APPENDIX A

REMI MODEL AND SOCIOECONOMIC IMPACTS

APPENDIX A

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Introduction

The proposed action for this EIS is to implement improvements to operations and maintenance activities at Lake Lanier. Although these improvements encompass numerous activities (e.g., maintenance of shoreline vegetation, hunting and fishing, island management, nonnative plant management, fire management, erosion management, endangered species) only one component of the operation and maintenance improvements would potentially affect regional economic output: changes in the number of boat dock permits that would be issued. Specifically, implementation of the Preferred Alternative would reduce the total number of additional private boat docks that could be permitted on Lake Lanier. As described in Section 2.0, the No Action and the Preferred Alternatives provide for different levels of private boat dock development based on changes in the permitting process. Table A-1 presents estimates of the total number of additional private docks that could be permitted at Lake Lanier under each alternative during the 20-year study period.

It should be noted that issuance of boat dock permits could also be affected by drought. At an elevation of 1,063 feet msl and below, the Lake Lanier Drought Management Action Plan is implemented. Under this action plan, no new docks can be permitted. This could affect regional economic output through changes in construction activity and from a potential decrease in lake visitors (i.e., low water levels could affect the aesthetic appeal of the lake and reduce the number of visitors).

Therefore, the focus of this socioeconomic impact analysis is to assess the potential impacts to the ROI economy because of (1) decreases in dock construction spending due to changes in permitting or from drought conditions resulting in low lake elevation and (2) the potential decrease in consumer spending because of a drop in visitor attendance.

Table A-1
Number of Total Potential Additional Docks during the 20-Year Study Period under Each Proposed Alternative at High Lake Levels[1]

Alternative	Potential Additional Docks
No Action	3,500
Preferred	2,022

[1]Under the moderate and high flow scenarios, no new docks could be permitted.

This analysis differs from most NEPA economic impact analyses in that it does not assess a proposed action involving a specific construction project or the start-up or closure of a business or industrial facility. Economic impacts of these types of activities are easily quantified because of the clear relationship between the proposed action and changes in economic indicators such as employment and level of spending. For example, the operation of a new facility is typically associated with a defined workforce, a distribution of employees by occupation, labor and capital expenditures, and other variables that have direct and indirect impacts on the surrounding economy. These impacts usually can be traced through the regional economy using standard economic models.

However, the potential changes at Lake Lanier are not so directly linked to the regional economy. The proposed permitting changes under this action provide for different degrees of development in terms of the number of private docks that could be permitted by the U.S. Army Corps of Engineers (USACE). The actual construction of these private docks, however, may or may not be realized over the 20-year study period. The number of new private dock permits that can be issued within a year is constrained by the time it takes to process the permit applications (i.e., available manpower at the USACE Lake Lanier Project Management Office). Historically, an average of 175 permits are issued per year. Furthermore, even if the private docks were built, it would be difficult to directly link operation of those docks with quantifiable future permanent increases in economic activities. The installed docks would not require any employment for operation and maintenance, and because the docks would be associated with private residences the docks would not affect the activities of nonresident recreational visitors. Accordingly, any economic impact of the expansion of private dock capacity at Lake Lanier would be limited to the activities associated with dock construction.

It should be noted that boat docks almost certainly increase the value of lakefront property. The added value of a private dock at Lake Lanier has been estimated to range from approximately $50,000 to $60,000 (Darnell, personal communication, 2002). This effect on property values, however, is more a "wealth effect" than an "income effect." That is, the increased value of the property would not generate changes in consumer spending or other behavior that would in turn affect the regional economy of Lake Lanier. Accordingly, this economic analysis will not attempt to model the impacts of the alternatives on property values.

Because no detailed studies have been performed nor surveys conducted to determine whether different lake levels affect visitation, a screening analysis was performed to ascertain whether reductions in lake levels could affect future visitation. The analysis was based on historical USACE data on monthly average lake elevation levels and monthly lake visitation. Data for the summer months (May through

September) for the years 1993 to 2001 were used for the analysis.[1] These months were selected because Lake Lanier's economic impact on the ROI peaks during the period from May to September when the lake receives the majority of its visitors. Data for these months would likely capture the correlation between lake levels and lake visitation, if one existed.

Table A-2 shows the monthly average lake elevation and number of monthly visitors between 1993 and 2001. A monthly trend can be seen in Table A-2, as the number of visitors typically increases from May through July, then decreases in August and September. As shown in Table A-3, however, there were only 2 years during the study period that a year-to-year decrease (i.e., comparing July to July) in lake elevation corresponded to a reduction in the number of visitors. Only once did an increase in lake elevation correspond with an increase in attendance. In all other years evaluated, decreases in lake levels were accompanied by increases in visitors. A similar lack of correspondence was found for the other months evaluated. While the size of the data set evaluated is relatively small (8 years), it nonetheless indicates that there is no significant correlation between lake elevation levels and visitor attendance, at least for lake levels varying between approximately 1,059 feet msl and 1,073 feet msl.

Visitation levels have followed a seasonal trend, increasing during the spring and summer months and diminishing during the fall and winter. Furthermore, anecdotal evidence suggests that decreases in visitation during the peak season are related more to short-term weather conditions (e.g., precipitation on weekends) rather than to lake levels (Williams, personal communication, 2002).

Based on this information, it is assumed that under historical lake levels visitation trends would remain unchanged, with annual fluctuations primarily influenced by other factors such as short-term weather events and economic and population growth.

However, the impact analysis does evaluate the potential for unusually low lake levels (i.e., below historical levels; the lowest recorded level was 1,052 feet msl in 1981) to dampen visitor levels. The low lake level could adversely affect the aesthetics of the lake, rendering some of the existing facilities less desirable; private docks could be grounded; public marinas could be at least partially grounded. The actual extent of the impact of low water levels on lake attendance cannot be accurately predicted based on historical information, because lake levels have never decreased to an extreme. To account for the large

[1] Data on lake elevation levels and lake visitation are available for years prior to 1993. At the end of 1992, however, the USACE switched to a new accounting system for tabulating the number of visitors at Lake Lanier. Therefore, visitation data from 1993 on cannot be compared to previous years.

Table A-2
Lake Lanier Elevation and Visitation, May to September, 1993 to 2001

Date	Lake Elevation[1]	Visitors (in thousands)[2]
May 1993	1,071	840
June 1993	1,070	1,111
July 1993	1,068	1,368
August 1993	1,066	859
September 1993	1,063	708
May 1994	1,071	785
June 1994	1,071	1,134
July 1994	1,072	928
August 1994	1,072	885
September 1994	1,070	732
May 1995	1,071	738
June 1995	1,070	1,022
July 1995	1,069	1,203
August 1995	1,067	946
September 1995	1,066	601
May 1996	1,072	725
June 1996	1,071	1,052
July 1996	1,070	1,492
August 1996	1,067	899
September 1996	1,066	644
May 1997	1,072	737
June 1997	1,072	1,020
July 1997	1,071	1,479
August 1997	1,070	1,077
September 1997	1,067	610
May 1998	1,072	863
June 1998	1,071	1,129
July 1998	1,069	1,147
August 1998	1,067	999
September 1998	1,066	873
May 1999	1,068	831
June 1999	1,067	979
July 1999	1,067	1,226
August 1999	1,066	1,014
September 1999	1,063	889
May 2000	1,068	972
June 2000	1,066	1,186
July 2000	1,064	1,192
August 2000	1,061	938
September 2000	1,059	805
May 2001	1,062	693
June 2001	1,063	1,225
July 2001	1,063	1,229
August 2001	1,062	862
September 2001	1,061	771

[1] Source: USACE, Mobile District, 2002.
[2] Source: Lake Lanier Project Management Office, 2002.

Table A-3
Lake Elevation and Lake Visitors, July to July, 1993 to 2001

Date	Lake Elevation[1]	Visitors (in thousands)[2]	Percent Change in Visitors from Previous Year	Increase or Decrease in Elevation from Previous Year	Increase or Decrease in Visitors from Previous Year
July 1993	1,068	1,368	—	—	—
July 1994	1,072	928	-32.2	↑	↓
July 1995	1,069	1,203	29.6	↓	↑
July 1996	1,070	1,492	24.0	↑	↑
July 1997	1,071	1,479	-0.9	↑	↓
July 1998	1,069	1,147	-22.5	↓	↓
July 1999	1,067	1,226	6.9	↓	↑
July 2000	1,064	1,192	-2.8	↓	↓
July 2001	1,063	1,229	3.2	↓	↑

[1] Source: USACE, Mobile District, 2002.
[2] Source: Lake Lanier Project Management Office, 2002.

range in possible outcomes, the analysis estimates potential economic impacts for three different visitor scenarios: a 10 percent drop in annual attendance from baseline, a 25 percent annual drop in attendance from baseline, and a 50 percent reduction in attendance from baseline. The analysis assumes that all three scenarios are equally probable. Given the high degree of uncertainty associated with these scenarios, the modeling results should be used as an indication of the range of economic consequences from significantly low lake water levels rather than a forecast of a particular outcome.

The REMI Model

The Regional Economic Models, Inc. (REMI) Policy Insight Model was selected to project economic conditions under unusually low lake levels. The REMI model serves two purposes to the study. First, it provides a baseline demographic and economic forecast for the period 2000 to 2020. The baseline forecast uses historical demographic and economic data to project future conditions. Second, the REMI model forecasts the impacts on that same ROI economy when changes in development growth patterns take place in the region.

REMI was established in 1980. The REMI Policy Insight Model has been evaluated by the Massachusetts Institute of Technology (MIT) and other peer reviewers, and has been used by the U.S. Environmental Protection Agency, the Federal Highway Administration, 26 state governments, city governments, universities, nonprofit organizations, public utilities, and private consulting firms throughout the country. REMI Policy Insight integrates key aspects of three types of economic models: Input/Output (I/O) models, Computer Generated Equilibrium (CGE) models, and econometric models. The Policy Insight Model is a dynamic model that forecasts how changes in the economy and adjustments

to those changes will occur on a year-by-year basis. The dynamic aspect of REMI provides insight into the long-term impact considerations of a policy change to an economic region.

The REMI model is a structural model, meaning that it clearly includes cause-and-effect relationships. The model shares two key underlying assumptions with mainstream economic theory: *households maximize utility* and *producers maximize profits*. In the model, businesses produce goods to sell to other firms, consumers, investors, governments, and purchasers outside the region. The output is produced using labor, capital, fuel, and intermediate inputs. The demand for labor, capital, and fuel per unit of output depends on their relative costs, since an increase in the price of any one of these inputs leads to substitution away from that input to other inputs. The supply of labor in the model depends on the number of people in the population and the proportion of those people who participate in the labor force. Economic migration affects the population size. More people will move into an area if the real after-tax wage rates or the likelihood of being employed increases in a region.

Supply and demand for labor in the model determine the wage rates. These wage rates, along with other prices and productivity, determine the cost of doing business for every industry in the model. An increase in the cost of doing business causes either an increase in price or a cut in profits, depending on the market for the product. In either case, an increase in cost would decrease the share of the local and U.S. market supplied by local firms. This market share combined with the demand described above determines the amount of local output. Of course, the model has many other feedbacks. For example, changes in wages and employment affect income and consumption, while economic expansion changes investment, and population growth affects government spending.

The REMI Policy Insight Model has been customized for the ROI defined in this EIS. For this study, the 53-sector Policy Insight Model is used. In the 53-sector model, industries are defined at their 2-digit Standard Industrial Classification (SIC) code level, which provides sufficient industry detail for the policy questions analyzed in this EIS. The model has a complete economic history of the ROI from 1969 to the present. Data for the model are obtained from the Bureau of Economic Analysis, the Bureau of Labor Statistics, the Department of Energy, the Census Bureau, and other public sources. Based on these data, a control, or baseline, forecast was generated for the ROI to the year 2035.[2] This baseline forecast simulates the expected long-term growth of the ROI based on past and current trends and conditions. An alternative forecast is then developed for each alternative scenario in the trends analysis. Alternative forecasts are created by altering the value of policy variables in the model from their value in the baseline

forecast. The deviation of the alternative forecast from the baseline forecast is the effect of the policy on the regional economy.

Baseline Forecast

The REMI forecast is based on a 30-year historical database, and takes into account national economic and demographic trends as well as regional-specific characteristics. In generating economic forecasts, the REMI model places greater weight on more recent data than on the older data to better capture recent trends at both the regional and national levels.

For purposes of the analysis, the No Action Alternative with a lake elevation above 1,063 feet msl is equivalent to the baseline.[3] Under these conditions, the lake would be at an elevation that would allow continued issuance of permits and favorable conditions for recreational use of the lake. Permits could be issued at the maximum rate. As described previously, the number of private dock permits that can be issued in a year is constrained by manpower. Using the historical average of 175 permits issued per year for the 20-year study period would result in a total of 3,500 new docks permitted by 2020. The Preferred Alternative is then compared against this rate of development to estimate impacts.

The economic ROI evaluated in this analysis includes Dawson, Forsyth, Gwinnett, Hall, and Lumpkin Counties, Georgia. These are the counties that border the lake and have directly or indirectly borne most of the economic impacts of development that has occurred around the lake over the last 46 years. The REMI model was used to forecast demographic and economic conditions for each of the counties constituting the ROI for the period 2000 to 2020.

As shown in Table A-4, over the 20-year study period the REMI baseline model forecasts a 41.8 percent increase in population in the ROI. This population increase equates to approximately 2.1 percent annual growth. In general, the model forecasts slower population growth toward the end of the forecast period than at the beginning. Overall, the ROI is projected to add about 349,600 persons during the 20-year period.

[2] The economic impact analysis for this study is limited to the 20-year study period of 2000 to 2020.
[3] Below 1,063 feet msl, the Drought Management Action Plan is implemented and no new dock permits are issued.

Table A-4
REMI Baseline Model Population Projections for the Period 2000 to 2020 (in thousands)

	2000	2005	2010	2015	2020	Total Percent Growth	Annual Growth Rate
ROI	836.651	959.742	1,047.489	1,119.549	1,186.267	41.8	2.1

In addition to the population projections, the REMI model provides projections for major economic indicators such as employment, personal income levels, and gross regional product (GRP). It also generates projections for many underlying economic variables that help determine final levels of economic output, including labor productivity, capital stock levels, wage rates by industry, GRP by sector, and input cost factors such as fuel costs relative to the nation. These "secondary" variables can be used to detail how and why an economy is changing over time.

Table A-5 presents the REMI model baseline projections for employment, GRP, and population for the ROI. Employment in the ROI would grow by approximately 16 percent. GRP (a measure of the ROI's total output of goods and services) would increase by about 66 percent during the 20-year period.

Table A-5
Baseline Economic Projections

ROI	2000	2005	2010	2015	2020
Total Employment (thousands)	472.776	486.863	506.681	528.229	546.341
GRP (billion fixed 92$)	24.430	27.966	32.022	36.401	40.675
Population (thousands)	836.651	959.742	1,047.489	1,119.549	1,186.267

Low Lake Level Forecast

Under low lake levels, the Drought Management Action Plan would be in effect, and no new dock permits could be issued. The 3,500 new docks projected under the baseline scenario would not be permitted and therefore would not be constructed. At low lake levels, visitor attendance would also be expected to decrease. At the low levels, private docks could be grounded and public marinas could be at least partially grounded. Lake aesthetics would be adversely affected, and some lake facilities, such as beaches or campsites, could become less desirable. As discussed previously, the low lake level scenario is analyzed at three different levels of visitor attendance: a 10 percent drop in annual attendance from baseline, a 25 percent annual drop in attendance from baseline, and a 50 percent reduction in attendance from baseline. The analysis assumes that each scenario is equally probable.

Baseline visitation levels were projected using USACE historical data for the period 1993 to 2001. Under the baseline scenario, visitor attendance is projected to increase at an annual rate equal to the average annual increase that occurred during the past 9 years (approximately 0.6 percent annual increase). Accordingly, total visitor attendance would be expected to increase from about 7.45 million in the year 2001 to 8.3 million in 2020. To estimate economic impacts, the analysis also used USACE data on distribution of visitors by type of visit, including day-trippers, and overnight visitors (campers and lodgers).

10 Percent Visitor Reduction. The results of the REMI forecast for the low lake levels with a 10 percent reduction in visitation and a decrease in dock construction spending are presented in Tables A-6 and A-7. If a low lake level resulted in a 10 percent drop in visitation and a decrease in new dock construction over the next 20 years, there would be less than a 0.25 percent decrease in employment, GRP, and population from baseline projections for the ROI. By 2020, employment in the ROI would decrease by about 590 jobs, or 0.1 percent. ROI population would decrease by 0.1 percent over the 20-year period (about 1,190 persons). GRP for the ROI would drop by 0.04 percent from baseline by 2020.

Table A-6
Economic Projections for Low Lake Levels with 10 Percent Visitor Reduction

ROI	2000	2005	2010	2015	2020
Total Employment (thousands)	472.163	486.318	506.125	527.658	545.748
GRP (billion fixed 92$)	24.416	27.954	32.009	36.387	40.659
Population (thousands)	836.569	959.096	1,046.529	1,118.428	1,185.075

Table A-7
Low Lake Levels and 10 Percent Visitor Reduction
Employment, GRP, and Population Decreases from Baseline Conditions

ROI	2000	2005	2010	2015	2020
Total Employment from Baseline (thousands)	-0.6128	-0.544	-0.5558	-0.571	-0.5931
Percentage Employment Decrease	-0.130	-0.112	-0.110	-0.108	-0.109
GRP (billion fixed 92$)	-0.01354	-0.01205	-0.01284	-0.01400	-0.01557
Percentage GRP Decrease	-0.055	-0.043	-0.040	-0.038	-0.038
Population from Baseline (thousands)	-0.08203	-0.6464	-0.9595	-1.121	-1.192
Percentage Population Decrease	-0.010	-0.067	-0.092	-0.100	-0.100

25 Percent Visitor Reduction. The results of the REMI forecast for a low lake level scenario with a 25 percent reduction in visitation and a decrease in construction activity are presented in Tables A-8 and A-9. By 2020, the ROI employment, GRP, and population would decrease by less than 0.3 percent from baseline (Table A-9). There would be 1,445 fewer jobs in the ROI compared to the baseline. GRP for the ROI would decrease by 0.1 percent from baseline. ROI population would be expected to drop by 2,895 persons by 2020, or about 0.2 percent.

Table A-8
Economic Projections for Low Lake Levels with 25 Percent Visitor Reduction

ROI	2000	2005	2010	2015	2020
Total Employment (thousands)	471.294	485.543	505.329	526.837	544.895
GRP (billion fixed 92$)	24.398	27.937	31.991	36.367	40.638
Population (thousands)	836.456	958.181	1,045.166	1,116.828	1,183.372

Table A-9
Low Lake Levels with 25 Percent Visitor Reduction
Employment, GRP, and Population Decreases from Baseline Conditions

ROI	2000	2005	2010	2015	2020
Total Employment from Baseline (thousands)	-1.482	-1.319	-1.351	-1.392	-1.446
Percentage Employment Decrease	-0.313	-.271	-0.267	-0.263	-0.265
GRP (billion fixed 92$)	-0.03208	-0.02861	-0.03074	-0.03362	-0.03738
Percentage GRP Decrease	-0.131	-0.102	-0.096	-0.092	-0.092
Population from Baseline (thousands)	-0.1957	-1.561	-2.323	-2.721	-2.895
Percentage Population Decrease	-0.023	-0.163	-0.222	-0.243	-0.244

50 Percent Visitor Reduction. The results of the REMI forecast for a low lake level with a 50 percent reduction in visitation and a decrease in construction are presented in Tables A-10 and A-11. By the year 2020, ROI employment, GRP, and population would all decrease by about 0.5 percent or less from baseline. Employment in the ROI would decrease 0.5 percent, or about 2,880 fewer jobs than under the baseline scenario. ROI population would decrease by approximately 5,760 people by 2020, or about 0.5 percent from baseline conditions. By 2020, the ROI GRP would decrease by 0.2 percent from baseline.

Table A-10
Economic Projections for Low Lake Levels
with 50 Percent Visitor Reduction

ROI	2000	2005	2010	2015	2020
Total Employment (thousands)	469.879	484.429	504.998	525.451	543.463
GRP (billion fixed 92$)	24.367	27.909	31.961	36.333	40.600
Population (thousands)	836.266	956.650	1,042.886	1,114.137	1,180.508

Table A-11
Low Lake Levels with 50 Percent Visitor Reduction
Employment, GRP, and Population Decreases from Baseline Conditions

ROI	2000	2005	2010	2015	2020
Total Employment from Baseline (thousands)	-2.93	-2.613	-2.683	-2.778	-2.878
Percentage Employment Decrease	-0.620	-0.537	-0.530	-0.526	-0.527
GRP (billion fixed 92$)	-0.06298	-0.05628	-0.06118	-0.06773	-0.7494
Percentage GRP Decrease	-0.258	-0.201	-0.191	-0.186	-0.184
Population from Baseline (thousands)	-0.3857	-3.093	-4.602	-5.412	-5.758
Percentage Population Decrease	-0.046	-0.322	-0.439	-0.483	-0.485

Summary of Low Lake Level Model Results. Table A-12 presents the impacts in employment, GRP, and population under each visitor reduction scenario. Results are presented as a percentage decrease from baseline. Overall, the reduction in visitors to Lake Lanier, whether it would be 10 percent, 25 percent, or 50 percent, and the decrease in dock construction activity would have minor adverse long-term impacts on the ROI. As shown in the table, economic indicators for employment, GRP, and population, even with a 50 percent decrease in recreational visitors, would drop about 0.5 percent or less from baseline conditions. The magnitude of these adverse impacts would be small, especially in comparison with the size of the regional economy.

However, it should be noted that these decreases in economic activity would be focused on the service and retail sectors of the local economy. Specifically, businesses that are linked to recreational activity at Lake Lanier (such as outdoor equipment supply stores, souvenir shops, restaurants, boat rental and sales, and boat dock builders) would be affected the most, experiencing the direct employment and income reduction from the decrease in the number of visitors to the lake.

Table A-12
ROI Employment, GRP, and Population Percentage Decreases from Baseline Conditions by 2020

Scenario	Employment	GRP	Population
10 Percent Scenario	-0.109	-0.038	-0.100
25 Percent Scenario	-0.265	-0.092	-0.244
50 Percent Scenario	-0.527	-0.184	-0.485