



Estimated Economic Impacts from Tennessee Valley Authority’s Chickamauga, Norris, and Watts Bar Reservoirs Shoreline Property Owners’ and Onsite Visitors’ Recreational Expenditures

Background — In addition to flood control, the Tennessee Valley Authority (TVA) is congressionally mandated to support economic development in the Tennessee Valley region. Outdoor recreational use of shorelines, reservoirs, and facilities contributes to supporting economic development in the region. To sustain outdoor recreational use, an understanding of recreational users’ patterns and trends (i.e., participation, expenditures, recreational user days, etc.) is needed. Economic impacts arise from recreational users’ expenditures from daily visits of public recreation sites, including private property owners use of shorelines. The purpose of this analysis was to ascertain expenditure patterns and usage for onsite recreation users that access Chickamauga, Norris, and Watts Bar Reservoirs (Figure 1) from major public entry points including property owners who access their shoreline properties. This study also provides estimates of the economic impacts associated with use of this onsite recreation. Two separate surveys were administered, with both conducted in the summer of 2016 (May 6 through September 11). Shoreline property owners were contacted via a mail survey and onsite recreational users were contacted via an intercept survey (Poudyal, 2017).

For property owners, a total of 3,000 (1,000 for each reservoir in the study) owners were randomly selected from the 26A permit database maintained by TVA. The survey response rates were 23.0 percent for Chickamauga, with 25.0 percent and 24.4 percent for Norris and Watts Bar shoreline property owners, respectively. The onsite visitor survey utilized multi-stage sampling technique. For onsite visitors, a total of 476 surveys were collected from onsite recruiting of participants intercepted at the public exit points at the three reservoirs. Out of 476 surveys, 220 were obtained at Norris, 198 at Chickamauga, and 58 at Watts Bar (Poudyal, 2017).

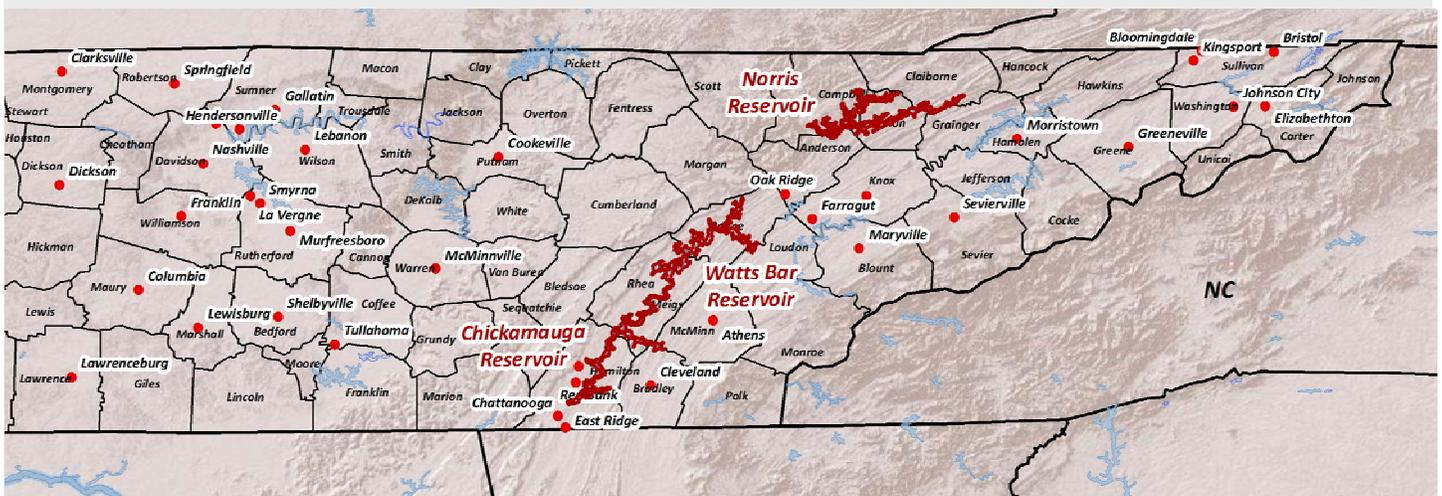


Figure 1. Location of Chickamauga, Norris, and Watts Bar Reservoirs in East Tennessee.

To estimate the economic impacts of the recreational expenditures, an input-output model, IMPLAN, was used (2013 data set) (IMPLAN Group LLC, 2013). Numerous communities and/or towns around the reservoirs are impacted economically. From the survey data, average expenditures per visit per day were calculated for lodging, food and beverages, transportation to and from the reservoir/recreational area, watercraft expenses, plus a broad category of other items that included entertainment, retail purchases, hunting/fishing/camping supplies, rentals, and souvenirs for both shoreline property owners and onsite users. In addition, shoreline property owners were asked about their annual expenditures for docks and shoreline maintenance, watercraft purchases, access/marina fees, property taxes, including property improvements such as landscaping and/or construction of boathouses, docks, and patio/decks. Estimated economic impacts are presented for both survey groups at both the state and multi-county level. For shoreline property owners, the numbers of permanent and non-permanent residents' lake front property owners used to estimate total expenditures for the various expenditure categories were 2,808 (1,582 permanent; 1,226 non-permanent) for Chickamauga, 2,590 (601 permanent; 1,689 non-permanent) for Norris, and 4,776 (2,879 permanent; 1,897 non-permanent) for Watts Bar. For onsite visitors' expenditures, the recreational day's values used to determine total expenditures were 5.8 million for Chickamauga, 3.1 million for Norris, and 1.8 million for Watts Bar (Poudyal, 2017).

The estimated economic impacts for all three reservoirs for onsite visitors are presented in Table 1. Using the Norris Reservoir for the multi-county analysis as the discussion reference, the estimated direct and total impacts (economic activity) were \$612.1 million and \$1.1 billion, respectively. Employment impacts were 8,758 direct and 11,949 for total. Total labor income and value added for onsite visitors at for Norris were \$384.5 million and \$632.6 million, respectively. State and local taxes were estimated at \$82.0 million. The magnitude of the estimated total economic impacts for onsite visitors at the multi-county level of analysis were the largest for Norris (\$1.1 billion), followed by Chickamauga (\$878.8 million) and Watts Bar (\$442.3 million). This held true for employment impacts for onsite visitors also with Norris having the largest total employment impact at 11,949, followed by Chickamauga (9,755), and Watts Bar (5,053).

Multipliers measure the additional total industry output or employment for an additional millions dollars in economic activity. The total industry output multipliers for onsite visitors for the multi-county analysis ranged from 1.70 for Chickamauga, 1.72 for Norris, and 1.80 for Watts Bar. Interpreted, for every dollar onsite visitors spent on lake recreation, an additional \$0.80 of economic activity was generated throughout the multi-county analysis (based on Watts Bar multiplier). The employment multipliers for onsite visitors ranged from 1.36 for both Chickamauga and Norris, and 1.38 for Watts Bar. For every job created based on Watts Bar shoreline property owners' expenditures, an additional .38 jobs are created in other industries throughout the multi-county region. Normally, both total industry output and employment multipliers are larger at the state level of analysis as a result of less leakage of economic activity outside of the larger study region.

The estimated economic impacts for all three reservoirs for both permanent and non-permanent shoreline property owners are presented in Table 2. The shoreline property owners' estimated economic impacts not only include daily expenditures but also annual expenditures for docks and shoreline maintenance, watercraft purchases, ac-

IMPLAN Metrics: Total Industry Output — economic activity and represents the estimated annual dollar value of production summed across all industries. Employment — the estimated number of total wage and salary employees (both full- and part-time), as well as self-employed. Labor Income — employee compensation (wages and benefits) and proprietor's income. Total Value Added — the estimated dollar values of wages and salaries including benefits, self-employed income, interests, rents, royalties, dividends, profits, plus excise and sales taxes.

Impact Types: Direct Impacts — the estimated economic impacts of activities from reservoir shoreline property owners and onsite visitors from the survey conducted. Total Impacts — the sum of direct impacts, plus the estimated economic impacts from businesses (i.e., restaurants, lodging, fuel, retail sales, etc.) providing goods and services (Indirect Impacts), and increased expenditures of new household income (Induced Impacts) as a result of shoreline owners and onsite visitors' recreational expenditures.

Table 1. Estimated Economic Impacts from Chickamauga, Norris, and Watts Bar Reservoir Onsite Visitors' Recreational Expenditures

Reservoir	Total Industry Output ^a		Employment		Labor Income ^a		Total Value Added ^a		State/Local Taxes
	Direct	Total	Direct	Total	Direct	Total	Direct	Total	Total
	<i>(Million \$)</i>		<i>(Number)</i>		<i>(Million \$)</i>		<i>(Million \$)</i>		<i>(Million \$)</i>
<u>Chickamauga</u>									
Multi-County ^b	\$517.3	\$878.8	7,155.1	9,755.0	\$227.5	\$337.2	\$330.6	\$532.1	\$70.5
State	\$544.8	\$1,009.4	7,650.8	10,849.3	\$234.2	\$390.4	\$346.4	\$612.6	\$78.2

^a2017\$; ^bFor Chickamauga, Multi-County region includes Bledsoe, Bradley, Cumberland, Grundy, Hamilton, Loudon, Marion, McMinn, Meigs, Monroe, Polk, Rhea, Roane, and Sequatchie Counties in Tennessee and Catoosa, Dade, Murray, Walker, and Whitfield Counties in Georgia.

<u>Norris</u>									
Multi-County ^b	\$612.1	\$1,054.5	8,758.3	11,949.4	\$245.9	\$384.5	\$384.4	\$632.6	\$82.0
State	\$612.5	\$1,118.2	8,320.0	11,810.4	\$257.0	\$427.2	\$394.4	\$683.5	\$82.1

^a2017\$; ^bFor Norris, Multi-County region includes Anderson, Campbell, Claiborne, Grainger, Hamblen, Hancock, Hawkins, Jefferson, Knox, Morgan, Roane, Scott, Sevier, and Union Counties in Tennessee; Bell, Harlan, Knox, McCreary, and Whitley Counties in Kentucky; and Lee County in Virginia.

<u>Watts Bar</u>									
Multi-County ^b	\$245.8	\$442.3	3,671.2	5,052.9	\$107.3	\$170.0	\$152.3	\$263.0	\$34.1
State	\$246.1	\$460.1	3,668.8	5,138.0	\$107.4	\$179.2	\$152.7	\$275.4	\$34.8

^a2017\$; ^bFor Watts Bar, Multi-County region includes Anderson, Bledsoe, Blount, Bradley, Campbell, Cumberland, Hamilton, Knox, Loudon, McMinn, Meigs, Monroe, Morgan, Rhea, Roane, and Scott Counties in Tennessee.

cess/marina fees, property taxes, including property improvements such as landscaping and/or construction of boat-houses, docks, and patio/decks. Using Watts Bar permanent residents for the multi-county analysis as the discussion reference, the estimated direct and total impacts (economic activity) were \$25.0 million and \$45.6 million, respectively. Employment impacts were 185 direct and 332 for total. Total labor income and value added for permanent shoreline property owners at Watts Bar were \$16.3 million and \$23.9 million, respectively. State and local taxes were estimated at \$2.3 million.

The magnitude of the estimated total economic impacts for permanent residents for the multi-county analysis for Watts Bar was \$45.6 million, followed by Chickamauga (\$24.2 million), and Norris (\$22.8 million). For non-permanent residents at the multi-county level of analysis, Norris had the largest total economic impact at \$60.7 million, followed by Chickamauga (\$38.8 million) and Watts Bar (\$34.0 million). For employment, Norris had the largest total employment impacts at 484 followed by Chickamauga (308) and Watts Bar (256) for non-permanent residents at the multi-county level of analysis.

The total industry output multipliers for *permanent* residents for shoreline property owners for the multi-county analysis were 1.72 for Chickamauga, 1.74 for Norris, and 1.82 for Watts Bar. The employment multipliers for *permanent* residents shoreline property owners (multi-county) were 1.72 for Chickamauga, 1.69 for Norris, and 1.79 for Watts Bar. The total industry output multipliers for *non-permanent* residents for shoreline property owners for the multi-county analysis were 1.69 for Chickamauga, 1.75 for Norris, and 1.78 for Watts Bar. The employment multipliers for *non-permanent* residents shoreline property owners (multi-county) were 1.59 for Chickamauga, 1.66 for Norris, and 1.72 for Watts Bar. As previously mentioned, both total industry output and employment multipliers are normally larger at the state level of analysis as a result of less leakage of economic activity outside of the larger study region.

Table 2. Estimated Economic Impacts from Chickamauga, Norris, and Watts Bar Reservoir Permanent and Non-Permanent Residents' Shoreline Property Owners' Recreational Expenditures

Reservoir	Total Industry Output ^a		Employment		Labor Income ^a		Total Value Added ^a		State/Local Taxes
	Direct (Million \$)	Total (Million \$)	Direct (Number)	Total (Number)	Direct (Million \$)	Total (Million \$)	Direct (Million \$)	Total (Million \$)	Total (Million \$)
<u>Chickamauga</u>									
<u>Permanent</u>									
Multi-County ^b	\$14.1	\$24.2	101.8	175.4	\$5.0	\$8.3	\$7.3	\$12.7	\$1.4
State	\$14.4	\$26.9	100.7	188.0	\$5.5	\$9.8	\$7.6	\$14.4	\$1.5
<u>Non-Permanent</u>									
Multi-County ^b	\$23.0	\$38.8	193.1	308.3	\$8.8	\$13.7	\$12.3	\$21.0	\$2.6
State	\$23.2	\$43.0	189.5	327.5	\$9.4	\$16.2	\$12.7	\$23.4	\$2.7
^a 2017\$; ^b For Chickamauga, Multi-County region includes Bledsoe, Bradley, Cumberland, Grundy, Hamilton, Loudon, Marion, McMinn, Meigs, Monroe, Polk, Rhea, Roane, and Sequatchie Counties in Tennessee and Catoosa, Dade, Murray, Walker, and Whitfield Counties in Georgia.									
<u>Norris</u>									
<u>Permanent</u>									
Multi-County ^b	\$13.1	\$22.8	105.2	177.6	\$4.9	\$8.0	\$6.6	\$12.0	\$1.3
State	\$13.2	\$24.4	101.3	179.7	\$5.2	\$9.1	\$6.9	\$13.2	\$1.4
<u>Non-Permanent</u>									
Multi-County ^b	\$34.7	\$60.7	292.3	484.3	\$13.3	\$21.7	\$18.7	\$33.1	\$4.1
State	\$35.4	\$65.7	288.6	500.1	\$14.3	\$24.7	\$19.7	\$36.8	\$4.3
^a 2017\$; ^b For Norris, Multi-County region includes Anderson, Campbell, Claiborne, Grainger, Hamblen, Hancock, Hawkins, Jefferson, Knox, Morgan, Roane, Scott, Sevier, and Union Counties in Tennessee; Bell, Harlan, Knox, McCreary, and Whitley Counties in Kentucky; and Lee County in Virginia.									
<u>Watts Bar</u>									
<u>Permanent</u>									
Multi-County ^b	\$25.0	\$45.6	185.0	331.9	\$9.3	\$16.3	\$12.7	\$23.9	\$2.3
State	\$24.5	\$46.2	180.5	331.2	\$9.2	\$16.7	\$12.5	\$24.4	\$2.4
<u>Non-Permanent</u>									
Multi-County ^b	\$19.1	\$34.0	148.7	255.7	\$7.5	\$12.5	\$9.7	\$17.9	\$1.8
State	\$18.8	\$34.9	145.8	258.0	\$7.4	\$12.9	\$9.5	\$18.5	\$1.9
^a 2017\$; ^b For Watts Bar, Multi-County region includes Anderson, Bledsoe, Blount, Bradley, Campbell, Cumberland, Hamilton, Knox, Loudon, McMinn, Meigs, Monroe, Morgan, Rhea, Roane, and Scott Counties in Tennessee.									

Economic Impacts Per Shoreline Miles for TVA Reservoirs

Total shoreline miles for TVAs nine dams along the Tennessee River, including tributary dams and reservoirs, is estimated at 10,719.5. For Chickamauga, the estimated shoreline miles are 810.0, and for Norris and Watts Bar, shoreline miles are estimated at 809.2 and 721.0, respectively. A weighted average for total industry output, employment, and labor income from the multi-county analysis for the three reservoirs was used to estimate the economic impacts per shoreline mile for TVA's reservoirs. For total industry output, the weighted average per mile for shoreline property owners was \$96,616 and \$1.0 million for onsite visitors (see Table 3). For employment and labor income for shoreline

property owners the weighted averages per mile for employment was 0.74 and \$34,399, respectively. For onsite visitors, the weighted average per mile was 11.4 for employment and \$381,037 for labor income. For the total TVA system (10,719.5 miles), total industry output economic impacts are estimated at \$1.0 billion for shoreline property owners and \$10.9 billion for onsite visitors. For the total TVA system, employment estimated economic impacts are 7,939 for shoreline property owners and 122,564 for onsite visitors. Following this same theme for labor income for the total TVA system, estimated economic impacts are \$368.7 million for shoreline property owners and \$4.1 billion for onsite visitors. And for state/local taxes, \$61.8 million are estimated for shoreline property owners and \$854.7 million for onsite visitors.

Table 3. Estimated Economic Impacts Per Shoreline Mile and For Total Tennessee Valley Authority’s Reservoirs System for Shoreline Property Owners and Onsite Visitors

Reservoir	Shoreline Miles	TIO ^a	Weighted Average Per Mile	Emp ^a	Weighted Average Per Mile	Labor Income ^a	Weighted Average Per Mile	State/Local Taxes ^a	Weighted Average Per Mile
<i>Property Owners</i>		(Million \$)		(Number)		(Million \$)		Million \$)	
Chickamauga	810.0	\$63.0		483.7		\$22.0		\$4.0	
Norris	809.2	\$83.5		661.9		\$29.7		\$5.4	
Watts Bar	721.0	\$79.6		587.6		\$28.8		\$4.1	
Total 3 Reservoirs	2,340.2	\$226.1	\$96,616	1,733.2	0.74	\$80.5	\$34,399	\$13.5	\$5,769
Total TVA System	10,719.5	\$1,035.6		7,939		\$368.7		\$61.8	
<i>Onsite Visitors</i>									
Chickamauga	810.0	\$878.8		9,755.0		\$337.2		\$70.5	
Norris	809.2	\$1,054.5		11,949.4		\$384.5		\$82.0	
Watts Bar	721.0	\$442.3		5,052.9		\$170.0		\$34.1	
Total 3 Reservoirs	2,340.2	\$2,375.6	\$1,015,127	26,757.3	11.4	\$891.7	\$381,036	\$186.6	\$79,737
Total TVA System	10,719.5	\$10,881.7		122,564		\$4,084.5		\$854.7	

^a For shoreline property owners, TIO, Emp, Labor Income, and State/Local Taxes are the sum of both permanent and non-permanent residents’ total economic impacts.

Discussion/Limitations

It is important to note that this type of study has limitations. The model used represents the region’s economy in a given year. Therefore, the results reflect a snap-shot in time. If onsite or non-permanent visitors were to consistently increase their visits to a reservoir, it is likely the businesses serving those users could increase or expand and a greater percentage of the inputs purchased in the region. Conversely, if the visits to the area were to decrease, it is likely those businesses would decrease or close. Furthermore, the economic value of changes to the environment in an area, such as changes in water quality, erosion, or wildlife from use of the area’s resources cannot be captured with the current analysis. Further study would be needed to capture these effects. It should be recognized that the expenditure data were derived from surveys conducted for three of TVAs reservoirs between May through September, 2016. These data were then extrapolated to annual projections for the entire TVA reservoir system. Finally, expenditure data were taken based on TVA’s current methods to manage the reservoirs. It is assumed when using this information that the composite of expenditures presented would not be altered by changes in these reservoir management methods.

References:

IMPLAN Group LLC, IMPLAN System (2013 data and V.3 software), 16905 Northcross Dr., Suite 120, Huntersville, NC 28078. Available at <http://www.implan.com/>.

Poudyal, Neelam. 2017. Personal Communication. Assistant Professor, Department of Forestry, Wildlife and Fisheries, University of Tennessee, Knoxville.

Tennessee Valley Authority (TVA). 2017. Chickamauga (available at <https://www.tva.gov/Energy/Our-Power-System/Hydroelectric/Chickamauga-Reservoir>); Norris (available at <https://www.tva.gov/Energy/Our-Power-System/Hydroelectric/Norris-Reservoir>); and Watts Bar (available at <https://www.tva.gov/Energy/Our-Power-System/Hydroelectric/Watts-Bar-Reservoir>). Accessed January 27, 2017.

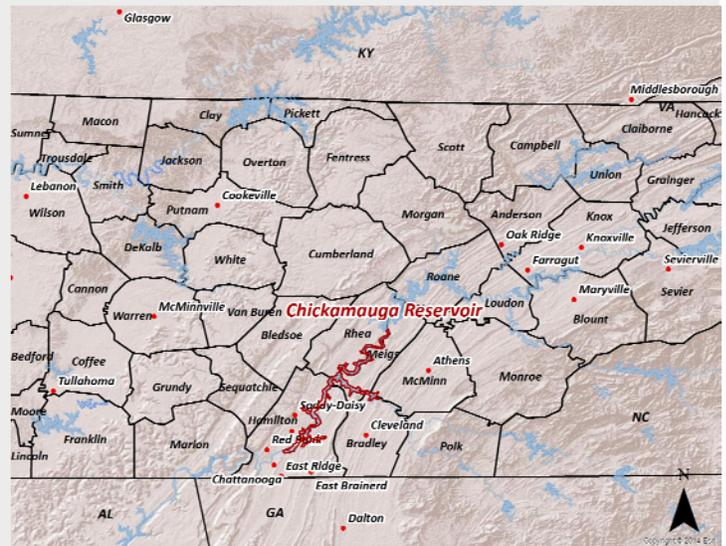
AIM-AG/AGRI-Industry Modeling & Analysis Group: (Dr. Burton English, Dr. Kim Jensen, and Mr. Jamey Menard, Department of Agricultural & Resource Economics, The University of Tennessee Institute of Agriculture. For more information concerning AIM-AG, please contact the group at 865-974-7231 or visit the web page at <http://aimga.ag.utk.edu/>. Data generated from the report from IMPLAN 2013 (values reported in 2017\$) data. Surveys conducted and data analyzed by Dr. Neelam Poudyal, Haley Gotwald, Carlotta Caplenor, Cristina Maldonado, and David Watkins, Department of Forestry, Wildlife, and Fisheries, The University of Tennessee Institute of Agriculture.



Source: Tennessee Valley Authority/Chickamauga, 2017

Chickamauga Dam and Reservoir Facts: Construction of Chickamauga Dam was completed in 1940 and is 129 feet high and 5,800 feet in length. The hydroelectric facility has a net dependable capacity of 119 megawatts from its four generating units. The reservoir has 784 miles of shoreline and 36,240 acres of water surface. The lock at Chickamauga is approximately 60 feet by 360 feet and is a major thoroughfare for barge traffic. Flood storage capacity is 345,300 acre feet (Tennessee Valley Authority/Norris, 2017).

Chickamauga Reservoir — An total of 213 shoreline property owners and 198 onsite visitors were surveyed at Chickamauga Reservoir between May 6 and September 11, 2016. For permanent residents shoreline property owners, the total annual mean expenditures was \$767.64 (Table 4) and \$900.09 for non-permanent residents (Table 5). The top three expenditure categories for permanent residents were for property taxes (\$2,760.13), watercraft purchases (\$2,277.80), and dock maintenance (\$619.08). For non-permanent residents, the top three expenditure categories were for watercraft purchases (\$3,355.70), property taxes (\$1,553.02), and other expenses (\$1,444.68). Property improvement mean expenditures averaged \$509.44 (Table 6) for permanent residents, with the top three expenditure categories for boat dock construction (\$982.17), landscaping (\$865.72), and “Other” (\$520.35). For non-permanent residents, the average mean expenditures for property improvement was \$2,222.00 (Table 7), with the top three expenditure categories for “Other” (\$4,620.00), boat dock construction (\$2,500.00), and patio/deck construction (\$1,860.00). The average mean expenditures across all categories for lodging, food and beverages, transportation, entertainment, and supplies were \$34.24 and \$40.57 for permanent and non-permanent shoreline property owners, respectively (Tables 8 and 9). For onsite visitors, the average mean expenditure was \$5.47 (Table 10). For shoreline property owners, the top three expenditures for both permanent and non-permanent residents were boat repair/services, fuel/oil for watercraft, and food and beverages. For onsite visitors, the top three expenditures were for food and beverages, fuel/oil for vehicles, and fuel/oil for watercraft.



For onsite visitors at the multi-county level of analysis, the top five industries impacted for total industry output were gasoline stores, food and beverage stores, full service restaurants, real estate, and sporting goods and hobby stores. For employment, the top five industries impacted were gasoline stores, food and beverage stores, full service restaurants, sporting goods and hobby stores, and general merchandise stores. For permanent residents shoreline property owners at the multi-county level of analysis, the top five industries impacted for total industry output were other local government enterprises, motor vehicles and parts dealers, maintenance and repair construction of nonresidential structures, construction of other new nonresidential structures, and

Table 4. Annual Mean Expenditures from Chickamauga Reservoir Permanent Residents Shoreline Property Owners

Category	Average (N=157)
Property Taxes	\$2,760.13
Watercraft Purchases	\$2,277.80
Dock & Maintenance	\$619.08
Shoreline Maintenance	\$231.72
Other Expenses	\$175.79
Dock/Marina Fees	\$63.68
Dock Fees	\$10.51
Private Land Access Fees	\$2.93
Total	\$6,141.14
Overall Average	\$767.64

Table 5. Annual Mean Expenditures from Chickamauga Reservoir Non-Permanent Residents Shoreline Property Owners

Category	Average (N=50)
Watercraft Purchases	\$3,355.70
Property Taxes	\$1,553.02
Other Expenses	\$1,444.68
Dock & Maintenance	\$380.00
Shoreline Maintenance	\$296.00
Dock/Marina Fees	\$125.30
Dock Fees	\$36.00
Private Land Access Fees	\$10.00
Total	\$7,200.70
Overall Average	\$900.09

Table 6. Property Improvements Mean Expenditures from Chickamauga Reservoir Permanent Residents Shoreline Property Owners

Category	Average (N=157)
Built Boat Dock	\$982.17
Landscaping	\$865.72
Other	\$520.35
Built Patio/Deck	\$159.87
Built Boathouse	\$19.11
Horse/Biking Trail Maintenance	\$0.00
Total	\$2,547.22
Overall Average	\$509.44

Table 7. Property Improvements Mean Expenditures from Chickamauga Reservoir Non-Permanent Residents Shoreline Property Owners

Category	Average (N=50)
Other	\$4,620.00
Built Boat Dock	\$2,500.00
Built Patio/Deck	\$1,860.00
Landscaping	\$1,130.00
Built Boathouse	\$1,000.00
Horse/Biking Trail Maintenance	\$0.00
Total	\$11,110.00
Overall Average	\$2,222.00

landscape and horticultural services. For employment the top five industries impacted were motor vehicle and parts dealers, landscape and horticultural services, other local government enterprises, building material and garden equipment and supplies stores, and construction of other new nonresidential structures. For non-permanent residents shoreline property owners at the multi-county level of analysis, the top five industries impacted for total industry output were building materials and garden equipment and supply stores, construction of other new nonresidential structures, motor vehicle and parts dealers, other local government enterprises, and real estate. For employment the top five industries impacted were motor vehicle and parts dealers, construction of other new nonresidential structures, landscape and horticultural services, real estate, and maintenance and repair construction of nonresidential structures.

Table 8. Annual Mean Recreational Expenditures from Chickamauga Reservoir Permanent Residents Shoreline Property Owners

Category	Average (N=157)
Boat Repair/Services	\$171.33
Food & Beverages	\$132.99
Fuel/Oil for Watercraft	\$130.73
Fuel/Oil for Vehicles	\$42.67
Fishing Supplies	\$38.35
Boat Rental Fees	\$28.03
Hunting Supplies	\$21.66
Vehicle Repairs/Services	\$20.78
Retail Goods	\$14.01
Fishing/Hunting Fees/Licenses	\$13.63
Entry/Parking/Launch Fees	\$10.66
Entertainment	\$9.74
Lodging	\$5.86
Other Expenses	\$3.34
Camping Supplies	\$3.23
Other Transportation Costs	\$1.64
Other Transportation	\$1.11
Guide/Outfitter/Tour Fees	\$0.51
Souvenirs/Gifts	\$0.32
Other Equipment Rentals	\$0.00
Horseback Riding	\$0.00
<i>Total</i>	<i>\$650.59</i>
<i>Overall Average</i>	<i>\$34.24</i>

Table 9. Annual Mean Recreational Expenditures from Chickamauga Reservoir Non-Permanent Residents Shoreline Property Owners

Category	Average (N=50)
Boat Repair/Services	\$187.70
Fuel/Oil for Watercraft	\$138.37
Food & Beverages	\$134.39
Fuel/Oil for Vehicles	\$112.29
Fishing Supplies	\$58.54
Retail Goods	\$35.90
Fishing/Hunting Fees/Licenses	\$28.16
Hunting Supplies	\$20.70
Vehicle Repairs/Services	\$16.53
Lodging	\$15.80
Other Transportation Costs	\$6.00
Camping Supplies	\$5.20
Souvenirs/Gifts	\$4.70
Entertainment	\$3.40
Guide/Outfitter/Tour Fees	\$1.70
Other Equipment Rentals	\$0.80
Entry/Parking/Launch Fees	\$0.30
Horseback Riding	\$0.20
Boat Rental Fees	\$0.10
Other Transportation	\$0.00
Other Expenses	\$0.00
<i>Total</i>	<i>\$770.78</i>
<i>Overall Average</i>	<i>\$40.57</i>

Table 10. Annual Mean Recreational Expenditures from Chickamauga Reservoir Onsite Visitors

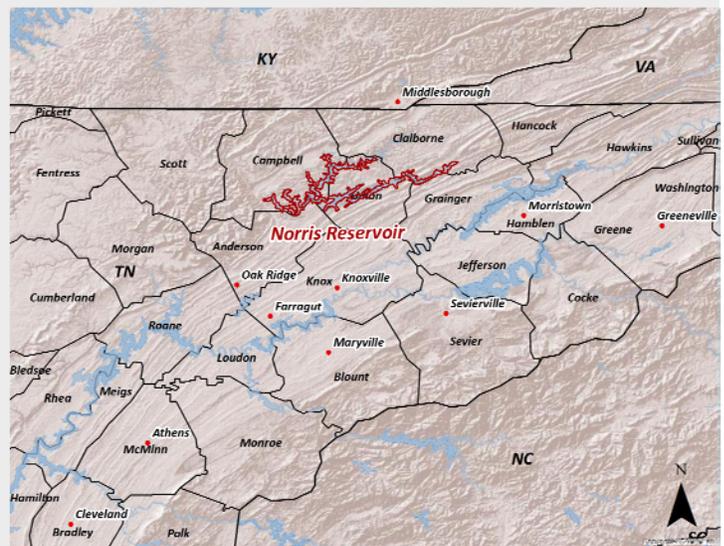
Category	Average (N=198)
Food & Beverages	\$33.21
Fuel/Oil for Vehicles	\$16.92
Fuel/Oil for Watercraft	\$14.14
Lodging	\$11.87
Fishing Supplies	\$6.64
Fishing/Hunting Fees/Licenses	\$4.93
Boat Repair/Services	\$3.31
Retail Goods	\$2.59
Hunting Supplies	\$2.32
Other Expenses	\$1.83
Camping Supplies	\$1.61
Entertainment	\$0.95
Other Equipment Rentals	\$0.94
Vehicle/Repair Services	\$0.74
Boat Rental Fees	\$0.63
Entry/Parking/Launch Fees	\$0.58
Other Transportation	\$0.31
Other Transportation Costs	\$0.25
Souvenirs/Gifts	\$0.13
Horseback Riding	\$0.00
Guide/Outfitter/Tour Fees	\$0.00
<i>Total</i>	<i>\$103.90</i>
<i>Overall Average</i>	<i>\$5.47</i>



Source: Tennessee Valley Authority/Norris, 2017

Norris Dam and Reservoir Facts: Construction of Norris Dam was completed in 1936 and is 265 feet high and 1,860 feet in length. The hydroelectric facility has a net dependable capacity of 110 megawatts from its two generating units. The reservoir has 809 miles of shoreline and 33,840 acres of water surface. The dam was the first TVA built and its reservoir is the largest on the Tennessee River tributary. Also used for flood storage, in a normal rainfall year the water level of the reservoir varies around 29 feet. Flood storage capacity is 1,113,000 acre feet (Tennessee Valley Authority/Norris, 2017).

Norris Reservoir — An total of 232 shoreline property owners and 220 onsite visitors were surveyed at Norris Reservoir between May 6 and September 11, 2016. For permanent residents’ shoreline property owners, the total annual mean expenditures was \$870.53 (Table 11) and \$1,036.97 for non-permanent residents (Table 12). The top three expenditure categories for permanent residents were for watercraft purchases (\$3,238.81), property taxes (\$1,914.43), and shoreline maintenance (\$715.75). For non-permanent residents, the top three expenditure categories were for watercraft purchases (\$3,872.01), property taxes (\$1,900.63), and other expenses (\$1,058.30). Property improvement mean expenditures averaged \$1,218.38 (Table 13) for permanent residents, with the top three expenditure categories for built boat dock (\$3,236.25), “Other” (\$1,809.60), and landscaping (\$1,435.63). For non-permanent residents, the average mean expenditures for property improvement was \$2,019.47, with the top three expenditure categories for “Other” (\$6,497.99), boat dock construction (\$2,22.82), and patio/deck construction (\$1,704.70) (Table 14). The average mean expenditures across all categories for lodging, food and beverages, transportation, entertainment, and supplies were \$41.15 and \$41.34 for permanent and non-permanent shoreline property owners, respectively (Tables 15 and 16). For onsite visitors, the average mean expenditure was \$12.79 (Table 17). For shoreline property owners, the top three expenditures for both permanent and non-permanent residents were boat repair/services, fuel/oil for watercraft, and food and beverages. For onsite visitors, the top three expenditures were for food and beverages, lodging, and fuel/oil for vehicles.



For onsite visitors at the multi-county level of analysis, the top five industries impacted for total industry output were gasoline stores, food and beverage stores, real estate, full service restaurants, and owner-occupied dwellings. For employment, the top five industries impacted were gasoline stores, food and beverage stores, full service restaurants, real estate, and general merchandise stores. For permanent residents’ shoreline property owners at the multi-county level of analysis, the top five industries impacted for total industry output were construction of other new nonresidential structures, motor vehicle and parts dealers,

Table 11. Annual Mean Expenditures from Norris Reservoir Permanent Residents Shoreline Property Owners

Category	Average (N=80)
Watercraft Purchases	\$3,238.81
Property Taxes	\$1,914.43
Shoreline Maintenance	\$715.75
Dock & Maintenance	\$602.75
Other Expenses	\$303.54
Dock/Marina Fees	\$111.31
Dock Fees	\$71.25
Private Lane Access Fees	\$6.38
<i>Total</i>	<i>\$6,964.22</i>
<i>Overall Average</i>	<i>\$870.53</i>

Table 12. Annual Mean Expenditures from Norris Reservoir Non-Permanent Residents Shoreline Property Owners

Category	Average (N=149)
Watercraft Purchases	\$3,872.01
Property Taxes	\$1,900.63
Other Expenses	\$1,058.30
Dock & Maintenance	\$818.12
Shoreline Maintenance	\$429.20
Dock/Marina Fees	\$116.58
Dock Fees	\$94.24
Private Lane Access Fees	\$6.71
<i>Total</i>	<i>\$8,295.79</i>
<i>Overall Average</i>	<i>\$1,036.97</i>

Table 13. Property Improvements Mean Expenditures from Norris Reservoir Permanent Residents Shoreline Property Owners

Category	Average (N=80)
Built Boat Dock	\$3,236.25
Other	\$1,809.60
Landscaping	\$1,435.63
Built Patio/Deck	\$812.50
Built Boathouse	\$10.00
Horse/Biking Trail Maintenance	\$6.28
<i>Total</i>	<i>\$7,310.26</i>
<i>Overall Average</i>	<i>\$1,218.38</i>

Table 14. Property Improvements Mean Expenditures from Norris Reservoir Non-Permanent Residents Shoreline Property Owners

Category	Average (N=149)
Other	\$6,497.99
Built Boat Dock	\$2,222.82
Built Patio/Deck	\$1,704.70
Landscaping	\$934.90
Built Boathouse	\$753.02
Horse/Biking Trail Maintenance	\$3.36
<i>Total</i>	<i>\$12,116.79</i>
<i>Overall Average</i>	<i>\$2,019.47</i>

building material and garden equipment and supplies stores, other local government enterprises, and maintenance and repair construction of nonresidential structures. For employment, the top five industries impacted were construction of other new nonresidential structures, motor vehicle and parts dealers, building material and garden equipment and supplies stores, landscape and horticultural services, and maintenance and repair construction of nonresidential structures. For non-permanent residents' shoreline property owners at the multi-county level of analysis, the top five industries impacted for total industry output were building material and garden equipment and supplies stores, construction of other new nonresidential structures, motor vehicle and parts dealers, other local government enterprises, and maintenance and repair construction of nonresidential structures. For employment, the top five industries impacted were building material and garden equipment and supplies stores, construction of other new nonresidential structures, motor vehicle and parts dealers, landscape and horticultural services, and maintenance and repair construction of nonresidential structures.

Table 15. Annual Mean Recreational Expenditures from Norris Reservoir Permanent Residents Shoreline Property Owners

Category	Average (N=80)
Boat Repair/Services	\$232.00
Fuel/Oil for Watercraft	\$138.24
Food & Beverages	\$115.05
Fishing Supplies	\$40.01
Fuel/Oil for Vehicles	\$39.29
Entertainment	\$37.50
Vehicle Repairs/Services	\$27.81
Retail Goods	\$20.56
Fishing/Hunting Fees/Licenses	\$20.31
Lodging	\$16.51
Camping Supplies	\$14.63
Hunting Supplies	\$11.13
Souvenirs/Gifts	\$9.88
Entry/Parking/Launch Fees	\$7.04
Other Equipment Rentals	\$6.25
Other Transportation Costs	\$3.88
Other Transportation	\$0.38
Other Expenses	\$0.31
Boat Rentals Fees	\$0.00
Horseback Riding	\$0.00
Guide/Outfitter/Tour Fees	\$0.00
<i>Total</i>	<i>\$740.78</i>
<i>Overall Average</i>	<i>\$41.15</i>

Table 16. Annual Mean Recreational Expenditures from Norris Reservoir Non-Permanent Residents Shoreline Property Owners

Category	Average (N=149)
Boat Repair/Services	\$283.41
Food & Beverages	\$154.75
Fuel/Oil for Watercraft	\$88.26
Fuel/Oil for Vehicles	\$80.18
Retail Goods	\$54.63
Boat Rental Fees	\$38.62
Fishing Supplies	\$32.50
Vehicle Repairs/Services	\$19.49
Fishing/Hunting Fees/Licenses	\$15.34
Entertainment	\$10.28
Entry/Parking/Launch Fees	\$9.54
Other Expenses	\$7.32
Lodging	\$7.29
Souvenirs & Gifts	\$6.71
Guide/Outfitter/Tour Fees	\$6.38
Other Equipment Rentals	\$3.80
Hunting Supplies	\$3.59
Other Transportation Costs	\$1.80
Other Transportation	\$1.49
Camping Supplies	\$1.41
Horseback Riding	\$0.00
<i>Total</i>	<i>\$826.79</i>
<i>Overall Average</i>	<i>\$41.34</i>

Table 17. Annual Mean Recreational Expenditures from Norris Reservoir Onsite Visitors

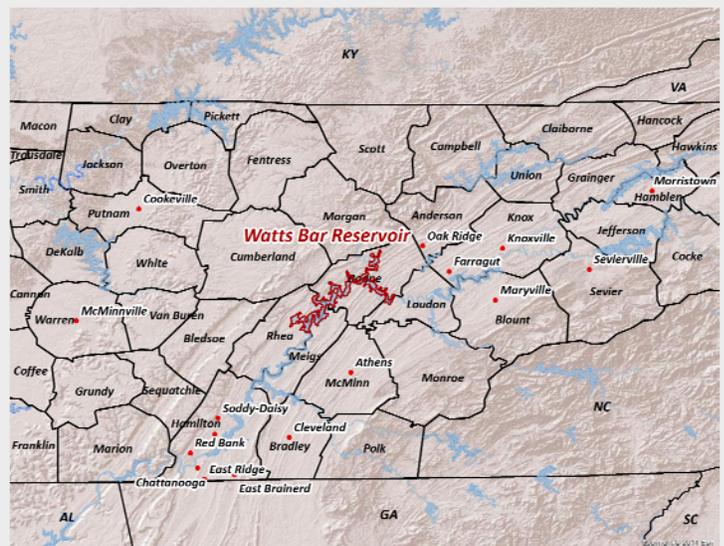
Category	Average (N=220)
Food & Beverages	\$77.73
Lodging	\$51.21
Fuel/Oil for Vehicles	\$32.47
Fuel/Oil for Watercraft	\$31.99
Boat Rental Fees	\$7.97
Retail Goods	\$5.94
Fishing/Hunting Fees/Licenses	\$5.59
Fishing Supplies	\$5.54
Entry/Parking/Launch Fees	\$2.39
Vehicle Repairs/Services	\$2.26
Souvenirs/Gifts	\$2.05
Boat Repair/Services	\$1.60
Camping Supplies	\$1.49
Other Expenses	\$0.76
Entertainment	\$0.51
Other Equipment Rentals	\$0.42
Hunting Supplies	\$0.23
Other Transportation	\$0.05
Other Transportation Costs	\$0.00
Horseback Riding	\$0.00
Guide/Outfitter/Tour Fees	\$0.00
<i>Total</i>	\$230.20
<i>Overall Average</i>	\$12.79



Source: Tennessee Valley Authority/Watts Bar, 2017

Watts Bar Dam and Reservoir Facts: Construction of Watts Bar Dam was completed in 1942 and is 112 feet high and 2,960 feet in length. The hydroelectric facility has a net dependable capacity of 182 megawatts from its five generating units. The reservoir has 722 miles of shoreline and 39,090 acres of water surface. The lock at Chickamauga is approximately 60 feet by 360 feet and handles more than a million tons of cargo a year. Flood storage capacity is 379,000 acre feet (Tennessee Valley Authority/Norris, 2017).

Watts Bar Reservoir — An total of 218 shoreline property owners and 58 onsite visitors were surveyed at Norris Reservoir between May 6 and September 11, 2016. For permanent residents’ shoreline property owners, the total annual mean expenditures were \$707.54 (Table 18) and \$519.42 for non-permanent residents (Table 19). The top three expenditure categories for permanent residents were for property taxes (\$2,460.34), watercraft purchases (\$1,101.57), and dock maintenance (\$323.83). For non-permanent residents, the top three expenditure categories were for watercraft purchases (\$1,678.82), property taxes (\$1,357.53), and other expenses (\$551.71). Property improvement mean expenditures averaged \$657.92 (Table 20) for permanent residents, with the top three expenditure categories for “Other” (\$1,732.23), boat dock construction (\$1,054.69), and landscaping (\$730.27). For non-permanent residents, the average mean expenditures for property improvement was \$904.51 (Table 21), with the top three expenditure categories for boat dock construction (\$2,005.88), landscaping (\$1,057.65), and patio/deck construction (\$894.12). The average mean expenditures across all categories for lodging, food and beverages, transportation, entertainment, and supplies were \$26.50 and \$23.29 for permanent and non-permanent shoreline property owners, respectively (Tables 22 and 23). For onsite visitors, the average mean expenditure was \$10.75 (Table 24). For shoreline property owners, the top three expenditures for both permanent and non-permanent residents were boat repair/services, fuel/oil for watercraft, and food and beverages. For onsite visitors, the top three expenditures were for food and beverages, fuel/oil for vehicles, and lodging.



For onsite visitors at the multi-county level of analysis, the top five industries impacted for total industry output were gasoline stores, food and beverage stores, full service restaurants, real estate, and sporting goods and hobby stores. For employment, the top five industries impacted were gasoline stores, full service restaurants, food and beverage stores, sporting goods and hobby stores, and general merchandise stores. For permanent residents’ shoreline property owners at the multi-county level of analysis, the top five industries impacted for total industry output were other local government enterprises, building material and garden equipment and supplies stores, construction of other new nonresidential structures, motor vehicle and parts dealers, maintenance

Table 18. Annual Mean Expenditures from Watts Bar Reservoir Permanent Residents Shoreline Property Owners

Category	Average (N=128)
Property Taxes	\$2,460.34
Watercraft Purchases	\$1,101.57
Dock & Maintenance	\$323.83
Shoreline Maintenance	\$159.45
Dock/Marina Fees	\$106.25
Other Expenses	\$93.82
Private Land Access Fees	\$0.00
Dock Fees	\$0.00
<i>Total</i>	<i>\$4,245.26</i>
<i>Overall Average</i>	<i>\$707.54</i>

Table 19. Annual Mean Expenditures from Watts Bar Reservoir Shoreline Property Owners

Category	Average (N=85)
Watercraft Purchases	\$1,678.82
Property Taxes	\$1,357.53
Other Expenses	\$551.71
Dock & Maintenance	\$199.65
Shoreline Maintenance	\$166.47
Dock/Marina Fees	\$135.29
Private Land Access Fees	\$50.59
Dock Fees	\$15.29
<i>Total</i>	<i>\$4,155.35</i>
<i>Overall Average</i>	<i>\$519.42</i>

Table 20. Property Improvements Mean Expenditures from Watts Bar Reservoir Permanent Residents Shoreline Property Owners

Category	Average (N=128)
Other	\$1,732.23
Built Boat Dock	\$1,054.69
Landscaping	\$730.27
Built Patio/Deck	\$216.80
Built Boathouse	\$197.89
Horse/Biking Trail Maintenance	\$15.63
<i>Total</i>	<i>\$3,947.51</i>
<i>Overall Average</i>	<i>\$657.92</i>

Table 21. Property Improvements Mean Expenditures from Watts Bar Reservoir Non-Permanent Residents Shoreline Property Owners

Category	Average (N=85)
Built Boat Dock	\$2,005.88
Landscaping	\$1,057.65
Built Patio/Deck	\$894.12
Other	\$757.65
Built Boathouse	\$705.88
Horse/Biking Trail Maintenance	\$5.88
<i>Total</i>	<i>\$5,427.06</i>
<i>Overall Average</i>	<i>\$904.51</i>

and repair construction of nonresidential structures. For employment, the top five industries impacted were building material and garden equipment and supplies stores, landscape and horticultural services, construction of other new nonresidential structures, other local government enterprises, and motor vehicle and parts dealers. For non-permanent residents' shoreline property owners at the multi-county level of analysis, the top five industries impacted for total industry output were construction of other new nonresidential structures, motor vehicle and parts dealers, other local government enterprises, building material and garden equipment and supplies stores, and landscape and horticultural services. For employment, the top five industries impacted were construction of other new nonresidential structures, landscape and horticultural services, building material and garden equipment and supplies stores, motor vehicle and parts dealers, and other local government enterprises.

Table 22. Annual Mean Recreational Expenditures from Watts Bar Reservoir Permanent Residents Shoreline Property Owners

Category	Average (N=128)
Boat Repair/Services	\$134.36
Fuel/Oil for Watercraft	\$125.27
Food & Beverages	\$77.46
Fishing Supplies	\$44.47
Fuel/Oil for Vehicles	\$28.97
Retail Goods	\$15.00
Hunting Supplies	\$13.52
Vehicle Repairs/Services	\$10.23
Fishing/Hunting Fees/Licenses	\$8.78
Entry/Parking/Launch Fees	\$5.37
Guide/Outfitter/Tour Fees	\$4.30
Boat Rental Fees	\$3.13
Souvenirs/Gifts	\$2.89
Lodging	\$1.37
Camping Supplies	\$1.00
Other Transportation Costs	\$0.70
Other Equipment Rentals	\$0.25
Other Expenses	\$0.01
Other Transportation	\$0.00
Entertainment	\$0.00
Horseback Riding	\$0.00
<i>Total</i>	<i>\$477.08</i>
<i>Overall Average</i>	<i>\$26.50</i>

Table 23. Annual Mean Recreational Expenditures from Watts Bar Reservoir Non-Permanent Residents Shoreline Property Owners

Category	Average (N=85)
Fuel/Oil for Watercraft	\$120.76
Food & Beverages	\$106.98
Boat Repair/Services	\$92.67
Fuel/Oil for Vehicles	\$71.69
Fishing Supplies	\$19.42
Fishing/Hunting Fees/Licenses	\$18.48
Retail Goods	\$14.12
Vehicle Repairs/Services	\$11.21
Entertainment	\$8.39
Camping Supplies	\$7.65
Other Expenses	\$6.99
Guide/Outfitter/Tour Fees	\$2.94
Lodging	\$2.35
Souvenirs/Gifts	\$1.47
Other Transportation Costs	\$1.43
Other Equipment Rentals	\$1.18
Horseback Riding	\$0.59
Boat Rental Fees	\$0.24
Hunting Supplies	\$0.24
Entry/Parking/Launch Fees	\$0.15
Other Transportation	\$0.06
<i>Total</i>	<i>\$489.01</i>
<i>Overall Average</i>	<i>\$23.29</i>

Table 24. Annual Mean Recreational Expenditures from Watts Bar Reservoir Onsite Visitors

Category	Average (N=58)
Food & Beverages	\$50.14
Fuel/Oil for Vehicles	\$30.06
Lodging	\$19.64
Fuel/Oil for Watercraft	\$9.67
Camping Supplies	\$9.40
Retail Goods	\$6.92
Entertainment	\$6.72
Fishing Supplies	\$5.23
Fishing/Hunting Fees/Licenses	\$4.53
Souvenirs/Gifts	\$3.88
Vehicle Repairs/Services	\$3.21
Hunting Supplies	\$0.52
Entry/Parking/Launch Fees	\$0.46
Other Transportation Costs	\$0.05
Other Transportation	\$0.00
Boat Rental Fees	\$0.00
Boat Repair/Services	\$0.00
Horseback Riding	\$0.00
Guide/Outfitter/Tour Fees	\$0.00
Other Equipment Rentals	\$0.00
Other Expenses	\$0.00
<i>Total</i>	<i>\$150.43</i>
<i>Overall Average</i>	<i>\$10.75</i>