Estimated Economic Impacts from Recreational Expenditures Associated with TVA Reservoirs

A SELECTED SUMMARY OF SURVEYS OF SHORELINE PROPERTY OWNERS AND ON-SITE VISITORS TO THE CHICKAMAUGA, NORRIS, AND WATTS BAR RESERVOIRS

MARCH 2017
STUDY PURPOSE

In addition to electricity, flood control, environmental stewardship, management of the Tennessee River, and other duties, 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 that mission. Economic impacts arise from recreational users’ expenditures from daily visits of public recreation sites, including private property owners’ use of shorelines. Obtaining measures of the economic impacts is helpful for better understanding how outdoor recreational use results in additional economic activity to the region; hence, the purpose of this report is to provide estimates of the economic activity resulting from expenditures by recreational users of Chickamauga, Norris, and Watts Bar Reservoirs.

METHODS USED

In order to provide estimates of the economic impacts, an understanding of recreational users’ patterns and trends (i.e., participation, expenditures, recreational user days, etc.) was needed. Therefore, during summer 2016, a team of researchers from the University of Tennessee Institute of Agriculture used a combination of on-site observations, brief visitor interviews, and a mail survey to obtain information about the nature and length of visitors’ recreational reservoir use and related economic expenditures. The surveys also obtained information about user attitudes, amenity preferences, and recreation satisfaction. For the complete report see Poudyal et al. The three reservoirs (Chickamauga, Norris, and Watts Bar Reservoirs) were selected based on their size, location, level of use, and proximity to population centers (Figure 1).

The study considered expenditures by both on-site recreation users who access Chickamauga, Norris, and Watts Bar Reservoirs from major public entry points, as well as those by property owners who access their shoreline properties. 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 on-site recreational users were contacted via an intercept survey as they were accessing the reservoirs.

For property owners, a total of 3,000 owners (1,000 for each reservoir in the study) 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 on-site visitor survey utilized a multi-stage sampling technique. For on-site visitors, a total of 476 surveys were collected from on-site 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.

Findings show that TVA reservoirs remain highly popular among the local as well as non-local public for a variety of water and land-based recreational uses. Pleasure boating, fishing (from boat and shore), and swimming remain the most popular recreation activities, although water-skiing/tubing was more popular in Norris compared to Chickamauga and Watts Bar, and camping and wildlife viewing were more popular in Watts Bar and Chickamauga, respectively. Land-based activities such as hiking, camping, picnicking, mountain biking, sightseeing, etc., seemed to be very popular among reservoir visitors. Visitors currently are highly satisfied with the amenities provided by the reservoirs, although some concerns remain over low water level, bank erosion, and recent growth of invasive aquatic plants in some reservoirs. For further information about these survey results, see Poudyal et al.

To estimate the economic impacts to the communities and/or towns around the reservoirs from recreational users’ expenditures, an input-output model, IMPLAN, was used (2013 data set) (IMPLAN Group LLC, 2013). 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 expenditures by recreational area, watercraft expenses, plus a broad category of

![Figure 1. Location of Chickamauga, Norris, and Watts Bar Reservoirs in East Tennessee.](image-url)
other items that included entertainment, retail purchases, hunting/fishing/camping supplies, rentals, and souvenirs for both shoreline property owners and on-site 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. These expenditures were then inputted into IMPLAN to measure the estimated economic impacts.

**ESTIMATED ECONOMIC IMPACTS**

Table 1 (see back page) exhibits the estimated impacts for each sampled reservoir in terms of industry output, employment, labor, and tax revenues. These three reservoirs were used as example reservoirs and the economic activity per shoreline mile was then projected across the total TVA system.

Based on the estimated multi-county total industry output economic impacts for the three reservoirs in this study, the weighted averages of impacts per shoreline mile are $96,616 for shoreline property owners and $1.01 million for on-site visitors. For the total TVA system (10,719.5 shoreline miles), total industry output economic impacts are estimated at $1.03 billion for shoreline property owners and $10.9 billion for on-site visitors. For employment estimated in the analysis for the three reservoirs, the average employment generated per shoreline mile for shoreline property owners is 0.74 jobs and for on-site visitors is 11.4 jobs. For the total TVA system, employment estimated economic impacts are 7,939 jobs for shoreline property owners and 122,564 jobs for on-site visitors. For tax revenue estimated in the analysis for the three reservoirs, the average property tax generated per shoreline mile for shoreline property owners is 0.74 jobs and for on-site visitors is 11.4 jobs. For the total TVA system, property tax estimated economic impacts are $61.8 million for shoreline property owners and $854.7 million for on-site visitors.

With approximately 10,719.5 miles of shoreline property, simply put, the analysis determined that, including multiplier effects throughout the economy, more than $1.1 million of economic activity associated with recreation is generated per mile of TVA-managed reservoir.

Given these estimates of economic impacts per shoreline mile, for the entire system of TVA reservoirs, it is estimated that total economic impact is $11.91 billion in total industrial output, 130,503 in jobs, $4.45 billion in labor income, and $916.5 million in state and local taxes.

**STUDY LIMITATIONS AND FUTURE RESEARCH**

These findings indicate that the recreation industry supported by TVA-managed reservoirs contributes substantially to the region's economy. It is important to note that these are “snapshot” estimates of economic activity from recreational user expenditures based on surveys conducted at three representative reservoirs. Changes in user expenditures or expenditure patterns would impact these estimates. Future research may yield additional valuations, including the use and economic impacts of dispersed recreation use, the value of ecosystem services (e.g., flood protection, hydrological regulation, bird habitat, and aesthetics) to regional residents and to society, or the economic value of residential property on or near TVA-managed reservoirs. These can substantially contribute to property tax revenue for local cities and municipalities.

**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 on-site 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 on-site visitors’ recreational expenditures.
Table 1. Estimated Economic Impacts Per Shoreline Mile and for Total Tennessee Valley Authority’s Reservoir System for Shoreline Property Owners and On-site Visitors

<table>
<thead>
<tr>
<th>Reservoir</th>
<th>Shoreline Miles</th>
<th>TIO(^a) (Million $)</th>
<th>Weighted Average Per Mile</th>
<th>Emp.(^a) (Number)</th>
<th>Weighted Average Per Mile</th>
<th>Labor Income(^a) (Million $)</th>
<th>State/Local Taxes(^a) (Million $)</th>
<th>Weighted Average Per Mile</th>
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</thead>
<tbody>
<tr>
<td><strong>Property Owners</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chickamauga</td>
<td>810.0</td>
<td>$63.0</td>
<td></td>
<td>483.7</td>
<td></td>
<td>$22.0</td>
<td>$4.0</td>
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<tr>
<td>Norris</td>
<td>809.2</td>
<td>$83.5</td>
<td></td>
<td>661.9</td>
<td></td>
<td>$29.7</td>
<td>$5.4</td>
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<td>Watts Bar</td>
<td>721.0</td>
<td>$79.6</td>
<td></td>
<td>587.6</td>
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<td>$28.8</td>
<td>$4.1</td>
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<tr>
<td><strong>Total 3 Reservoirs</strong></td>
<td>2,340.2</td>
<td>$226.1</td>
<td>$96,616</td>
<td>1,733.2</td>
<td>0.74</td>
<td>$80.5</td>
<td>$34,399</td>
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<td><strong>Total TVA System</strong></td>
<td>10,719.5</td>
<td>$1,035.6</td>
<td></td>
<td>7,939</td>
<td></td>
<td>$368.7</td>
<td>$61.8</td>
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<td><strong>On-site Visitors</strong></td>
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<tr>
<td>Chickamauga</td>
<td>810.0</td>
<td>$878.8</td>
<td></td>
<td>9,755.0</td>
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<td>$337.2</td>
<td>$70.5</td>
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<tr>
<td>Norris</td>
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<td>$1,054.5</td>
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<td>11,949.4</td>
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<td>$384.5</td>
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<tr>
<td>Watts Bar</td>
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<td>5,052.9</td>
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<td>$170.0</td>
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<tr>
<td><strong>Total 3 Reservoirs</strong></td>
<td>2,340.2</td>
<td>$2,375.6</td>
<td>$1,015,127</td>
<td>26,757.3</td>
<td>11.4</td>
<td>$891.7</td>
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<td><strong>Total TVA System</strong></td>
<td>10,719.5</td>
<td>$10,881.7</td>
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<td>122,564</td>
<td></td>
<td>$4,084.5</td>
<td>$854.7</td>
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</tr>
</tbody>
</table>

\(^a\) 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.


Photos courtesy TVA.