

# MEASURING REGIONAL ECONOMIC IMPACTS OF RECREATION

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**MEASURING REGIONAL ECONOMIC IMPACTS OF RECREATION**

by

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**December 1997**

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MEMORANDUM

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From: Jon Platt  
Natural Resource Economist, Economics Group

Subject: *Measuring Regional Economic Impacts of Recreation Report*

The attached subject report presents procedures for estimating regional economic impacts of recreation. As a result of the literature search conducted for the study, a series of recreational expenditure studies have also been identified. This paper should aid in the development of future Reclamation regional economic impact studies of recreation.

Your name came up as someone who may benefit from the paper. Should you have any questions concerning the attached report, please contact Chuck Borda at (303) 236-8080, extension 538, or myself at (303) 236-8080, extension 529. Additional copies of the report are available. We hope the report serves you well.



Attachment

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## 1.0 INTRODUCTION

Recreation has become an increasingly important component of Bureau of Reclamation (Reclamation) projects. Not only has recreation often been included as a project purpose, but recreation use at these projects is often substantial and continues to expand. As recreational use of Reclamation sites has increased, so has the need to measure the economic value and regional economic impact of that use through National Economic Development (NED) analyses and Regional Economic Development (RED) analyses, respectively.

### 1.1 National Economic Development versus Regional Economic Development Analyses

Most of the economic studies pursued by Reclamation include NED and/or RED analyses. NED analysis as defined by the *Economic and Environmental Principles and Guidelines for Water and Related Resources Implementation Studies*, U.S. Water Resources Council, 1983 (Principals and Guidelines) refers to the evaluation of a proposed project or plan through use of benefit-cost analysis. Benefit-cost analysis measures changes in economic efficiency or net benefits (benefits minus costs) to the nation from implementing a proposed project. The benefits of a proposed project are measured by net willingness to pay of consumers and profits earned by producers. Costs reflect not only expenditures associated with construction and operation of a project, but also any lost benefits arising from implementation. The net benefits of a project, from a national perspective, provide a very useful decision making tool.

RED analysis, as defined by the Principles and Guidelines, focuses on changes in regional economic activity as a result of a proposed project. The Principles and Guidelines recommend estimating changes in regional economic activity by measuring impacts to regional income and employment. In estimating the changes in regional economic activity, direct impacts (initial changes in primary inputs required to produce the output necessary to meet changes in final demand<sup>1</sup>) are estimated for use in calculating the indirect impacts (changes in secondary, backward-linked input purchases between industries) and induced impacts (changes in household expenditures due to changes in household income stemming from direct and indirect effects). The magnitude of this combination of direct, indirect, and induced impacts (multiplier effect) depends on the size and diversity of the regional economy. Generally, the larger and more diverse the regional economy, the greater the multiplier effect.

As compared to the national orientation of the NED analysis, the RED analysis focuses only on impacts to a specified geographic area (region). This regional orientation does not account for possible displacement effects outside the region. Should a gain in economic activity in the study region displace a similar level of activity elsewhere within the nation, from a national perspective,

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<sup>1</sup> Final demand represents purchases by the final consumer (households, government, investment, exports).

these impacts would offset. Regional analyses ignore out-of-region effects, whereas NED analyses take these into account. Therefore, the objective of conducting a RED analysis is to analyze the more localized effects of a project and to evaluate whether the project would create overly adverse effects on economic activity within the study area.

Both NED and RED analyses may be considered by the decision maker in accepting or rejecting a proposed project. However, each of these analyses measure distinctly different economic effects.

This paper focuses on regional impact analyses of recreation including procedures for collection of recreation expenditure data which meet the elements in the Principles and Guidelines for RED analysis.

## **1.2 Research Purpose**

The purpose of this paper is to enhance the quality of Reclamation regional economic impact analyses of recreation by suggesting a theoretically correct estimation procedure and by providing direction for obtaining the critical background expenditure data. The paper presents a few studies with applicable expenditure information for Reclamation work and provides options for collecting expenditure data when existing information is unavailable or inappropriate.

## **1.3 Framework of the Paper**

This paper is divided into four sections which cover the theory and procedures for estimating regional economic impacts of recreation, current literature on recreational regional economic impact studies, procedures for collecting recreation expenditure data, and conclusions. Appendices include definitions and conversion approaches for the various measures of recreation use, literature search procedures, an annotated bibliography of reviewed expenditure studies, and recreation expenditure data applicable to Reclamation regional economic impact studies.

## 2.0 THEORY AND PROCEDURES FOR ESTIMATING REGIONAL ECONOMIC IMPACTS OF RECREATION

### 2.1 Theory of Estimating Regional Recreation Impacts

This section deals with theoretical issues associated with estimating regional economic impacts of recreation. Readers interested in more general regional economic impact analysis topics, including selection of an appropriate model (e.g., input-output, economic base, general equilibrium, etc.), should consult one of the numerous textbooks on the subject (e.g., *Regional Economic Impact and Analysis and Project Evaluation* by H.C. Davis).

The basic assumption or theory behind conducting a regional economic impact analysis of recreation is that changes in current in-region nonresident recreational expenditures will stimulate changes in regional economic activity. To analyze this statement, one could break it down into the following component parts:

Changes: Focus on changes in recreation compared to a baseline level of activity. Current recreation conditions may or may not adequately reflect recreation activity for the baseline. If not, a visitation baseline estimate must be developed from which to measure the impacts of each project alternative.

Measuring the change in recreational activity as compared to the baseline requires estimation of recreation use by activity for each of the project alternatives. This often requires consideration of recreational site, time, or activity substitution within the region.

Current versus periodic impacts: Recent Reclamation regional economic impact analyses have used input-output models, typically either the U.S. Department of Agriculture (USDA) Forest Service IMPLAN model or the U.S. Department of Commerce Bureau of Economic Analysis (BEA) model. Both input-output models apply inter-industry data to provide a snapshot of an economy at a given point-in-time. This current orientation makes analysis of near-term impacts possible, but proves problematic when attempting to measure impacts over time (e.g., annual or periodic expenditures). If the makeup of an economy could be predicted, adjustments could theoretically be made to IMPLAN's inter-industry data to allow forecasting of regional economic impacts over time. Since this is generally not possible, the only approach is to measure impacts of future recreational expenditures assuming current economic conditions.

Region: Focus on impacts to the targeted region. Defining the target region can be difficult and often somewhat arbitrary. Typically the region is limited to those counties where the

initial regional impacts are likely to occur<sup>2</sup>. If we are dealing with a re-operation of a reservoir, recreation impacts may be expected not only around the reservoir, but also along the river downstream of the reservoir. As a result, the region could be defined as adjacent counties along either side of the river in addition to the counties around the reservoir. For example, in an on-going Reclamation anadromous fisheries oriented reservoir reoperation study of the Trinity River in northern California, the recreation impact region has been defined as not only the adjacent counties around Trinity Reservoir and along the linked Trinity and Sacramento River systems, but also Pacific Ocean coastal counties to take into account the migratory path of the salmon.

Total Nonresident In-Region Expenditures:

*Resident versus Nonresident Expenditures:* Resident recreational spending in the region is typically ignored under the assumption that gains or losses in recreational expenditures would displace or be displaced by changes in expenditures for other recreational activities within the region (e.g., activity substitution). While different recreational expenditures may cause different regional impacts (i.e., since different types of recreational expenditures could affect different industries, the magnitude of impact may be different), the displacement assumption implies the same level of total in-region recreational spending. The displacement assumption considers the differential between the regional impacts stemming from different types of recreational expenditures to be insignificant.

Should there be reason to believe that resident recreational expenditures will not displace other in-region recreational expenditures (e.g., increase of in-region recreational expenditures is assumed to displace an out-of-region expenditure) or the differential in regional impacts between different types of recreational expenditures may be significant, then regional impacts from resident expenditures could be expected and should be analyzed.<sup>3</sup>

*In-Region Expenditures:* Focus on nonresident expenditures actually incurred in the region. As illustrated throughout this paper, obtaining recreational expenditure information, measured in a consistent format with recreation visitation data, can be quite difficult (see

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<sup>2</sup> Instead of defining the region based on where the initial impacts are expected to occur, start from this position and expand the region based on inter-regional linkages. This generally requires detailed information as to trade patterns from the initial impact region's central city to other counties in the area. Given that determining trade patterns can be a difficult task, regional definitions are normally limited to the initial impact area.

<sup>3</sup> Within IMPLAN, type II multipliers include personal consumption expenditures (PCEs). As a result, applying any PCE as a change in final demand would involve double counting. To avoid this problem, split out recreational expenditures from the PCEs before attempting to estimate any regional impacts of recreation expenditures through a change in final demand (Alward and Olson, 1997).

Appendix C for a discussion of the different measures of recreation use and how to convert between them).

The in-region portion of nonresident expenditures normally involves a judgement call. Perhaps the best way to evaluate the in-region percentage is to separate the overall expenditure down into component parts (e.g., lodging, food, gas, supplies, etc.<sup>4</sup>). Depending on the origins of nonresident site users and the length of stay associated with each visit, varying proportions of the costs may be assumed to be incurred in the region. For example, if a high percentage of site users live within a day's drive of the site (i.e., no lodging costs en route) and tend to stay several days each visit, most of the lodging costs could be assumed to fall within the region.

A more general approach to estimate in-region costs would be to apply the ratio of on-site days to total trip days (implicitly assumes that average costs per day, whether en route or on-site, would be similar). Obviously, without detailed information from a recreation survey, none of the allocation approaches would likely prove extremely accurate.

Since the probability of obtaining recreation survey information for the study site is remote, attempts are often made to apply results from similar sites. Given in-region expenditures per trip can vary between sites and even recreational activities, application of less than ideal expenditure information is often necessary.

Another potential aspect of the in-region expenditure analysis relates to what percentage of in-region expenditures are actually expected to stay in the region as opposed to immediately exiting the region. For example, assume a recreator purchases gasoline within the region. One may want to assume that only the retail component of the cost of gasoline would actually remain in the region. The costs of manufacturing and transportation may quickly exit the region. The in-region retail component, known as retail margin, consists of retail operating expenses, profits, and taxes. This in-region retail margin component stimulates the regional economic activity, manufacturing and transportation costs would not. Conversely, one may need to include not only the retail margin, but also the manufacturing component.<sup>5</sup>

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<sup>4</sup> Note that the expenditures refer to the variable expenditures per trip. Fixed expenditures (e.g., purchase of a boat), which are incurred periodically but not on a per trip basis, are excluded from the regional economic analysis since they do not vary with changes in visitation.

<sup>5</sup> Retail trade sectors represent service sectors. These sectors do not manufacture a product, they simply consolidate goods for consumer purchase. These sectors reflect pure margin. As a result, there is a need to bridge between the retail sectors and the manufacturing sectors. In IMPLAN, to account for both retail and manufacturing components, the retail trade sector should not be directly selected (sectors 448-455) since these sectors account for the retail margin only. To provide the bridge to the manufacturing component, one needs to select the appropriate industry within the personal consumption expenditure activity data file.

Depending on the input-output model used (IMPLAN or BEA), this margining element may already be included. IMPLAN assumes various margins (which can be adjusted) based on national statistics. BEA multipliers do not and therefore the margins must be considered when estimating in-region expenditures.

## 2.2 Procedures for Estimating Regional Recreation Impacts

The following steps are suggested when conducting a regional economic impact analysis of recreation.

- Step 1: Identify the Anticipated Types of Recreation Affected: Based on the characteristics of the proposed project or plan, identify types of recreation that could potentially be affected. For example, would river, reservoir, and ocean recreation be impacted?
- Step 2: Define the Study Region: Based on the types of potentially affected recreation, define the geographic area over which the initial impacts are likely to be experienced. This geographic area represents the region across which the regional impacts will be measured.
- Step 3: Identify the Sites Within the Study Region: Given the types of impacted recreation and the geographic area of impact, identify the potentially affected sites (e.g., reservoirs, river reaches, coastal areas, etc.).
- Step 4: Identify Impacted Recreational Activities by Site: At each potentially impacted site, consider which recreational activities would be affected by the project or plan. There may be situations where only water based activities would be significantly affected.
- Step 5: Estimate Anticipated Changes in Recreation Use by Recreational Activity and Site for Nonresidents of the Region: This is one of the most difficult aspects of conducting a regional analysis of recreation. If possible, coordination with a knowledgeable recreation specialist should be pursued before estimating visitation changes. First, gather current information on recreation use by activity and site. Then estimate recreation use by activity and site under baseline conditions. Finally, estimate recreation use by activity and site for each of the project alternatives under consideration. The difference between baseline use and the alternative specific use for each activity at each site reflects the change in use associated with that alternative.

The comparison of baseline versus alternative specific recreation use by activity needs to focus on the nonresident portion of use by activity (where nonresident is

determined based on definition of the region)<sup>6</sup>. Obtaining estimates of the nonresident percentage of recreation use by activity can be difficult, the best source of information would be visitation data separated by county of residence. Frequently, information on visitation by county of residence is unavailable so professional judgement must be used to develop the nonresident visitation percentages, gleaned information from various site specific and similar site informational sources. Applying the expected nonresident percentage of recreation use by activity for each site results in estimates of changes in nonresident recreation use by activity and site.

To complicate this step even further, within region recreational substitution may require consideration. The size of the region may influence the potential for substitution. Typically, the larger the region, the greater the likelihood of multiple substitute sites. Recreational substitution represents the movement of activity between sites, between time periods, and even between activities. Substitution within the region would affect estimates of the change in regional recreation use associated with each project alternative. To the extent that a loss in use at one reservoir is offset by a gain in use at another reservoir, and both reservoirs are located within the region, consider the net effect on regional recreation use. However, if the nonresident percentages and/or nonresident expenditures per trip vary significantly between the in-region reservoirs, regional impacts should be estimated at both sites before considering the net effect. Conversely, substitution of recreational activity to sites outside the region would not be used to offset in-region activity.

Perhaps the best way to address site substitution is through use of a multi-site use estimating model. Such models attempt to account for substitution by incorporating visitation information across sites. Another approach for considering substitution, involves the use of resource based and/or facility based carrying capacities by activity from competing sites. Comparing carrying capacity to existing or anticipated use by activity provides a measure of each site's ability to absorb losses in recreation use. Both of these approaches require a great deal of professional judgement.

Step 6: Estimate Changes in Recreational Expenditures within the Region: To estimate changes in regional expenditures, one applies estimates of changes in recreation use by activity and site to estimates of in-region recreational expenditures by activity and site. As discussed above, analyses typically focus on nonresident activity and expenditures only. Changes in nonresident in-region recreational expenditures can

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<sup>6</sup> While the analysis typically focuses on nonresident activity, recall that there may be situations where resident activity should also be considered.

be used with input-output models (e.g., IMPLAN, BEA) to estimate regional impacts in terms of income and employment.

Estimates of nonresident expenditures must be provided in the same units as the changes in recreation use. Recreation visitation may be measured in a variety of ways (e.g., per trip, day, hour, etc.). Since several categories of recreational expenditures are associated with the overall trip (i.e., most travel costs) as opposed to each day of the trip, expenditure is preferably presented on a per trip basis. In addition to aligning units in terms of visit duration (e.g., per trip, day, etc.), one must also consider the level of cost aggregation. Recreational expenditures can be gathered in various ways including aggregated by party, by household, or by individual. With recreation use measured on an individual per recreator basis, recreational expenditures must also ultimately be converted to an average per recreator.

Estimating in-region recreational expenditures requires a great deal of information. First, attempt to collect information by site and activity. Recreational expenditures typically vary by site, and often vary across activities at the same site<sup>7</sup>. Second, attempt to separate the expenditure data by type of expenditure (lodging, food, gas, supplies, etc.). This detail will aid in estimating regional impacts by allowing separation of expenditures by industry. Third, sort the data by visitor origin so visitation and expenditure information can be separated into resident versus nonresident. Typically, nonresident expenditures per trip will exceed those of residents because of higher lodging, food, and gas purchases. Assuming nonresident recreational expenditures can be estimated, the final step involves estimating the portion actually spent within the region, as opposed to en route or at home.

The best way to gather the necessary detail on expenditures is from on-site recreation surveys. Unfortunately, expenditure information is not currently collected through Reclamation's on-going recreational data collection effort. Given the time, expense, and expertise required of surveys, an objective of this paper was to try and locate

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<sup>7</sup> Expenditures may not need to be gathered for each recreational activity. Assuming most expenditures are driven by length of stay on-site (e.g., costs of transportation, lodging, food), perhaps the only distinction which would need to be made would be between day use and overnight use activities. This separation would assume that all day use activities would result in similar expenditures as would all overnight activities. While this may appear logical, it assumes application of visitation estimates measured in recreation days. Expenditures for overnight activities could vary considerably if measured on a per trip basis since trip lengths vary in duration.

Another difficulty with dropping the orientation toward expenditures by activity is that for some recreational activities, activity oriented expenditures may be significant (e.g., cost of the boat charter can be a significant portion of total trip costs for a charter boat ocean fishing trip).

secondary sources of expenditure information which might be applied to Reclamation regional economic impact analyses.

## 3.0 LITERATURE

### 3.1 Intent and description of literature search:

The intent of the literature search was twofold. First, to provide backup references for consultation by agency economists on theoretical or procedural questions. Second, to develop a library of regional economic impact studies by recreational activity across Reclamation's 17 western states for future consideration in obtaining recreational expenditure data.

The literature search was conducted in two parts, 1) keyword searches of several relevant databases (see Appendix B for a details on the keyword searches) and 2) reviews of the references included in each collected study. Keyword searches using the Internet, Colorado Research Library System (CARL), Dialog Database, and Firstsearch Database provided a large set of both published (journals, books, etc.) and unpublished (consulting firm reports, government agency reports, university working papers, etc.) articles. Review of the references and bibliographies from these collected papers identified numerous additional studies for consideration. The total number of articles obtained equaled 96 (see the bibliography for citations for all 96 articles).

### 3.2 Literature with applicable recreation expenditure data:

One of the objectives of this research was to identify studies with recreation expenditure data that could be used for regional economic impact analysis.<sup>8</sup> The review of the research indicated that many of the papers did not have applicable recreation expenditure data that could be used in Reclamation studies.

Of the 96 recreational regional economic impact studies collected, 71 covered only theoretical concepts related to regional economic impact analyses of recreation with only a narrow focus on the collection of expenditure data. In these studies, the recreation expenditure data was often expressed in general terms (e.g., \$100 million from tourism) making it difficult to identify expenditures per visitor or economic sector. This left 25 studies which presented information on recreation expenditures. The 25 studies with expenditure data were subsequently reviewed in detail, an annotated bibliography of these studies can be found in Appendix C.

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<sup>8</sup> For a periodically updated source of recreational economic impact and expenditure information, see the Internet site entitled "Bibliography of Economic Impacts of Parks, Recreation, and Tourism" prepared by Wen Huei Chang at: <http://pilot.msu.edu/user/changwe4/bibli.htm>

There were two common problems that became apparent after reviewing these 25 articles. First, several articles presented dated expenditure information, some over 15- to 20-years old. Even the more recent studies, dated 5 to 10 years ago, often used data that was more than 10 years old. A possible solution to this problem of dated expenditure information would be to index the recreation expenditure data to current dollars using an appropriate price index (e.g., Consumer Price Index). However, indexing dated expenditure information may not realistically represent current expenditures by recreationists.

The second problem pertains to the unit of measure. Recreation expenditure data were presented in a multitude of different units (e.g., dollars per trip, day, person, party, etc.). The most common, and preferred basis for measuring expenditures is per person per trip. For Reclamation studies, recreation visitor data are often available on a day use basis<sup>9</sup>. Since it is important for the expenditure data to be measured on a common basis with the recreation use data, conversions of the expenditure data obtained from these studies.

This portion of the paper identifies recreation expenditure studies applicable to Reclamation economic impact analysis. Of the 25 articles presenting expenditure data, 11 either addressed recreational activities not pursued at Reclamation sites or covered areas outside the 17 western states where Reclamation manages projects (e.g., offshore fishing tournaments in Florida and Texas). Seven of the 14 remaining articles present either dated recreation expenditure information (15- to 20-years old) or data in a format which made it very difficult to convert to common basis. Finally, only 7 of the original 96 articles were identified as having fairly recent expenditure data applicable to Reclamation projects.

Below, are brief descriptions of the seven articles which have recreation expenditure data that could be immediately used for an economic impact analysis on a Reclamation study (a summary of the expenditure information presented in these studies can be found in Appendix D):

**Dawson, S., D. Blahna, and J. Keith. 1993. Expected and actual regional economic impacts of Great Basin National Park. *Journal of Park and Recreation Administration* 11(4):45-59.**

This study concentrates on the impacts from tourism and recreation due to the establishment of the Great Basin National Park in eastern Nevada. The authors collected expenditure data at the park in 1988 using on-site interviews. The expenditure data was used in a three-county model using the IMPLAN input-output computer program. Average expenditures, measured on a per person per

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<sup>9</sup> While visitation measured in recreation days is typically reported, at many Reclamation sites, visitation data is also available in terms of trips, recreation visitor days, and hours.

trip basis, were assigned to the appropriate economic sectors before use with IMPLAN.

The recreation expenditure data could be used for studies within Upper and Lower Colorado Regions dealing with land based recreation activities. The data may have to be indexed to current dollar levels.

**Douglas, A. J. and D. A. Harpman. 1995. Estimating recreation employment effects with IMPLAN for the Glen Canyon Dam region. *Journal of Environmental Management*. 44(3):233-247.**

This journal article considers water related recreation activities on the Colorado River below Glen Canyon Dam and the associated employment impacts in the local area. Per trip recreation expenditure data was used based on 1985 on-site surveys. Recreation trip data by activity (day rafting, fishing, commercial rafting, and private rafting) was collected for 1991. The recreation trip and expenditure data were used as inputs for a two-county regional input-output model using the IMPLAN program. The direct and total employment impacts from this two-county input-output model were used to estimate jobs per million dollars of gross national product output. In looking at the employment impacts by economic sector, the authors found in recreation related sectors, employment impacts per million dollars of regional output were nearly twice that produced by agriculture. From the results of the study, the authors concluded recreation activities along this portion of the Colorado River are more labor intensive than activities related to the agricultural sector.

This study does provide recreation expenditure data which could be applied to Reclamation regional economic impact studies. The expenditure data is somewhat dated, but could be indexed before application.

**Johnson, R.L. and E. Moore. 1993. Tourism impact estimation. *Annals of Tourism Research* 20(2):279-288.**

This paper presents the results of an economic impact study of white water recreation on the Upper Klamath River in Oregon. The recreation expenditure data was collected in 1988 using mail surveys. The average expenditure data was sorted by local and non-local recreationists and was adjusted to account for site substitution and multiple site trips. The expenditure data was assigned to appropriate economic sectors and used to develop a two-county regional input-output model using the IMPLAN program. The paper includes a good theoretical discussion and clearly identifies approaches used in conducting the regional economic impact analysis.

The study includes fairly recent information on recreation expenditures per recreator per trip for white water recreation that could be applied to a Reclamation regional economic impact study.

**Loomis, J.B., W.M. Hanemann, and T.C. Wegge. 1990. Environmental benefits study of San Joaquin Valley's fish and wildlife resources. JSA 87-150. Sacramento: Jones and Stokes Associates.**

The purpose of this study was to get an impression of public attitudes toward fish and wildlife issues in the San Joaquin Valley, and to collect economic information for measuring values and regional economic impacts stemming from the use of those fish and wildlife resources. The study collected information by means of mail and telephone surveys of randomly selected households in California, Oregon, Washington, and Nevada. The data collected from these surveys were used to develop contingent valuation (CV) models to estimate willingness to pay (WTP) by recreationists for various programs to improve fish and wildlife conditions in the San Joaquin Valley. The survey also obtained expenditures from wildlife refuge recreationists within the San Joaquin Valley. The expenditure data is presented on both a per trip and a per day basis. Information is also provided on the percent of total recreational expenditures were actually spent in the San Joaquin Valley.

The study does provide information on recreational expenditure data that could be used for economic impact analysis. This information is particularly useful for any studies within Reclamation's Mid-Pacific Region that may impact fish and wildlife recreational activities. The recreation expenditure data does not indicate the year of collection. Most of the data was compiled during the 1987-1989 period, so it can be assumed that the recreation expenditure data was collected during the same time period. As a result, the data may need to be indexed before application.

**Propst, D.B., D.J. Stynes, J. Hee Lee, and R.S. Jackson. 1992. Development of spending profiles for recreation visitors to Corps of Engineers Projects (final report). Report No. WES/TR/R-92-4. U.S. Corps of Engineers, Waterways Experiment Station, Vicksburg.**

This report, prepared for the U.S. Army Corps of Engineers (COE), used survey based information obtained in 1989 and 1990 to develop expenditure profiles of recreation visitors at 12 COE recreation sites in various parts of the United States. In addition to providing a good presentation of benefit-cost and regional economic impact analysis, the report thoroughly describes survey methods and results. The types of surveys conducted included a combination of personal, on-site interviews and mail questionnaires. Expenditure data was collected at each

of the 12 sites. Recreation expenditure data are separated into the following categories: local (resident) and non-local, day visitors and overnight visitors, boaters and non-boaters.

This study provides fairly recent recreation expenditure data for water recreation sites within certain Reclamation regions. Western sites include Oahe Reservoir (North and South Dakota), Milford Lake, (Kansas), Dworshack Reservoir (Idaho), McNary Lake (Oregon/Washington), Willamette River projects (Oregon), and Lake Mendicino (California). A problem with the expenditure data is it was measured in terms of average expenditures per party (group). Further information on the average number of persons in a party would be required to convert the data to a per visitor basis.

**Bowker, J.M., H.K.Cordell, L.J.Hawks, and D.B.K. English. 1994. An economic assessment of alternative water-level management for Shasta and Trinity Lakes, final report. Athens: U.S. Department of Agriculture, Forest Service, Southeastern Experiment Station.**

The objective of this study was to estimate changes in recreation visitation, economic value, and regional economic impact due to changing Shasta and Trinity Lake water elevations. To perform the economic impact analysis, surveys (mail and on-site) were conducted at Shasta and Trinity Lakes during the 1992 recreation season. Expenditure data from these surveys were obtained on a per trip basis and focused on nonresident recreationists. Predicted annual recreation visitation was provided by separate use estimating models designed to measure changes in recreation visits as a function of lake water levels. The visitation and expenditure estimates were used as inputs into a two-county (Shasta and Trinity counties) regional input-output model using IMPLAN.

This study provides information on recreation expenditures, measured on a per trip basis, that could be used for economic impact analysis on Reclamation studies.

**U.S. Department of the Interior, Fish and Wildlife Service and U.S. Department of Commerce, Bureau of Census. 1993. 1991 national survey of fishing, hunting and wildlife-associated recreation. Washington, D.C.: U.S. Government Printing Office.**

The Fish and Wildlife Service and Bureau of Census publishes state by state results of this survey approximately every 5 years. Reports are based on surveys of resident and nonresident recreationists and focused on participation and expenditures related to fishing, hunting, and other wildlife recreation activities (e.g., non-consumptive activities such as bird watching). Expenditures are broken out by trip related and equipment related expenses and are allocated

by one digit standard industrial classification (SIC) sectors. Total expenditures and average expenditures per recreationist per year are presented. Dividing total statewide expenditures by total statewide visitation would provide estimates of average expenditures per recreator per visit.

Advantages of these statewide reports are that the data are fairly recent and have been consistently collected across states. Disadvantages include the lack of site specific information, a limited range of recreational activities, and no delineation between travel versus on-site expenditures. For a Reclamation study, if there are no site specific data and the recreation activities are similar, expenditure data from these reports may be applicable.

## 4.0 PROCEDURES FOR COLLECTING RECREATION EXPENDITURE DATA

Once the boundaries of the region have been identified, there are two basic options for collecting recreational expenditure data applicable to regional economic impact analyses: (1) use existing data or (2) new data.

### 4.1: Collection Existing Expenditure Data:

Existing data can be obtained through conducting a search of the literature or through direct contacts with government agencies managing recreational facilities.

Literature Search: Conduct a literature search for applicable recreation expenditure information in or around the identified region. The search can be conducted at local, university, or government agency libraries, or through the Internet. The focus of the literature search should include journal articles, books, government agency reports, consulting firm reports, university working papers, etc., related to regional economics of recreation. If recreation expenditure data are identified, it is important to determine if the data are applicable to the recreation activities being affected by the policy or action taking place.

Government Agencies: Other sources of recreation expenditure data include federal, state, and possibly local government agencies which have recreation management responsibilities within the identified region. Contacting the planning departments for such federal agencies as Bureau of Land Management, Forest Service, National Park Service, and Fish and Wildlife Service could provide information on recreation expenditures. State and local government agencies often have planning departments, economic development offices, and recreation departments which could provide information on recreation expenditures.

If recreation expenditure data are identified by the above sources, it is also important the data reflect current expenditure patterns for those recreation activities being affected. We suggest if the data are less than 10 years old, it can be indexed to current dollars using the Consumer Price Index. It is also important for the expenditure data to be on a common basis (i.e., expenditures per visitor per trip or day) with the visitation data. The expenditure data would be most useful if broken out by the economic sectors where the initial dollars are spent (e.g., lodging, food, transportation, supplies, etc.).

### 4.2: Collect New Data - Recreation Survey:

If there is sufficient time and funds, an expenditure survey could be conducted at the affected recreation sites. Sampling design, questionnaire content, and time schedule are critical items which need to be evaluated when considering the survey option. The survey option would be most preferred given the obvious advantage of obtaining current data relevant to the study site

and region. Collection of the proper information can be insured through use of on-site surveys.<sup>10</sup> The primary disadvantages relate to the time, cost, and technical expertise requirements.

In most studies, time and budget constraints, typically prevent the use of on-site surveys as a project specific data collection tool. Given this reality, federal agencies like Reclamation, need to gather the required expenditure and visitation data as part of their on-going recreational data collection effort. Unfortunately, with future federal agency budgets expected to continue to decline, there appears to be little chance of expanding recreational data collections to include the required expenditure information for regional economic impact analyses of recreation

Should funds become available to pursue on-site recreation surveys, statistically based sampling approaches could be designed to gather expenditure data from only a small sample of site users and extrapolate those estimates to the population of site users. Visitation data is currently being collected yearly on Reclamation projects. Expenditure information need not be collected annually, a periodic data collection effort would likely suffice (e.g., every 5 to 10 years). Data collection could be targeted toward certain sites instead of every site in the region. Site selection could be based on knowledge of upcoming agency studies, the degree to which a site could represent other sites in the region, or if a site provides unique recreational activities which prevent it from using information from other sites in the region.

Recreation expenditure oriented questions for consideration within Reclamation's recreation data collection effort may involve some of the following (note these questions would provide a dual purpose since they would also be useful for developing models of economic value).

Question 1: Length of trip, number of days and nights at site.

Purpose: Separate single-day from multiple-day (overnight) visits. Can also be used to allocate costs to in-region.

Question 2: Recreation activities pursued at site. Which activity would you characterize as the primary activity?

Purpose: Aids in allocating costs by activity.

Question 3: Number of members in your party for which you are paying.

Purpose: Necessary for allocating costs on an individual basis.

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<sup>10</sup> Survey Procedure: Make contact on-site. Either provide respondents surveys and have them complete expenditure questions after returning home, or mail the survey to those willing to participate as obtained from the on-site contact. Need to gather expenditure data after the trip has been completed to ensure full trip costs are being obtained.

Question 4: Cost per household per trip for each area of the following items:

	\$	Percent Incurred at Home	Percent Incurred En Route	Percent Incurred at or Around Recreation Site
Transportation car motor home, trailer rental gas air/train/bus fare				
Food grocery store vs. restaurant				
Lodging hotel/motel vs. camping				
Activity Specific Expenses fishing: bait, equipment rental, guide service, etc. boating: rental equipment, launch fee, etc.				

Purpose: Provides the basic cost information for allocation.

Question 5: Percent of en route costs incurred within 50 miles of the recreation site.

Purpose: Necessary for allocating en route costs between in-region versus out-of-region (assumes region includes a 50 miles radius from the site).

Question 6: Town of residence: \_\_\_\_\_

Purpose: Defines starting point of the trip. Necessary to determine whether the recreator would be considered a resident or nonresident of the region.

Question 7: Trip Purpose - Was visiting the site for recreation the exclusive purpose of the trip? If not, was recreating at the site the primary purpose of the trip? If not, what percent of the at home, en route, and on-site costs were associated with recreation at the site?

Purpose: Used to estimate what percent of a multiple purpose trip costs could be allocated to the recreation purpose.

## 5.0 CONCLUSIONS

The basic conclusion of this paper suggests in order to develop a high quality regional economic impact analyses of recreation, detailed information on visitation and recreational expenditures are required.

The preferred approach for gathering the necessary visitation and expenditure information is through on-site surveys of recreators. Only through on-site surveys can assurances be obtained that the proper information is collected. However, in most Reclamation studies, time and budget constraints typically prevent the use of on-site surveys as a data collection tool. Given this reality, federal agencies like Reclamation, need to gather expenditure and visitation data as part of their on-going recreational data collection effort. Unfortunately, while Reclamation does attempt to gather visitation information, expenditure data is lacking. Furthermore, with future Reclamation budgets expected to continue to decline, there appears to be little chance of expanding recreational data collections to include the required expenditure information for regional economic impact analyses of recreation.

Should funds become available to pursue on-site recreation surveys, statistically based sampling approaches could be designed to gather expenditure data from only a small sample of site users and extrapolate those results to the population of site users. Visitation data is currently being collected yearly on Reclamation projects. Expenditure information need not be collected as frequently, a periodic data collection effort would likely suffice (e.g., every 5 to 10 years). Data collection could also be targeted toward specific sites, as opposed to all sites. Site selection could be based on knowledge of upcoming agency studies, the degree to which a site could represent other sites in a region, or if a site provides unique recreational activities which prevent it from using information from other sites.

One of the primary objectives of this paper was to develop a library of regional economic impact studies of recreation. This has been achieved through the literature search. The other primary objective was to obtain expenditure information by region and recreation activity. Unfortunately, of the 96 regional economic impact studies gathered, only 25 reported some form of recreation expenditures. Of those, only seven provided expenditure data which could be immediately used by Reclamation for recreational regional economic impact studies.

The lack of useful expenditure data is discouraging. In addition, the prospects are not good for obtaining such information in future literature searches. Regional economic impact studies are difficult to locate through traditional literature search approaches because many of these studies are not published in the journal based literature (most are considered "grey literature": unpublished agency reports, consulting firm reports, university working papers, etc.). Of the studies available, most neglect to present information on recreational expenditures. This reporting shortfall is especially troublesome and needs to be remedied in future research efforts.

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**APPENDIX A**

**MEASURES OF RECREATION USE**

## Measures of Recreation Use:

Since different recreation measures may be used to address different management objectives, no standard measure of recreation use has or will likely ever evolve. This section presents various measures of recreation use and how to convert between them (Walsh, 1986).

A. Participation: Number of users for a given period of time (e.g., users per year).

B. Time Based Visitation: Recreation Day/Activity Day  
Recreation Visitor Day or Hour

Recreation Day/Activity Day: Recreation by one individual at a site for any portion of a 24-hour period. The approach is satisfactory for measuring the quantity of recreation in a single (or similar) activity, where the length of stay (hours per day) does not vary significantly between participants.

Problems:

1. Approach can result in double-counting when measuring individual use for more than one activity during a single day.
2. Cannot compare day estimates if length of stay (hours) varies significantly across users.

Recreation Visitor Day (Forest Service): A recreation visitor day (RVD) represents 12 person hours of recreation. This activity could reflect 12 hours by 1 person, or 12 persons for 1 hour, or anywhere in between. The recreation can take place continuously or intermittently within the same 24 hour day or across time. This approach provides a good measure of recreational activity when individuals participate in greater than one activity per day for varying periods of time.

Problem:

Recreators perceive recreation as an occasion rather than a set period of time. From an economic valuation perspective, the amount of recreation use generally reflects the frequency of use as opposed to the duration of use. If 12 people visit a site for 1 hour, this would be counted as 12 recreation occasions and not 1 12-hour RVD. Since recreation activities generally do not last 12 hours, the 12-hour RVDs may dramatically underestimate number of recreation occasions. RVDs provide a good measure of facilities use for maintenance purposes, but not a good measure of the number of recreation occasions.

### C. Recreation Occasion based Visitation: Recreation Visit or Trip

Recreation Visit (National Park Service): Recreation by a single individual for any length of time. This is the same as a recreation trip when the individual visits only one recreation site during the visit. When the visits are of similar duration (single day or overnight/weekend), this approach provides the best use measure.

#### Problems:

1. Measure becomes less effective when trips are of significantly different lengths of stay since value per visit is a function of length of stay. When comparing across sites or activities, this measure is often categorized by length of stay.
2. Allocation of value or expenditure per site become difficult when individuals use more than one site on the same visit.
3. Allocation of value or expenditure to the recreation purpose becomes difficult when trips are taken for multiple purposes. For example, if an individual visits relatives and subsequently travels to a Reclamation reservoir to go fishing, then the travel costs associated with only the recreation purpose need to be identified.

Conversion Methods: The following simple formulas are used to convert between the various visitation measures.

1. *RVDs to Recreation Days:*

$$(\text{RVDs} \times 12) \div \text{Average Hours Per Day}$$

2. *Recreation Days to RVDs:*

$$(\text{Recreation Days} \times \text{Average Hours Per Day}) \div 12$$

3. *Recreation Visits (Trips) to Recreation Days:*

$$\text{Visits} \times \text{Average Days Per Trip}$$

4. *Recreation Days to Recreation Visits (Trips):*

$$\text{Recreation Days} \div \text{Average Days Per Visit}$$

5. *Recreation Visits (Trips) to RVDs:*

$$(\text{Visits} \times \text{Average Days Per Visit} \times \text{Average Hours Per Day}) \div 12$$

6. *RVDs to Recreation Visits (Trips):*

$$[(\text{RVDs} \times 12) \div \text{Average Hours Per Day}] \div \text{Average Days Per Visit}$$

7. *Visitation to Number of Participants:*

To convert from recreation visitation to number of participants, information on of trips, days, etc., per participant per length of time (e.g., year) must be available. The total visitation could then be divided by the average visitation per year to estimate the number of participants per year.

**APPENDIX B**

**LITERATURE SEARCH DETAIL**

Components of Literature Search: A series of literature search avenues were pursued in this study. They are broken down into four major search categories: Dialog System, CARL System, Firstsearch System, and INTERNET.

A. DIALOG SYSTEM: Reclamation library personnel conducted the following keyword searches of the following databases:

1. KEYWORD SEARCH LOGIC: (?) implies any continuation of the word (e.g., impact(?) pulls in impacts and recreation(?) pulls in recreational)

a. Keyword: Impact(?) Recreation(?)

Brings up: Economic Impact(s) Recreation  
Regional Economic Impact(s) Recreation  
Regional Impact(s) Recreation  
Impact(s) Recreation  
Impact Analysis Recreation

b. Keyword: Regional Economic(?)

Brings up: Regional Economic Impact(s)  
Regional Economic Development

c. Keyword: Socioeconomic(?) Recreation(?)

Brings up: Socioeconomic Impact(s) Recreation  
Socioeconomic Analysis Recreation

d. Keyword: Input-Output Recreation(?)

Brings up: Input-output analysis recreation  
Input-output modeling recreation

e. Keyword: Recreation(?) Expenditure(?)

2. DATABASES SEARCHED: Topic Indexes are Numbered:

a. Business Economics:

15 ABI/INFORM  
139 Economic Literature Index  
148 Trade and Industry Index

- b. CAS:
    - 6 NTIS (National Technical Information Service)
  - c. Humanities:
    - 7 Social Scisearch
    - 35 Dissertations Abstracts Online
    - 38 Academic Index
  - d. Leisure/Recreation/Sport:
    - 48 Sport
    - 50 CAB Abstracts 1984+
    - 166 GPO Publications Reference File
  - e. Science and Technology:
    - 265 Federal Research in Progress
    - 434 Scisearch
  - f. Social Science: Databases duplicated in other sections
  - g. Water and Water Quality:
    - 117 Water Resources Abstracts
    - 245 Waternet
  - h. Other:
    - 102 ASI
    - 77 Conference Papers Index
    - 60 CRIS/USDA
- B. CARL SYSTEM: This search applied the same keywords identified under the Dialog search to the CARL System (a group of Colorado university research libraries).
- C. OCLC FIRSTSEARCH SYSTEM: A broad database of published and unpublished social science research.
- D. INTERNET: Conducted the following searches within the Natural Resources Research Information page.

- Searched government agency funded research (U. S. Army Corps of Engineers Waterways Experiment Station, U. S. Department of Agriculture research, etc.).
- Searched Library of Congress databases.
- Searched Social Sciences in Forestry

**APPENDIX C**

**ANNOTATED BIBLIOGRAPHY OF EXPENDITURE STUDIES**

## RECREATION IMPACT ANALYSES INFORMATION RESOURCES

### A. TITLE OF PAPER

Alward, G.S., W.G. Workman, and W.R. Maki. 1992. Regional economic impact analysis for Alaskan wildlife resources. In *Valuing wildlife resources in Alaska*, edited by G.L. Peterson, et al., 61-86. Boulder: Westview Press.

### B. RECREATION MEASURE:

Recreation Activities: Wildlife recreation

State: Alaska

Counties: N/A

Name of water site: N/A

### C. DESCRIPTION OF METHODOLOGY:

This chapter in the book titled *Valuing Wildlife Resources* discusses the concepts and methods for estimating regional economic impact from recreation expenditures related to wildlife resources in Alaska. Besides covering general concepts of economic impact analysis, the authors discuss spatial aspects in doing impact analysis. They highlight sources of information on wildlife recreation related expenditures. Also presented were secondary source regional models which could lessen the problem of constructing regional models from primary data sources.

### D. APPLICABLE EXPENDITURE DATA AVAILABLE: Yes No

### E. ADVANTAGES AND DISADVANTAGES:

**Advantages:** This paper does provide a discussion of regional economic impact analysis as it relates wildlife resources in Alaska. Topics discussed such as spatial analysis, regional analysis systems, and secondary source regional models may be of help in determining methods for conducting a regional economic impact analysis. While expenditure information is not included, the study does present sources of information which may provide recreation data for a Reclamation study.

**Disadvantages:** This paper does not give specific recreation expenditure data.

## RECREATION IMPACT ANALYSES INFORMATION RESOURCES

### A. TITLE OF PAPER:

Bell, F., P. Sorensen, and R. Leeworthy. 1982. The economic impact and valuation of saltwater recreational fisheries in Florida. Sea Grant Report No. 47, University of Florida, Gainesville.

### B. RECREATION MEASURE:

Recreation Activities: Saltwater fishing

State: Florida

Counties: All coastal counties

Name of Water Recreation Site: Coastal Florida

### C. DESCRIPTION OF METHODOLOGY:

For economic impact analysis, an export base model is used to estimate the potential impacts from nonresidential fishing recreationists. Data collection on nonresident recreationists was provided by a telephone survey.

Main purpose of the study was to develop a reliable estimate of the economic value of recreational saltwater fishing to Florida's economy. On page 58, Table 3.6 displays per day recreation expenditures for nonresident saltwater fishing.

### D. APPLICABLE EXPENDITURE DATA AVAILABLE: Yes\_\_ No X

**Advantages:** Good presentation on export base theory and application for economic impact analysis.

**Disadvantages:** The expenditure data is somewhat dated (1978-1980) and relates to an area (Florida) not associated with any of the 17 western states.

## RECREATION IMPACT ANALYSES INFORMATION RESOURCES

### A. TITLE OF PAPER

Brooks, R.O. 1979. The economic impacts of the wild and scenic rivers act on the middle fork of the Clearwater River. Master's thesis, University of Idaho, Boise.

### B. RECREATION MEASURE:

Recreation Activities: Outdoor recreation/camping

State: Idaho

Counties: Idaho and Clearwater

Name of Water Site: Middle Fork of the Clearwater River Wild and Scenic River designation

### C. DESCRIPTION OF METHODOLOGY:

Purpose of this study is to estimate the economic impacts from the restrictions and land easements of wild and scenic river designation to the resources in the area. One of the resources that could be impacted is outdoor recreation (i.e., fishing, hunting, camping, etc.).

To estimate the impacts on outdoor recreation, net economic value was determined by use of statistically estimated demand models. Recreation survey data was collected at U. S. Forest Service campgrounds and included some recreation expenditure data. A problem with the responses to the survey dealt with lack of information from the recreationists on their local expenditures, particularly food, lodging, and camping fees.

Some recreation data by user group is displayed in Table 14 on page 50.

D. Applicable Expenditure Data Available: Yes  No

### E. ADVANTAGES AND DISADVANTAGES:

**Advantages:** This study does provide some recreational expenditure information in an area with Reclamation projects.

**Disadvantages:** The recreation data is somewhat dated (1977). Information from the survey, specifically for local expenditures, is lacking.

## RECREATION IMPACT ANALYSES INFORMATION RESOURCES

### A. TITLE OF PAPER

Coon, R. C. 1990. Expanding the North Dakota input-output model to include recreation and tourism. Department of Agricultural Economics Report No. 255, Agricultural Experiment Station, North Dakota State University, Fargo.

### B. RECREATION MEASURE:

Recreation Activities: Recreation and tourism

State: North Dakota

Counties: Statewide

Name of Water Site: N/A

### C. DESCRIPTION OF METHODOLOGY:

The purpose of this study was to collect data to develop a recreation and tourism industrial sector to be included in the North Dakota input-output model. Surveys were mailed out to businesses that deal with recreation and tourism customers at Fargo, Devils Lake, and Medora. From the surveys, total revenues and total expenditures were obtained and used to develop technical input-output coefficients.

### D. APPLICABLE EXPENDITURE DATA AVAILABLE: Yes\_ No X

### E. ADVANTAGES AND DISADVANTAGES:

**Advantages:** Information on the recreation sector for this state is presented.

**Disadvantages:** This study does not present any recreationist expenditure data for water recreation activities. The information presented in this study is related to those businesses which have sales from recreation and tourism customers. There are no per visitor or per day expenditures that can be derived from this study which could be applied to water recreation study.

## RECREATION IMPACT ANALYSES INFORMATION RESOURCES

### A. TITLE OF PAPER

Cordell, K., J. Bergstrom, G. Ashley, and J. Karish. 1990. Economic effects of river recreation on local economies. *Water Resources Bulletin* 26(1):53.

### B. RECREATION MEASURE:

Recreation Activities: River recreation

State: New York, Pennsylvania, West Virginia

Counties: New York - Delaware, Sullivan  
Pennsylvania - Lackawanna, Pike, Susquehanna, Wayne  
West Virginia - Fayette, Monroe, Summers

Name of Water Site: Upper Delaware, Delaware Gap, New River Gorge

### C. DESCRIPTION OF METHODOLOGY:

The purpose of this study was to estimate the economic impacts from expenditures for river recreation activities in the Upper Delaware River Basin and the Delaware Water Gap of Pennsylvania and the New River Gorge in New York. The expenditure data was obtained from the Parks Area Recreation Visitors Study (PARVS) which conducted surveys during 1985-1986 period. Average expenditures per person per trip were developed for the three river recreation areas.

### D. APPLICABLE EXPENDITURE DATA AVAILABLE: Yes\_\_ No X

### E. ADVANTAGES AND DISADVANTAGES:

**Advantages:** Some information on average water recreation expenditure data is provided.

**Disadvantages:** The river based recreation expenditure data reflect areas outside Reclamation's 17 western states. There is no breakdown of the average expenditure data into economic sectors which can be used for an IMPLAN regional model. The data may be out of date.

## RECREATION IMPACT ANALYSES INFORMATION RESOURCES

### A. TITLE OF PAPER

Dawson, S., D. Blahna, and J. Keith. 1993. Expected and actual regional economic impacts of Great Basin National Park. *Journal of Park and Recreation Administration* 11(4):45-59.

### B. RECREATION MEASURE:

Recreation Activities: Camping, hiking, sight seeing

State: Nevada, Utah

Counties: Nevada - White Pine  
Utah - Beaver, Millard

Name of Water Site: N/A

### C. DESCRIPTION OF METHODOLOGY:

This article concentrates on the potential and actual impacts from tourism and recreation at Great Basin National Park. The authors collected expenditure data from on-site interviews of visitors to the park in 1988. The expenditure data were used in a three county model using the IMPLAN computer program. Average expenditures on a per person per trip basis were broken out by appropriate economic sectors. These expenditures are listed on page 52 Table 1.

### D. APPLICABLE EXPENDITURE DATA AVAILABLE: Yes No

### E. ADVANTAGES AND DISADVANTAGES:

**Advantages:** The recreation expenditure data could be used for studies within Upper and Lower Colorado Regions dealing with land based recreation activities. The data may have to be indexed to current dollar levels.

**Disadvantages:** The recreation expenditure data obtained for this study does not directly apply to water based recreation. Also the data is somewhat out of date.

## RECREATION IMPACT ANALYSES INFORMATION RESOURCES

### A. TITLE OF PAPER

Ditton, R. B. and D. K. Loomis. 1987. Hall of fame fishing tournament (1985): An analysis of the participants' characteristics, attitudes and expenditures. Report No. TAMU-SG-88-201, National Sea Grant College Program, Rockville.

### B. RECREATION MEASURE:

Recreation Activities: In-shore saltwater fishing

State: Texas

Counties: Galveston

Name of Water Site: Galveston area

### C. DESCRIPTION OF METHODOLOGY:

Study involved a survey and economic impact analysis of a saltwater fishing tournament in the Galveston Bay area of Texas. The mail-in survey provided data on fishing preferences and other characteristics as well as expenditures. The recreation expenditure data (1985) were broken out for inshore and offshore fishing. The expenditures are on a per person basis. The economic impact analysis (methodology not clearly identified but appears to be some type of export based method) used regional multipliers to estimate total impact from nonlocal purchases.

### D. APPLICABLE EXPENDITURE DATA AVAILABLE: Yes\_\_ No X

### E. ADVANTAGES AND DISADVANTAGES:

**Advantages:** This study does provide some recreation expenditure data.

**Disadvantages:** The recreation data are limited to salt water fishing tournament activity and would not be applicable to typical ocean recreational fishing. The data are now over 10 years old and may need to be updated.

## RECREATION IMPACT ANALYSES INFORMATION RESOURCES

### A. TITLE OF PAPER

Douglas, A. J. and D. A. Harpman. 1995. Estimating recreation employment effects with IMPLAN for the Glen Canyon Dam region. *Journal of Environmental Management*. 44(3):233-247.

### B. RECREATION MEASURE:

Recreation Activities: Commercial and private river rafting and fishing

State: Arizona

Counties: Coconino and Mojave

Name of Water Site: Colorado River below Glen Canyon Dam

### C. DESCRIPTION OF METHODOLOGY:

This journal article looks at water related recreation activities on the Colorado River and the employment impacts from these activities in the local area. Per trip recreation expenditure data were obtained from a 1985 on-site survey. Recreation trip data by activity (day rafting, fishing, commercial rafting, and private rafting) were collected in 1991. The recreation trip and expenditure data were used as inputs to a two county regional input-output model using IMPLAN. The direct and total employment impacts were used to compare jobs per million dollars of gross national product between recreation and agricultural sectors.

### D. APPLICABLE EXPENDITURE DATA AVAILABLE: Yes No

### E. ADVANTAGES AND DISADVANTAGES:

**Advantages:** This study provides recreation expenditure data applicable to Reclamation regional economic impact studies in the Lower Colorado region and possibly other regions with river rafting and fishing activities.

**Disadvantages:** The recreation expenditure data are now over 10 years old and therefore may need to be updated.

## RECREATION IMPACT ANALYSES INFORMATION RESOURCES

### A. TITLE OF PAPER

English, D. 1992. Theory and techniques for estimating regional economic impacts from outdoor recreation visitor expenditures. Ph.D. diss., University of Georgia, Athens.

### B. RECREATION MEASURE:

Recreation Activities: Multiple activities

State: Alabama

Counties: Jackson and Marshall

Name of water recreation site: Lake Guntersville

### C. DESCRIPTION OF METHODOLOGY:

Main focus of this research is development of a spatial allocation model for recreation expenditure data.

Page 55 presents a list of recreation expenditure economic sector categories based on the CUSTOMER - PARVS Survey. It was stated in the study that expenditure data from several different recreation sites in the U.S. were obtained from this CUSTOMER Survey and used in regression equations. This data is not displayed in the body of the document.

This dissertation mostly focuses on the expenditures related to travel to the recreation site and recreation equipment purchases. There is some analysis of expenditures incurred within the recreation site impact area. These expenditures are displayed as an average per person per visit (see p. 129).

### D. RECREATION EXPENDITURE DATA AVAILABLE: Yes\_\_ No X

### E. ADVANTAGES AND DISADVANTAGES:

**Advantages:** Good presentation on the theories and application of input-output methodology and regional impact analysis. References to PARVS and CUSTOMER Survey.

**Disadvantages:** The expenditure data are limited and are related to an area (Alabama) not associated with any of the 17 western states.

## RECREATION IMPACT ANALYSES INFORMATION RESOURCES

### A. TITLE OF PAPER

Garcia, L. M. 1985. Estimating tourism/recreation linkages in a local economy for regional resource management. Department of Agricultural and Applied Economics Staff Paper No. P85-21, University of Minnesota, Minneapolis-St. Paul.

### B. RECREATION MEASURE:

Recreation Activities: Varied recreation/tourism

State: Minnesota

Counties: Aitkin, Carlton, Cook, Itasca, Koochichiching, Lake, St.Louis

Name of Water Site: Boundary Waters Canoe Area

### C. DESCRIPTION OF METHODOLOGY:

The purpose of this paper was to demonstrate the linkage between recreational activities, facilities, and regional economic activity. Surveys were conducted of the market area participants (tourists/recreationists), businesses, and government agencies. It appears an input-output model was developed. Visitor expenditure data is displayed in Table 4 of the Appendix.

### D. APPLICABLE EXPENDITURE DATA AVAILABLE: Yes\_ No X

### E. ADVANTAGES AND DISADVANTAGES:

**Advantages:** This study provides recreation expenditure data which may be applicable to projects in North and South Dakota and possibly other areas.

**Disadvantages:** While recreation expenditure data are presented, it is difficult to determine the basis of the expenditures. The expenditure data is on a destination basis, not on a recreation activity basis. The information is dated (1981), and would need to be indexed before application.

## RECREATION IMPACT ANALYSES INFORMATION RESOURCES

### A. TITLE OF PAPER

Jackson, R. S., D. J. Stynes, D. B. Propst, and L. E. Siverts. 1992. Natural resources technical support program: Economic impact analysis as a tool in recreation program evaluation (final report). Report No. WES/IR/R-92-1. U.S. Army, Western Command, Fort Shafter.

### B. RECREATION MEASURE:

Recreation Activities: Day use, camping, other water recreation

State: Illinois

Counties: Moultrie and Shelby

Name of Water Site: Lake Shelbyville

### C. DESCRIPTION OF METHODOLOGY:

This report was prepared for the U. S. Army Corps of Engineers (COE) to demonstrate a procedure for estimating the regional economic impacts of COE recreation programs on local, state and national economies. Recreator expenditure profiles were obtained by on-site and mail surveys. The expenditure data were incorporated into three IMPLAN program input-output models: a two county local model, a state of Illinois model, and a nationwide model. Expenditures were based on nonlocal visits to the site.

### D. APPLICABLE EXPENDITURE DATA AVAILABLE: Yes\_\_ No X

### E. ADVANTAGES AND DISADVANTAGES:

**Advantages:** This study provides fairly recent information on recreation expenditures for water-based recreation sites that may be applied to Reclamation study. It also provides a clear approach for performing a regional impact analysis.

**Disadvantages:** The information on average expenditures is measured on a per party per trip basis. There may be information excluded from the report which would allow for the conversion of expenditure data. The expenditure data are not associated with sites in or near a Reclamation project.

## RECREATION IMPACT ANALYSES INFORMATION RESOURCES

### A. TITLE OF PAPER

Johnson, R.L. and E. Moore. 1993. Tourism impact estimation. *Annals of Tourism Research* 20(2):279-288.

### B. RECREATION MEASURE:

Recreation Activities: White water rafting

State: Oregon

Counties: Jackson and Klamath

Name of Water Site: Upper Klamath River

### C. DESCRIPTION OF METHODOLOGY:

This paper presented the results of an economic impact study for white water recreation on the Upper Klamath River in Oregon. The expenditure data were collected in 1988 using a mail survey. The expenditure data were grouped by local and nonlocal recreationists, and accounted for site substitution and multiple site trips. The expenditure data were assigned to economic sectors and applied in construction of a two county input-output model using the IMPLAN program. The expenditure data is displayed in Tables 2 through 5 on pages 284 and 285.

### D. APPLICABLE EXPENDITURE DATA AVAILABLE: Yes No

### E. ADVANTAGES AND DISADVANTAGES:

**Advantages:** This study provides fairly recent information on recreation expenditures for white water rafting which may be applied in Reclamation studies. The study also provides a useful discussion of approaches for performing regional impact analyses.

**Disadvantages:** No significant disadvantages.

## RECREATION IMPACT ANALYSES INFORMATION RESOURCES

### A. TITLE OF PAPER

Loomis, J.B., W.M. Hanemann, and T.C. Wegge. 1990. Environmental benefits study of San Joaquin Valley's fish and wildlife resources. JSA 87-150. Sacramento: Jones and Stokes Associates.

### B. RECREATION MEASURE:

Recreation Activities: Waterfowl hunting and fishing

State: California

Counties: Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus, Tulare

Name of Water Site: San Joaquin Valley National Wildlife Refuges and Management Areas

### C. DESCRIPTION OF METHODOLOGY:

The objective of the study was to estimate the economic values of fish and wildlife resources in the San Joaquin Valley. Surveys (mail and telephone) were conducted to collect data to develop contingent valuation (CV) models for estimating net willingness to pay. Expenditure data were collected on the recreation uses in the Valley.

### D. APPLICABLE EXPENDITURE DATA AVAILABLE: Yes No

### E. ADVANTAGES AND DISADVANTAGES:

**Advantages:** This study provides information on recreational expenditure data useful for economic impact analysis. The information provided can be used in Reclamation studies, particularly for Mid-Pacific Region Central Valley studies.

**Disadvantages:** Recreation expenditure data fails to indicate the year of collection. Most of the other data were compiled from 1987 to 1989, so it can be assumed that the expenditure data is based on the same time period.

## RECREATION IMPACT ANALYSES INFORMATION RESOURCES

### A. TITLE OF PAPER

Maki, W.R. 1984. Regional economic accounts for recreation resource planning. Department of Agricultural and Applied Economics Staff Paper P84-25, University of Minnesota, Minneapolis-St Paul.

### B. RECREATION MEASURE:

Recreation Activities: Varied recreation/tourism

State: N/A

Counties: N/A

Name of Water Site: N/A

### C. DESCRIPTION OF METHODOLOGY:

This paper describes an approach to estimating the role of the tourism/recreation industry within a regional economy. The paper linked recreation expenditures to regional and national input-supplying industries using a matrix method.

An input-output model was developed for northeast Minnesota using visitor expenditure data (1981) displayed in Table 1 on page 8 of their report. The format is very similar to another University of Minnesota staff paper (P85-21), "Estimating Tourism/Recreation Linkages in a Local Economy for Regional Resource Management." The visitor expenditures are based on destinations such as resorts or water sites.

### D. APPLICABLE EXPENDITURE DATA AVAILABLE: Yes\_\_ No\_\_ Maybe X

### E. ADVANTAGES AND DISADVANTAGES:

**Advantages:** This study provides recreation expenditure data applicable to projects in North and South Dakota and possibly other areas.

**Disadvantages:** While recreation expenditure data is presented, it is difficult to determine the basis of the expenditures. The expenditure data are on a destination type basis, not on a recreation activity basis. The data are somewhat dated (1981) and would need to be indexed before application.

## RECREATION IMPACT ANALYSES INFORMATION RESOURCES

### A. TITLE OF PAPER

McCollum, D.W., G.S. Alward, and W.G. Workman. 1992. Developing a study plan - the economic impact of wildlife in Alaska. In *Valuing wildlife resources in Alaska*, edited by G.L. Peterson, et al., 312-336. Boulder: Westview Press.

### B. RECREATION MEASURE:

Recreation Activities: Wildlife recreation

State: Alaska

Counties: N/A

Name of Water Site: N/A

### C. DESCRIPTION OF METHODOLOGY:

This chapter in the book *Valuing Wildlife Resources* discusses steps involved in conducting a recreational economic impact analysis, Alaskan wildlife are used as an example. The authors cover four primary steps in conducting an impact analysis - data gathering is seen as the major task. They discussed the need to do literature searches and review existing economic impact models. Data collection is discussed in detail, with recommendations on types of data and use of data. The authors also cover the types of analytical methods available. They discuss input-output, econometric, and general equilibrium approaches, including various combinations of approaches. Specific recreation expenditure data were presented along with sources of information.

### D. APPLICABLE EXPENDITURE DATA AVAILABLE: Yes\_\_ No X

### E. ADVANTAGES AND DISADVANTAGES:

**Advantages:** This paper provides a discussion of regional economic impact analysis. The step by step approach presented should help the analyst perform an impact analysis.

While this paper doesn't provide expenditure data, it does suggest sources of information for obtaining recreation expenditure data useful in Reclamation studies.

**Disadvantages:** This paper does not provide specific recreation expenditure data.

## RECREATION IMPACT ANALYSES INFORMATION RESOURCES

### A. TITLE OF PAPERS

McKean, J. and K. Nobe. 1983. Sportsmen expenditures for hunting and fishing in Colorado -1981. Technical Series Report No. 39, Water Resources Research Institute, Colorado State University, Fort Collins.

McKean, J. and K. Nobe. 1984. Direct and indirect economic effects of hunting and fishing in Colorado - 1981. Technical Series Report No. 44, Water Resources Research Institute, Colorado State University, Fort Collins.

### B. RECREATION MEASURE:

Recreation Activities: Hunting and fishing recreation

State: Colorado

Counties: All counties

Name of Water Site: Applicable to Colorado lakes and streams

### C. DESCRIPTION OF METHODOLOGY:

These reports reflect an update of a 1973 Sportsman survey. An extensive mail survey was conducted to collect expenditure data from resident and nonresident sportsmen during 1981. This data was separated by variable and fixed expenditures incurred within the various regions in Colorado. The variable costs are based on the distance to the site, number of trips, and recreation activity. The report discusses the use of input-output methods to estimate the economic effects from hunting and fishing for counties and planning regions within the state of Colorado.

D. APPLICABLE EXPENDITURE DATA AVAILABLE: Yes\_\_ No\_\_ Maybe X

### E. ADVANTAGES AND DISADVANTAGES:

**Advantages:** This study provides information on recreation expenditures for hunting and fishing recreation activities within Colorado.

**Disadvantages:** The information on average expenditures are measured on a per recreator basis for the hunting and fishing activity. Information from the 1983 technical report (Report #39) may provide information on the average time spent during the recreation activity to derive an expenditure per day estimate. The data are somewhat dated but may be indexed. The authors and the Colorado Division of Wildlife are considering updating this expenditure data.

## RECREATION IMPACT ANALYSES INFORMATION RESOURCES

### A. TITLE OF PAPER

Milon, J.W. and C.M. Adams. 1987. Economic impact of Florida's recreational boating industry in 1985. Report No. TP-50. Sponsored by Office of Sea Grant, National Oceanic and Atmospheric Administration, Rockville.

### B. RECREATION MEASURE:

Recreation Activities: Ocean boating

State: Florida

Counties:

Name of water recreation site:

### C. DESCRIPTION OF METHODOLOGY:

This study looks at the economic impact of the recreational boating industry in the state of Florida. From a 1980 input-output study of marine recreation, multipliers were developed to estimate the total economic activity. These multipliers were compared to multipliers taken from a Water Resources Council national input-output model.

### D. APPLICABLE EXPENDITURE DATA AVAILABLE: Yes\_\_ No X

### E. ADVANTAGES AND DISADVANTAGES:

**Advantages:** Good presentation on recreational boating industry and the subsectors of this industry.

**Disadvantages:** The expenditure data is somewhat dated (1980-1985) and relates to an area (Florida) outside Reclamation's 17 western states.

## RECREATION IMPACT ANALYSES INFORMATION RESOURCES

### A. TITLE OF PAPER

Moore, R., R. Gitelson, and A. Graefe. 1994. The economic impact of rail-trails. *Journal of Park and Recreation Administration* 12(2):63-72.

### B. RECREATION MEASURE:

Recreation Activities: Walking, jogging, and bicycling

State: California, Florida, Iowa

Counties: California - Alameda  
Florida - Leon  
Iowa - Dubuque

Name of Water Site: N/A

### C. DESCRIPTION OF METHODOLOGY:

This study used in-person and mail surveys to obtain information on recreation activities and expenditures related to rail and trail sites. Direct recreation expenditures were estimated on an per person per day basis. Nonlocal expenditures were calculated.

### D. APPLICABLE EXPENDITURE DATA AVAILABLE: Yes\_\_ No\_\_ Maybe X

### E. ADVANTAGES AND DISADVANTAGES:

**Advantages:** The study does provide some information on the recreation expenditures which may be applicable to Reclamation sites in California. The data collected was fairly recent (1990-1991) and it accounts for nonlocal recreation expenditures.

**Disadvantages:** The expenditure information found in this study generally relates to land based activities. One of the three sites considered may be applicable to Reclamation recreation in the Mid-Pacific Region.

## RECREATION IMPACT ANALYSES INFORMATION RESOURCES

### A. TITLE OF PAPER

O'Leary, J., F.A. McGuire, F.D. Dottavio, and P.B. Alexander. 1987. Outdoor recreation expenditure: A nationwide study. *Visions in Leisure and Business* 5(4):46-52.

### B. RECREATION MEASURE:

Recreation Activities: N/A

State: N/A

Counties: Nationwide

Name of Water Site: N/A

### C. DESCRIPTION OF METHODOLOGY:

This study summarized information obtained from a 1983 Nationwide Recreation Survey (NRS). The survey gathered recreator spending information by recreation activity. The study provides a summary of the implications of increasing both recreational spending and demand for outdoor recreation.

### D. APPLICABLE EXPENDITURE DATA AVAILABLE: Yes No

### E. ADVANTAGES AND DISADVANTAGES:

**Advantages:** The study provides some general information on the recreation expenditures from the NRS. It estimates average recreator spending for participation in outdoor recreation activities.

**Disadvantages:** The information in this study is limited to a general description of recreation expenditures. It does not provide any detailed recreation expenditure data which could be used in a regional economic impact analysis.

## RECREATION IMPACT ANALYSES INFORMATION RESOURCES

### A. TITLE OF PAPER

Propst, D.B., D.J. Stynes, J. Hee Lee, and R.S. Jackson. 1992. Development of spending profiles for recreation visitors to Corps of Engineers Projects (final report). Report No. WES/TR/-R-92-4. U.S. Corps of Engineers, Waterways Experiment Station, Vicksburg.

### B. RECREATION MEASURE:

Recreation Activities: Boating, camping, and general recreation

State: Nationwide

Counties: 12 reservoir/lake sites within the United States

Name of Water Site:	California - Mendocino Georgia - Lanier Lake Idaho - Dworshak Reservoir Illinois - Shelbyville Kansas - Milford Lake Missouri - Ouchita Lake	North and South Dakota - Oahe Lake Pennsylvania - Raytown Tennessee - Cumberland & Priest Lake Washington - McNary Lock and Dam Willamette River Projects
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### C. DESCRIPTION OF METHODOLOGY:

This report was prepared for the U. S. Army Corps of Engineers (COE) to develop expenditure profiles of recreation visitors at 12 COE recreation sites. The report provides a good presentation of benefit-cost analysis and economic impact analysis. The report describes survey methods and results. Average trip expenditure data were developed for each of the 12 sites. The expenditure categories are broken down into sectors useful for IMPLAN. The expenditures are separated by local (resident) and nonlocal, day visitor and overnight, boater and non-boater.

D. APPLICABLE EXPENDITURE DATA AVAILABLE: Yes X No   

### E. ADVANTAGES AND DISADVANTAGES:

**Advantages:** This study provides fairly recent information on recreation expenditures for water recreation sites within the various Reclamation regions.

**Disadvantages:** The information on average expenditures is presented on a per party basis. There is enough information to allow the data to be converted to visitor per day basis.

## RECREATION IMPACT ANALYSES INFORMATION RESOURCES

### A. TITLE OF PAPER

Stoll, J., L. Jones, and J. Bergstrom. 1985. Economic Impact of the recreational boating industry in Texas. Sea Grant Report No. 85-604, Texas A&M University, College Station.

### B. RECREATION MEASURE:

Recreation Activities: Boating recreation

State: Texas

Counties: Statewide

Name of Water Site: N/A

### C. DESCRIPTION OF METHODOLOGY:

This study evaluates the economic impacts from the recreational boating industry in the state of Texas. This industry is comprised of boat and trailer manufacturers, equipment manufacturers, marinas, boat yards, and marine trade. The study concentrates on the expenditures in this industry and the associated economic impacts within the state.

### D. APPLICABLE EXPENDITURE DATA AVAILABLE: Yes\_\_ No X

### E. ADVANTAGES AND DISADVANTAGES:

**Advantages:** The study provides some information on the recreational boat industry in the state of Texas.

**Disadvantages:** The information in this study is limited to expenditures related to recreational boat purchases and not to the variable expenditures associated with recreational visitation.

## RECREATION IMPACT ANALYSES INFORMATION RESOURCES

### A. TITLE OF PAPER

Bowker, J.M., H.K.Cordell, L.J.Hawks, and D.B.K. English. 1994. An economic assessment of alternative water-level management for Shasta and Trinity Lakes, final report. Athens: U.S. Department of Agriculture, Forest Service, Southeastern Experiment Station.

### B. RECREATION MEASURE:

Recreation Activities: Boating, camping, and fishing

State: California

Counties: Shasta and Trinity

Name of Water Site: Shasta and Trinity Lakes

### C. DESCRIPTION OF METHODOLOGY:

The objective of the study was to estimate the changes in recreation visitation, economic value, and regional economic impact due to changing Shasta and Trinity Lake water elevations. Recreation surveys were conducted and the data used to develop regression equations to predict visitation at the lakes. Contingent valuation models were developed to estimate willingness-to-pay for recreation use given lake level fluctuations at each lake. The IMPLAN input-output model was used to estimate recreational regional economic impacts due to lake level variation.

### D. APPLICABLE EXPENDITURE DATA AVAILABLE: Yes No

### E. ADVANTAGES AND DISADVANTAGES:

**Advantages:** This study provides information on recreational expenditures useful for economic impact analysis. The information can be applied to Reclamation studies, particularly in the Mid-Pacific and Pacific Northwest Regions.

**Disadvantages:** No significant disadvantages.

## RECREATION IMPACT ANALYSES INFORMATION RESOURCES

### A. TITLE OF PAPER

U.S. Department of the Interior, Fish and Wildlife Service and U.S. Department of Commerce, Bureau of Census. 1993. 1991 national survey of fishing, hunting and wildlife-associated recreation. Washington, D.C.: U.S. Government Printing Office.

### B. RECREATION MEASURE:

Recreation Activities: Fishing, hunting, and wildlife

State: All

Counties: N/A

Name of Water Site: N/A

### C. DESCRIPTION OF METHODOLOGY:

The National Survey of Fishing, Hunting, and Wildlife-Associated Recreation is conducted periodically (approximately every 5 years). Reports are generated by state from this nationwide survey effort. Surveys focus on resident and nonresident recreationists' participation and expenditures for the recreation activities listed above. Expenditures are broken out by trip related and equipment related expenditures. The expenditures are presented in total and per recreationist.

### D. APPLICABLE EXPENDITURE DATA AVAILABLE: Yes No

### E. ADVANTAGES AND DISADVANTAGES:

**Advantages:** This study provides current information on recreational expenditures useful for economic impact analysis (particularly for fishing). The information may be used in Reclamation studies throughout the West.

**Disadvantages:** Recreation expenditure data covers general expenditures and are not site specific. The trip related expenditures are not separated into travel versus on-site expenditures.

## RECREATION IMPACT ANALYSES INFORMATION RESOURCES

### A. TITLE OF PAPER

Yuan, M. and N. Moisey. 1991. Estimates of travel-related economic impacts and associated visitor characteristics in the Butte area. Research Report 17. Institute for Tourism and Recreation Research, University of Montana, Missoula.

### B. RECREATION MEASURE:

Recreation Activities: Travel activities

State: Montana

Counties: Silver Bow-Butte

Name of Water Site: N/A

### C. DESCRIPTION OF METHODOLOGY:

This study concentrates on the economic impacts from travel related expenditures in Silver Bow county, Montana using data from the 1988 and 1990 Montana Travel Survey. Nonresidents were asked about their travel plans, travel expenses, and socio-demographic information. A regional input-output model was developed using IMPLAN based on the information provided by the Montana Travel Survey.

### D. APPLICABLE EXPENDITURE DATA AVAILABLE: Yes No

### E. ADVANTAGES AND DISADVANTAGES:

**Advantages:** The study provides information on travel data within the state of Montana. It also shows how IMPLAN program was used to develop a regional model.

**Disadvantages:** The information in this study is limited to expenditures related to tourism travel and not to expenditures related to water related activities at recreation sites.

## **APPENDIX D**

### **EXPENDITURE ESTIMATES FROM CURRENTLY APPLICABLE STUDIES**

Note: Before applying any of the following expenditure data, it is strongly recommended the original research study be reviewed to verify applicability and to determine the degree of data conversion necessary due to variation in measurement units.

EXPENDITURE DATA APPLICABLE TO RECLAMATION STUDIES:

AUTHORS	REC. SITE	STATE/COUNTY	DATA PERIOD	RECREATION ACTIVITIES	UNIT OF MEASURE	EXPENDITURES (\$/UNIT) BY ECONOMIC SECTOR							
						FOOD / RESTAURANT	LODGING	TRANSP.	BOAT EXP.	MTCE. FUEL	EQUIP. PURCH / RENTAL	FEES LICENSES	OTHER
1. J.M. Bowker, et.al. USDA Forest Service	Shasta and Trinity lakes	CA Shasta and Trinity	1992	Shasta Lake: developed camp dispersed camp fishing houseboating other boating	per nonresident	40.79	42.28	8.00			10.74		5.52
					recreator,	21.20	6.11	17.79			22.78		3.45
					per trip,	16.61	9.48	31.17			15.37		1.28
					at site	14.74	17.25	19.94			61.76		2.72
						12.35	10.23	19.59			245.25		2.83
				Trinity Lake: developed camp fishing houseboating other boating scenic driving	per recreator	40.79	42.28	8.00			10.74		5.52
					per trip	27.18	45.41	12.81			8.52		8.80
						31.35	27.72	68.55			40.89		2.82
						26.41	10.34	13.92			22.37		3.58
						8.87	16.38	2.51			84.88		1.51
2. S.A. Dawson, D.J. Blahna and J.E. Keith	Great Basin National Park	UT/NV UT- Millard Beaver NV - White Pine	1988	camping, hiking and sight seeing	per recreator	4.22	3.28	7.24				1.67	1.01 1/
					per trip								6.31 2/
footnote: 1/ This expenditure is related to amusement services which consists of dollars spent at casinos, golf courses, theaters, and museums 2/ These expenditures are related to the retail sector and consist of dollars spent on groceries, clothing, liquor, and gifts.													
3. A.J. Douglas and D. Harpman	Glen Canyon Dam Region	AZ Coconino Mojave	1985	Day-use raft	per recreator	1.00	-	1.00	-	-	6.00	52.00	2.00
					per trip	(grocery)		(car rental)			(personal gear)	(raft fee)	
						26.51 (grocery)	6.02 (private)	0.47 (car rental)	-	39.7	6.45	19.75 (license)	34.93
						13.06 (restaurant)	18.06 (public)	9.13 (airfare)		(fuel)	(equip. rental)	13.24 (guide fee)	
						15.19 (grocery)	79.43(private)	23.68 (car rental)	-	39.77	77.58	901.70	41.96
	60.24 (restaurant)	4.17 (public)	183.48 (air fare)		(fuel)	(personal gear)	(raft fee)						
	Private raft	145.39 (grocery)	4.81 (private)	3.77 (car rental)	92.24	58.87 (persnl. gear)	-	41.38					
		16.15 (restaurant)	19.26 (public)	41.58 (airfare)		25.41(equip.rental)							
4. R.L. Johnson and E. Moore	Upper Klamath River	OR Klamath Jackson	1988	white water rafting	per recreator	38.58 (restaurant)	39.54	5.00		13.61	4.12 (raft rental)	72.45	14.97
					per trip	12.18 (groceries)		(shuttle service)		0.47 (equipment)	(guide fee)		
						18.05 (restaurant)	15.23	5.43		3.46 (raft rental)	67.92	7.04	
					adjusted	7.28 (groceries)		(shuttle service)		0.43 (equipment)	(guide fee)		
footnote: 1/ Average expenditures were adjusted to account for multiple destination trips and substitution effects.													

EXPENDITURE DATA APPLICABLE TO RECLAMATION STUDIES (cont.):

AUTHORS	REC. SITE	STATE/COUNTY	DATA PERIOD	RECREATION ACTIVITIES	UNIT OF MEASURE	EXPENDITURES (\$/UNIT) BY ECONOMIC SECTOR							
						FOOD / RESTAURANT	LODGING	TRANSP.	BOAT EXP.	MTCE. FUEL	EQUIP. PURCH / RENTAL	FEEES LICENSES	OTHER
5. Jones and Stokes Associates (J.B. Loomis, W.M. Hanemann, and T.C. Wegge)	San Joaquin Valley and Wildlife Refuge Areas	CA	1987-1989	San Joaquin Valley - fish and wildlife activities	per recreator per trip	58.4	99.01			43.5 (fuel)		20.92	22.02 1/
		San Joaquin Stanislaus		San Joaquin Valley - fish and wildlife activities	per day	11.34	19.23			8.45 (fuel)		4.06	4.28 1/
		Merced Madera		San Joaquin Wildlife refuges only - fish and wildlife activities	per trip	46.87	38.21			31.98 (fuel)		19.51	41.65 1/
		Fresno Kings Tulare Kern		San Joaquin Wildlife refuges only - fish and wildlife activities	per day	9.57	7.82			6.54 (fuel)		3.99	8.52 1/
footnotes: 1/ The expenditures under the "OTHER" category were defined by the authors as purchases of supplies.													
6. D.B. Probst, et. al., U.S. Army Corp Of Engineers	Lake McNary Lake Mendocino Oahe Lake Dworshack Resv. Milford Lake Willamette lakes	OR-WA CA ND-SD ID KS OR	1989-1990	boating, camping, other activities.	per party per trip	For expenditures see Table C2 in the original report.							
7. USDI Fish & Wildlife Service & U.S. Department of Commerce, N/A Bureau of Census Table 20		All States	1990-1991	fishng: resident nonresident	per recreator per year 1/		119 2/ 240 2/	82 213	76 36		35 216 2/ 216 2/		52 22 2/ 3/
				hunling: resident nonresident		112 583 2/ 2/	99 432	- -	- -				
footnotes: 1/ Expenditures per visit can be estimated using visitation data from the report. 2/ The expenditures for lodging include food expenditures for resident and nonresident recreationists. 3/ Other expenditures consist of retail purchases of bait (\$41- resident, \$14 - nonresident) and ice (\$11 - resident, \$8 - nonresident). 4/ Equipment rental for fishing recreation consists of boat rental and other fees.													

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Expenditure Category Key:

Table Title

Definition:

Food:	FOOD/RESTAURANT	Food purchases in grocery stores and restaurants
Lodging:	LODGING	Private and public lodging costs.
Transportation:	TRANSP.	Transportation fares, rental car costs
Boating Expenses	BOAT EXP.	Boat fuel, rentals
Maintenance, Fuel	MTCE. FUEL	Private auto maintenance and fuel costs
Equipment Purchases & Rental	EQUIP. PURCH/RENTAL	Non-boating activity rentals
Fees & Licenses	FEEES, LICENSES	Fishing licenses, guide fees
Miscellaneous	OTHER	Specified in footnotes or see original report