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Regional Economic Impacts of Recreation Visitation Response to Reservoir Water Level Management

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Abstract:

This paper reports the regional economic impacts of increased recreation visitation from delaying drawdown at four reservoirs in western North Carolina on the six-county area where the reservoirs lie. Visitation and economic indicators were very responsive to water level management policy, especially at reservoirs with the greatest recreation infrastructure development.

Introduction

The Tennessee Valley Authority (TVA) was created to improve the economy of depressed areas of the South, by building a system of reservoirs to generate electricity, control floods and facilitate navigation. Although these purposes are still important, outdoor recreation has also become a prominent use of many TVA reservoirs. Recreation users are increasing in number and are willing to express their views to TVA managers (Cordell et al., 1990, Atlanta Journal-Constitution 1991, TVA 1990).

Because of pressures from recreation users and recreation-related businesses, TVA is considering maintaining higher summer water levels at reservoirs in the mountains of North Carolina and Georgia, and is studying the regional economic impacts of increased recreation anticipated to result from higher water levels. This paper reports the results of a study designed to estimate such impacts for four reservoirs in western North Carolina, Lakes Chatuge, Fontana, Hiwassee, and Santeetlah.

At present, TVA manages the water levels in these reservoirs for flood control and hydropower. Water levels peak in late spring, as the reservoirs capture runoff during the flood season of December to April (Figure 1). Water levels are then drawn down from early summer until late fall to generate power and create excess reservoir capacity.

As water levels drop, so does recreation visitation. Drawdown results in exposed banks, reduced access for boating, fishing and swimming, and lessened aesthetic appeal. By late August, often half the boat ramps are unusable and many coves are hazardous for boating due to submerged rocks. Foot access is hampered from exposed slopes as steep as 35 degrees and by large mud flats surrounding the water. Normal reservoir operation patterns cause losses of over 20 percent of surface acreage at three of the four reservoirs (Table 1). At full pool, the surface acreage for the reservoirs are: Fontana, 10,870 acres[1]; Hiwassee, 6230 acres; Chatuge, 7290 acres; and Santeetlah, 2860 acres (TVA 1990). Because of the warm climate, recreation demand for the reservoirs remains high through the summer and into October.

Drawdown begins and ends at slightly different times at the reservoirs, but the management alternatives under study by TVA are essentially the same (Table 1). The management alternatives are to delay drawdown start by one, two, or three months. It is expected that each delay in water level reduction would increase recreation visitation for the rest of the summer and fall.

In the next section, the background theory for determining the economic impacts of recreation trips is presented. Then, methods for estimating the economic impacts of three water level management alternatives are described. Results are then presented, followed by a discussion of the results. The final section provides a

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[1] Normal summer operations at Fontana often do not allow the reservoir to fill to full pool, although the other three reservoirs usually fill to within a foot or two of full pool. Normal summer maximum target elevation for Fontana is 17 feet below the full pool elevation. At this lower elevation, surface acreage is 9,610 acres.

summary and conclusions.

Theory

Household production provides the theoretic base for analyzing the economic impacts of recreation trips (English and Bergstrom 1990). Households desire to maximize utility gained from the consumption of nonrecreation goods, services, and activities, and from recreation trips produced by the household (Bockstael and McConnell 1981; McConnell 1975; Bockstael, Strand and Hanemann 1987). The number of trips defines the output produced by the household. Trip production functions depend on the activity, trip length, quality level, and site(s) visited. Trips for different activities may require that the household use different sets of equipment, skills, and variable inputs.

Both quality and quantity of recreation trips affect the trip production function and the utility derived from those trips (Bockstael and McConnell 1981). Market goods and services can be used in trip production to increase quality and thus trip utility beyond some baseline level. The recreation site visited affects the production function as well. Sites vary in distance from each household, indicating variation in both travel time and purchased travel inputs to trip production (Chavas, Stoll, and Sellar 1987). Entry and equipment rental fees, and equipment needs can also vary by site (Morey 1981).

Time length of a trip, especially onsite time, helps determine the production function and quality level for the trip (Wilman 1980). Overnight trips require lodging facilities or equipment that are not needed for single-day trips; longer trips may require increased variable inputs such as food or equipment rental.

Recreation trip production theory thus defines the relationship of input purchase decisions to optimal trip production (Bergstrom and Cordell 1990). Bockstael and McConnell (1981) modeled the trip decision process in two stages. First, the household minimizes trip costs for each trip type, including determining the costs of purchasing and acquiring all necessary inputs, such as gasoline, food, equipment, and so on. It is assumed that identical production functions are used for trips of the same type, so minimized trip costs are the same for all trips of the same type taken during the planning period. The household then determines the optimal number of trips to produce by solving a constrained utility maximization problem.

Because recreation trips are produced by households, not by industries, purchases made for trip production are the economic activity that can potentially impact a local or regional economy (Bergstrom, et al. 1990). In estimating recreation's contribution to a regional economy, we include not just the inputs for recreation travel but all inputs needed to produce recreation trips, including both variable trip inputs and durable recreation equipment. A recreation trip consists of five distinct phases (Clawson 1962): (1) preparation and planning; (2) travel to the site; (3) onsite time; (4) travel home; (5) post trip. Input purchases can occur in any or all of these phases, and can be divided and examined in similar categories.

Regional economic impacts are changes in the economic activity in a region that result from a project or policy (Randall 1987). Impacts include changes in the real value of output, employment, and income within the region (Sassone and Schaffer 1978). Economic impacts from households purchasing inputs for recreation trip production, including both variable inputs and durable recreation equipment, can accrue to a region in different ways. One important determinant is the location of the purchases, the 'where' aspect of the purchase. Purchases made within the region clearly affect the regional economy. Purchases made outside the region can affect the target region through interregional flows of goods, services, labor, and income (Miller and Blair 1985). However, this research assumes away any interregional flows, and is concerned only with purchases made within the regional economy. This research also treats recreation as a basic exporting industry (Richardson 1973) and examines regional growth only through growth in exports. Recreation gets 'exported' as visitors from outside the regional economy come into the region and make purchases of trip inputs.

Methods

Economic Impact Analysis. Economic impacts of recreation on a regional economy are measured by the direct, indirect and induced effects of spending associated with recreation trips (Bergstrom, et al., 1989). Impacts to a localized area resulting from the various water level management alternatives were measured by three indicators. Total gross output (TGO) measures changes in the value of output in the region's industrial and service sector. Total income (TI) measures changes in income that accrues to households and business proprietors. Total employment (FTE) measures changes in the number of full-time equivalent jobs. The impact of changes in water level management on these indicators was estimated using an input-output (I-O) model. Changes in final demand for each policy alternative were input into the model. Interindustry linkages in the local economy determine the total output, income and employment impacts (Miller and Blair, 1985). Two sets of data were required to develop the changes in final demand for each management alternative: 1) an expenditure profile of nonresident visitors to each reservoir, and 2) expected changes in nonresident visitation to each reservoir under each management alternative.

<u>Visitor Expenditure Data</u>. Expenditure data for visitors to the reservoirs were collected using the Public Area Recreation Visitor Study (PARVS) instrument. During the summer of 1988 and 1989, exit interviews were conducted on a random sample of reservoir users. Strata were defined by day vs. overnight and boat vs. nonboat users. These strata were selected to represent major user types according to differences in (a) expenditure patterns, and (b) visitation response to management alternatives. Overnight users spend more time onsite, and purchase meals and lodging that day users do not. Boaters' expenditures reflect the additional

costs of boat use. Also, boaters' activities are affected directly by the water level, so their visitation response to the management alternatives could reasonably be expected to be greater than for nonboaters. Data collected at the site included visitation and travel patterns. The on-site survey yielded 1779 usable responses. Respondents received a follow-up mail survey, of which there were 628 usable returns. The follow-up survey asked about trip-related expenditures and annual equipment purchases and use patterns. The mail survey was conducted according to general principles specified by Dillman (1978).

Expenditure information was of two types. The first was trip-related spending made at or near home, in-route to and from the site, and at or near the recreation site for specific items within the categories of food, lodging, transportation, and activities. The second type concerned annual spending on recreation equipment, such as RV's, boats, and motorcycles.

Nonresident Spending in the Impact Area. The local impact area for the study was six counties in western North Carolina: Cherokee, Clay, Graham, Macon, Jackson, and Swain (Figure 2). The method used for allocating both trip-related and annual equipment expenditures to the local area was developed through the cooperation of government and academic researchers (Watson and Brachter 1987; Bergstrom, et al. 1989).

All trip-related expenses made at or near the recreation site were assumed to occur in these 6 counties, within about 35 miles of the visited site, and so were within the local impact region. The homes of the nonresident visitors lay outside the local impact region, so trip-related expenditures made at or near home were made outside the local impact region. The at-home expenses thus did not contribute to the economy of the impact region.

It was assumed that in-route expenses were equally likely to be made in each mile traveled. Further, it was assumed that visitors would take the most direct route possible to the visited site, so a straight line from any visitor's home to the visited site was a rough approximation of his actual route. The straight line distance from home to site was calculated for each visitor, and the point at which this line entered the six-county area was noted. The percentage of in-route expenses that was expected to occur in the local region equalled the total straight-line distance from the visitor's home to the reservoir visited divided by the distance traveled within the 6-county area.

Annual expenditures on durable equipment <u>not</u> made in the respondent's home county was spatially allocated based on equipment use patterns. It was assumed that the purchases not made near home were made during a recreation trip[2]. Annual spending for each equipment type was divided by the number of trips on which the equipment was used in the last 12 months to yield spending per trip. This figure was multiplied by the ratio of reported use of the equipment at the visited site to its use anywhere, which estimated the likelihood that the equipment was purchased in the

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[2] In future studies, it would be desirable to consider and model durable equipment expenditures made away from home on <u>non-recreational</u> trips.

local region. The result was the expected annual equipment purchases in the region attributable to recreation trips to the reservoir visited.

The last step to prepare expenditure profiles for I-O analysis was to allocate spending by item across economic sectors in order to derive final demand effects by sector. The procedure used was developed specifically for compatibility with IMPLAN (Watson and Brachter 1987). National annual personal consumption expenditure (PCE) data and input-output tables prepared by the Bureau of Economic Analysis from 1977 (BEA) were used to develop percentage allocations to transportation, manufacturing, and retail and wholesale trade sectors for each expenditure item[3].

The result was an average expenditure profile for each of the four visitor strata for each of the reservoirs in the study, measured in dollars per visitor. Multiplying these profiles by current visitation levels gave an estimate of the present direct contribution of reservoir recreation to the local economy.

<u>Visitation changes</u>. Estimates of visitor changes resulting from alternative management policies were necessary to estimate the economic impacts. Exact data on the visitation pattern over the year at the study reservoirs is not collected by TVA. General

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[3] It should be noted that national total data do not perfectly reflect the margin patterns of expenditures made in a particular local area. Also, PCE expenditures patterns do not completely accurately reflect recreation expenditure patterns. However, time and funding prevented the development of more accurate expenditure pattern profiles. More research focused on the development of PCE patterns specific to recreation (and perhaps different <u>types</u> of recreation) is needed.

observations by managers, however, suggest that visitation drops in conjunction with lowered water levels (TVA 1990). Higher summer and early fall water levels would increase visitation during those times of the year. It is not expected that visitation would change much during winter and fall, since water levels would be the same as under the current management policy. Data came from two sources. Current users were asked how often they now visited the reservoir and their anticipated visitation for each management alternative. This was a lower bound for visitation change because it assumed no visitation increase from new visitors. Second, for each reservoir a panel of local persons was asked to estimate the change in visitation for each management alternative. Panels were asked to consider both new visitors to the reservoirs and increased visits by current users. This estimate represented the upper bound. A most likely visitation change scenario was calculated as the mean of the upper and lower bounds. Expected visitation increases were multiplied by the proportion of nonlocal visitation in the sample by reservoir and user type. It was assumed that the increased visitation would contain roughly the same proportions of local to nonlocal users as did the sample. The proportions ranged from 22% for day nonboaters at Santeetlah, to 93% for overnight nonboaters at Fontana (Table 2).

Input-output Analysis. IMPLAN is an I-O model developed by the U.S. Forest Service and is based on the 1982 Census of Business. Through IMPLAN, an analyst can construct nonsurvey I-O models for one or more counties (Alward et al. 1985). IMPLAN has extended industrial sector categories to account for recreation purchase patterns (Alward and Lofting 1985). Software modules calculate the direct, indirect and induced effects of recreational spending or other final demand vectors. Expenditure profiles and visitation changes by reservoir, user type and management alternative were input into IMPLAN. Results included the changes in TGO, TI, and FTE from each management alternative.

Results

Visitation Change. In percentage terms, visitation at Fontana and Hiwassee were expected to be most responsive to water level changes (Table 3). Current management practices have the greatest impact at these two reservoirs. Current management at Fontana draws water down 45 feet below the full level, over 25 feet more than at any other reservoir. Hiwassee undergoes the greatest loss in surface area from the full level (33%). Santeetlah has limited access facilities and for this reason had the least visitation change.

The estimated increases in nonresident visits for each reservoir and user type are presented by management alternative in Table 2. Holding the reservoir water levels full a month longer would result in an additional 320,000 visits, including 130,000 overnight visits. Keeping water levels full two more months could be expected to result in 640,000 more nonresident visits, including 255,000 overnight visits. Keeping water levels up for 3 more months could result in 1.08 million more nonresident visits, including over 455,000 overnight visits.

Visitor Expenditures. The average expenditures per person per trip in the six-county area ranged from about $34 at Hiwassee to $72 at Santeetlah (Table 3). For visitors to all reservoirs, over half of trip spending in the local area was for food and lodging. Generally, boat users spent more per trip in the local area than did non-boat users, especially for transportation and activities. Overnight users spent more per trip than did day users, especially for lodging and food.

Economic Impacts. Under current reservoir management policy, nonresident recreational spending at the four study reservoirs contributes nearly $62 million in TGO (1982 dollars), $39 million in income and 1,500 jobs. This represents 2.3 percent of the 6-county region's total TGO, 3.5 percent of the region's income and 2.8 percent of employment. Keeping water levels near full for one more month could be expected to result in an increase of $19.3 million in TGO, $12.2 million in TI, and 470 FTE jobs (Table 4). Holding reservoir levels near full two months longer could be expected to result in $37.4 million more TGO, $23.7 million more TI, and new 900 FTEs. A three-month delay in beginning the reservoir drawdown could be expected to result in $65.4 million increase in TGO, $42.2 million increase in TI, and 1,590 new FTEs.

Discussion

The scale of the expected nonresident visitation increases highlights the importance of reservoir management policy on recreational use. Delaying drawdown appears to be able to entice several hundred thousand additional visits to the area. The increase is presumably due to easier access to the water, an augmented resource base (surface area) for water-based activities, reduced low water hazards (eg., stumps) and increased aesthetic appeal at the reservoirs. Some gains in visitation may be generated simply by insuring that water accesses such as boat ramps and docks still reach the water during the period of lowest water levels.

The increase in nonresident visits to these four reservoirs can come either from an increase in the total number of recreational trips taken by households in response to a shift in recreational supply, or from a shift in trip destination but no increase in overall number of trips taken. That is, keeping water levels higher at these reservoirs can cause some households to take more recreation trips than they otherwise would and some of the trips will be to the study reservoirs. Alternatively, higher water levels may leave the total trips taken unchanged, but increase the proportion of the trips with destinations at one of the four study reservoirs. The relative importance of these two effects is not known. If increased visitation to the study reservoirs comes from households merely shifting destinations, then the local gains in economic activity may come at the expense of activity elsewhere. However, depending on the characteristics of the areas suffering the revenue loss, there may or may not be a beneficial effect with regard to TVA's mandate to assist rural economies.

A potential weakness of the study is that expected visitation changes were elicited without specific instructions regarding the status of access facilities. Some respondents may have assumed that facility growth would occur to alleviate any crowding caused by greater visitation. In this case, the expected visitation change is attributable to the interactive effect of facility growth and higher water levels, rather than to just higher water levels given existing facilities. The results of the study would be stronger if specific instructions about facility levels had been incorporated in both the visitation survey and expert panels.

We have assumed that responses were based on holding current facility levels constant, and that the effect of crowding would be slight. The period of greatest predicted visitor increase coincided with the period just before the start of drawdown under each management alternative, when water levels under each management alternative exhibited the greatest difference from current management policy. During these times, boat ramps, docks and other facilities that are presently underused or unusable would be available to accommodate the increased visitation. Crowding may or may not affect actual visitation increases depending on present facility use rates, the actual temporal distribution of visitation increases, and the numbers of current facilities made more accessible by higher water levels. To account for the possible effects of crowding and facility constraints, the middle visitation estimate can be considered the most probable response.

The results presented here indicate that water level management policy can significantly impact the economy of a local area. Given a middle visitation change estimate, a two-month delay in drawdown start (management alternative 2) results in a 1.5 to 2 percent increase in the economic growth indicators for the region. A three-month delay (management alternative 3) yields a 2.5 to 3 percent increase in the indicators. Most (75 percent) of the increase in economic activity could be achieved by altering water level policy at just Chatuge and Fontana. These two reservoirs are most important for several reasons. Both have high baseline visitation levels and visitation growth that is responsive to management shifts.

The existence of more developed recreation infrastructure at Chatuge and Fontana may heighten the expected visitation response to management policy and thus affect their contribution to economic growth. The effects of increasing the resource base for recreation are severely dampened when there are few access points for the resource. Of the four reservoirs studied here, Santeetlah had the lowest percentage response to the management alternatives, and also has the fewest developed facilities and access points.

The differences in economic impacts across the four reservoirs suggests a potential management strategy to facilitate multiple-objective operation of TVA reservoirs in western North Carolina. Lake Chatuge and Lake Fontana, as mentioned previously, have a relatively high degree of existing recreation infrastructure development. Lake Hiwassee and Lake Santeetlah are essentially undeveloped areas. The results of this study suggest that the greatest potential for local economic growth resulting from higher water levels occurs at the more developed reservoirs. Hence, if local economic development is the goal, efforts to increase water levels in the summer to enhance outdoor recreation should perhaps be focussed on Lakes Chatuge and Fontana. This strategy would also allow Lakes Hiwassee and Santeetlah to continue to provide opportunities for recreation in a more remote, "wilderness-like" setting. Recent research suggests that the demand for and value of wilderness recreation, including water-related wilderness experiences, will continue to grow in the future (Bergstrom and Cordell 1990; Cordell et al. 1990).

The economic impacts presented here are to be considered both short run responses and conservative estimates. They are conservative estimates because only the increase in nonresident visits was examined in the present study. Undoubtedly, residents of the local area can be expected to increase their use of the reservoirs under any of the management alternatives. To the extent that local residents shift their trip destinations from reservoirs outside the local area to one of the four examined here, leakage of money for the "import" of recreation purchased in other areas will cease. The increased "domestic" purchases of recreation will result in further economic growth.

The estimates here are short run changes because the I-O model does not allow for the development of new facilities. Building new marinas or boat docks may be more attractive investments as a result of either the higher visitation levels or improved resource base. More resources may then attract yet more visitors. It may take a number of years for the interplay between additional visitation and additional facility development to settle down.

Additional direct costs to TVA to provide for more recreation opportunities are not expected to be large. Some research has indicated that direct costs to management agencies for providing public recreation follows a declining marginal cost function (Daniels and Cordell 1989). The major opportunity costs for the management alternatives are in hydropower production[4]. TVA has estimated that for all management alternatives, fall drawdown can empty the reservoirs sufficiently so that no flood control benefits are lost to downstream cities (TVA 1990). Annual values of energy losses from holding water levels higher at these reservoirs could be as high as $0.8 million for alternative 1, $6.8 million for alternative 2 and $10.7 million for alternative 3[5]. However, these

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[4] The effects of higher summer water levels and increased recreation visitation on the reservoirs themselves are unknown. In the longer run, increased recreation visitation may also affect local services and infrastructure, either positively or negatively. Positive results may include better health care, police and fire protection services, and an improved transportation network. Negative results may include higher property taxes and seasonal excess capacity in water, sewer, and other public services. Additional research needs to address these issues.

[5] These figures are based on TVA estimates for the value of energy losses from simultaneously instituting the same management alternatives at these and seven other reservoirs, and the proportion of power generating capacity of the study reservoirs to this set of eleven reservoirs. The study reservoirs contain 42.8 percent of the set's megawatt generating capacity.

losses could be recaptured to the extent that TVA can compensate for holding water in the study reservoirs by shifting generation to other reservoirs in the system during the summer months

Summary and Conclusions

Increasing recreation by holding water levels higher can be an efficient policy tool. It can selectively target reservoirs with potential for increased nonlocal visitation and higher opportunities for purchase of goods. The magnitude of impacts show that water level management can affect a local economy.

The major opportunity cost for the management alternatives is in hydropower production. The electricity forgone by holding water in the reservoirs can be partly made up by shifting generation to other reservoirs in the system. Annual energy losses at these reservoirs would be roughly $1.5 million for alternative 1, $10 million for alternative 2 and $16 million for alternative 3 (TVA 1990). TVA has estimated that for all management alternatives, fall drawdown can empty the reservoirs enough so that no flood control benefits are lost (TVA 1990).

To summarize, recreation consumers appear to be responsive to increased availability of recreation resources and services. Managing reservoir levels for recreation can be an effective policy for the goal of stimulating the local economy and improving the quality of life in areas of the nation that have been targets for past projects with similar goals.

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Table 1 -- Target water levels in feet below nearly full level[6], and percentage surface area loss, by reservoir and management alternative

Lake	Dates	Management Alternative			
		Current	1	2	3
Chatuge	4/15-7/31	0	0	0	0
	8/1-8/31	-3 (6)[7]	0	0	0
	9/1-9/30	-5 (11)	-3 (6)	0	0
	10/1-10/15	-7 (15)	-5 (11)	-3 (6)	0
Fontana	5/1-7/15	0	0	0	0
	7/16-8/15	-11 (6)	0	0	0
	8/16-9/15	-28 (15)	-11 (6)	0	0
	9/16-10/15	-45 (24)	-28 (15)	-11 (6)	0
Hiwassee	5/1-8/20	0	0	0	0
	8/21-9/5	-5 (5)	0	0	0
	9/6-9/30	-11 (12)	-5 (5)	0	0
	10/1-10/15	-18 (33)	-11 (12)	-5 (5)	0
Santeetlah	3/15-7/15	0	0	0	0
	7/16-8/15	-6 (7)	0	0	0
	8/16-9/15	-13 (16)	-6 (7)	0	0
	9/16-10/15	-17 (20)	-13 (20)	-6 (7)	0

[6] TVA managers consider reservoirs near full level if water levels are within about ten feet of normal summer maximum. For example, Fontana is near full at 1682 feet, although normal summer maximum is at 1693 feet. Feet below near full are measured from the minimum water level necessary for the reservoir to be nearly full. Thus at ten feet below near full, there can be twenty feet of exposed bank at Fontana. Delaying drawdown lengthens the time water levels are near full and increases the time that reservoirs are at summer peak levels.

[7] Numbers in parentheses represent percentage loss in surface area from full reservoir level.

Table 2. Anticipated increases in nonresident visitation by lake and water level management alternative. (1000 visits)

Lake/User Type	Management alternative			
	Current (baseline)	1	2	3
Chatuge:				
Day Boater	92	22	53	69
Overnight Boater	151	41	99	158
Day Nonboater	165	34	86	105
Overnight Nonboater	73	20	42	66
Fontana				
Day Boater	94	42	84	166
Overnight Boater	74	31	44	111
Day Nonboater	98	29	56	124
Overnight Nonboater	19	5	9	20
Hiwassee				
Day Boater	51	31	39	64
Overnight Boater	26	16	21	30
Day Nonboater	61	20	39	51
Overnight Nonboater	25	9	12	19
Santeetlah				
Day Boater	34	9	19	25
Overnight Boater	59	7	23	35
Day Nonboater	19	4	10	13
Overnight Nonboater	44	5	12	20

Table 3. Direct spending by non-residents within the six-county impact region, mean per person per trip (1988 dollars)

	Expenditure Category						
	Lodging	Food	Transportation	Activities	Miscellaneous	Equipment	Total
Chatuge	11.33	10.92	6.71	5.32	5.96	1.21	41.45
Fontana	18.56	20.64	18.97	7.49	1.49	2.08	69.23
Hiwassee	11.07	11.63	6.00	3.23	1.79	0.29	34.01
Santeetlah	4.50	32.52	28.17	3.21	2.23	1.43	72.06

Table 4. Changes in Economic Indicators Due to Changes in Nonresident Recreational Visits to Western North Carolina Reservoirs Under Different Water-level Management Alternatives.

Lake/Indicator	Current (baseline)	Management alternative 1	2	3
Chatuge				
TGO	27	7	16	24
TI	17	4	10	15
FTE	640	160	380	570
Fontana				
TGO	21	8	13	30
TI	14	5	9	20
FTE	490	180	310	710
Hiwassee				
TGO	6	3	4	7
TI	4	2	3	5
FTE	180	100	130	190
Santeetlah				
TGO	7	1	3	5
TI	4	1	2	3
FTE	190	30	80	120
Total				
TGO	61	19	37	65
TI	39	12	24	42
FTE	1500	470	900	1590