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An Assessment of the National Economic Effects of the U.S. Army Corps of Engineers Recreation Program

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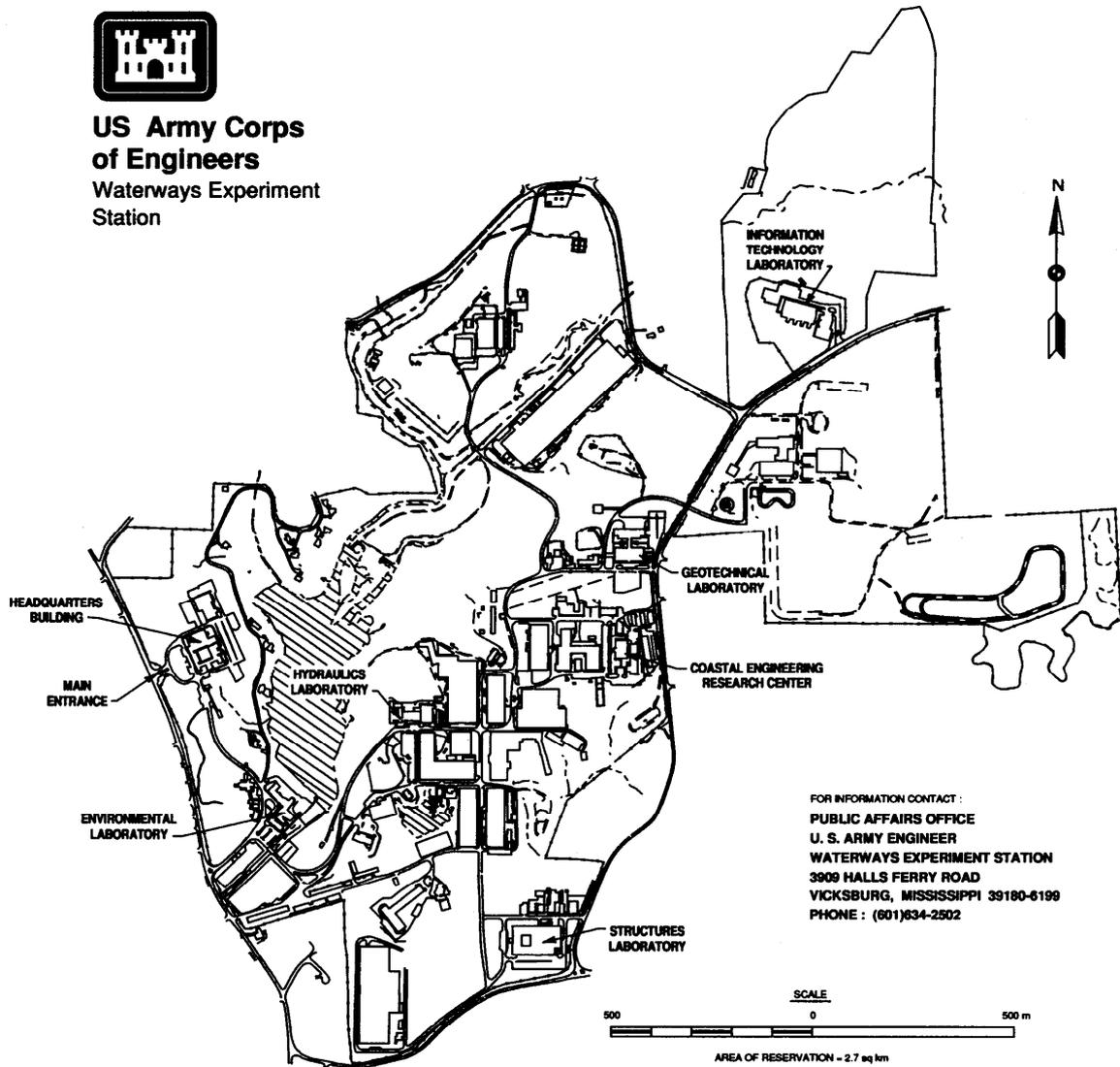
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Preface

The work reported herein was conducted as part of the Natural Resources Research Program (NRRP), Work Unit 32269. The NRRP is sponsored by the Headquarters, U.S. Army Corps of Engineers (HQUSACE), and is assigned to the U.S. Army Engineer Waterways Experiment Station (WES) under the purview of the Environmental Laboratory (EL). Funding was provided under Department of the Army Appropriation No. 96X3121 General Investigation. The NRRP is managed under the Environmental Resources Research and Assistance Programs (ERRAP), Mr. J. L. Decell, Manager. Mr. Russell K. Tillman was Assistant Manager, ERRAP, for the NRRP. Technical Monitors during this study were Ms. Judy Rice and Mr. Robert Daniel, HQUSACE.

The work reported herein was conducted by Mr. R. Scott Jackson, Natural Resource Division (NRD), EL, and Drs. Daniel J. Stynes and Dennis B. Propst, Michigan State University. The work was conducted under the direct supervision of Mr. H. Roger Hamilton, Chief, Resource Analysis Branch, NRD, and under the general supervision of Dr. Robert M. Engler, Chief, NRD, and Dr. John W. Keeley, Director, EL.

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1 Introduction

The U.S. Army Corps of Engineers (CE) manages over 460 water resource development projects throughout the United States. These lake and river projects provide significant recreation opportunities and benefits to visitors. Spending by visitors on goods and services associated with the CE recreation program has an important influence on economic development in many regions of the country and is an important component of the national economy.

In 1991, over \$10 billion was spent by visitors engaged in recreation at CE projects, resulting in \$2.9 billion in employee income and over 180,000 jobs in industries directly supplying goods and services to CE visitors. Direct economic output associated with CE visitor spending represents 0.2 percent of the \$4.2 trillion U.S. economy and 0.13 percent of all jobs in the United States. Secondary effects of CE visitor spending accounted for an additional \$9.5 billion in employee income and 437,000 jobs. The total effect of visitor spending in 1991 accounted for 0.4 percent of employee income and 0.5 percent of jobs in the United States.

The CE recreation program is an important component of the U.S. travel and tourism industry, representing over 1.4 percent of direct sales in the estimated \$600 billion industry. Local economic effects of the CE recreation program vary widely between projects, depending on the nature of the project, types of visitors, and the size of the regional economy. Based on the estimated impacts at J. Percy Priest Lake in suburban Nashville, TN, and Lake Shelbyville in rural Illinois, between 30 and 60 percent of the direct effects of visitor trip spending is estimated to accrue to the local areas around CE projects. For purchases of durable goods, 10 to 25 percent of the direct effects are felt locally. Secondary effects are spread more widely across the country, with local areas "capturing" on average about 10 percent of the total effects.

Purpose

This report describes the economic effects of the CE recreation program on the U.S. economy and estimates the economic effects on local regions adjacent to CE projects.

Scope

Economic effects are based on spending by visitors to CE projects during 1991. All visitors engaging in some recreation activity related to CE projects are included in the analysis. This encompasses day users, individuals camping at CE projects, and visitors staying overnight near CE projects and engaging in some kind of recreation activity on the CE project. (Note: The latter are officially counted as day users by the CE.)

2 Methods

Recreation use of CE projects is translated into national and local economic effects by first determining the total spending of visitors to CE projects. Total spending by visitors is adjusted for the portion of spending that is captured by the national or local economy. At the national level, all spending except for purchases of foreign imports is captured. However, for local regions around CE projects, only spending within 30 miles¹ of the project is included, and only local retail, wholesale, and transportation margins of retail purchases of goods imported from outside the local region are “captured.” The captured portion of visitor spending represents the “direct economic effects” of visitor spending. Regional economic multipliers estimated from national and local input-output models are applied to these direct effects to estimate total economic effects. Economic effects are expressed in terms of spending (sales), income, and employment accruing to the national or local economy. Economic effects are estimated for both trip and durable goods spending associated with visits to CE projects nationwide. Formally,

$$\text{Recreation visits} \times \text{Per visit spending} = \text{Total spending}$$

$$\text{Direct effects} = \text{Total spending} \times \text{Capture rate}$$

$$\text{Direct effects} \times \text{Multipliers} = \text{Total effects}$$

Recreation Use

Total recreation use included in this analysis was taken from the 1991 Natural Resource Management System (NRMS) database.² In 1991, 410.6 million visits were reported at CE projects. A visit is defined as the entry of one person onto a CE project to engage in one or more recreation activities. Fee camping at CE projects in 1991 totaled 8.036 million visits according to the 1991 Federal Recreation Fee Report.³

¹ To convert miles to kilometers, multiply by 1.609347.

² U.S. Army Corps of Engineers. (1991). Natural Resource Management System, Washington, DC.

³ National Park Service. (1991). Federal Recreation Fee Report to Congress, Washington, DC.

Sightseers in CE use statistics are defined as visitors not engaging in any particular activity at the project. Sightseers account for 30 percent of all CE visits. To avoid inflating the spending and impact estimates by “drive throughs” and other marginal recreational uses, only sightseers spending at least 1 hr at the project are included. Based on sightseeing activity at Raystown Lake, 20 percent of sightseers are included in the analysis.

Prior to applying spending profiles, visits were transformed into “party visits” by dividing total camping visits by an average party size of 3.2 visitors and day use visits by an average party size of 2.8 visitors. Average party sizes were obtained from visitor spending surveys conducted in 1989 and 1990.¹ This resulted in 99.4 million day use party visits and 2.5 million camping party visits. Table 1 summarizes recreation use considered in the analysis.

Table 1 Summary of 1991 Recreation Use Included in Analysis			
	Visits (millions)	Average Party Size (visitors)	Party Visits (millions)
Day use	278	2.8	99.4
Camping	8	3.2	2.5
Sightseeing	124	2.8	8.9 ^a
Total	410		110.8

^a Twenty percent of all reported sightseeing parties.

To improve the accuracy of spending estimates, visitors were further divided into 12 types or “segments.” By estimating use and spending for distinct types of visitors, the analysis can better account for variations in spending by different types of visitors. For example, overnight visitors spend more than day users, and visitors who are camping or boating will have a distinct pattern of spending from visitors staying in motels or not boating. The segmentation also divides visitors between local residents (living within 30 miles of the project) and nonresidents.

Recreation use by segment was estimated using visitation statistics, data from visitor surveys, and some judgment. The total number of day users and campers was taken from the CE recreation use reporting system. It is estimated that 0.1 percent of nonresident day users nationally stay overnight in the area near the project. This percentage of “other overnight” visitors was split out from the day use statistics. Twenty-seven percent of visitors participate in boating activities based on NRMS statistics. Resident and nonresident

¹ Propst, D. B., Stynes, D. J., Lee, J. H., and Jackson, R. S. (1992). “Development of spending profiles for recreation visitors to Corps of Engineers projects,” Technical Report R-92-4, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

percentages came from a survey conducted in 1989-90 at 12 representative CE projects across the country.¹ All sightseeing was incorporated into the day use nonboater segment. The resulting allocation of visitor segments is reported in Table 2.

Table 2 CE National Visitor Segments					
	Party Visits (thousands)				
	Resident	%	Nonresident	%	Total
Day use					
Boater	21,941	19.8	4,894	4.4	26,835
Nonboater	66,020	59.6	15,410	13.9	81,430
Camper					
Boater	102	0.1	510	0.5	612
Nonboater	408	0.4	1,427	1.3	1,835
Overnight					
Boater	0		0	0	0
Nonboater	0		102	0.1	102
Total	88,471	79.9	22,343	20.1	110,814

Visitor Spending

Trip and durable goods spending profiles were estimated for each of these 12 segments based on the national visitor spending survey.¹ A spending profile gives the average amount spent per party trip by each type of visitor. Spending was divided into 33 trip spending categories (e.g., camping fees, motel, groceries, restaurant meals, and gasoline) and 20 categories of durable equipment.

Spending on major durable goods such as boats, outboard motors, and recreational vehicles that were brought on the trip for use at CE projects was converted to annual per party trip equivalents. This avoided multiple counting of the cost of equipment used many times at CE projects over several years. Only the costs of durable goods purchased within the past year were included so that an annual estimate of spending could be generated by multiplying the

¹ Propst, D. B., Stynes, D. J., Lee, J. H., and Jackson, R. S. (1992). "Development of spending profiles for recreation visitors to Corps of Engineers projects," Technical Report R-92-4, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

spending profile by visitation figures. Durable spending was further reduced to one-fourth of the total amount to account for use of durable goods at sites other than CE projects. In effect, it is assumed that CE projects claim one-fourth of the spending on durable equipment that is used at least once at a CE project.

Total trip and durable goods spending for visitors to all CE projects is presented in Table 3. Over \$10 billion in visitor spending is estimated to have occurred in 1991 in association with recreational use of CE projects. Over \$6 billion was spent for trip-related items and over \$4 billion for durable goods. The majority (73 percent) of trip spending occurred in local counties adjacent to CE projects, while 41 percent of spending on durable goods occurred locally.¹ The \$10 billion in spending attributable to 1991 CE recreation visits provides the basis for estimating economic impacts in the next chapter.

Table 3 National CE Recreation Visitor Spending (1990 dollars)				
	Spending per Party Visit	Percent Local	Party Visits (thousands)	Total Spending (\$ million)
Trip	54.97	73	110,814	6,092
Durable goods	35.84 ^a	41	110,814	3,972
Total				10,064
^a Twenty-five percent share of total durable goods spending.				

¹ Propst, D. B., Stynes, D. J., Lee, J. H., and Jackson, R. S. (1992). "Development of spending profiles for recreation visitors to Corps of Engineers projects," Technical Report R-92-4, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

3 Economic Effects

Background

IMPLAN, an economic input-output model developed by the U.S. Forest Service, was used to estimate the economic effects of visitor spending. The current version of IMPLAN uses 1990 data on the economic structure of the United States. Therefore, all economic effects presented are reported in 1990 dollars. Four types of economic effects are reported in this analysis: direct, indirect, induced, and total effects.

Economic impacts may be divided into direct, indirect, and induced effects. The sum of these three is termed the "total" effects. Several measures of economic effects may be reported, including sales, income, value added, taxes, and employment. Various multipliers may be calculated to express the amount of indirect and/or induced effects associated with a change in final demand (direct effect). These concepts are briefly defined prior to presenting the results.

The direct effects are the changes in economic activity within those economic sectors that directly receive visitor spending, i.e., the increased sales, income, and employment in motels, campgrounds, gas stations, boat and recreational vehicle (RV) dealers, and other retail establishments.

Indirect effects are the changes in economic sectors that supply goods and services to those businesses and organizations directly serving the visitors, e.g., linen supply services to hotels and businesses selling goods or services used to produce boats or camping vehicles. Employees and proprietors of establishments impacted directly or indirectly by visitor spending earn income that is then spent on the usual array of household goods and services ranging from housing to groceries to health care. The changes in economic activity resulting from household spending of earned income are termed "induced effects."

Three measures of economic activity are used to capture these direct, indirect, and induced effects of visitor spending: total sales (also termed output), employee income, and jobs. Output measures the value of all sales required to meet the demand associated with visits to CE projects. Employee income covers wages and salaries necessary to produce this output, and

employment is an estimate of the number of jobs required to produce this level of sales or production. Employment estimates include both full- and part-time jobs.

Multipliers capture the amount of indirect and/or induced activity associated with the direct effects. Multipliers may be expressed in terms of sales, income, or jobs. Two types of multipliers are reported. Type I multipliers identify the relationship between direct and indirect effects and are expressed as follows:

$$\text{Type I multiplier} = \frac{\text{Direct} + \text{Indirect}}{\text{Direct}}$$

Type III multipliers incorporate the induced effects generated by visitor spending and are computed as follows:

$$\text{Type III multiplier} = \frac{\text{Direct} + \text{Indirect} + \text{Induced}}{\text{Direct}}$$

Type I and Type III multipliers are commonly recognized measures of a regional economy's response to a specific economic stimulus. These multipliers can be used to evaluate estimated economic effects presented in this report. The size of the multiplier indicates the extent of economic interdependence within the regional or national economy. The greater the propensity of businesses and households to purchase goods and services within a region, the higher the multipliers will be. The larger the region and more highly developed the regional economy, the greater the regional multipliers will be. Multipliers for the U.S. economy are therefore larger than corresponding multipliers for a state, which in turn will be larger than multipliers for a single county. Multipliers reflect the degree to which an initial infusion of spending "turns over" within the economy.

National Effects

The \$10 billion (Table 3) in visitor spending associated with the CE recreation program results in direct effects of over \$2.8 billion in employee income and 180,000 jobs. When indirect and induced effects are considered, the economic effects of CE visitor spending increases to \$12.4 billion in employee income and 618,000 jobs. This represents 0.5 percent of U.S. jobs and 0.4 percent of employee income in the United States. Over one-half of total economic output, income, and jobs is associated with induced effects. The left side of Table 4 presents a summary of the economic effects of the CE recreation program.

Table 4 National Economic Effects of CE Recreation Program (1990 dollars)						
					Multipliers	
	Direct	Indirect	Induced	Total	Type I	Type III
Output/sales, \$ million						
Trip	5,342	3,510	17,008	25,860	1.66	4.84
Durable	2,874	2,097	8,974	13,945	1.73	4.85
Total	8,215	5,607	25,982	39,804	1.68	4.85
Income, \$ million						
Trip	1,882	840	5,263	7,984	1.45	4.24
Durable	1,016	624	2,777	4,417	1.61	4.35
Total	2,898	1,463	8,040	12,401	1.52	4.28
Employment, jobs (million)						
Trip	119	36	249	404	1.31	3.40
Durable	61	21	131	213	1.34	3.49
Total	180	57	380	618	1.32	3.43

The right side of Table 4 presents Type I and Type III multipliers. The total Type III income multiplier is 4.28. This means that for each dollar in income directly associated with visitor spending, an additional \$3.28 in income is generated in the United States. The significant differences between Type I and Type III multipliers reflect the importance of induced effects to total economic activity.

Economic Sectors Affected

Visitor spending impacts a variety of economic sectors at the national level. The most immediately affected sectors are those directly receiving visitor spending, such as lodging, eating and drinking establishments, amusements, petroleum refining, and boat-building sectors. Table 5 reports the five sectors of the U.S. economy for which CE visitor spending represents the largest portion of total U.S. sales.

Indirect and induced effects of visitor spending are spread more widely across economic sectors. Almost 75 percent of all jobs resulting from direct, indirect, and induced effects of CE visitor spending is associated with seven sectors of the economy (Table 6).

Table 5 Direct Sales Effects of CE Visitor Spending (1990 dollars)		
Industry	Output, \$ million	Percent of U.S. Sector Output
Boat-building and repairing	981	21.5
Motorhomes	383	18.1
Travel trailers and campers	271	17.9
Amusement and recreation	365	2.0
Internal combustion engines	132	2.4

Table 6 Total Employment Effects Associated with CE Visitor Spending (Full-time Equivalent Jobs)		
Industry	Jobs	Percent of Jobs from CE Spending
Retail	148,310	24.0
Services	117,530	19.0
Eating and drinking places	46,770	7.6
Manufacturing	41,770	6.8
Finance, insurance, and real estate	39,520	6.4
Wholesale	29,720	4.8
Agriculture	22,540	3.6

Retail sectors account for 24 percent of the 618,000 jobs supported by CE visitor spending, followed by the services and eating and drinking places. The size and distribution of total effects at the national level are strongly influenced by the sizable induced effects. It should be noted that these effects of visitor spending would by no means completely disappear in the absence of CE projects. The distribution of economic activity to different regions and sectors would be affected, however, with sectors and regions receiving the direct effects most clearly impacted. In the next section, we look more closely at the effects of visitor spending on regions around CE projects.

Local Effects

While estimates of national economic activity provide an indication of the overall role of CE visitor spending in the U.S. economy, it is also useful to evaluate the importance of the CE recreation program on smaller regions adjacent to CE projects. Local effects were estimated using multipliers developed for counties contiguous to two CE projects representing regions with

differences in population and economic conditions. These projects are Lake Shelbyville, situated in a rural agricultural region in central Illinois, and J. Percy Priest Lake, located in suburban Nashville.

Table 7 presents Type I and Type III multipliers for counties adjacent to the two CE projects evaluated. Multipliers for Priest Lake were consistently higher than for the region around Lake Shelbyville. For example, in the local region around Priest Lake, for each dollar in employee wages in sectors directly affected by CE visitor spending on durable goods, an additional \$1.62 in wages is generated through indirect and induced effects. The corresponding figure for Lake Shelbyville is \$0.57. This difference reflects the more highly developed economy in counties around Priest Lake with a total economic output of more than \$2.6 billion. Economic development in the region around Lake Shelbyville is much less than Priest Lake, with total output of less than \$760 million in 1990.

Table 7 Multipliers for Local Economic Effects of CE Recreation Program						
	Multipliers					
	Type I			Type III		
	Output	Income	Jobs	Output	Income	Jobs
Trip						
Shelbyville	1.16	1.11	1.07	1.06	1.75	1.52
Priest	1.35	1.25	1.23	1.51	2.30	2.07
Durable goods						
Shelbyville	1.10	1.06	1.04	1.92	1.57	1.47
Priest	1.22	1.17	1.17	2.55	2.62	1.94

The local share of national economic effects was estimated under the assumption that the economic structure for regions adjacent to CE projects fall within the range of conditions represented by Lakes Shelbyville and Priest. It is speculated that the "average" CE project may fall about midway between Shelbyville and Priest in terms of local economic characteristics. Table 8 presents the economic effects of 100,000 party visits to Lakes Priest and Shelbyville using national per visit spending profiles (Table 3) and segment distributions (Table 2). This analysis was done to develop coefficients for estimating local economic effects of the national CE recreation program. Local capture rates and multipliers from this analysis can be used to estimate the local impacts of CE recreation programs nationwide.

Table 8 Effect of 100,000 Party Visits on Regions Adjacent to Lakes Shelbyville and Priest (1990 dollars)				
Local Spending per 100 K Party Visits	Local Capture Rate, %	Direct Effects	Type III Multiplier	Total Effects
Trip Spending \$4.12*				
Shelbyville	35			
Output, \$ million		1.41	1.06	1.49
Income, \$ million		0.52	1.75	0.91
Jobs		56.00	1.52	85.00
Priest	68			
Output, \$ million		2.80	1.51	4.23
Income, \$ million		0.89	2.30	2.05
Jobs		64.96	2.07	134.47
Durable Goods \$1.33**				
Shelbyville	23			
Output, \$ million		0.28	1.92	0.54
Income, \$ million		0.13	1.57	0.196
Jobs		11.00	1.47	16.17
Priest	46			
Output, \$ million		0.61	2.55	1.56
Income, \$ million		0.22	2.62	0.58
Jobs		15.02	1.94	29.14
Note: * \$4.12 million = \$54.97 per party visit * 73% local * 100,000 visits. **\$1.33 million = \$35.84 per party visit * 41% local * 100,000 visits.				

All economic effects of equivalent amounts of visitor spending were significantly higher at Priest Lake than at Lake Shelbyville. This is primarily the result of the much higher "capture rates" for trip and durable spending at Priest Lake. The capture rate is the percent of visitor spending that remains in the region during the initial round of spending. Sixty-eight percent of trip spending and 46 percent of durable spending is captured by the local economy at Priest Lake, compared with 35 percent and 23 percent, respectively, at Lake Shelbyville. A greater percentage of the retail goods and services purchased by visitors at Priest Lake is produced within the local area.

Total output, income, and jobs per 100,000 visits presented in Table 8 were applied to total 1991 CE recreation use of 110,814,000 party visits to estimate the effects of CE visitor spending on counties adjacent to CE projects

(Table 9). Upper and lower bounds on estimates are presented for output, income, and jobs. The upper bounds are based on multipliers and capture rates identified at Priest Lake, and the lower bounds were based on those at Lake Shelbyville. Table 10 presents percentages of CE visitor trip and durable good spending impacts that accrue to local regions based on the Priest Lake and Lake Shelbyville analysis.

Table 9					
Local Effects of National CE Visitor Spending (1990 dollars)					
	Local Spending (\$ million)	Direct Local Effect ¹ Scenarios		Total Local Effect Scenarios	
		Priest	Shelby	Priest	Shelby
Trip	4,447				
Output, \$ million		3,103	1,562	4,687	1,651
Income, \$ million		986	576	2,271	1,008
Jobs, thousands		72	62	149	94
Durable	1,616				
Output, \$ million		676	310	1,729	601
Income, \$ million		244	144	642	217
Jobs, thousands		17	12	32	18
Total	6,063				
Output, \$ million		3,779	1,873	6,416	2,252
Income, \$ million		1,230	720	2,913	1,225
Jobs, thousands		89	74	181	112

¹ Local effects include all spending and associated indirect and induced effects within a 30-mile radius of CE projects.

Total output accruing to local counties adjacent to CE projects is estimated at between \$2.2 and \$6.4 billion, representing between 6 and 16 percent of total output associated with the CE recreation program. Local effects on employee income are estimated at between \$1.2 billion and \$2.9 billion, and job estimates range from 112 to over 181 thousand in counties adjacent to CE projects. Most local economic effects result from trip spending, as durable goods are generally either purchased or manufactured outside the local area.

**Table 10
Percentage of CE Visitor Spending Impacts Accruing to Local Region¹**

	Direct Effect Scenarios		Total Effect Scenarios	
	Priest	Shelby	Priest	Shelby
Trip				
Output	58	29	18	6
Income	52	31	28	13
Jobs	61	52	37	23
Durable				
Output	24	11	12	4
Income	24	14	15	5
Jobs	27	20	15	8
Total				
Output	46	23	16	6
Income	42	25	23	10
Jobs	49	41	29	18
¹ Local regions were defined to include all counties within 30 miles of CE projects.				

4 Conclusions

Economic effects of visitor spending associated with recreational use of CE projects are a significant component of the national economy. Up to 29 percent of all effects are felt in counties adjacent to CE projects, with over 70 percent of the impacts occurring in other regions of the United States. Economic effects presented in this report stem from purchases made by CE visitors and do not fully reflect the “value” or benefits to the visitor associated with recreational use of CE projects. Different methods, such as travel cost modeling and contingent valuation surveys, are required to measure consumer surplus to users.

The process presented in this report to assess the economic effects of the current CE recreation program is an effective method for assessing the current CE recreation program. It would also be effective in evaluating the potential economic effects of natural resource allocation and management decisions affecting recreation opportunities at CE projects.

The accuracy of economic impact estimates presented in this report is dependent on several factors. These factors include the accuracy of overall use estimates, the allocation of total use to visitor segments, the application of spending profiles to visitor segment estimates, and the estimation of economic output, income, and jobs resulting from visitor spending. Future CE economic impact assessments could be improved with the following actions:

- a.* Fully integrate current Visitation Estimation and Reporting System (VERS) visitation reports into the NRMS visitation reporting fields. This action will improve the precision of estimates of total use.
- b.* Create an additional VERS visitation report that reports recreational use according to the visitor segments required to precisely estimate visitor spending.
- c.* Develop additional visitor spending profiles for important user groups. Analysis of spending patterns indicates that spending estimates could be improved by developing profiles for significant groups possessing unique spending patterns, such as marina boaters and private dock owners.

- d.* Incorporate the results of future visitor spending surveys conducted at CE projects into current spending profiles.
- e.* Conduct economic impact studies on additional CE projects to increase the understanding of the effects of the local economic structure on multipliers.
- f.* Classify CE projects according to local economic structure and types of visitors attracted. Economic estimates for individual projects could then be based on the category in which the project falls to account for different spending patterns and regional economic multipliers. National estimates could then be improved by more fully taking into account the range of different kinds of projects in distinct regional economic settings.

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13. ABSTRACT (Maximum 200 words) Increased consideration of regional economic implications of recreation programs associated with Corps water resource development projects has resulted in the need for improved procedures for measuring these effects. An approach is proposed for developing credible, technically sound economic impact assessments of agency recreation programs. The approach involves four steps: (a) identification of appropriate economic impact indicators; (b) development of representative recreation expenditure final demand vectors; (c) creation of recreation demand models to measure recreation use shifts under different management actions; and (d) use of economic input/output models to transform shifts in recreation use into regional income and employment effects. Implementation of the proposed approach improves the ability of the agency to assess the full range of outputs associated with water resource development projects. This increased capability improves the agency's ability to communicate regional benefits of programs to affected state and local agencies, thus creating opportunities for maintaining and expanding recreation program partnerships to improve service to the visiting public.

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