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Economic contribution of wildlife management areas to local and state economies

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ABSTRACT

Sustaining public support for new and existing protected areas including wildlife management areas (WMA) requires demonstrating whether and how protected areas can bring economic benefit to local stakeholders. This is particularly critical in rural areas where increasing acres in WMAs may lead to reduction in tax revenue available that local governments need for provision of many public services. This study presents an approach to characterize economic contribution of WMA related expenditures by visitors and wildlife agency on county and state level economy. While the results are based on data from Tennessee WMAs, the economic multipliers presented here may be applicable to other comparable places in projecting economic impacts of WMA related activities.

KEYWORDS

Wildlife management;
economic impacts;
multiplier; WMA

The provision of public recreation lands such as Wildlife Management Areas (WMAs) involves significant costs in terms of acquisition, protection, and maintenance. Expanding public land systems like WMAs often meets political resistance as taking large acres of land off the tax roll results in declined revenues, which is critical for local governments in rural areas to provide public services. State wildlife agencies and other conservation organizations interested in expanding more land into the WMA system may benefit from understanding reliable estimates of economic benefits (e.g., expenditures, value-added, jobs) that WMAs bring to the local (e.g., county) and state economy.

The economics literature on wildlife-based recreation has focused on activity-specific expenditures for large geographic regions. For example, Munn, Hussain, Spurlock, and Henderson (2010) estimated that \$33 billion in expenditures by anglers and hunters in the Southeast United States generated \$11 billion in indirect impacts and \$9.6 million in induced impacts. Similar broad-scale studies have been conducted to estimate the economic contribution of hunting (Poudel, Munn, & Henderson, 2016). While these studies provide a framework for characterizing economic contributions and offer a broad outlook of expenditures, and economic multipliers, such estimates are of little help in understanding the economic contribution of WMAs (specific type of public lands offering more than just hunting or fishing) on county or state economies. Given their focus on habitat conservation and wildlife recreation, in particular, recreation activities and visitor expenditures associated with WMAs are a small part of the region-wide outdoor recreation industry. Social account matrices and multipliers at the county or state level are unique and can differ from that of

regions as large as the southeast United States because each county or state has distinct economic characteristics with unique interrelationships among industries. With the notable exception of studies on the national wildlife refuge system (Carver & Caudill, 2007), no study has focused on characterizing the economic contribution of state-managed WMAs and their economic impact (in terms of output, jobs, wages, tax revenue) at the county and state economy scale. This findings abstract addresses these knowledge gaps.

Data were collected using a mixed-mode mail and web survey (Dillman, Smyth, & Christian, 2014) sent to individuals with a permit or privilege to access 155 WMAs managed by Tennessee Wildlife Resource Agency (TWRA, 2019). Estimating economic expenditure first required estimating the proportion of license holders that annually visit a given WMA, and how much an average visitor spends on 21 items (e.g., lodging, fuel, meal, equipment, guide fee) during a typical trip to that WMA. Respondents were asked about the number of trips taken, days spent, and expenditures (within WMA County) while recreating at one or more of 155 WMAs in Tennessee in 2018. By combining the trip profile and expenditure data, total visitor expenditures for each WMA was computed, which was then combined with the agency expenditures (e.g., landscaping, consultation, labor expenditures) to obtain WMA-specific total expenditure at the county level. Estimated expenditures were then analyzed in the regional input-output modeling program, IMPLAN (IMPLAN Group LLC, 2013), to estimate the direct, indirect, and induced impact of this spending in the WMA counties. IMPLAN models the economy of a county or a region (a group of adjacent counties) and analyzes how spending in one industry affects others. A separate economic impact model was developed for each WMA, with the impact region defined as the counties where the WMA is located; only the portion of trip expenditure occurred within the WMA county was considered as input for the region of interest. A statewide model was also developed to characterize the contribution of WMA expenditures on the state economy.

A number of economic metrics from IMPLAN were used. For example, jobs or employment represents the estimated number of both full- and part-time jobs generated by the WMA expenditure in the county. Labor income includes employee compensation (wages and benefits) and proprietor's income. Total value added represents the estimated dollar values of wages and salaries including benefits, self-employed income, interests, rents, royalties, dividends, profits, plus excise and sales taxes. This measure represents a contribution to GDP. Total impacts are the sum of direct impacts (i.e., jobs, income, tax that are directly linked with the WMA-related expenditure), the indirect impacts (i.e., estimated economic impacts from businesses (restaurants, lodging, fuel, retail sales) providing goods and services, and induced impacts (i.e., increased expenditures of new household income as a result of visitors' recreational expenditures)). The total effect includes the direct effect as well as the multiplier effects.

Out of 10,000 sportspersons contacted, 3,037 (30%) responded. Ninety-five percent were male and the average age was 51 years. The majority (55%) reported having a high-school degree or some college and another 31% had a bachelor's degree or higher. Eighty-five percent self-identified as hunters or trappers. The five most popular primary WMA activities reported were hunting (63%), fishing (16%), hiking (7%), ATV/OHV riding (5%), and wildlife watching (4%). In terms of recreation days, visitors traveled an average of 69 miles and made an average of 8.5 trips to WMAs. In 2018, WMAs visitors in the state collectively spent over 3.44 million recreation days. Based on total recreation days spent, the

Table 1. Top 10 WMAs in Tennessee according to estimated recreation days and expenditures.

Rank	<i>Recreation days</i>		Rank	<i>Expenditures</i>	
	WMA	Days		WMA	Expenditures
1	Catoosa	202,677	1	North Cherokee	\$24,714,773
2	North Cherokee	192,114	2	Percy Priest	\$21,702,012
3	North Cumberland	170,723	3	South Cherokee	\$20,931,397
4	Reelfoot	154,175	4	Catoosa	\$20,767,975
5	Percy Priest	130,895	5	North Cumberland	\$20,192,772
6	South Cherokee	123,425	6	Reelfoot	\$17,969,192
7	Chickamauga	91,424	7	Land between the Lakes	\$12,902,218
8	Chuck Swan	90,818	8	Old Hickory	\$12,376,831
9	Big Sandy	86,073	9	Hiwassee Refuge	\$11,800,821
10	Old Hickory	82,103	10	Laurel Hill	\$11,627,780

Table 2. Economic contributions of WMA-related spending in Tennessee state economy, 2018.

Impact type	Jobs	Labor income	Value added	State and local tax	Federal tax
Direct effect	7,602	\$221,434,610	\$326,432,430	\$49,137,958	\$49,205,429
Indirect effect	1,252	\$66,311,848	\$109,293,229	\$7,175,752	\$14,859,661
Induced effect	1,666	\$85,624,002	\$140,916,055	\$13,314,785	\$19,253,133
Total effect	10,520	\$373,370,460	\$576,641,714	\$69,628,479	\$83,318,224
Multiplier	1.38	1.69	1.77	1.42	1.69

top 10 WMAs were ranked (Table 1). During the year, visitors spent a total of \$427 million in trip-related activities within the counties where they visited WMAs. Another \$108 million was estimated to have been spent by visitors in places outside of visited WMA. The top 10 WMAs according to WMA-related expenditures are presented in Table 1.

Statewide IMPLAN results highlight the contribution of the direct, indirect, and induced effects that add up to the total effect of WMA-related spending on the state economy (Table 2). The jobs column shows the number of jobs directly or indirectly created, whereas the labor income column shows total salaries and wages paid in all sectors of the economy attributable to the activities under study. The value-added column shows the difference between output and intermediate inputs and therefore interpreted as a contribution to GDP. These tax revenue columns represent the estimated total of all income, sales, property and other taxes that accrue to respective taxing authorities.

The estimated direct contributions on jobs show that WMAs in Tennessee contributed more than 7,600 jobs that provided a labor income of \$221 million. The direct spending from WMA users and the managing agency resulted in \$49 million in state and local tax, and another \$49 million in federal tax. These direct effects in the regional economy created an additional 3,918 jobs and \$152 million in labor income. The indirect tax effect included \$20 million in state and local tax and \$33 million in federal tax. Considering the direct and multiplier effects (i.e., indirect and induced), WMA-related expenditures in Tennessee contributed an estimated 10,520 jobs and \$373 million in labor income, \$69 million in state and local tax, and \$83 million in federal tax. The direct contribution of economic output resulting from the industries associated with recreational use of WMAs in Tennessee was approximately \$326 million. An additional \$250 million in indirect and induced GDP contributions resulted in a total of \$576 million contributions in state GDP.

The economic multiplier (ratio of total effect and direct effect) measures additional output or jobs generated because of direct effect. The employment multiplier of 1.38

Table 3. Total economic contributions of WMA-related spending in local economy in Tennessee in 2018.

Rank	WMA	Jobs	Labor income (million)	Value added (million)	State and local tax (million)	Federal tax (million)
1	North Cherokee	648	\$22.07	\$34.02	\$4.17	\$5.50
2	Percy Priest	603	\$25.94	\$40.98	\$3.84	\$5.88
3	South Cherokee	566	\$17.15	\$26.85	\$3.61	\$4.23
4	Catoosa	559	\$17.31	\$27.37	\$3.70	\$4.30
5	North Cumberland	505	\$18.02	\$27.69	\$3.27	\$4.21
6	Reelfoot	404	\$16.17	\$25.18	\$2.74	\$3.72
7	Land Between the Lakes	353	\$11.98	\$18.59	\$2.23	\$3.08
8	Old Hickory	340	\$11.18	\$17.88	\$2.28	\$2.78
9	Hiwassee Refuge	286	\$8.07	\$12.79	\$1.89	\$1.79
10	Chickamauga	284	\$11.86	\$18.40	\$1.81	\$2.75

implies that for every job created based on WMA expenditures, an additional 0.38 jobs were created in other industries throughout the state. The tax multiplier implies that for every dollar of state and local tax revenue generated by WMA-related expenditures, an additional \$0.42 in state and local tax, and \$0.69 in federal tax revenue was contributed through multiplied effect on other industries.

Estimated expenditures associated with each WMA were combined with WMA-specific IMPLAN models to estimate economic contribution at the local level (county or group of counties where a WMA is located). The top 10 WMAs according to estimated total (direct, indirect and induced combined) economic contribution in creating jobs are shown in Table 3. The rankings could differ if alternative contribution criteria (e.g., value-added, tax) were used.

Overall findings demonstrated the extent to which WMAs can economically contribute at local as well as state level. Even though past studies have analyzed the economic impacts of public lands set aside for recreation (national forests, state parks), WMAs are unique because of relative size, location, and management focus on habitat conservation and consumptive recreation. Since this article is the first to characterize the economic impact of WMAs, the economic multipliers could be applied in other states having similar economic realities. As state wildlife agencies and their stakeholders nationwide face tighter budget constraints, the economic contribution of the WMA system on state GDP could facilitate legislative negotiations. Finally, county-level economic contributions presented could be used to educate the local public on the economic benefit of WMAs and demonstrate that loss of property tax revenue due to new WMA designation can be offset by economic benefits.

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References

- Carver, E., & Caudill, J. (2007). *Banking on nature 2006: The economic benefits to local communities of national wildlife refuge visitation*. Washington, D.C.: US Fish & Wildlife Service, Division of Economics.
- Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). *Internet, phone, mail, and mixed-mode surveys: The tailored design method* (4th ed.). Hoboken, NJ: John Wiley & Sons.
- IMPLAN Group LLC, IMPLAN System. (2013). *2013 data and V.3 software*. Huntersville, NC. Retrieved from <http://www.implan.com/>
- Munn, I. A., Hussain, A., Spurlock, S., & Henderson, J. E. (2010). Economic impact of fishing, hunting, and wildlife-associated recreation expenditures on the Southeast U.S. regional economy: An input-output analysis. *Human Dimensions of Wildlife*, 15, 433–449. doi:10.1080/10871209.2010.508193
- Poudel, J., Munn, I. A., & Henderson, J. E. (2016). Economic contribution of hunting expenditure to the southern United States. *International Journal of Environmental Studies*, 73(2), 236–254. doi:10.1080/00207233.2016.1143701
- Tennessee Wildlife Resource Agency. (2019). *TWRA wildlife management areas map*. Retrieved from <https://www.tn.gov/twra/hunting/wildlife-management-areas.html>