Economic Impacts of Hunting in the Southeast

Robert I. Southwick, *Southwick Associates, P.O. Box 5662 Arlington, VA 22205*

Abstract: Hunting is a popular and traditional pastime. However, natural resource managers are increasingly called upon to defend the use of hunting as a wildlife management tool and as a source of public recreation. The purpose of this study was to produce economic information to help resource managers and the public gain a better understanding of the economic contributions of hunting, to justify conservation and management expenditures, and help shape beneficial regulatory actions. My data show hunters spent $5.07 billion in the southeastern states in 1991 and jobs supported by hunting per state ranged from 3,120 (Oklahoma) to 23,370 (Texas). Hunting also produces important state tax revenues in the Southeast with $236.1 million generated by sales tax and $34.0 million generated in income tax revenues by hunting-supported jobs in SEAFWA member states. This report quantifies the economic contributions of deer and migratory bird hunting.

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Hunting is a popular and traditional pastime producing many conservation, social, and economic benefits. However, resource managers are increasingly called upon to justify hunting as a wildlife management tool and as a source of public recreation. This project was conducted to help resource managers understand and explain the financial, social, and economic contributions of hunting.

Economics can describe how hunting activities stimulate the economy, the value of hunting to the participant, and how hunting related expenditures benefit not only the businesses that directly cater to hunters, but to all of society. Economic data is used by wildlife managers, industry, media, government leaders, hunting participants, and others interested and/or active in hunting management and provides assistance in 6 general areas:

1) Legislative activities. Economics can help gain political support for hunting programs and/or conservation initiatives by demonstrating the importance of fish and wildlife-related activities to constituents and commerce.

2) Develop management priorities and plan management actions. Along with biological and other data, economics can help federal, state, and local governments develop conservation and wildlife management priorities and un-

derstand potential economic effects of various management schemes and options.

3) Public communication. Economics can help secure public support for fish and wildlife issues by demonstrating the potential benefits of wildlife-associated recreation. In addition, economics can help win the attention of people who may not care about wildlife, but are interested in economic prosperity and commerce.

4) Hunter management. Economics provides insights on hunter behavior, habits, and preferences to help officials effectively manage human interactions with wildlife.

5) Habitat conservation. By demonstrating the economic returns possible from proper fish and wildlife management and use, economics can help habitat conservation and restoration efforts.

6) Restitution for lost wildlife. Economics can establish restitution for illegally killed fish and wildlife or lost recreational opportunities.

Methods

The methodology employed to produce hunting economic estimates involved a survey of hunter expenditures and an economic model. To better present the economic methodology used here, the scope of the study and basic descriptions of economic concepts are first provided.

Scope of Study

The purpose of this project was to estimate the economic benefits of hunting within each state in the Southeast and the nation as a whole. The information produced includes the level of jobs, income, tax revenues, and total multiplier effect generated by hunting and does not include other social data such as hunter demographics, motivations, and social trends.

Descriptions of Economic Concepts

The economic benefits measured in this project are economic impacts. Economic impacts describe the monetary transactions resulting from an activity such as hunting. Economic impacts are composed of 3 primary parts. First are direct impacts. These are the initial purchase made by a hunter. For example, when a person buys a shotgun for $395, there is a direct impact on the retailer of $395. Secondly, there are indirect impacts. These occur after the original retail sale. The retailer must next purchase additional shotguns, the gun manufacturer must purchase additional wood, metal, and finishes; finish manufacturers must buy resins, and so on. Therefore, the original expenditure of $395 benefits a host of other industries. Lastly, there are induced impacts which result from wages and salaries paid to employees. The employees of the retailer, manufacturers, and their suppliers spend their paychecks which in turn create another cycle of indirect and induced effects. Through this cycle, hunting benefits everyone

throughout the United States including thousands of people who do not hunt nor have any perceived tie to hunting.

Several measures of economic impacts are derived. Retail sales are the total dollars spent by hunters in the course of their hunting activities. These expenditures range from guns and ammunition to travel, magazines, and repair expenses. Hunters' retail purchases are the direct impact and start the process that results in significant economic benefits through the indirect and induced effects.

Salaries and wages are the total salaries and wages paid by businesses to their employees and includes the employees of all businesses that are part of the direct, indirect, and induced rounds of spending. Total full and part time jobs supported by the direct, indirect, and induced rounds of spending also are measured.

The total economic effect, otherwise known as output, is the sum of the direct, indirect, and induced impacts created by the original retail sale. For example, the hunter's original purchase of a shotgun for $395 may result in total effects throughout the economy of $750.

Lastly, are tax revenues, which are partitioned into 2 components. Sales tax revenues are the total revenues received by states from taxes on the purchases of goods and services (including fuel taxes). In this project, sales tax estimates are based on hunters purchases only and do not account for the revenues generated by indirect and induced purchases. Income tax revenues are the income taxes generated through all hunting-supported jobs. In this project, income tax estimates include the indirect and induced impacts.

Generating Economic Estimates and Sources of Data

The methodology used to estimate the economic benefits of hunting consists of 3 basic steps: 1) tabulate 1991 hunter expenditures, 2) partition the expenditures into retail, wholesale, and manufacturing portions, and 3) apply the economic model.

Source of Data

Data on hunter expenditures were obtained from the 1991 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. Conducted approximately every 5 years by the U.S. Fish and Wildlife Service and the U.S. Bureau of the Census, the survey provides state-specific participation, demographic, and expenditure data. The survey is a combination of telephone and in-person interviews and is funded by Federal Aid in Sportfish and Wildlife Restoration administrative funds.

Potential error exists in the Survey as people are asked to recall past activities. For frequent purchases such as ammunition or fuel, recalling the exact amounts spent can be difficult. Past surveys inquired into people's activities over a 1-year period, until research commissioned by the USFWS (Southwick and Rockland 1990) reported responses could be significantly overstated. To reduce error, the 1991 survey used a trimester (3 interviews/year) format.

Another potential bias exists in the Survey's assumption that all equipment such as rifles, binoculars, decoys, etc. are purchased in the hunter's state of resi-

dence. This requires that all equipment purchases be classified as resident purchases. This can underestimate the economic impact estimates for states that cater to high numbers of out-of-state hunters and can overestimate the impacts for states whose residents frequently hunt out of state. This bias is not true for travel expenses which are correctly assigned by the Survey to the state where they occurred.

One potential bias was accounted for by the Survey. Hunters often purchase goods and services that could be used for fishing or other activities. The Survey asked hunters if the purpose of each purchase was for hunting. If not, the purchase would not be recorded as a hunting expense. This helps to reduce overestimates.

The Survey collected data for 39 categories of goods and services typically consumed by hunters. These responses were downloaded from the Survey into 50 state-specific expenditure files. Travel expenses in each file were subdivided into resident and non-resident components.

As products move through the economy, they are handled by retailers, wholesalers, and manufacturers. Each state expenditure file was separated accordingly. Economic impact analyses treats each segment as separate industries, otherwise known as margins. A margin is the percentage, or mark-up, of a sale attributable to the retail, wholesale, or manufacturing sector. For example, 70% of the final retail value of a shotgun sale may be attributed to the manufacturer, 5% to the wholesaler and 25% to the retailer. This means the manufacturing industry earned 70% of the final retail price, the wholesaler accrued 5% of the sale, and the retailer received 25%. Of course, sales revenue was not distributed to each industry segment upon sale, but once the final sale transaction was completed and all accounts settled, each industry received their percentage. Because there are no wholesale or manufacturing activities in the service sector, services are not subject to the above process.

Data from the U.S. Department of Commerce were used to calculate margins. The data were obtained from the Census of Retail Trade: Measures of Values Produced (1987) and the Census of Wholesale Trade: Measures of Values Produced (1987). These documents contain national sales figures for most retail and wholesale industry sectors as well as gross margins (a gross margin is the total revenue remaining once costs of goods sold were subtracted). To derive margins, each wholesale and retail industry's gross margin was divided by that industry's total sales. This produced the typical price mark-up for that industry. Next, two formulas were applied:

$$R/(1+R) = \text{retail margin, where } R = \text{typical retail mark-up}$$

$$W/\{(1+W)(1+R) = \text{wholesale margin, where } W = \text{typical wholesale mark-up.}$$

These formulas estimated percentage of a product's final selling price that accrued to each sector. The manufacturing margin was derived by summing the retail and wholesale margins and subtracting the total from 100 percent. After the original retail sales were divided into their retail, wholesale and manufacturing margins, the economic model was applied.

The Economic Model and Its Application

There are many types of economic models available. An input-output model was used for this project. Input-output models describe how sales in 1 industry impact other industries through the direct, indirect, and induced impacts. The RIMS-II Regional input-output model was used here and was developed by the U.S. Department of Commerce, Bureau of Economic Analysis, for primary use by the Federal government.

The relationships between industries are explained through multipliers. Multipliers are a ratio that describe the benefits produced in 1 industry as a result of sales in another. The RIMS-II model provides multipliers describing the salaries and wages, jobs, and total economic effect (output) created by sales from any specific industry. For example, an income multiplier of 0.61 would indicate that for every dollar spent by an industry, 61 cents in wages and salaries would be paid to the employees of other industries.

A potential error exists in the RIMS-II model. The model is based on mail surveys of industry, inquiring how much money they spend and where it is spent to meet production demands. If industry is not completely truthful, the results could be skewed.

Using a computer spreadsheet, the model was applied by matching the adjusted hunter expenditures with the correct multipliers. For example, the total hunter dollars attributed to the food manufacturing margin was multiplied separately by the wages and salary, output and employment multipliers specific to food production. The resulting estimates describe the salaries and wages, total economic effects, and jobs supported by food processors from hunters' food purchases. This process was repeated for all hunter expenditures. After all expenditures were matched with multipliers, the retail, wholesale, and manufacturing estimates were summed to produce the final economic benefit estimates for each category of hunter expenditures. The results for each state were then summed to derive the total economic impacts of hunting in that state.

The total economic impacts of hunting in the United States were not determined by summing the results of all 50 states. Doing so would underestimate the true economic impacts. The objective was only to estimate the total benefits produced by hunting activities within each state. The benefits produced by manufacturer and wholesaler exports to other states were not included. Therefore, by summing the state-specific impact estimates would underestimate the true impacts generated by hunting annually as the out-of-state shipments would not be included. For example, if trade between states were not accounted for, the benefits produced by hunters purchasing Winchester rifles outside of Massachusetts (where the factory is) would not be included in the final national economic estimates. The RIMS-II model accounts for this by providing separate multipliers for the overall U.S. economy. Total U.S. hunter expenditure estimates were obtained from the Survey, adjusted for the retail, wholesale, and manufacturing trade margins, and then matched to the multipliers to produce the U.S. hunting economic estimates.

Regional economic impacts could not be produced. The RIMS-II model does not provide multipliers for any multi-state regions and state-specific economic estimates could not be summed to derive regional estimates.

Results and Discussion

The expenditure figures in Table 1 present the total retail sales in 1991 generated from hunting activities by hunters 16 years and older in the United

Table 1. Hunter expenditures in the southeast (SEAWA) states (1991).

Expenditure category	Dollars spent
Food, drink, and refreshments	$648,896,775
Lodging	81,687,397
Public transportation	24,340,643
Private transportation	515,017,580
Guide fees	13,313,187
Pack trip or package fees	23,390,553
Public land use fees	10,527,494
Private land use fees	77,209,270
Equipment rental	5,620,030
Rifles	396,931,939
Shotguns	231,706,750
Muzzleloaders, primitive firearms	42,122,265
Pistols, handguns	138,539,950
Bows and arrows, archery equipment	161,197,770
Telescopic sights	79,717,614
Decoys and game calls	20,095,567
Ammunition	256,180,319
Hand loading equipment	40,463,398
Hunting dogs and associated costs	141,032,532
Other equipment (e.g. cases, and carriers for hunting equipment or game, hunting knives, etc.)	93,920,528
Camping equipment	33,450,586
Binoculars, field glasses, telescopes, etc.	24,572,310
Special hunting clothes, rubber boots, waders, and foul weather gear	105,815,538
Processing and taxidermy costs	55,677,867
Magazines	17,559,704
Membership dues and contribution	64,852,049
Other eqiupment (e.g. snowshoes, skis, maintenance and repair of equipment)	11,936,190
Land ownership	802,034,704
Land leasing	242,366,732
License fees	71,005,747
Special licenses, stamps, or tags	25,781,130
Bass boat	0
Other type of motor boat	1,422,958
Canoe, other boat	484,787
Boat motor, boat trailer/hitch	4,415,675
Pickup, camper, van, tent trailers	241,559,786
Cabin	66,753,329
Trail bike, dune buggy, 4×4 Vehicle	279,626,944
Other equipment (including ice chest)	8,354,401
Total	$5,059,582,000

Table 2. The economic impacts of all hunting activities in the Southeast (1991) (obtained using RIM-II economic model).

	Table 2A: Economic Impacts			
	Retail sales	Jobs	Salaries/wages	Total multiplier effect
United States total	$12,415,899,000	410,900	$8,854,499,000	$35,124,285,000
Alabama	276,790,000	7,210	135,829,000	540,846,000
Arkansas	283,902,000	9,050	149,852,000	566,049,000
Georgia	297,470,000	8,510	167,896,000	604,152,000
Florida	260,329,000	7,140	141,830,000	475,935,000
Kentucky	245,975,000	8,130	142,587,000	527,462,000
Louisiana	322,852,000	9,370	171,238,000	629,166,000
Maryland	199,472,000	4,590	97,762,000	302,430,000
Mississippi	415,128,000	9,390	155,741,000	730,798,000
Missouri	365,867,000	7,670	122,882,000	590,121,000
North Carolina	254,162,000	7,570	139,091,000	490,270,000
Oklahoma	148,726,000	3,120	54,600,000	237,134,000
South Carolina	157,876,000	4,990	82,781,000	297,165,000
Tennessee	346,294,000	9,590	184,675,000	683,584,000
Texas	1,072,943,000	23,370	474,520,000	2,145,313,000
Virginia	267,215,000	6,410	127,942,000	489,966,000
West Virginia	153,581,000	4,470	$75,691,000	$270,972,000
Southeast total	$5,068,582,000			

	Table 2B: Tax Revenues		
	State sales tax	State income tax	Federal income tax
United States total	$391,409,100	$98,110,300	$1,118,632,000
Alabama	11,539,000	3,180,000	16,697,000
Arkansas	12,079,000	1,406,000	17,861,000
Georgia	11,033,000	4,238,000	20,847,000
Florida	29,623,000		17,631,000
Kentucky	15,063,000	2,374,000	17,240,000
Louisiana	13,751,000	3,505,000	20,909,000
Maryland	5,835,000	3,655,000	12,326,000
Mississippi	19,994,000	1,070,000	15,432,000
Missouri	11,149,000	5,809,000	14,522,000
North Carolina	11,044,000	3,835,000	9,588,000
Oklahoma	7,090,000	297,300	6,599,000
South Carolina	6,376,000	879,000	9,874,000
Tennessee	17,436,000		22,811,000
Texas	45,707,000		59,257,000
Virginia	9,052,000	3,281,000	15,921,000
West Virginia	9,324,000	466,000	9,076,000
Southeast total	$236,095,000	$33,995,300	$286,591,000

States and in the 16 Southeastern Association of Fish and Wildlife Agency (SEAFWA) states.

The Economic Benefits of all U.S. Hunting Activities

Hunter expenditures circulate through the economy generating significant economic benefits. Tables 2–4 present the economic impacts for all hunting ac-

Table 3. The economic impacts of deer hunting in the Southeast (1991) (obtained using RIM-II economic model).

	Table 3A: Economic Impacts			
	Retail sales	Jobs	Salaries/wages	Total multiplier effect
United States total	$5,876,500,000	193,400	$4,167,435,000	$16,573,987,000
Alabama	148,657,000	3,870	72,951,000	290,476,000
Arkansas	155,044,000	4,940	81,837,000	309,131,000
Georgia	200,370,000	5,730	113,091,000	406,945,000
Florida	160,365,000	4,400	87,369,000	293,181,000
Kentucky	78,790,000	2,610	45,672,000	168,952,000
Louisiana	146,020,000	4,240	77,447,000	284,559,000
Maryland	121,722,000	3,250	68,281,000	209,327,000
Mississippi	248,421,000	5,470	91,396,000	428,396,000
Missouri	133,190,000	2,790	44,734,000	214,827,000
North Carolina	155,219,000	4,650	83,815,000	302,493,000
Oklahoma	59,617,000	1,280	22,267,000	94,759,000
South Carolina	97,105,000	3,070	50,919,000	182,177,000
Tennessee	158,436,000	4,390	84,497,000	312,753,000
Texas	516,418,000	11,270	228,402,000	4,032,561,000
Virginia	140,694,000	3,380	67,367,000	257,977,000
West Virginia	68,155,000	2,000	$34,095,000	$121,117,000
Southeast total	$2,588,223,000			

	Table 3B: Tax Revenues		
	State sales tax	State income tax	Federal income tax
United States total	$182,242,800	$44,574,200	$526,478,000
Alabama	6,198,000	1,708,000	8,968,000
Arkansas	6,597,000	768,100	9,754,000
Georgia	7,431,000	2,855,000	14,042,000
Florida	18,248,000		10,861,000
Kentucky	4,825,000	578,800	3,826,000
Louisiana	6,219,000	1,395,000	8,024,000
Maryland	3,561,000	2,208,000	7,035,000
Mississippi	11,965,000	709,400	10,505,000
Missouri	4,059,000	2,702,000	6,754,000
North Carolina	6,744,000	2,384,000	5,959,000
Oklahoma	2,842,000	115,800	2,688,000
South Carolina	3,923,000	539,000	6,074,000
Tennessee	7,977,000		10,437,000
Texas	21,999,000		28,512,000
Virginia	4,942,000	1,661,000	8,383,000
West Virginia	4,138,000	215,900	4,096,000
Southeast total	$121,668,000	$17,840,000	$145,918,000

tivities and break out deer hunting and migratory bird hunting for the United States and expenditure estimates for each of the SEAFWA states.

State-Specific Hunting Impacts

Hunting provides the Southeast with an important source of retail sales ($5.07 billion), jobs (from 3,120 to 23,370 per state), wages and salaries ($54.6

Table 4. The economic impacts of migratory bird hunting in the Southeast (1991) (obtained using RIM-II economic model).

Table 4A: Economic Impacts

	Retail sales	Jobs	Salaries/wages	Total multiplier effect
United States total	$1,382,846,000	45,570	$983,745,000	$3,900,750,000
Alabama	16,607,000	430	8,150,000	32,451,000
Arkansas	31,229,000	1,000	16,484,000	62,265,000
Georgia	20,823,000	600	11,753,000	42,291,000
Florida	18,223,000	500	9,928,000	33,315,000
Kentucky	19,678,000	650	11,407,000	42,197,000
Louisiana	29,182,000	840	15,361,000	57,478,000
Maryland	19,974,000	390	8,608,000	34,402,000
Mississippi	24,908,000	550	9,216,000	42,953,000
Missouri	25,611,000	540	8,602,000	41,308,000
North Carolina	17,791,000	530	9,607,000	34,672,000
Oklahoma	14,873,000	370	6,768,000	28,393,000
South Carolina	20,524,000	650	10,761,000	38,631,000
Tennessee	24,241,000	670	12,906,000	47,797,000
Texas	289,695,000	6,340	127,937,000	578,064,000
Virginia	16,033,000	390	7,677,000	29,398,000
West Virginia	3,072,000	90	$1,515,000	$5,422,000
Southeast total	$592,464,000			

Table 4B: Tax Revenues

	State sales tax	State income tax	Federal income tax
United States total	$40,335,900	$11,565,180	$124,323,000
Alabama	1,185,000	204,000	1,002,000
Arkansas	1,329,000	186,300	1,965,000
Georgia	772,300	333,800	1,459,000
Florida	3,259,000		1,234,000
Kentucky	1,205,000	239,600	1,379,000
Louisiana	2,200,000	331,400	1,875,000
Maryland	525,100	366,000	1,234,000
Mississippi	1,200,000	93,800	1,085,000
Missouri	780,400	406,900	1,017,000
North Carolina	737,000	467,800	1,197,000
Oklahoma	709,000	49,100	834,000
South Carolina	2,615,000	139,000	1,284,000
Tennessee	1,221,000		1,594,000
Texas	12,341,000		16,063,000
Virginia	543,100	222,400	955,300
West Virginia	186,000	13,600	181,260
Southeast total	$30,807,900	$3,053,700	$34,358,560

million to $474.5 million per state), and tax revenues ($270.1 million for all southeastern states and $286.6 million for the U.S. government). All residents benefit, especially in rural areas where most hunting occurs and other sources of income are limited. Through the multiplier effect, hunting benefits all residents, even those who never hunt.

Table 5. Per-capita contributions of hunting (1991) (obtained using RIM-II economic model).

	State population 16 years and older	$\bar{x}$ Retail sales per state resident
Alabama	3,110,000	$89.00
Arkansas	1,807,000	157.11
Florida	10,320,000	25.23
Georgia	4,840,000	61.46
Kentucky	2,826,000	87.04
Louisiana	3,161,000	102.14
Maryland	3,659,000	54.52
Mississippi	1,914,000	216.89
Missouri	3,940,000	90.58
North Carolina	5,104,000	49.80
Oklahoma	2,411,000	61.69
South Carolina	2,645,000	59.69
Tennessee	3,818,000	90.70
Texas	12,548,000	85.51
Virginia	4,721,000	56.60
West Virginia	1,420,000	108.16
Southeast total	68,244,000	$87.26

Contributions of Hunting Per Capital

Even though only 7.5% of the U.S. population hunts, these individuals contribute a significant amount to state and national economies. For example, for every person in Mississippi, state hunters provided $216.89 in retail sales to the state economy ($1,140 per hunter, Table 5). This $216.89, via the multiplier effect, generated $381.82 in total economic effects for every state resident. To understand the importance of this, consider the numerous issues receiving coverage in daily papers that have less impact on a per-capita basis. This information can be used to demonstrate how any action impacting hunting activity can impact the state economy. Likewise, any action that could increase overall hunting participation could produce additional benefits. Table 5 describes the retail sales per capita for each southeastern state for all hunting, deer and migratory bird hunting.

Propensity to Hunt

Hunting in the Southeast generates a larger per capita economic stimulus than in other U.S. regions. In 1991, the 16 states that comprise the SEAFWA contained 35.9% of the U.S. population. However, this region was responsible for over 40.8% of all U.S. hunting expenditures. The Southeast also had a higher proportion of total hunting days than the rest of the U.S. with 44.2% (USFWS 1993). This information can be used to demonstrate the importance of hunting to residents of the Southeast.

Summary

In 1991, hunters in the Southeast spent $5.07 billion on hunting activities. These expenditures supported jobs per state ranging from 3,120 (Oklahoma) to 23,370 (Texas), with household income ranging from $54.6 million (Oklahoma) to $127.9 million (Texas) per state. Hunting also produces important tax revenues in the Southeast with $236.1 million in state sales taxes, $34.0 in state income taxes, and $286.6 million in Federal income taxes. All residents benefit, especially those in rural areas where most hunting activities occur and other sources of income are limited. These results are intended to provide wildlife managers, industry, political leaders, and others with some of the information necessary to optimally manage U.S. wildlife resources. Through well-informed decision-making, hunting will continue to provide state residents with valuable economic benefits for years to come.

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