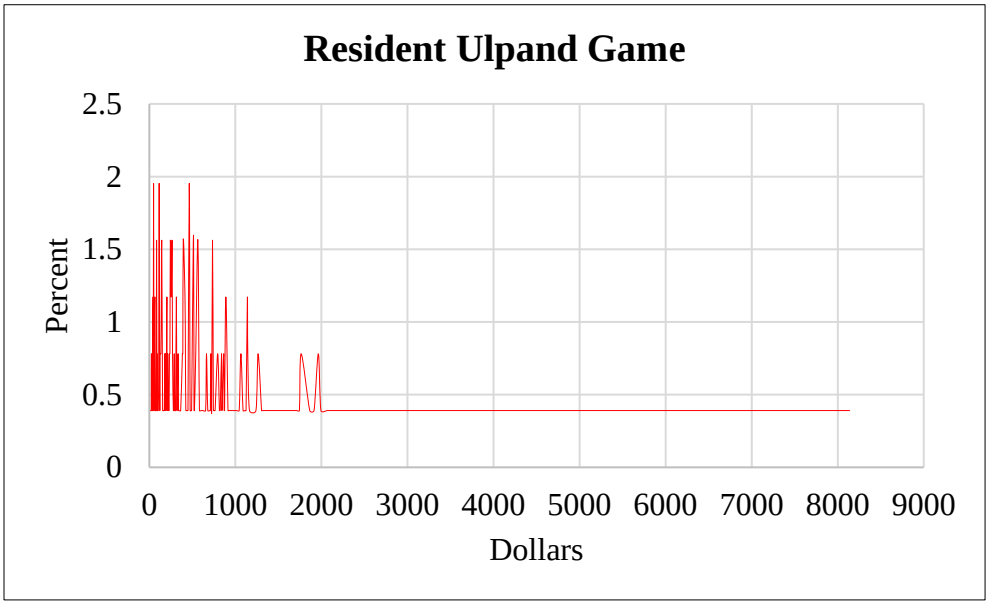

Figure G10. Sample Distribution for Resident Upland Game Total Spending

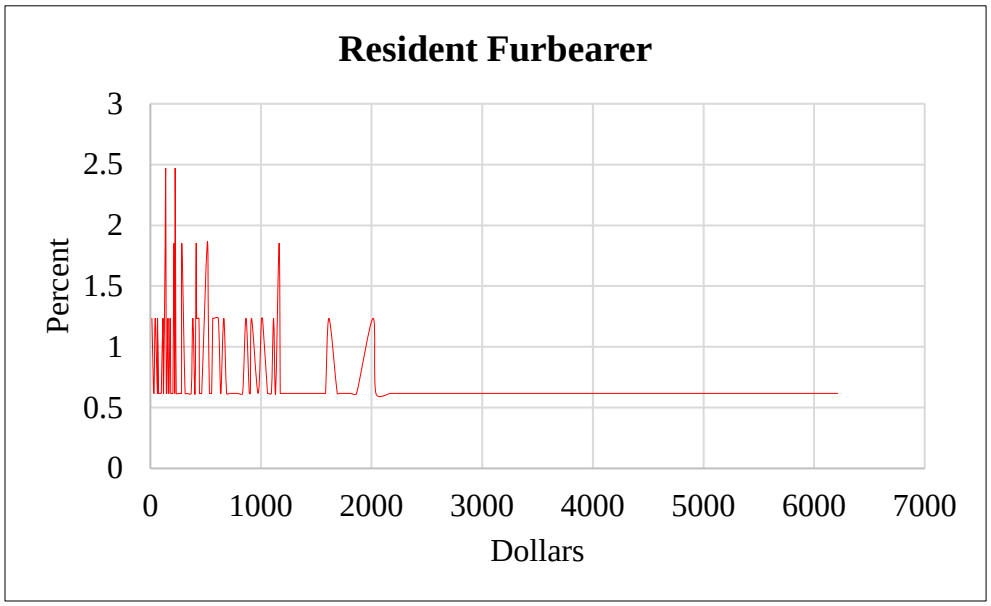

Figure G11. Sample Distribution for Resident Furbearer Total Spending

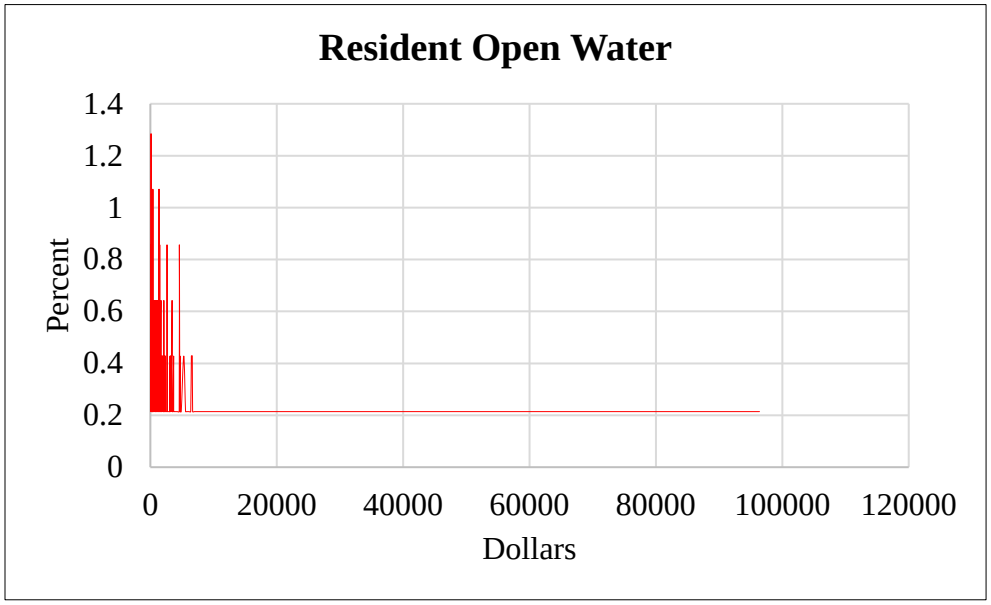

Figure G12. Sample Distribution for Resident Open Water Fishing Total Spending

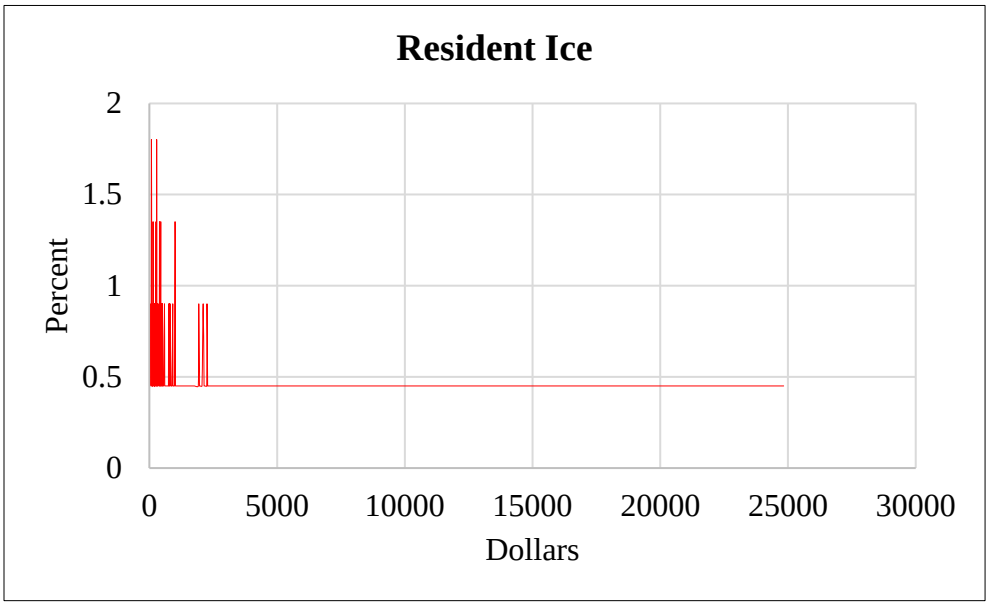

Figure G13. Sample Distribution for Resident Ice Fishing Total Spending

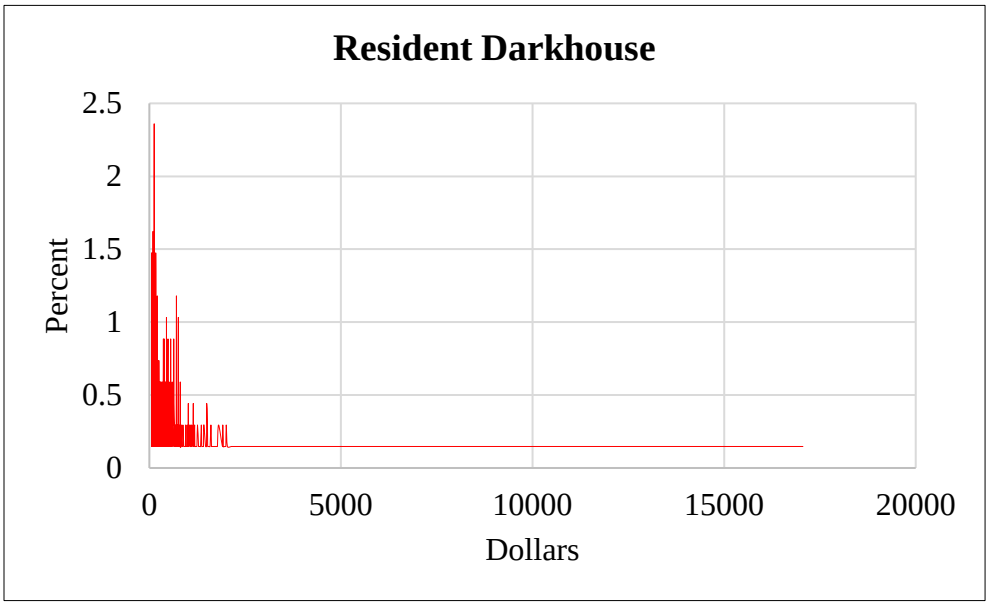

Figure G14. Sample Distribution for Resident Darkhouse Spearfishing Total Spending

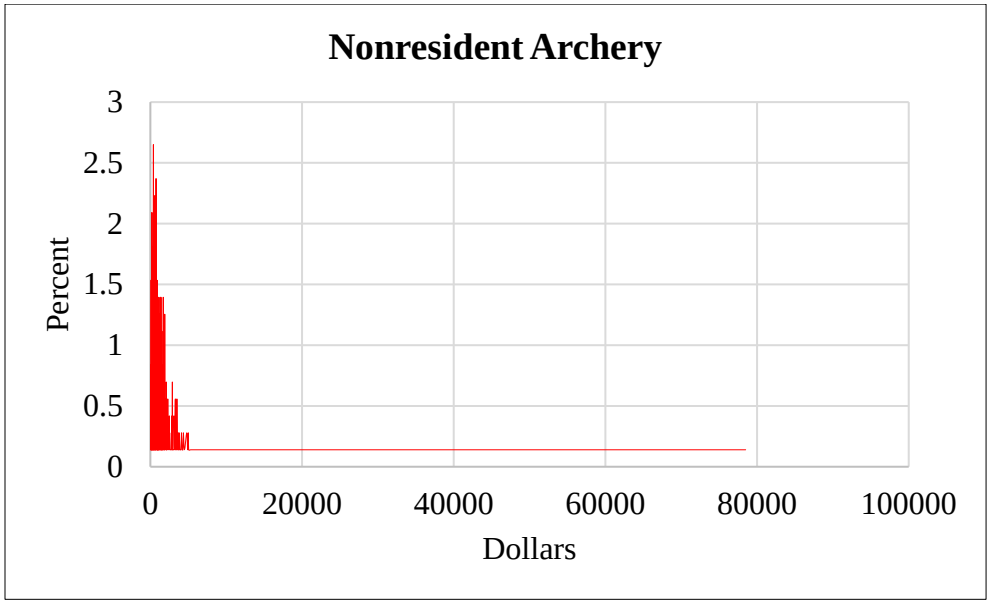

Figure G15. Sample Distribution for Nonresident Archery Deer Total Spending

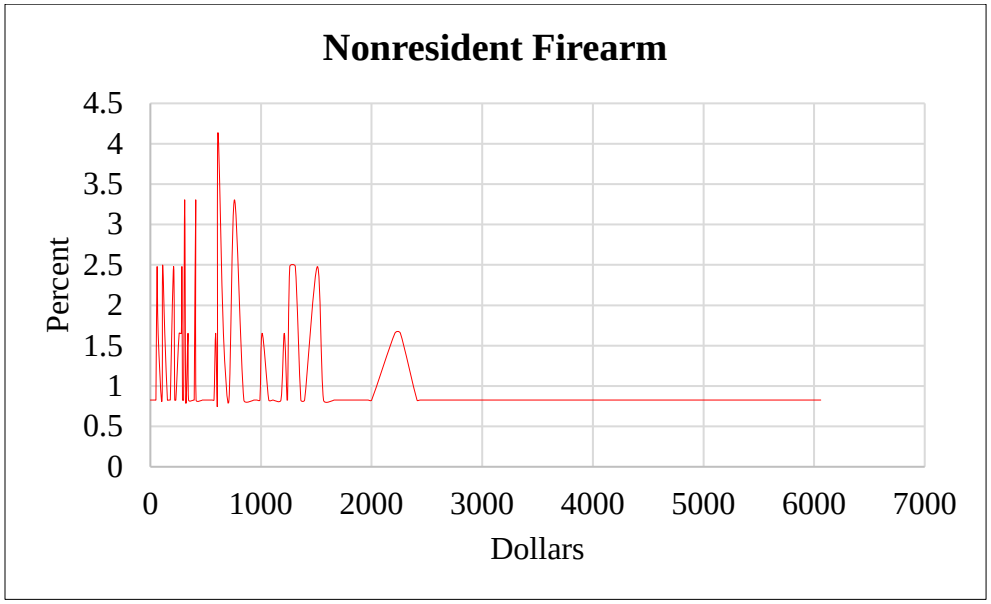

Figure G16. Sample Distribution for Nonresident Firearm Deer Total Spending

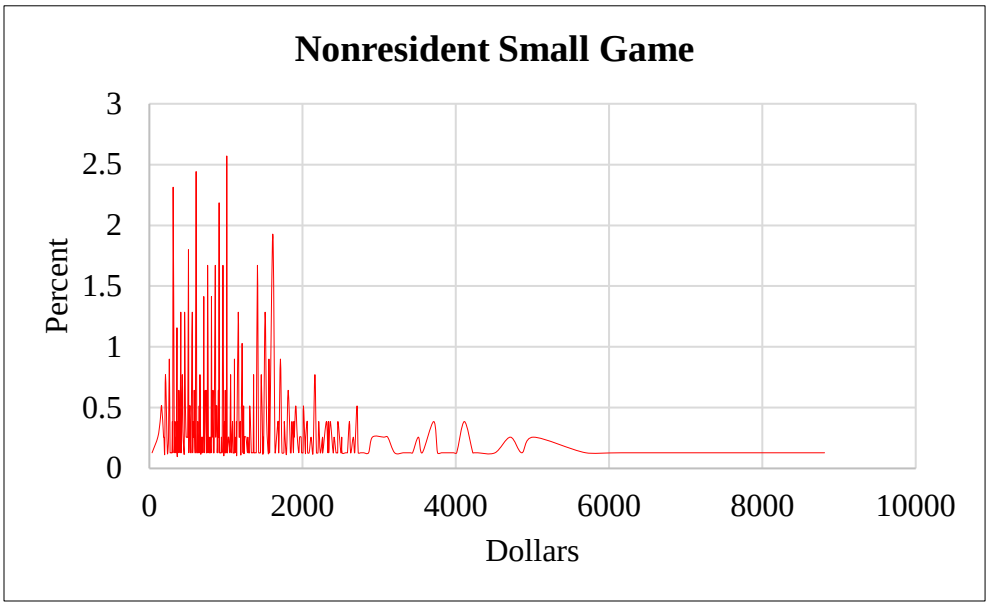

Figure G17. Sample Distribution for Nonresident Small Game Total Spending

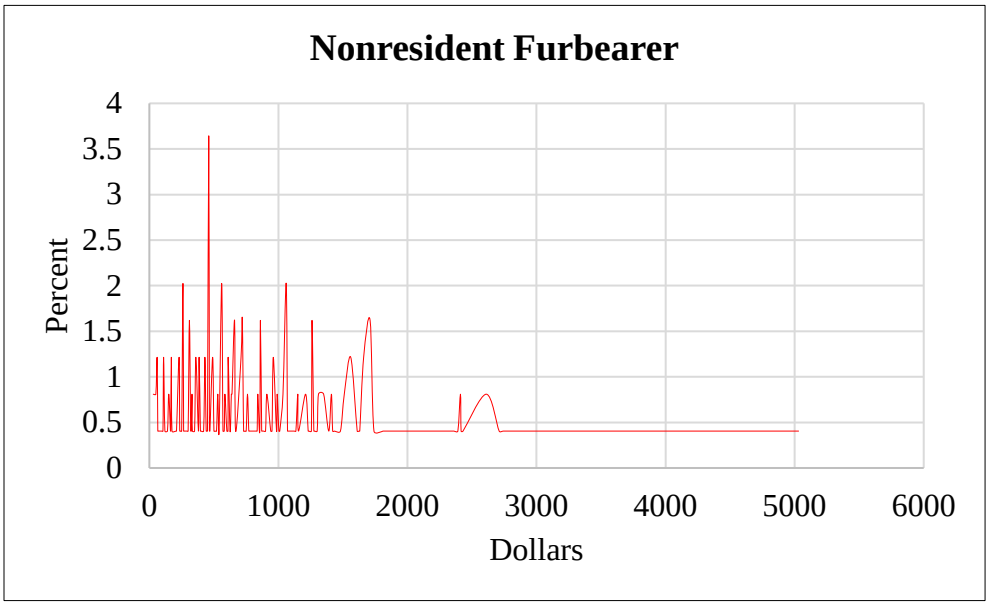

Figure G18. Sample Distribution for Nonresident Furbearer Total Spending

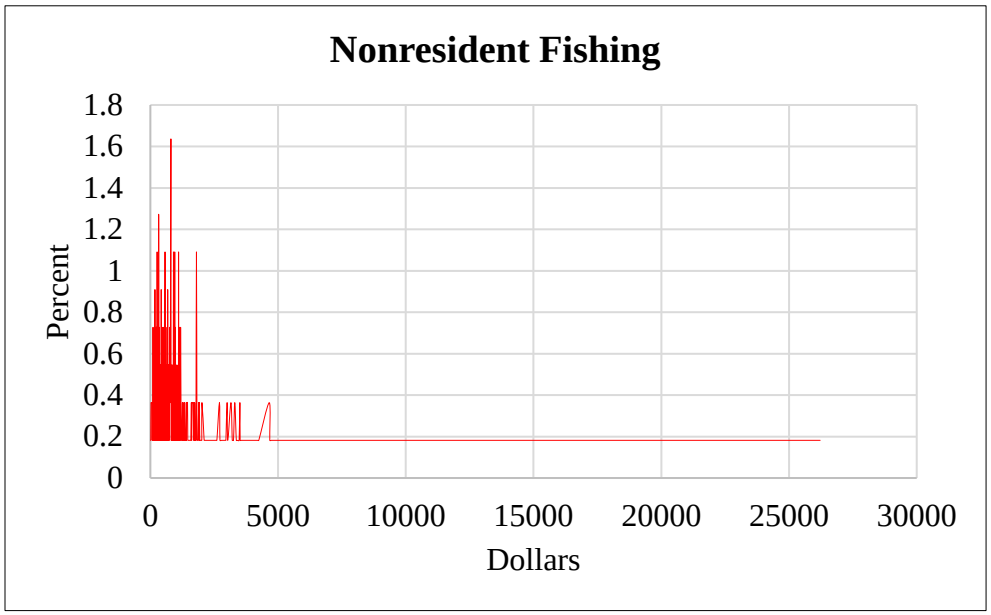

Figure G19. Sample Distribution for Nonresident Fishing Total Spending

Confidence Intervals

The purpose of taking a random sample from a population and estimating a statistic, such as the mean or average is to approximate the mean or average of the entire population. A confidence interval is used because the true statistic of the population is unknown. A confidence interval provides a range of values likely to contain the true population parameter of interest. Confidence intervals are constructed at a predetermined confidence level, such as 85%, and are selected by the user. It means sampling the same population repeatedly; interval estimates would contain the true population parameter in approximately 85% of the cases. Typically, the high and low range of a confidence interval constructed from a limited or small data set is large.

A confidence interval (CI) is calculated by

CI = (point estimate of the parameter) + (percent of the t distribution) * (estimated standard error of the estimate)

Appendix Table G2 shows the 85% confidence interval for the average variable, fix and total spending from the survey. The confidence intervals are quite reasonable. For example, the confidence interval estimates for variable spending by special big game hunters is $1,330 to $1,215 and $422 to $407 for fixed spending. The confidence interval for total spending is $1,707 to $1,667. The estimated sample mean of total spending is $1,687, which is between the high and low confidence interval values for the mean total season expenditure. This means that any typical sportsman selected at random would have an 85% chance of spending between the high and low confidence levels for average total season expenditure during a typical hunting season.

Appendix Table G1. Confidence Intervals (85 percent) for Variable, Fixed and Total Season Spending for North Dakota Hunters and Anglers, 2017-2018							
	Variable		Fixed		Total[a]		Mean
	Upper	Lower	Upper	Lower	Upper	Lower	
Resident							
Deer							
Archery	491	446	507	493	980	958	969
Firearm	448	422	226	218	664	650	657
Gratis	279	260	173	144	448	409	429
Muzzleloader	289	262	153	147	431	420	425
Special Big Game			422	407	1,707	1,667	1,687
Pronghorn	507	465	221	153	716	630	673
Furbearer	481	453	534	489	1,105	853	979
Small Game							
Upland	490	443	356	304	836	756	796
Waterfowl	649	596	650	556	1,286	1,165	1,226
Turkey							
Fall	173	160	133	110	302	273	288
Spring	143	134	124	98	263	235	249
Fishing							
Open Water			3,296		4,642	4,045	4,344
Ice	540	508	808	689	1,338	1,207	1,273
Darkhouse	349	325	354	313	697	643	670
Nonresident							
Deer							
Archery			288	242	1,382	1,281	1,332
Firearm		837	151	97	1,179	956	1,068
Small Game			143	119	1,284	1,211	1,248
Furbearer	734	696	449	106	1,165	820	993
Fishing		974	275	197	1,290	1,189	1,239

[a] The 85% confidence interval for total spending is not the summation of the variable and fixed confidence intervals. An 85% confidence interval for total spending is calculated after each respondents variable and fixed spending are summed.