This Economics/Recreation Appendix contains several individual reports prepared under contract.

The Economics portion of the appendix is made of up two reports prepared by the University of Nevada, Reno. The first report, which includes two parts, is the "Truckee River Basin Regional Economic Impact Model," Technical Report UCED 94-18. This first report initially was prepared for the 1998 draft EIS/EIR and still applies to analyses included in this revised draft EIS/EIR. The second report is entitled "Economic Impact Model for Analyses Associated with the Truckee River Operating Agreement and the Water Quality Settlement Agreement Study Areas," Technical Report UCED 98/99-04. This report was prepared for the revised draft EIS/EIR for the Truckee River Operating Agreement as well as for the EIS for the Water Quality Settlement Agreement. This report updates and expands information contained in Technical Report UCED 94-18.

The Recreation portion of this appendix also is made up of two reports: "Instream Flows and Recreation on the Truckee River and selected Tributaries" and "Recreation Model Results for the Truckee River Water Quality Settlement Agreement Environmental Impact Statement." The first report was prepared for this study by Colorado State University to be used in evaluating river-related recreation. The second report, prepared by the University of Nevada, Reno, includes recreation model results and analyses based on more recent survey data from California Department of Water Resources that were used for this study as well as for the Truckee River Water Quality Settlement Agreement EIS.

TECHNICAL REPORT
UCED 94-18

TRUCKEE RIVER BASIN
REGIONAL ECONOMIC IMPACT MODEL

PART 1 OF 2

UNIVERSITY OF NEVADA, RENO

Truckee River Basin
Regional Economic Impact Model

Report Prepared by

Thomas R. MacDiarmid
Karl A. McArthur
Thomas R. Harris
Robert R. Fletcher
Kambiz Raffiee
Shawn W. Stoddard
and
Rangesan Narayanan

Thomas R. MacDiarmid is a Research Associate in the Department of Agricultural Economics at the University of Nevada, Reno.

Karl A. McArthur is a Research Associate in the Department of Agricultural Economics at the University of Nevada, Reno.

Thomas R. Harris is a Professor in the Department of Agricultural Economics and Director of the University Center for Economic Development at the University of Nevada, Reno.

Robert R. Fletcher is a Professor in the Department of Agricultural Economics at the University of Wyoming.

Kambiz Raffiee is an Associate Professor in the Department of Economics at the University of Nevada, Reno.

Shawn W. Stoddard is a Research Associate in the Department of Agricultural Economics at the University of Nevada, Reno.

Rangesan Narayanan is a Professor and Chairman in the Department of Agricultural Economics at the University of Nevada, Reno.

July 1995

UNIVERSITY OF NEVADA RENO

The University of Nevada, Reno is an Equal Opportunity/Affirmative Action employer and does not discriminate on the basis of race, color, religion, sex, age, creed, national origin, veteran status, physical or mental disability, and in accordance with university policy, sexual orientation, in any program or activity it operates. The University of Nevada employs only United States citizens and aliens lawfully authorized to work in the United States.

This publication, *Truckee River Regional Economic Impact Model*, was published by the University Center for Economic Development in the Department of Agricultural Economics at the University of Nevada, Reno. Funds for this publication were provided by the United States Department of the Interior, Bureau of Reclamation. This publication's statements, conclusions, recommendations, and/or data represent solely the findings and views of the authors and do not necessarily represent the views of the United States Department of the Interior, the Bureau of Reclamation, University of Nevada, Reno, or any reference sources used or quoted by this study. Reference to research projects, programs, books, magazines, or newspaper articles does not imply an endorsement or recommendation by the authors unless otherwise stated. Correspondence regarding this document should be sent to:

Rangesan Narayanan
Chairman and Professor
Department of Agricultural Economics
Mail Stop 204
University of Nevada, Reno
Reno, Nevada 89557-0105
(702) 784-6701

and

Thomas R. Harris
Director and Professor
University Center for Economic Development
Department of Agricultural Economics
Mail Stop 204
University of Nevada, Reno
Reno, Nevada 89557-0105
(702) 784-1681

UCED
University of Nevada, Reno
Nevada Cooperative Extension
Department of Agricultural Economics

Executive Summary

The U.S. Bureau of Reclamation is preparing an *Environmental Impact Statement (EIS)* for the *Truckee River Operating Agreement (TROA)*. As part of their *EIS*, the Bureau is looking at the potential economic impacts of *TROA* on the Truckee River Basin economy. The potential impacts include economic impacts on recreation from changes in reservoir storage levels at Donner Lake, and at, Prosser, Stampede, and Boca Reservoirs as well as economic impacts of reallocations of water between agriculture, commercial, and residential uses. To estimate these economic impacts, the Department of Agricultural Economics at the University of Nevada has been under contract with the Bureau to develop a regional economic impact model of the Truckee River Basin.

The research by the Department of Agricultural Economics to develop this regional economic impact model is complete. This regional model encompasses the Truckee River Basin. Portions of Sierra, Nevada, Placer, El Dorado, and Alpine counties in eastern California and portions of Pershing, Washoe, Lyon, and Douglas counties and Carson City, an independent city, in western Nevada make-up the basin. Besides estimation of economic impacts, the modeling effort involved a survey of visitation and recreation use at Donner Lake, and at, Prosser, Stampede, and Boca Reservoirs and an accounting of economic activity in the region by economic sector. Features of the model include relationships between visitation and reservoir storage levels, annual patterns of visitation, and expenditures. These features allow for estimation of the number of visitors and their expenditures in the region relative to reservoir storage levels. Given reservoir storage levels for the year 1993, the model estimates 800,000 visitors at the four sites with expenditures in the region of $7 million. Additional model features include economic relationships between measures of economic activity and economic linkages between economic sectors. Economic activity in the region is output of $18 billion, employment of 188,000 jobs, personal income of $7 billion, population of 308,000 persons, housing of 122,000 dwellings, agriculture water use of 74,000 acre-feet, commercial water use of 12,000 acre-feet, and residential water use of 72,000 acre-feet. These features allow for estimation of economic impacts relative to reservoir storage levels. With expenditures of $7 million, the model estimates an overall economic impact on the region of $10 million. This level of impact supports employment of 80 jobs and creates $1.5 million in personal income. These same model features also allow for estimation of economic impacts of reallocations of water. Expected future growth in the region requires a 40,000 acre-foot transfer from agriculture use to commercial and residential uses. For this reallocation, the model estimates a positive overall economic impact on the region of $9 billion in 1990 dollars. This level of impact supports employment of an additional 101,000 jobs and creates an additional $2 billion in personal income over this period. Growth in population is 164,000 persons and new housing is 65,000 dwellings. Commercial water use increases by 11,000 acre-feet and residential water use increases by 29,000 acre-feet. Research to further develop this regional model may possibly continue with respect to economic impacts of river flows.

Table of Contents

Chapter	Page
1. Introduction	1
1.1. Description of the Study Area	2
1.2. Justification for the Model	7
1.3. Specification of the Objectives	8
2. Model Development	10
2.1. Explanation of Input-Output Analysis	11
Measurement of an Economic Impact	12
Accounting of the Economic Activity	14
Estimation of an Economic Impact	18
2.2. Description of Input-Output Modeling	21
Development of the Recreation Model Component	22
Development of the Input-Output Model Component	24
Application of the Model	26
3. Recreation Model Component	30
3.1. Survey of the Visitation	31
Interview Questionnaire	32
List of Observations	39
Descriptive Statistics	43
3.2. Estimation of the Expenditure Function	88
Specification of the Expenditure Function	89
Estimation of the Expenditure Function	92
3.3. Formulation of the Model Equations	104
Visitation Relative to End of the Month Reservoir Storage Levels	105
Annual Visitation Relative to End of the Month Reservoir Storage Levels	113
Annual Number of Camping Visitors	119
Annual Number of Day Use Visitors	122
Annual Number of Camping Visitor Groups	126
Annual Number of Day Use Visitor Groups	128
Annual Camping Visitor Expenditures	130
Annual Day Use Visitor Expenditures	133
Annual Number of Camping and Day Use Visitors	136
Annual Camping and Day Use Visitor Expenditures	138
Annual Camping and Day Use Visitor Expenditures by Category	140

Table of Contents

Chapter	Page
4. Input-Output Model Component	142
4.1. Definition of the Region	143
Economic Area	144
Population Base	145
Economic Sectors	153
4.2. Collection of the Control Total Data	156
Output	157
Employment	173
Income	184
Population	187
Housing	190
Agriculture Water Use	202
Commercial Water Use	208
Residential Water Use	213
Output Response Coefficients	223
Water Transfer Coefficients	226
4.3. Derivation of the Model Tables	228
Transactions Matrix	229
Direct Requirements	234
Final Demand Requirements	237
Output Requirements	245
Employment Requirements	248
Income Requirements	254
Multipliers	260
5. Model Application	262
5.1. Estimation of the Economic Impacts for Alternative Reservoir Storage Levels	263
Direct Economic Impact	264
Total Economic Impact	269
Response Economic Impact	271
Summary	280
5.2. Estimation of the Economic Impacts for Reallocations of Water	282
Direct Economic Impact	283
Total Economic Impact	289
Response Economic Impact	291
Summary	300

Table of Contents

Chapter	Page
6. Conclusion	302
6.1. Description of the Model Components	303
Recreation Model Component	303
Input-Output Model Component	307
6.2. Explanation of the Model Applications	310
Estimation of the Economic Impacts for Alternative Reservoir Storage Levels	310
Estimation of the Economic Impacts for Reallocations of Water	312
6.3. Presentation of the Model Improvements	314
Recreation Model Component Improvement	314
Model Application Improvement	314
Supplement	315
References	569

Supplement
Table of Contents

Chapter		Page
7.	**Recreation Model Component Improvement**	316
7.1.	Survey of the Visitation	317
	Interview Questionnaire	318
	List of Observations	329
	Descriptive Statistics	331
7.2.	Estimation of the Expenditure Function	376
	Specification of the Expenditure Function	377
	Estimation of the Expenditure Function	380
7.3.	Survey of the Second-Home Owners	398
	Cover Letter	399
	Questionnaire	400
	Response Summary	408
	Descriptive Statistics	409
	Comments	438
7.4.	Survey of the Vacation-Home Renters	440
	Cover Letter	441
	Questionnaire	442
	Response Summary	449
	Descriptive Statistics	450
	Comments	477
7.5.	Estimation of the Expenditure Function	479
	Specification of the Expenditure Function	480
	Estimation of the Expenditure Function	483
7.6.	Formulation of the Model Equations	501
	Visitation Relative to End of Month Reservoir Storage Levels	502
	Annual Visitation Relative to End of Month Reservoir Storage Levels	515
	Annual Number of Camping Visitors	526
	Annual Number of Day Use Visitors	529
	Annual Number of Camping Visitor Groups	533
	Annual Number of Day Use Visitor Groups	535
	Annual Camping Visitor Expenditures	537
	Annual Day Use Visitor Expenditures	540
	Annual Number of Camping and Day Use Visitors	543
	Annual Camping and Day Use Visitor Expenditures	545
	Annual Camping and Day Use Visitor Expenditures by Category	547

Supplement
Table of Contents

Chapter	Page
8. Model Application Improvement	549
8.1. Estimation of the Economic Impacts for Alternative Reservoir Storage Levels	550
Direct Economic Impact	551
Total Economic Impact	556
Response Economic Impact	558
Summary	567

List of Tables

Table		Page
3.1-1.	Number of Respondents	45
3.1-2.	Site Visitation of Respondents	47
3.1-3.	Activities of Respondents	49
3.1-4.	Annual Visitation of Respondents	51
3.1-5.	Annual Visitation of Respondents per Site	53
3.1-6.	Number of Visits by Respondents per Site	55
3.1-7.	Local and Non-Local Respondents per Site	57
3.1-8.	Group Make-Up of Respondents per Site	59
3.1-9.	Camping and Day Use Respondents per Site	61
3.1-10.	Ranking of Reasons to Visit by Respondents per Site	63
3.1-11.	Expenditures by Respondents per Site	65
3.1-12.	Expenditures by Camping Respondents per Site	67
3.1-13.	Expenditures by Day Use Respondents per Site	69
3.1-14.	Activity Hours per Day by Respondents per Site	71
3.1-15.	Activity Hours per Day by Camping Respondents per Site	73
3.1-16.	Activity Hours per Day by Day Use Respondents per Site	75
3.1-17.	Indicated Number of Visits by Respondents at Alternative Water Levels per Site	77
3.1-18.	Site Substitution of Respondents per Site	79
3.1-19.	Willingness of Respondents to Pay to Maintain Water Level per Site	81
3.1-20.	Age Brackets of Respondents	83
3.1-21.	Education Levels of Respondents	85
3.1-22.	Household Income Levels of Respondents	87
3.2-1.	Camping and Day Use Visitor Expenditure Function Observations	100
3.2-2.	Camping and Day Use Visitor Expenditure Function Values	103
3.3-1.	Scale Values for Reservoir Storage Levels	109
3.3-2.	Beginning of the Month Reservoir Storage Levels	110
3.3-3.	Scale Values for End of the Month Reservoir Storage Levels	110
3.3-4.	Indicated Number of Visits per Respondent for Reservoir Storage Levels	111
3.3-5.	Visitation Relative to End of the Month Reservoir Storage Levels	112
3.3-6.	Survey Year Visitation Relative to End of the Month Reservoir Storage Levels	112
3.3-7.	Survey Year Annual Visitation by Respondents by Month by Reservoir	117
3.3-8.	Expected Annual Visitation by Month by Reservoir	117
3.3-9.	Weights for expected Annual Visitation by Month by Reservoir	117
3.3-10.	Annual Scale Values by Reservoir	118

List of Tables

Table		Page
3.3-11.	Annual Visitation Relative to End of the Month Reservoir Storage Levels	118
3.3-12.	Survey Year Annual Visitation Relative to End of the Month Reservoir Storage Levels	118
3.3-13.	Annual Number of Camping Visitors by Campground by Reservoir	121
3.3-14.	Annual Number of Camping Visitors by Reservoir	121
3.3-15.	Annual Number of Camping Visitors by Month by Reservoir	121
3.3-16.	Ratio of Day Use Visitors to Camping Visitors by Reservoir	124
3.3-17.	Annual Number of Day Use Visitors by Reservoir	125
3.3-18.	Annual Number of Day Use Visitors by Month by Reservoir	125
3.3-19.	Annual Number of Camping Visitor Groups by Month by Reservoir	127
3.3-20.	Annual Number of Day Use Visitor Groups by Month by Reservoir	129
3.3-21.	Camping Visitor Group Expenditure Function Values by Reservoir	131
3.3-22.	Annual Camping Visitor Expenditures by Month by Reservoir	131
3.3-23.	Annual Camping Visitor Expenditures by Category by Reservoir	132
3.3-24.	Day Use Visitor Group Expenditure Function Values by Reservoir	134
3.3-25.	Annual Day Use Visitor Expenditures by Month by Reservoir	134
3.3-26.	Annual Day Use Visitor Expenditures by Category by Reservoir	135
3.3-27.	Annual Number of Camping and Day Use Visitors by Month by Reservoir	137
3.3-28.	Annual Camping and Day Use Visitor Expenditures by Month by Reservoir	139
3.3-29.	Annual Camping and Day Use Visitor Expenditures by Category by Reservoir	141
4.1-1.	Population In and Out of the Region for Sierra County	146
4.1-2.	Population In and Out of the Region for Nevada County	146
4.1-3.	Population In and Out of the Region for Placer County	147
4.1-4.	Population In and Out of the Region for El Dorado County	147
4.1-5.	Population In and Out of the Region for Alpine County	148
4.1-6.	Population In and Out of the Region by County for California	148
4.1-7.	Population In and Out of the Region for Washoe County	149
4.1-8.	Population In and Out of the Region for Pershing County	149
4.1-9.	Population In and Out of the Region for Story County	150
4.1-10.	Population In and Out of the Region for Lyon County	150
4.1-11.	Population In and Out of the Region for Carson City	151
4.1-12.	Population In and Out of the Region for Douglas County	151
4.1-13.	Population In and Out of the Region by County for Nevada	152

List of Tables

Table		Page
4.1-14.	Population for the Region by County and by State	152
4.1-15.	Economic Sector Definitions	154
4.1-16.	State and Local Government Employment by State	155
4.1-17.	Distribution of State and Local Government Employment by State	155
4.2-1.	Value of Livestock Production for the Region by State	159
4.2-2.	Value of Dairy Production for the Region by State	159
4.2-3.	Value of Alfalfa Hay Production for the Region by State	160
4.2-4.	Value of Other Hay Production for the Region by State	160
4.2-5.	Value of Barley Production for the Region by State	160
4.2-6.	Output by Agriculture Sector for the Region by State	161
4.2-7.	Output by Non-Agriculture Sector by County for California	164
4.2-8.	Population Percentage for the Region by County for California	165
4.2-9.	Local Government Employment Percentage for the Region by County for California	165
4.2-10.	Output by Non-Agriculture Sector for the Region by County for California	166
4.2-11.	Output by Non-Agriculture Sector by County for Nevada	167
4.2-12.	Population Percentage for the Region by County for Nevada	168
4.2-13.	Local Government Employment Percentage for the Region by County for Nevada	168
4.2-14.	Output by Non-Agriculture Sector for the Region by County for Nevada	169
4.2-15.	Output by Non-Agriculture Sector for the Region by State	170
4.2-16.	Output by Economic Sector for the Region by State	172
4.2-17.	Employment by Agriculture Sector for the Region by State	175
4.2-18.	Employment by Non-Agriculture Sector by County for California	177
4.2-19.	Employment by Non-Agriculture Sector for the Region by County for California	178
4.2-20.	Employment by Non-Agriculture Sector by County for Nevada	179
4.2-21.	Employment by Non-Agriculture Sector for the Region by County for Nevada	180
4.2-22.	Employment by Non-Agriculture Sector for the Region by State	181
4.2-23.	Employment by Economic Sector for the Region by State	183
4.2-24.	Income Coefficients by Economic Sector for the Region by State	185
4.2-25.	Income by Economic Sector for the Region by State	186
4.2-26.	Ratio of Population for the Region to Employment for the Region by State	188
4.2-27.	Population by Economic Sector for the Region by State	189

List of Tables

Table		Page
4.2-28.	Housing Units by Type by County for California	192
4.2-29.	Housing Units by Type for the Region by County for California	192
4.2-30.	Housing Units by Type by County for Nevada	193
4.2-31.	Housing Units by Type for the Region by County for Nevada	193
4.2-32.	Housing Units by Type for the Region by State	194
4.2-33.	Distribution of Housing Units by Type for the Region by State	194
4.2-34.	Ratio of Housing Units for the Region to Population for the Region by State	194
4.2-35.	Occupied Housing Units by Type by County for California	195
4.2-36.	Occupied Housing Units by Type for the Region by County for California	195
4.2-37.	Occupied Housing Units by Type by County for Nevada	196
4.2-38.	Occupied Housing Units by Type for the Region by County for Nevada	196
4.2-39.	Occupied Housing Units by Type for the Region by State	197
4.2-40.	Distribution of Occupied Housing Units by Type for the Region by State	197
4.2-41.	Ratio of Occupied Housing Units for the Region to Population for the Region by State	197
4.2-42.	Households by Type by County for California	198
4.2-43.	Households by Type for the Region by County for California	198
4.2-44.	Households by Type by County for Nevada	199
4.2-45.	Households by Type for the Region by County for Nevada	199
4.2-46.	Households by Type for the Region by State	200
4.2-47.	Distribution of Households by Type for the Region by State	200
4.2-48.	Ratio of Households for the Region to Population for the Region by State	200
4.2-49.	Housing by Economic Sector for the Region by State	201
4.2-50.	Irrigation Water Supply from Truckee River Sources for the Region by State	204
4.2-51.	Irrigated Acreage per Crop for the Region by State	204
4.2-52.	Application of Irrigation Water per Crop for the Region by State	204
4.2-53.	Irrigation Water Use per Crop for the Region by State	205
4.2-54.	Livestock Water Requirements per Cow by State	206
4.2-55.	Number of Cows for the Region by State	206
4.2-56.	Livestock Water Use per Cow for the Region by State	206
4.2-57.	Agriculture Water Use by Economic Sector for the Region by State	207

List of Tables

Table		Page
4.2-58.	Commercial Water Requirements per Employee by Economic Sector by State	209
4.2-59.	Commercial Water Requirements per Employee by Economic Sector by State	210
4.2-60.	Commercial Water Requirements per Employee by Economic Sector by State	211
4.2-61.	Commercial Water Use by Economic Sector for the Region by State	212
4.2-62.	Residential Water Requirements per Household by State	215
4.2-63.	Residential Water Requirements for Family Households by Economic Sector for the Region by State	216
4.2-64.	Residential Water Requirements for Non-Family Households by Economic Sector for the Region by State	217
4.2-65.	Residential Water Use by Economic Sector for the Region by State	218
4.2-66.	Residential Water Requirements for Metered Family Households by Economic Sector for the Region by State	219
4.2-67.	Residential Water Requirements for Metered Non-Family Households by Economic Sector for the Region by State	220
4.2-68.	Metered Residential Water Use by Economic Sector for the Region by State	221
4.2-69.	Ratio of Metered Residential Water Use to Residential Water Use by Economic Sectors for the Region	222
4.2-70.	Control Totals by Economic Sector for the Region	224
4.2-71.	Output Response Coefficients by Economic Sector for the Region	225
4.2-72.	Water Transfer Coefficients by Economic Sector for the Region	227
4.3-1.	Transactions Matrix for the Region	231
4.3-2.	Direct Requirements	235
4.3-3.	Identity Matrix	239
4.3-4.	I - A Matrix	241
4.3-5.	Final Demand Requirements	243
4.3-6.	Output Requirements	246
4.3-7.	Employment Requirements	250
4.3-8.	Total Employment Requirements	252
4.3-9.	Income Requirements	256
4.3-10.	Total Income Requirements	258
4.3-11.	Multipliers	261
5.1-1.	End of Month Reservoir Storage Levels	266

List of Tables

Table		Page
5.1-2.	Annual Number of Camping and Day Use Visitors by Month by Reservoir	266
5.1-3.	Annual Camping and Day Use Visitor Expenditures by Month by Reservoir	267
5.1-4.	Annual Camping and Day Use Visitor Expenditures by Category by Reservoir	267
5.1-5.	Direct Economic Impact by Economic Sector	268
5.1-6.	Total Economic Impact by Economic Sector	270
5.1-7.	Employment Response by Economic Sector	273
5.1-8.	Income Response by Economic Sector	274
5.1-9.	Population Response by Economic Sector	275
5.1-10.	Housing Response by Economic Sector	276
5.1-11.	Agriculture Water Use Response by Economic Sector	277
5.1-12.	Commercial Water Use Response by Economic Sector	278
5.1-13.	Residential Water Use Response by Economic Sector	279
5.1-14.	Summary	281
5.2-1.	Water Transfer Amount	285
5.2-2.	Water Transfer Coefficients by Economic Sector	286
5.2-3.	Water Transfer Amount by Economic Sector	287
5.2-4.	Direct Economic Impact by Economic Sector	288
5.2-5.	Total Economic Impact by Economic Sector	290
5.2-6.	Employment Response by Economic Sector	293
5.2-7.	Income Response by Economic Sector	294
5.2-8.	Population Response by Economic Sector	295
5.2-9.	Housing Response by Economic Sector	296
5.2-10.	Agriculture Water Use Response by Economic Sector	297
5.2-11.	Commercial Water Use Response by Economic Sector	298
5.2-12.	Residential Water Use Response by Economic Sector	299
5.2-13.	Summary	301

Supplement
List of Tables

Table		Page
7.1-1.	Number of Respondents	333
7.1-2.	Site Visitation of Respondents	335
7.1-3.	Activities of Respondents	337
7.1-4.	Annual Visitation of Respondents	339
7.1-5.	Annual Visitation of Respondents per Site	341
7.1-6.	Number of Visits by Respondents per Site	343
7.1-7.	Local and Non-Local Respondents per Site	345
7.1-8.	Group Make-Up of Respondents per Site	347
7.1-9.	Camping and Day Use Respondents per Site	349
7.1-10.	Ranking of Reasons to Visit by Respondents per Site	351
7.1-11.	Expenditures by Respondents per Site	353
7.1-12.	Expenditures by Camping Respondents per Site	355
7.1-13.	Expenditures by Day Use Respondents per Site	357
7.1-14.	Activity Hours per Day by Respondents per Site	359
7.1-15.	Activity Hours per Day by Camping Respondents per Site	361
7.1-16.	Activity Hours per Day by Day Use Respondents per Site	363
7.1-17.	Indicated Number of Visits by Respondents at Alternative Water Levels per Site	365
7.1-18.	Site Substitution of Respondents per Site	367
7.1-19.	Willingness of Respondents to Pay to Maintain Water Level per Site	369
7.1-20.	Age Brackets of Respondents	371
7.1-21.	Education Levels of Respondents	373
7.1-22.	Household Income Levels of Respondents	375
7.2-1.	Camping and Day Use Visitor Expenditure Function Observations	389
7.2-2.	Camping and Day Use Visitor Expenditure Function Values	397
7.3.1.	Location of Main Residence	411
7.3-2.	Decision Factor Influence to Purchase or Build a Second-Home	413
7.3-3.	Second-Home Ownership	415
7.3-4.	Group Make-Up	417
7.3-5.	Annual Second-Home Visitation	419
7.3-6.	Site Visitation	421
7.3-7.	Annual Site Visitation	423
7.3-8.	Summer Season Donner Lake Visitation	425
7.3-9.	Summer Season Donner Lake Activities	427
7.3-10.	Summer Season Donner Lake Activity Hours	429
7.3-11.	Ranking of Summer Season Donner Lake Characteristics	431

Supplement
List of Tables

Table		Page
7.3-12.	Summer Season Donner Lake Alternative Lake-Level Sensitivity	433
7.3-13.	Summer Season Visitation Expenditures	435
7.3-14.	Annual Second-Home Upkeep and Repairs and Expenditures	437
7.4-1.	Location of Main Residence	452
7.4-2.	Decision Factor Influence to Rent a Vacation-Home	454
7.4-3.	Group Make-Up	456
7.4-4.	Annual Vacation-Home Visitation	458
7.4-5.	Site Visitation	460
7.4-6.	Annual Site Visitation	462
7.4-7.	Summer Season Donner Lake Visitation	464
7.4-8.	Summer Season Donner Lake Activities	466
7.4-9.	Summer Season Donner Lake Activity Hours	468
7.4-10.	Ranking of Summer Season Donner Lake Characteristics	470
7.4-11.	Summer Season Donner Lake Alternative Lake-Level Sensitivity	472
7.4-12.	Summer Season Visitation Expenditures	474
7.4-13.	Summer Season Vacation-Home Rent Expenditure	476
7.5-1.	Camping and Day Use Visitor Expenditure Function Observations	492
7.5-2.	Camping and Day Use Visitor Expenditure Values	500
7.6-1.	Scale Values for Reservoir Storage Levels	507
7.6-2.	End of the Month Reservoir Storage Levels	508
7.6-3.	Scale Values for End of the Month Reservoir Storage Levels	508
7.6-4.	Indicated Number of Visits per Respondent for Reservoir Storage Levels	509
7.6-5.	Visitation Relative to End of the Month Reservoir Storage Levels	510
7.6-6.	Survey Year Visitation Relative to End of the Month Reservoir Storage Levels	510
7.6-7.	Survey Year Annual Visitation by Respondents by Month by Reservoir	520
7.6-8.	Expected Annual Visitation by Month by Reservoir	520
7.6-9.	Weights for Expected Annual Visitation by Month by Reservoir	520
7.6-10.	Annual Scale Values by Reservoir	521
7.6-11.	Annual Visitation Relative to End of the Month Reservoir Storage Levels	521
7.6-12.	Survey Year Annual Visitation Relative to End of the Month Reservoir Storage Levels	521
7.6-13.	Annual Number of Camping Visitors by Campground by Reservoir	528

Supplement
List of Tables

Table		Page
7.6-14.	Annual Number of Camping Visitors by Reservoir	528
7.6-15.	Annual Number of Camping Visitors by Month by Reservoir	528
7.6-16.	Ratio of Day Use Visitors to Camping Visitors by Reservoir	531
7.6-17.	Annual Number of Day Use Visitors by Reservoir	532
7.6-18.	Annual Number of Day Use Visitors by Month by Reservoir	532
7.6-19.	Annual Number of Camping Visitor Groups by Month by Reservoir	534
7.6-20.	Annual Number of Day Use Visitor Groups by Month by Reservoir	536
7.6-21.	Camping Visitor Group Expenditure Function Values by Reservoir	538
7.6-22.	Annual Camping Visitor Expenditures by Month by Reservoir	538
7.6-23.	Annual Camping Visitor Expenditures by Category by Reservoir	539
7.6-24.	Day Use Visitor Group Expenditure Function Values by Reservoir	541
7.6-25.	Annual Day Use Visitor Expenditures by Month by Reservoir	541
7.6-26.	Annual Day Use Visitor Expenditures by Category by Reservoir	542
7.6-27.	Annual Number of Camping and Day Use Visitors by Month by Reservoir	544
7.6-28.	Annual Camping and Day Use Visitor Expenditures by Month by Reservoir	546
7.6-29.	Annual Camping and Day Use Visitor Expenditures by Category by Reservoir	548
8.1-1.	End of Month Reservoir Storage Levels	553
8.1-2.	Annual Number of Camping and Day Use Visitors by Month by Reservoir	553
8.1-3.	Annual Camping and Day Use Visitor Expenditures by Month by Reservoir	554
8.1-4.	Annual Camping and Day Use Visitor Expenditures by Category by Reservoir	554
8.1-5.	Direct Economic Impact by Economic Sector	555
8.1-6.	Total Economic Impact by Economic Sector	557
8.1-7.	Employment Response by Economic Sector	560
8.1-8.	Income Response by Economic Sector	561
8.1-9.	Population Response by Economic Sector	562
8.1-10.	Housing Response by Economic Sector	563
8.1-11.	Agriculture Water Use Response by Economic Sector	564
8.1-12.	Commercial Water Use Response by Economic Sector	565
8.1-13.	Residential Water Use Response by Economic Sector	566
8.1-14.	Summary	568

List of Figures

Figure		Page
1.1-1.	Location of the Truckee River Basin	5
1.1-2.	Hydrologic Features of the Truckee River Basin	6
2.1-1.	Arrangement of the Transactions Matrix	17
2.2-1.	Flowchart for Estimation of the Economic Impacts for Alternative Reservoir Storage Levels	28
2.2-2.	Flowchart for Estimation of the Economic Impacts for Reallocations of Water	29

Supplement
List of Figures

Figure		Page
7.6-1.	Donner Lake Visitation and End of the Month Reservoir Storage Level Relationship	511
7.6-2.	Prosser Reservoir Visitation and End of the Month Reservoir Storage Level Relationship	512
7.6-3.	Stampede Reservoir Visitation and End of the Month Reservoir Storage Level Relationship	513
7.6-4.	Boca Reservoir Visitation and End of the Month Reservoir Storage Level Relationship	514
7.6-5.	Donner Lake Annual Pattern of Visitation	522
7.6-6.	Prosser Reservoir Annual Pattern of Visitation	523
7.6-7.	Stampede Reservoir Annual Pattern of Visitation	524
7.6-8.	Boca Reservoir Annual Pattern of Visitation	525

1. Introduction

The Bureau of Reclamation is preparing an *Environmental Impact Statement (EIS)* for the *Truckee River Operating Agreement (TROA)*. This is required by the *National Environmental Policy Act*. In preparing this *EIS*, the Bureau must look at the potential economic impacts of the *Truckee River Operating Agreement* on the Truckee River Basin economy. A regional economic impact model of the Truckee River Basin has been developed for this purpose. A description of the study area, justification for the model, and specification of the objectives are presented here.

1.1. Description of the Study Area

The Truckee River Basin covers five counties in California (Sierra, Nevada, Placer, El Dorado and Alpine) and five counties (Washoe, Pershing, Storey, Lyon and Douglas) and Carson City in Nevada. The location of the Truckee River Basin is shown in Figure 1.1-1.

The Truckee River, approximately 110 miles in length, begins in California at the outlet from Lake Tahoe near the town of Tahoe City. The river flows north pass the town of Truckee to the California-Nevada state line, then east into Nevada and through the Truckee Meadows. Within the Truckee Meadows are the cities of Reno and Sparks. The river then continues east towards the town of Wadsworth and then turns north, to end in Nevada at Pyramid Lake on the Pyramid Lake Indian Reservation.

Three natural lakes with regulated outlets and four man-made reservoirs, all located in California, permit control of Truckee River flows and provide storage for watershed runoff. These are Lake Tahoe, Donner Lake, Independence Lake, Martis Creek Reservoir, Prosser Creek Reservoir, Stampede Reservoir, and Boca Reservoir. Operation and management of the water levels in these lakes and reservoirs is under the control of the Bureau of Reclamation. These lakes and reservoirs provide storage and allow for regulation of Truckee River flows. The hydrologic features of the Truckee River Basin are shown in Figure 1.1-2.

Tourism is the single most important economic segment of the California communities. The towns of Tahoe City and Truckee rely on both summer and winter recreation attractions to draw thousands of visitors to the area. Summer recreation attractions include Lake Tahoe, the Truckee River and the lakes and reservoirs. The beauty of Lake Tahoe is known internationally. Winter recreation attractions include several ski areas. Winter activities also provide an important economic boost to the area. Most of the future development within California is expected to be related to recreation and the development of second or vacation homes.

With the exception of Boca Reservoir, most of the visitors to the lakes and reservoirs are from out of the area. Any operation or management change affecting lake and reservoir levels as well as river flows will have an impact on the number of visitors to the area. In an initial study by Loomis (OCAP DEIS May 1986) found "that visitation change is most sensitive to water levels; a one percent change in water level results in a 1.36 percent change in visitation, holding all other factors constant". The recreation season for the area is short (Memorial Day through Labor Day) and includes primarily camping, picnicking, fishing, boating, swimming, and water skiing activities.

The Little Truckee River, which flows into Stampede and Boca Reservoirs, provides irrigation water for the Sierra Valley. About 25 ranches having an irrigated acreage of approximately 9,700 acres rely partly on this water. Most of the acreage is either meadows or pastures that produce forage for cattle. The irrigation water rights held by these ranches are dictated in the *Middle Fork of the Feather River Decree.*

Major tributaries draining the hills surrounding the Truckee Meadows provide additional water flow to the Truckee River. These tributaries are Hunter, Evans, Thomas, and Whites Creeks. Additional water flow to the Truckee River is also from Steamboat Creek and its tributaries near the eastern edge of the Truckee Meadows. Washoe Lake and Little Washoe Lake provide regulation of Steamboat Creek.

Truckee Meadows, including the cities of Reno and Sparks, has a diversified economy including gaming, warehousing, and some light manufacturing industries. Although the Truckee Meadows relys significantly on the Truckee River for its municipal and industrial water, there is an increasing recognition over the importance of having a clean and scenic river to enhance the quality of life in the Truckee Meadows. The Washoe County Regional Planning Board has initiated a Truckee River Corridor effort to protect and enhance the river. Also the Reno Redevelopment Commission has initiated a number of downtown projects associated with the river to encourage both local residents and tourists to visit local parks and walkways along the river.

The Truckee River provides irrigation water to the Truckee Meadows. The irrigated acreage is either meadows, pastures or alfalfa fields. Cattle graze on the meadows and pastures and are fed hay from the alfalfa fields. The irrigation water is water diverted from the river into ditches, water from creeks and drainage water. These irrigation water rights are dictated in the *Orr Ditch Decree.*

Over-time, the irrigation water rights are being purchased for municipal and industrial (M&I) uses. Truckee Meadows population is expected to grow 2 to 2.5 percent annually. On account of this growth, commercial and residential water use will increase. As transfers of water from agriculture to M&I use continues, income and employment in the agricultural sector can be expected to diminish with concomitant increases in other sectors purchasing water from agriculture.

East of the Truckee Meadows and near the town of Wadsworth, part of the Truckee River water is diverted at Derby Dam. The diverted water continues east through the Truckee Canal for irrigation in the Newlands Reclamation Project operated by the Truckee-Carson Irrigation District (TCID). The Newlands Project consists of two divisions. The Truckee Division surrounds the town of Fernley and the Carson Division surrounds the town of Fallon. Within the Newlands Project approximately 60,000 acres are irrigated with water from both the Truckee and Carson Rivers. Irrigation water from

both rivers is stored in Lahontan Reservoir and released on demand to farms in the Carson Division and also to farms on the Fallon Indian Reservation. Outflows from the Carson Division and Fallon Indian Reservation go to the Stillwater Wildlife Management Area (SWMA) and Carson Lake Pasture. These two areas are wetlands that provide habitat for fish, wildlife, and migratory fowl.

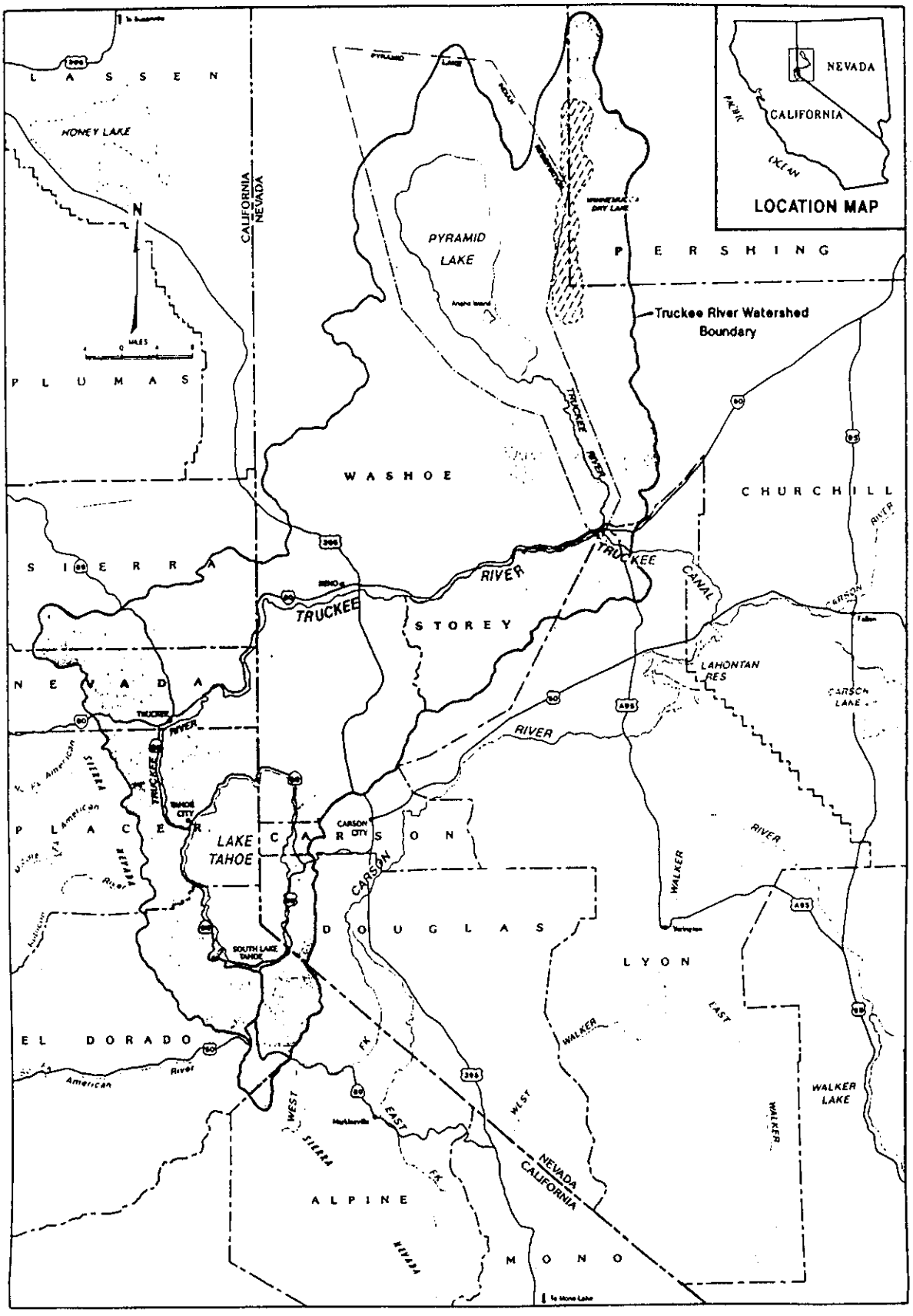
Recreation activities along the lower Carson River are primarily associated with fishing and other recreational uses on Lahontan Reservoir and hunting and bird watching associated with the wetlands at the Stillwater Wildlife Refuge.

Agriculture and the Fallon Naval Air Station are the primary industries in the Fallon area.

North of Wadsworth, the Truckee River ends at Pyramid Lake on the Pyramid Lake Indian Reservation. Aside from some irrigation en route (including the Pyramid Lake Paiute Indian farm lands), water flowing into Pyramid Lake helps sustain the Lahontan Cutthroat Trout and the Cui-ui fish, listed as an endangered species.

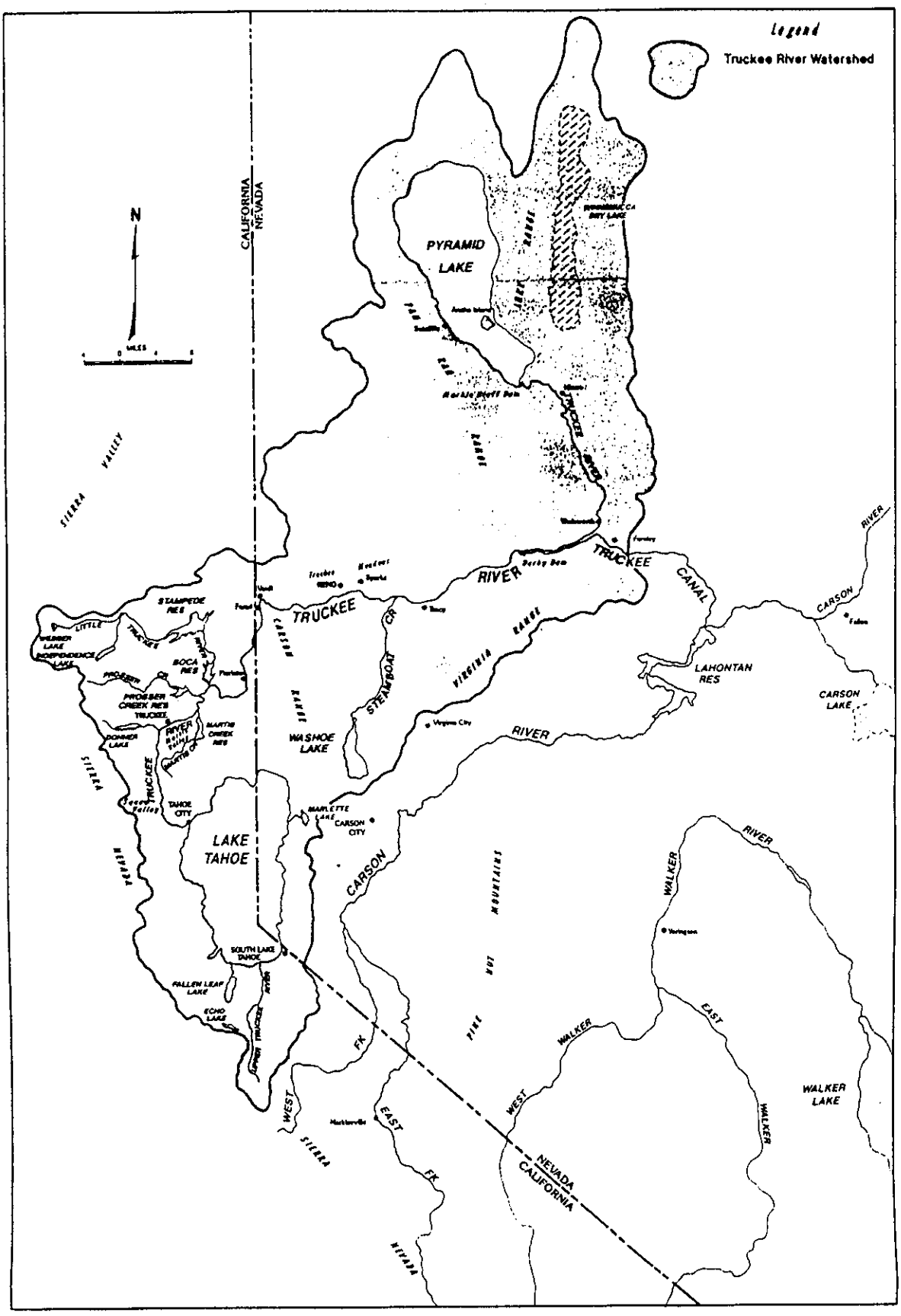
The Pyramid Lake Paiute Tribe has extensive plans for economic development for Pyramid Lake emphasizing the natural resources of the lake. Pyramid Lake supports a population of Lahontan Cutthroat Trout, and is popular for boating and fishing for trophy size cutthroat trout. Other activities include camping, swimming, water skiing, sightseeing and picnicking. The Tribe has recently completed construction of a new marina and campground along the west shore of the lake. Future development will be designed to enhance and utilize the lakes resources.

Figure 1.1-1. Location of the Truckee River Basin.



Source: State of California. *Truckee River Atlas.* Department of Water Resources. Sacramento, California. June 1991. Page 3.

Figure 1.1-2. Hydrologic Features of the Truckee River Basin.



Source: State of California. *Truckee River Atlas.* Department of Water Resources. Sacramento, California. June 1991. Page 4.

1.2. Justification for the Model

The Truckee River has had a long history of legal conflicts over who gets the water, how much, and when. The river is managed by a federal water master and the operation rules are dictated in the *Truckee River Agreement of 1935* which was made part of the *Orr Ditch Decree.* The continuing conflicts in the allocation of water in the Truckee River Basin include monitoring storage levels in the upstream reservoirs and stream flows for recreation, meeting growing water demands for municipal use in the Truckee Meadows (including provisions for drought periods), providing water deliveries to the Newlands Reclamation Project, protecting fish species at Pyramid Lake and stabilizing the lake level, and maintaining and improving wetlands at the Stillwater Wildlife Management Area. Any resolution to these conflicts will entail changes in the operation of the upstream reservoirs, changes in instream flows, and changes in intersectoral water allocations.

Public Law 101-618, also referred to as the *"Negotiated Settlement"* was passed by the 101st Congress at the end of its 1990 session to settle a number of water related issues in the Truckee and Carson River Basins. *Title I* of this public law establishes a fund for $43 million to settle the water related issues of the Fallon Paiute-Shoshone Indian Tribe. *Title II* of this law is intended to settle the water related issues associated with the Truckee River, Carson River, and Pyramid Lake.

One of the means by which the goals of *Title II* will be accomplished is through a *Truckee River Operating Agreement (TROA).* This operating agreement is essentially modification in the operation of the upstream reservoirs to provide benefits to fish and wildlife and to municipal, industrial, agricultural and recreational users downstream of Tahoe City, and satisfy the requirements of the *Endangered Species Act* by promoting the enhancement and recovery of the Cui ui fish at Pyramid Lake. This operating agreement is to be negotiated between the Secretary of the Department of the Interior and the states of California and Nevada after consultation with affected parties. The regulations concerning this operating agreement are outlined in *Section 205 of Public Law 101-618.* Under these regulations, the Secretary and the signatures to the operating agreement shall, if necessary, develop and implement a plan to mitigate any significant adverse environmental impacts resulting from the operating agreement.

For this purpose, one potentially important impact will be the effect of the *Truckee River Operating Agreement* on the economy of the Truckee River Basin. Therefore, in describing economic impacts resulting from the operating agreement, there is a definite need for a tool to both identify and quantify economic impacts from changes in the operation of the upstream reservoirs, changes in instream flows, and changes in intersectoral water allocations.

1.3. Specification of the Objectives

The objective of this research is a regional economic impact model of the Truckee River Basin. This model will be developed by following input-output analysis and input-output modeling procedures. This model will have a recreation model component and an input-output model component. Application of this model will be estimation of the economic impacts resulting from the *Truckee River Operating Agreement* on the Truckee River Basin economy. The sub-objectives of this research are:

1. Survey of the Visitation

   Personal interviews of visitors at selected river, lake and reservoirs sites will be done to collect information on recreation visitation, activities, and expenditures.

2. Estimation of the Expenditure Function

   An expenditure function will be estimated to calculate recreation expenditures of visitors at selected river, lake and reservoir sites.

3. Formulation of the Model Equations

   Model equations will be formulated to estimate the annual number of visitors at selected lake and reservoir sites and expenditures relative to reservoir storage levels and annual patterns of visitation.

4. Definition of the Region

   The region will be defined in terms of economic area, population base, and economic sectors.

5. Collection of the Control Total Data

   Control total data for the region will be collected for output, employment, income, population, housing, agriculture water use, commercial water use, and residential water use.

6. Derivation of the Model Tables

   Model tables for estimation of economic impacts will be derived from a transactions matrix that reflects the economy of the region.

7. Estimation of the Economic Impacts for Alternative Reservoir Storage Levels

A program will be developed to estimate economic impacts for alternative reservoir storage levels.

8. Estimation of the Economic Impacts for Reallocations of Water

A program will be developed to estimate economic impacts for reallocations of water.

The main objective and these sub-objectives are completed through the following chapters. The second chapter is on model development. The third chapter covers the recreation model component. The fourth chapter covers the input-output model component. The fifth chapter is on model application. The sixth chapter is a conclusion. In addition to these chapters there are two supplement chapters on model improvement. References are given at the end.

2. Model Development

The regional economic impact model is developed following input-output procedures. Input-output refers to the analytical framework developed by Professor Wassily Leontief in the late 1930's. Professor Leontief later received the Nobel Prize in Economic Science in 1973 for his work in this area (Miller and Blair, 1985). These input-output procedures are input-output analysis and input-output modeling. An explanation of input-output analysis and a description of input-output modeling are presented here.

2.1. Explanation of Input-Output Analysis

Input-output analysis concerns the measurement of an economic impact, accounting of the economic activity, and estimation of an economic impact.

Measurement of an Economic Impact

The economic impact on the region is the dollar amount of economic activity, reported as output, that would occur as a result of either alternative reservoir storage levels at Prosser, Stampede, and Boca Reservoirs or reallocations of water from agriculture use to commercial and residential uses. Measurement of economic impacts from both is done through direct, indirect, induced, and total effects.

The economic impact for alternative reservoir storage levels at Prosser, Stampede, and Boca Reservoirs is measured in the following manner. An economic impact occurs because of recreation activities at the reservoirs. At each alternative reservoir storage level there is a different level of recreation in terms of visitation to the reservoirs and expenditures in the economy. Visitation to the reservoirs is by camping and day use visitors. Expenditures in the economy are on items necessary for recreation at the reservoirs. Items such as gas, groceries, supplies, meals at restaurants, hotel rooms, and vacation-home rent. Camping and day use visitors purchase these items from businesses and cause a direct effect to occur on the economic activity in the region. In addition to this direct effect, indirect and induced effects also occur. Given that businesses in the region sell items for recreation to camping and day use visitors, these businesses also purchase products and services from other businesses in the region. Because of these purchases being made, there is then an indirect effect on other businesses and on economic activity in the region. The induced effect on economic activity in the region is household spending by employees of these affected businesses. At each alternative reservoir storage level there is a different amount of household spending by employees. Together the direct, indirect, and induced effects on economic activity make-up the total effect or economic impact on the region for alternative reservoir storage levels.

The economic impact for a reallocation of water from agriculture use to commercial use is measured in the following manner. An economic impact occurs since water is a resource requirement for agriculture production and commercial activity. A reallocation of water transfers an amount of water from agriculture use to commercial use. The direct effect on economic activity in the region is a decrease in agriculture production from farms and ranches, and an increase in commercial activity from businesses. The indirect effect on economic activity in the region is also a decrease in business activity from those businesses that sell products and services to farms and ranches for agriculture production, and also an increase in business activity of the businesses that sell products and services to businesses that have an increase in commercial activity. The induced effect on economic activity in the region is a decrease in household spending by employees on farms and ranches, and an increase in household spending by employees in commercial businesses. Together the direct, indirect, and induced effects on economic activity make-up the total effect or economic impact on the region for a reallocation of water from agriculture use to commercial use.

As a result of the total effect on economic activity there are also response effects that occur in the region. Response effects include effects on employment, income, population, housing, agriculture water use, commercial water use, and residential water use. These response effects are an additional part of an economic impact.

Accounting of the Economic Activity

There are several economic sectors in the region. An accounting of the economic activity is necessary to determine the sectors interdependence. Relationships between sectors are identified through intersector transactions. Transactions that are accounted for by sector include intermediate demand, final demand, final payments, total output, and total input.

A transactions matrix provides for the accounting of the economic activity by sector in the region. The arrangement of this matrix is shown in Figure 2.1-1. Sectors are both selling sectors and purchasing sectors. There are four quadrants in the matrix. Quadrant I contains intermediate demand transactions. Intermediate demand transactions are sales and purchases of products and services among sectors. Sales of products and services represent output and purchases of products and services represent input. Quadrant II contains final demand transactions. Final demand transactions are sales of output to personal consumption, private fixed investment, government, and exports. Quadrant III contains final payment transactions. Final payment transactions are payments for primary inputs. Primary inputs include value-added items of employee compensation, profits, interest, indirect business taxes, and depreciation. Imports are also a primary input. Quadrant IV describes transactions that are not directly linked to the other quadrants. Total output are total sales by sectors. Total input are total purchases by sectors.

The transactions matrix is a double-entry accounting system. There is a rowwise accounting of sales by sector and a columnwise accounting of purchases by sector. The rowwise accounting of sales by sector depict the sale pattern of products and services. The columnwise accounting of purchases by sector depict the purchase pattern of products and services in the production process. Total sales of products and services represent total output. Total purchases of products and services represent total input. Furthermore, the rowwise accounting sales by a sector reflect relationships known as forward linkages and the columnwise accounting of purchases by a sector reflect relationships known as backward linkages.

Rowwise, for Quadrants I and II, total output for each selling sector X_i consist of intersector sales of output to purchasing sectors of intermediate demand x_{ij}'s and sales of output to final demand Y_i. This is expressed through the following accounting equations:

$$X_i = x_{i1} + \ldots + x_{ij} + \ldots + x_{in} + Y_i; \qquad \text{where } i = 1, n; \qquad (2.1\text{-}1)$$

or,

$$X_i = \sum_{j}^{n} x_{ij} + Y_i; \qquad \text{where } i = 1, n. \qquad (2.1\text{-}2)$$

The summation over j reflects intersector sales for the products or services of sector i.

The final demand component of total output is disaggregated into personal consumption pc_i, private fixed investment fi_i, government g_i, and exports outside the region e_i. This is expressed through the following accounting equation:

$$Y_i = pc_i + fi_i + g_i + e_i; \qquad \text{where } i = 1, n. \qquad (2.1\text{-}3)$$

Again, consumption, investment, government, and exports comprise final demand. Government can be further disaggregated into federal, state, and local government.

Columnwise, for Quadrants I and III, total input for each purchasing sector X_j consists of intersector purchases of input from selling sectors of intermediate demand x_{ij}'s and purchases of input from final payments P_j. This is expressed through the following accounting equations:

$$X_j = x_{1j} + \ldots + x_{ij} + x_{nj} + P_j; \qquad \text{where } j = 1, n; \qquad (2.1\text{-}4)$$

or,

$$X_j = \sum_{i}^{n} x_{ij} + P_j; \qquad \text{where } j = 1, n. \qquad (2.1\text{-}5)$$

The summation over i reflects intersector purchases for the products or services of sector j.

The final payments component of total input is disaggregated into employee compensation ec_j, profit income pr_j, interest income in_j, indirect business taxes t_j, charges against depreciation of capital equipment d_j, and imports from outside the region m_j. This is expressed through the following accounting equation:

$$P_j = ec_j + pr_j + in_j + t_j + d_j + m_j; \qquad \text{where } j = 1, n. \qquad (2.1\text{-}6)$$

The employee compensation, profit income, interest income, indirect business taxes, and depreciation is the value-added portion of final payments.

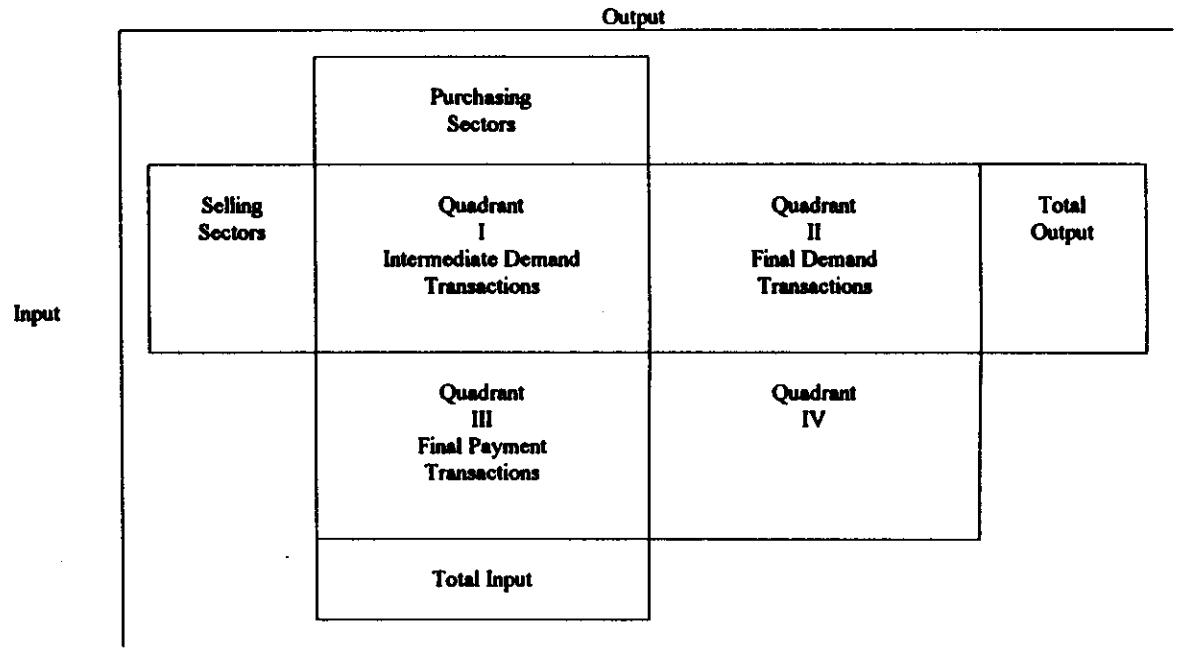
The final accounting identity of the transaction matrix is that for each sector total output X_i must equal total input X_j. This is expressed through the following accounting equation:

$$X_i = X_j; \qquad \text{where } i = j. \qquad (2.1\text{-}7)$$

The summation of total output for all sectors is gross output. The summation of total input for all sectors is gross outlay. Then gross output must also equal gross outlay.

The accounting of economic activity in the region is extended to also include employment, income, population, housing, agriculture water use, commercial water use, and residential water use by sector.

Figure 2.1-1. Arrangement of the Transactions Matrix.



Estimation of an Economic Impact

Estimation of an economic impact on the region is done by using the output requirements of an input-output model. The transactions matrix for the region is the basis for the input-output model. Through a sequence of calculations involving matrix algebra, the transactions matrix becomes an input-output model which provides direct requirements, final demand requirements, output requirements, employment requirements, and income requirements. Output requirements indicate the total effect on economic activity from a change in output. Output requirements also provide the distribution of the total effect over all economic sectors.

Three assumptions are made before the transactions matrix becomes an input-output model. The first assumption is that individual businesses which make-up the economy in the region can be grouped together into economic sectors. The reasoning here is that businesses in a given sector will be affected similarly by a given change. The second assumption is that all businesses in a given sector produce homogeneous products and services. The third assumption is that purchases of products and services by businesses in a sector from businesses in other sectors represent linear production functions. This last assumption is the assumption of fixed proportionality.

The transactions matrix for the region becomes an input-output model in the following manner. Purchases of products and services by businesses in a sector from businesses in other sectors are inputs into the production process. Inputs into the production process by a sector are used in direct proportion to the total output from that sector. This production relationship is expressed through the following equations:

$$a_{ij} = \frac{x_{ij}}{X_j}; \qquad \text{where } i, j = 1, n; \qquad (2.1\text{-}8)$$

or,

$$x_{ij} = a_{ij}X_j; \qquad \text{where } i, j = 1, n. \qquad (2.1\text{-}9)$$

The a_{ij} is the direct requirement of production. The direct requirements are determined for each sector by dividing the purchases of the given sector by the total output of the same sector. Each direct requirement is defined as the dollar value of input per dollar value of output. Rowwise, the direct requirements are then substituted into the

accounting equations (2.1-1):

$$X_i = a_{i1}X_1 + \ldots + a_{ij}X_j + \ldots + a_{in}X_n + Y_i; \qquad \text{where } i = 1, n. \tag{2.1-10}$$

For n sectors, the equations are more compactly restated in matrix algebra notation by the following equation:

$$X = AX + Y. \tag{2.1-11}$$

The X is an (n x 1) matrix that includes the total output for n sectors. The A is the (n x n) matrix of direct requirements. The Y is an (n x 1) matrix of final demand. This equation is then solved for X in terms of the A matrix and Y by matrix inversion. Matrix inversion provides for the following equations:

$$X(I - A) = Y; \tag{2.1-12}$$

and,

$$X = (I - A)^{-1} Y; \tag{2.1-13}$$

or,

$$X = BY. \tag{2.1-14}$$

The I is an (n x n) identity matrix. The A matrix is subtracted from the I matrix and then through matrix inversion becomes the final demand requirements matrix or B matrix. Inversion of the (I – A) matrix is represented by the superscript –1. The final demand requirements imply that, given a vector of final demand, economic activity can be directly determined for each sector by the following equation:

$$X_i = b_{i1}Y_1 + \ldots + b_{ij}Y_j + \ldots + b_{in}Y_n; \qquad \text{where } i = 1,n. \tag{2.1-15}$$

Then differentiating this equation with respect to final demand:

$$b_{ij} = \frac{\partial X_i}{\partial Y_j}; \qquad \text{where } i, j = 1, n. \tag{2.1-16}$$

The final demand requirements, b_{ij}'s, indicate the total effect on economic activity of sector i from a change in final demand for sector j. Their columnwise summation over all sectors is the final demand total requirement B_j. This summation is expressed through

the following equation:

$$B_j = \sum_{i}^{n} b_{ij}; \qquad \text{where } j = 1, n. \qquad (2.1\text{-}17)$$

The B_j indicates the total effect on economic activity over all sectors from a change in final demand for sector j. Similar to final demand requirements are output requirements. Output requirements are derived through the following equation:

$$c_{ij} = \frac{b_{ij}}{b'_{ij}}; \qquad \text{where } i, j = 1, n. \qquad (2.1\text{-}18)$$

The c_{ij}'s are output requirements. These are placed into a C matrix. Columnwise, the output requirements are calculated by dividing the final demand requirements by the intrasector final demand requirement b'_{ij}. The intrasector final demand requirement is the final demand requirement along the main diagonal of the B matrix. Output requirements, c_{ij}'s, indicate the total effect on economic activity of sector i from a change in output for sector j. Their columnwise summation over all sectors is the output total requirement C_j. This summation is expressed through the following equation:

$$C_j = \sum_{i}^{n} c_{ij}; \qquad \text{where } j = 1, n. \qquad (2.1\text{-}19)$$

The C_j indicates the total effect on economic activity over all sectors from a change in output for sector j. Following this, employment and income requirements are found to complete the input-output model.

Estimating an economic impact on the region is done using the output requirements matrix because the effects on economic activity are due to changes in output as opposed to changes in final demand.

Again, response effects are an additional part of the economic impact. Response effects include effects on employment, income, population, housing, agriculture water use, commercial water use, and residential water use. These are estimated by output response coefficients. Output response coefficients are defined as the unit values of employment, income, population, housing, agriculture water use, commercial water use, and residential water use per dollar value of output for each economic sector in the region.

2.2. Description of Input-Output Modeling

Input-output modeling involves the development of the recreation model component, development of the input-output model component, and application of the model.

Development of the Recreation Model Component

The regional economic model includes a recreation model component to estimate the direct effect on the region for alternative reservoir storage levels at Prosser, Stampede, and Boca Reservoirs. This direct effect is referred to as the direct economic impact.

The recreation model generates the annual number of camping and day use visitors, and the annual camping and day use visitor expenditures relative to end of the month storage levels at Prosser, Stampede, and Boca Reservoirs for a given year. Then annual camping and day use visitor expenditures are allocated by economic sector to become the direct economic impact.

Development of the recreation model component required three tasks. These tasks are titled: survey of the visitation, estimation of the expenditure function, and formulation of the model equations. A summary of each task is given below.

A survey of the visitation was done during the week of August 9th through the 15th, 1993. This survey involved personal interviews of both camping and day use visitors along the Upper Truckee River, at Prosser Reservoir, at Stampede Reservoir, at Boca Reservoir, along the Lower Truckee River, and at Pyramid Lake. A questionnaire was used for the personal interviews. Camping and day use respondents were asked questions on site visitation, group size, site characteristics, expenditures, activity hours, site visitation at alternative water levels, site substitution, and demographics. In all, 162 respondents participated in the survey.

An expenditure function was estimated with data taken from the survey of the visitation. An expenditure function estimates the expenditures of camping and day use visitors per day per group by site. The sites, again, include Upper Truckee River, Prosser Reservoir, Stampede Reservoir, Boca Reservoir, Lower Truckee River, and Pyramid Lake. This expenditure function is specified in a semi-logarithmic form and then estimated using a maximum-likelihood estimation technique. The expenditures per group per day by site were found to be dependent upon activity hours of respondents at the site and group size of respondents at the site.

Model equations were formulated to calculate the annual number of camping and day use visitors at the reservoirs and the annual expenditures of the camping and day use visitors relative to end of the month storage levels at Prosser, Stampede, and Boca Reservoirs. This model has eleven separate functions. A set of equations and group of variables is given for each function. Also data is described that was used to develop each function. Data was either taken from the survey of the visitation and estimation of the expenditure function or collected from additional sources. Data from additional sources include the number of camping visitors to the campgrounds at each reservoir and end of

the month storage levels for each reservoir. The end of the month reservoir storage levels for each reservoir serve as the input into the model.

More details on the recreation model component and each of these tasks is provided in Chapter 3.

Development of the Input-Output Model Component

The regional economic model includes a input-output model component to estimate the total effect and the response effect on the region for alternative reservoir storage levels at Prosser, Stampede, and Boca Reservoirs. The total effect and response effect are referred to as the total economic impact and the response economic impact, respectively. The input-output model is also used to estimate the direct economic impact, the total economic impact, and the response economic impact on the region for reallocations of water from agriculture use to commercial use.

The input-output model generates the total economic impact and the response economic impact on the region for alternative reservoir storage levels at Prosser, Stampede, and Boca Reservoirs. The input-output model also generates the direct economic impact, the total economic impact, and the response economic impact for reallocations of water from agriculture use to commercial use.

Development of the input-output model component required three tasks. These tasks are titled: definition of the region, collection of the control total data, and derivation of the model tables. A summary of each task is given below.

The region was defined by an economic area, a population base, and several economic sectors. The hydrologic boundaries of the Truckee River Basin outline the region. Within the region, the economic area covers part of eastern California and part of western Nevada. Part of eastern California includes portions of Sierra, Nevada, Placer, El Dorado, and Alpine counties and the towns of Truckee, Tahoe City, and South Lake Tahoe. Part of western Nevada includes portions of Pershing, Washoe, Lyon, Carson City (an independent city), and Douglas counties and the cities of Reno and Sparks. The population base for the region is 316,381 persons. Of this amount, 16% is from the California counties and 84% is from the Nevada counties. There are also twenty aggregated economic sectors that make-up the economy in the region. These sectors are livestock production, dairy production, alfalfa hay production, other hay production, barley production, agricultural services, gold mining, other mining, construction, manufacturing, transportation and communications, utilities, trade, eating, drinking, and lodging, finance, insurance, and real estate, services, hotels, gaming, and recreation, health, local government, and households.

Control total data was collected for the region. There is a control total for output, employment, income, population, housing, agriculture water use, commercial water use, and residential water use. A definition, a source, and values by economic sector for the region by state are given for each control total. The values are estimated either by using specific information, coefficients, or county level data adjusted to the region by population. For the region, output is $17,857,271,279. Employment is 188,121 jobs.

Income is $6,720,549,054. Population is 307,874 persons. Housing is 122,239 dwellings. Agriculture water use is 73,696 acre-feet. Commercial water use is 12,432 acre-feet. Residential water use is 72,453 acre-feet. Output response coefficients are also provided for the region. These coefficients indicate how employment, income, population, housing, agriculture water use, commercial water use and residential water use change from a one dollar change in output.

Input-output tables were derived from the transactions matrix for the region. The transactions matrix is developed for Washoe county using IMPLAN, but, rebalanced by a modified RAS technique to the output control total for each economic sector in the region. Following this, input-output tables are found by performing a sequence of calculations involving matrix algebra. The input-output tables include direct requirements, final demand requirements, output requirements, employment requirements, income requirements, and multipliers. A description is provided for each of these tables. The description includes a definition of the table, and explanation of any calculations, and representation of the table in matrix algebra notation.

More details on the input-output model component and each of these tasks is provided in Chapter 4.

Application of the Model

The regional economic model has two applications. The first application is to estimate economic impacts for alternative reservoir storage levels at Prosser, Stampede, and Boca Reservoirs. The second application is to estimate economic impacts for reallocations of water from agriculture use to commercial use. A computer program was written to perform the calculations for each of these applications.

The operation of the computer program to calculate economic impacts for alternative reservoir storage levels at Prosser, Stampede, and Boca Reservoirs follows the flowchart in Figure 2.2-1. This program integrates the recreation model component with the input-output model component. A summary of the operation of this program is given below.

The program starts with input data. The input data is the alternative reservoir storage levels at Prosser, Stampede, and Boca Reservoirs. The program takes the alternative reservoir storage levels and performs the first process. This process calculates each of the eleven functions of the recreation model. Output from this process includes the direct economic impact by economic sector. From this, the program takes the direct economic impact by economic sector and performs the second process. This process multiplies the direct economic impact by economic sector by the output requirements of the input-output model. Output from this process is the total economic impact by economic sector. Finally, the program takes the total economic impact by economic sector and performs the third process. This process multiplies the total economic impact by economic sector by the output response coefficients of the input-output model. Output from this process is the response economic impact by economic sector. Having generated the direct economic impact, total economic impact, and response economic impact the program stops.

The operation of the computer program to calculate economic impacts for reallocations of water from agriculture use to commercial use follows the flowchart in Figure 2.2-2. This program uses only the input-output model component. A summary of the operation of this program is given below.

The program starts with input data. The input data is either an agriculture water transfer amount or a commercial water transfer amount. From this, the program takes the water transfer amount and performs the first process. This process multiplies the water transfer amount by water transfer coefficients of the input-output model. Water transfer coefficients for agriculture water use are the proportions of agriculture water use in the agriculture sectors. Water transfer coefficients for commercial water use are the proportions of commercial water use in the commercial sectors. Output from this process is the water transfer amount by economic sector for either an agriculture water transfer or

a commercial water transfer. From this, the program takes the water transfer amount by economic sector and performs the second process. This process divides the water transfer amount by economic sector by the output response coefficients for either agriculture water use or commercial water use of the input-output model. Output from this process is the direct economic impact by economic sector for either an agriculture water transfer or a commercial water transfer. From this, the program takes the direct economic impact by economic sector and performs the third process. This process multiplies the direct economic impact by economic sector by the output requirements of the input-output model. Output from this process is the total economic impact by economic sector for either an agriculture water transfer or a commercial water transfer. Finally, the program takes the total economic impact by economic sector and performs the fourth process. This process multiplies the total economic impact by economic sector by output response coefficients of the input-output model. Output from this process is the response economic impact by economic sector for either an agriculture water transfer or a commercial water transfer. Having generated the direct economic impact, total economic impact, and response economic impact the program stops.

More details on model application and each of these computer programs is provided in Chapter 5.

Figure 2.2-1. Flowchart for Estimation of the Economic Impacts for Alternative Reservoir Storage Levels.

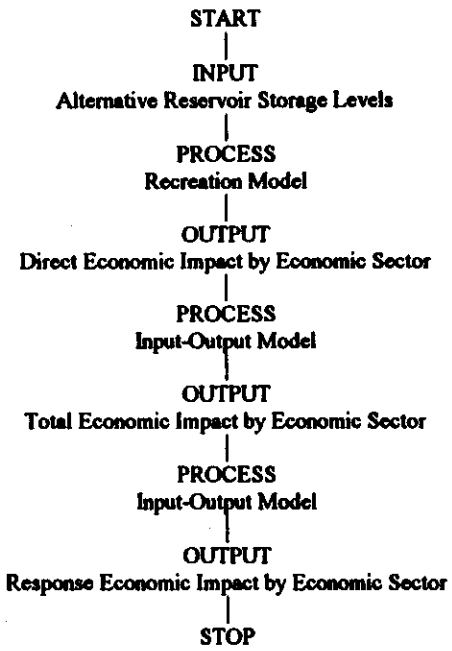
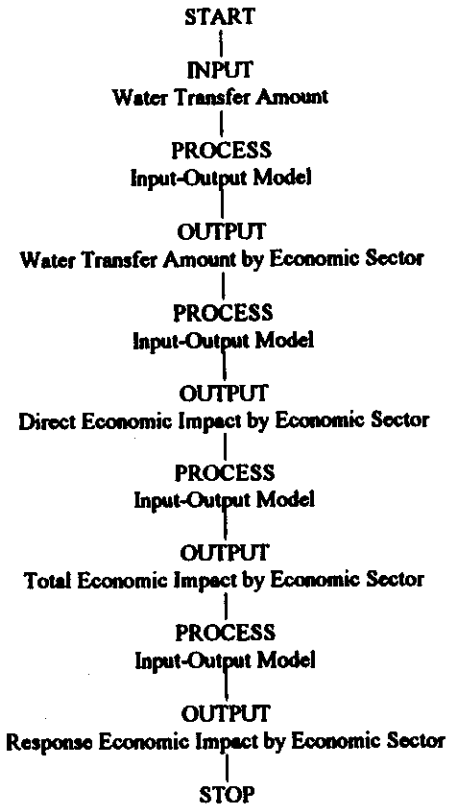


Figure 2.2-2. Flowchart for Estimation of the Economic Impacts for Reallocations of Water.



3. Recreation Model Component

The recreation model component of the regional economic impact model serves the purpose of estimating the annual number of camping and day use visitors at Prosser, Stampede, and Boca Reservoirs and their annual expenditures in the regional economy. Development of this component involved survey of the visitation, estimation of the expenditure function, and formulation of the model equations.

3.1. Survey of the Visitation

A visitation survey of the Truckee River Basin was done from August 9th through the 15th, 1993. Specific recreation sites visited included the Upper Truckee River, Prosser Reservoir, Stampede Reservoir, Boca Reservoir, the Lower Truckee River, and Pyramid Lake. The purpose of the survey was to first obtain an overall picture of the visitation and recreation activities occurring at the sites, second, quantify the amount of expenditures that visitors at the sites make to the local economy, and third, identify how the visitation would change in relation to the level of water at the sites. To achieve this purpose, information was gathered from visitors at the site through an interview process using a questionnaire. During the interview process, observations were also made at each site. Once the interview process was completed, all the data was then compiled and analyzed to develop a set of descriptive statistics. The interview questionnaire, a list of observations, and the descriptive statistics of the data are presented below.

Interview Questionnaire

On-site interviews were done using a questionnaire. Through this questionnaire, visitors were asked general, site specific, and demographic questions. General questions were asked to identify where recreation activities were occurring, the type of recreation activities, and months during the year that a visitor came to the area. Site specific questions were asked on the site where the visitor was at the time of the interview. These questions were to identify reasons for choosing to visit the site, local expenditures made to visit the site, the number of hours spent participating in recreation activities at the site, whether or not respondents would continue to visit the site if the water level were to change, which other site would be chosen in the event that the water level did change to the point they would no longer continue to visit the site, and the willingness to pay by the visitor to keep the water level at the interview site suitable for recreation. Demographic questions were also asked on the age, education, and household income of the visitor. These questions, however, due to their sensitivity, were made optional. The questions asked are given below.

General Questions

1. How many times during the year do you visit the following recreation sites?

Upper Truckee River	_____
Prosser Reservoir	_____
Stampede Reservoir	_____
Boca Reservoir	_____
Lower Truckee River	_____
Pyramid Lake	_____

2. What recreation activities do you enjoy at these sites? (if other activity is given, just make a note)

Picnicking	_____
Camping	_____
Fishing	_____
Swimming	_____
Boating	_____
Boating-fishing	_____
Boating-water skiing	_____
Jet skiing	_____
Rafting	_____
Kayaking	_____
Biking	_____
Hiking	_____
Other _____	

3. At what months during the year do you visit these sites?

April	_____
May	_____
June	_____
July	_____
August	_____
September	_____
October	_____

Site Specific Questions

1. How many times do you visit this site in a year? _____

2. Where are you from? City _____ County _____
   State _____ Zip Code _____

3. How many people are in your party? Adults _____ Children _____

4. Are you camping at this site? Yes _____ No _____

   If yes, how many days are you staying at this site? _____

   If no, how many hours are you staying at this site? _____

5. What is your reason for choosing to visit this site in order of preference? (scale 5 as highest and 1 as lowest, if other reason is given, just make a note)

Location	_____
Water level	_____
Facilities / services	_____
Fees	_____
Crowd	_____
Other _____	

6. How much did you spend on the following items to visit this site? (only list local expenditures at or around the interview site, i.e. Tahoe City, Truckee, Reno)

License fees	_____
Camping fees	_____
Hotel / motel	_____
Restaurant	_____
Grocery purchases	_____
Equipment and supplies	_____
Rental	_____
Fuel cost	_____
Other _____	_____
Total	$_____

7. How many hours per day during your visit is spent on the following activities at this site?

Picnicking	_____
Camping	_____
Fishing	_____
Swimming	_____
Boating	_____
Boating-fishing	_____
Boating-water skiing	_____
Jet skiing	_____
Rafting	_____
Kayaking	_____
Biking	_____
Hiking	_____
Other _____	_____
Total hours per day	_____

8. How often would you visit this site per year if the water level at this site dropped by the following schedule? (only use the schedule for the interview site)

Upper Truckee River (Tahoe City to Boca Reservoir outlet)

1) No reduction in river level _____
(350 cfs; suitable for rafting)
2) 1 / 3 reduction in river level _____
(250 cfs; suitable for rafting)
3) 2 / 3 reduction in river level _____
(125 cfs; minimum level suitable for rafting)
4) Over 2 / 3 reduction in river level _____
(Below 125 cfs, not suitable for rafting)

Prosser Reservoir

1) No reduction in lake level _____
(29,840 af; boat ramp usable)
2) Minor reduction in lake level _____
(28,000 af; boat ramp usable)
3) 1 / 3 reduction in lake level _____
(19,000 af; boat ramp usable, minimum level for recreation)
4) 2 / 3 reduction in lake level _____
(11,000 af; minimum level for boat ramp use)

Stampede Reservoir

1) No reduction in lake level _____
(226,000 af; boat ramp usable)
2) 1 / 4 reduction in lake level _____
(170,000 af; boat ramp usable)
3) 1 / 2 reduction in lake level _____
(130,000 af, boat ramp usable)
4) 2 / 3 reduction in lake level _____
(below 80,000 af; minimum level for boat ramp use)

Boca Reservoir

1) No reduction in lake level _____
(41,100 af; boat ramp usable)
2) Minor reduction in lake level _____
(38,000 af; boat ramp usable)
3) 1 / 3 reduction in lake level _____
(33,000 af; minimum level for boat ramp use)
4) 1 / 2 reduction in lake level _____
(22,000 af, minimum level for recreation)
5) Over half reduction in lake level _____
(Below 22,000 af)

Lower Truckee (Boca Reservoir outlet through Reno)

1) No reduction in river level _____
(1,000 cfs; suitable for rafting or kayaking)
2) 1 / 3 reduction in river level _____
(700 cfs; suitable for rafting or kayaking)
3) 2 / 3 reduction in river level _____
(400 cfs; Floriston rates; suitable for rafting, not suitable for kayaking)
4) Over 2 / 3 reduction in river level _____
(below 400 cfs; not suitable for rafting)

9. Would you choose to visit another site, given that the water level dropped and you quit visiting this site? Yes _____No _____

If yes, which of the following recreation sites would you choose? (delete the interview site)

Upper Truckee River _____
Prosser Reservoir _____
Stampede Reservoir _____
Boca Reservoir _____
Lower Truckee River _____
Pyramid Lake _____

10. How much would you be willing to pay per year not to have the water level drop so you can continue to visit this site?

$0 _____
$5 _____
$10 _____
$25 _____
$50 _____
$100 _____
$_____

Demographic Questions

1. Please indicate your age by marking the appropriate response?

under 16 years	_____
16 - 20	_____
21 - 30	_____
31 - 40	_____
41 - 50	_____
51 - 60	_____
61 - 70	_____
over 70	_____

2. Please indicate your education level by marking the appropriate response?

Elementary School	_____
High School	_____
Technical School	_____
2 Years of College	_____
4 Years of College	_____
Over 4 Years of College	_____

3. Please indicate your total household income level by marking the appropriate response?

below $10,000	_____
$10,000 - $25,000	_____
$26,000 - $50,000	_____
$51,000 - $75,000	_____
$76,000 - $100,000	_____
over $100,000	_____

The total number of visitors that participated in an interview was 177. There were 23 on the Upper Truckee River, 8 at Prosser Reservoir, 50 at Stampede Reservoir, 49 at Boca Reservoir, 27 on the Lower Truckee River, and 20 at Pyramid Lake. A day was spent at each site during the week. An additional day was spent at Stampede Reservoir and Boca Reservoir on the weekend.

List of Observations

Observations were made at each site during the interview process. Key observations are listed below.

1. The water flow in the Upper Truckee River was below 125 cubic feet per second. Prosser Reservoir held 19,000 acre-feet of water in storage. Storage in Stampede Reservoir was between 130,000 acre-feet and 170,000 acre-feet. There was 33,000 acre-feet of water held in storage in Boca Reservoir. The water flow in the Lower Truckee River was below 400 cubic feet per second.

2. The highest number of day use visitors for water related recreation activities were at Boca Reservoir followed by Prosser Reservoir, the Lower Truckee River, and Pyramid Lake. The highest number of camping visitors were at Stampede Reservoir, followed by the Upper Truckee River, Boca Reservoir, and Pyramid Lake.

3. The proportionate split of day use visitors to camping visitors was approximately 80% day users to 20% campers on the Upper Truckee River, at Prosser Reservoir, and at Boca Reservoir. Stampede Reservoir had a proportionate split of 20% day users to 80% campers. The Lower Truckee River was 100% day users. Pyramid Lake had about 50% day users to 50% campers.

4. Very little water related recreation activity was seen to occur along the Upper Truckee River. Reason for this was a low level of water flow in the river. River rafting and fishing from shore would be the activities seen on the river given a sufficient level of river flow. Mountain biking was the only recreation activity seen to occur along the river. This activity was seen throughout the day along developed bike paths beside the river.

5. The highest number of water related recreation activities were observed at Boca, Stampede, and Prosser Reservoirs. At Boca Reservoir, the early morning activities seen were fishing from shore and by boat. A definite change in activities occurred at mid-morning. The fishing activities were replaced by swimming, boating, water skiing, jet skiing, and wind surfing. The level of these activities grew throughout the day and started to diminish by late afternoon. Similar activities occurred at Stampede Reservoir. However, morning fishing by boat was observed as the predominant activity at Stampede Reservoir. Also jet skiing and wind surfing weren't seen at Stampede Reservoir. Only morning fishing from shore and by boat were seen at Prosser Reservoir. There were no afternoon activities on Prosser Reservoir like there were on Boca and Stampede Reservoirs.

6. Competition among fishing, pleasure boating, water skiing, and jet skiing activities was very apparent at Boca Reservoir. Pleasure boating and water skiing were seen to interrupt the fishing and the jet skiing was seen to interrupt the boating and water skiing.

7. The water related recreation activity seen along the Lower Truckee River was fishing from shore and this was mainly seen in the morning and evenings.

8. The water related recreation activities at Pyramid Lake were observed to be swimming, water skiing, and jet skiing. These activities occurred throughout the day. Fishing was not permitted at Pyramid Lake at the time of survey.

9. July and August were popular months for both day use and camping visitors at Boca and Stampede Reservoirs for water related recreation activities other fishing. During these months, day use visitors tended to visit a site more than once while camping visitors chose to visit a site only once. Camping visitors, however, chose to stay from a couple of days to about ten days. A stay of at least a week seemed to be common at Stampede Reservoir.

10. Reasons given for visiting each recreation site were different between the sites. The Upper Truckee River was visited because of location. Boca Reservoir was visited because of the water level, the location, and the fees. Stampede Reservoir was visited because of the facilities, location, water level, and the crowd. Prosser Reservoir was visited because of location, water level, and the fees. Visitation on the Lower Truckee River was dependent on the water level. Pyramid Lake was visited because of the water level.

11. Local expenditures were primarily made in Truckee. Expenditures varied among each site and by recreation activity. Expenditures made to visit Boca Reservoir were for fishing license fees, grocery purchases, equipment and supplies, and fuel costs. Likewise, expenditures for a visit to Stampede Reservoir were on fishing license fees, user fees, restaurant, grocery purchases, equipment and supplies, and fuel costs.

12. The Upper Truckee River with a water flow below 125 cubic feet per second was limited to camping and biking activities. A water flow above 125 cubic feet per second and below 350 cubic feet per second would add fishing and rafting activities.

13. A storage level at Prosser Reservoir of above 19,000 acre-feet to capacity at 29,840 acre-feet would cause camping, fishing by boat, and fishing from shore to remain. At a reservoir level below 19,000 acre-feet to 11,000 acre-feet the boat ramp would be usable but below 11,000 acre-feet the boat ramp is unusable eliminating much of the fishing by boat activity.

14. At Stampede Reservoir, a storage level of above 130,000 acre-feet to capacity at 226,000 acre-feet and below 130,000 acre-feet to 80,000 acre-feet, recreation activity would remain with camping, fishing, pleasure boating, and water skiing. Below 80,000 acre-feet the boat ramp would become unusable eliminating virtually all boating activities. Visitors also preferred some shoreline area to support swimming, fishing, boating. water skiing, jet skiing, and other activities.

15. There was 33,000 acre-feet of water in storage in Boca Reservoir. Recreation activities observed at this level were camping, fishing, pleasure boating, water skiing, and jet skiing. These activities would still be seen at a 38,000 acre-foot storage level. Above the 38,000 acre-foot level, however, reduces the amount of shoreline eliminating much or most of the boating and jet skiing activities. Similarly below the 33,000 acre-foot water level the boat ramp would become unusable eliminating all the boating activities. Jet skiing along with fishing from shore and camping are activities that would possibly remain to a certain extent at a lower water level.

16. The water flow in the Lower Truckee River was below 400 cubic feet per second and fishing from shore was the primary recreation activity. At a flow over 400 cubic feet per second rafting could be expected to occur. A flow at 700 cubic feet per second adds kayaking. A flow over 700 cubic feet per second, however, eliminates rafting.

17. At Pyramid Lake, visitors indicated that because of its large size, the water related recreation activities would occur at any lake level.

18. Day use visitors will tend to visit Boca Reservoir if the water level is suitable for recreation activities rather than visit Stampede Reservoir. Pyramid Lake will attract day use visitors when water levels at both Boca Reservoir and Stampede Reservoir are not suitable for recreation activities. Camping visitors will tend to visit Stampede Reservoir as opposed to Boca Reservoir. Both day use and camping visitors will tend to visit Boca Reservoir and Stampede Reservoir when other recreation areas in the vicinity are filled-up.

19. The willingness to pay to maintain a water level suitable for recreation activities was different between day use and camping visitors with regards to distance of travel to the recreation site, the recreation site itself, and the recreation activity.

20. Day use visitors as well as camping visitors were of all ages, education levels, and household income levels.

Descriptive Statistics

The descriptive statistics of the data are presented below with an explanation of their interpretation. The descriptive statistics include number of respondents, site visitation of respondents, activities of respondents, annual visitation of respondents, annual visitation of respondents per site, number of visits by respondents per site, local and non-local respondents per site, group make-up of respondents per site, camping and day use respondents per site, ranking of reasons to visit by respondents per site, expenditures by respondents per site, expenditures by camping respondents per site, expenditures by day use respondents per site, activity hours per day by respondents per site, activity hours per day by camping respondents per site, activity hours per day by day use respondents per site, indicated number of visits by respondents at alternative water levels per site, site substitution of respondents per site, willingness of respondents to pay to maintain water level per site, age brackets of respondents, education levels of respondents, and household income levels of respondents.

Number of Respondents

The number of respondents successfully interviewed were 162 out of the 177 visitors.

The breakdown of the number of respondents for each site is provided in Table 3.1-1. There were 20 respondents on the Upper Truckee River, 6 respondents at Prosser Reservoir, 46 respondents at Stampede Reservoir, 46 respondents at Boca Reservoir, 25 respondents on the Lower Truckee River, and 19 respondents at Pyramid Lake. These numbers reflect the number of days spent interviewing at each site. Again, just a day was spent at each site during the week. Then an additional day was spent at Stampede Reservoir and Boca Reservoir on the weekend.

Prosser Reservoir had the fewest respondents because visitation was observed to be low. Factors that possibly attributed to this were: the water level at Prosser was lower relative to the water levels at nearby Stampede and Boca Reservoirs; only two of four campgrounds at Prosser were open; a five mile per hour speed limit is enforce on the reservoir which rules out water skiing, jet skiing, and pleasure boating; and, Prosser is essentially unknown to non-local visitors.

Table 3.1-1. Number of Respondents.

	Study Area	Upper Truckee River	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Lower Truckee River	Pyramid Lake
Number of Respondents	162	20	6	46	46	25	19
Percentage of Respondents		12.35%	3.70%	28.40%	28.40%	15.43%	11.73%

Site Visitation of Respondents

The overall greatest site visitation of respondents was at Boca Reservoir.

The site visitation of respondents is presented in Table 3.1-2. Of the 162 respondents, 32% indicated that they visited the Upper Truckee River an average of 5 visits during the year, 19% indicated that they visited Prosser Reservoir an average of 8 visits during the year, 53% indicated that they visited Stampede Reservoir an average of 4 visits during the year, 49% indicated that they visited Boca Reservoir an average of 11 visits during the year, 23% indicated that they visited the Lower Truckee River an average of 22 visits during the year, and 28% indicated that they visited Pyramid Lake an average of 8 visits during the year. The highest percentage of respondents indicated that they visited Stampede and Boca Reservoirs. These numbers are however skewed upward by the number of respondents for these sites shown in Table 3.1-1. The highest average number of visits by respondents are indicated for Boca Reservoir and the Lower Truckee River. These numbers are influenced by local day use visitors choosing to visit the sites more frequently. In contrast, the lowest number of visits by respondents are for Stampede Reservoir and the Upper Truckee River. These numbers are influenced by non-local camping visitors choosing to visit the sites less frequently.

Table 3.1-2. Site Visitation of Respondents.

	Study Area	Upper Truckee River	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Lower Truckee River	Pyramid Lake
Number of Respondents	162	52	30	86	80	38	46
Percentage of Respondents		32.10%	18.52%	53.09%	49.38%	23.46%	28.40%
Number of Visits by Respondents		252	242	313	895	853	371
Average Number of Visits by Respondents		4.85	8.07	3.64	11.19	22.45	8.07

Activities of Respondents

Most of the respondents participated in camping, fishing, and swimming activities.

Activities of respondents are shown in Table 3.1-3. The activities include picnicking, camping, fishing, swimming, boating, fishing from a boat, water skiing, jet skiing, rafting, kayaking, biking, hiking, and other activities. Of the 162 respondents, 31% indicated that they were picnicking, 65% indicated that they were camping, 57% indicated that they were fishing, 34% indicated that they were swimming, 19% indicated that they were boating, 33% indicated that they were fishing from a boat, 28% indicated that they were water skiing, 15% indicated that they were jet skiing, 7% indicated that they were rafting, 3% indicated that they were kayaking, 15% indicated that they were biking, and 30% indicated that they were doing other activities. The other activities mentioned by the respondents include relaxing, getting away from it all, reading, and drinking beer.

Table 3.1-3. Activities of Respondents.

	Study Area
Number of Respondents Picnicking	50
Number of Respondents Camping	106
Number of Respondents Fishing	92
Number of Respondents Swimming	55
Number of Respondents Boating	30
Number of Respondents Fishing from Boat	54
Number of Respondents Water Skiing	45
Number of Respondents Jet Skiing	24
Number of Respondents Rafting	11
Number of Respondents Kayaking	4
Number of Respondents Biking	25
Number of Respondents Hiking	0
Number of Respondents Other	49
Percentage of Respondents Picnicking	30.86%
Percentage of Respondents Camping	65.43%
Percentage of Respondents Fishing	56.79%
Percentage of Respondents Swimming	33.95%
Percentage of Respondents Boating	18.52%
Percentage of Respondents Fishing from Boat	33.33%
Percentage of Respondents Water Skiing	27.78%
Percentage of Respondents Jet Skiing	14.81%
Percentage of Respondents Rafting	6.79%
Percentage of Respondents Kayaking	2.47%
Percentage of Respondents Biking	15.43%
Percentage of Respondents Hiking	0.00%
Percentage of Respondents Other	30.25%

Annual Visitation of Respondents

Annual visitation of respondents to the study area is the highest in the summer months of June, July, and August.

Annual visitation of respondents is presented in Table 3.1-4. Of the 162 respondents, 26% indicated that they visit the study area in April, 43% indicated that they visit the study area in May, 68% indicated that they visit the study area in June, 78% indicated that they visit the study area in July, 100% indicated that they visit the study area in August, 52% indicated that they visit the study area in September, 32% indicated that they visit the study area in October, and 7% indicated that they visit the study area in Other months. Other months include November, December, January, February, and March.

Table 3.1-4. Annual Visitation of Respondents.

	Study Area
Number of Respondents that Visit during April	42
Number of Respondents that Visit during May	70
Number of Respondents that Visit during June	110
Number of Respondents that Visit during July	126
Number of Respondents that Visit during August	162
Number of Respondents that Visit during September	85
Number of Respondents that Visit during October	52
Number of Respondents that Visit during Other	11
Percentage of Visitation during April	25.93%
Percentage of Visitation during May	43.21%
Percentage of Visitation during June	67.90%
Percentage of Visitation during July	77.78%
Percentage of Visitation during August	100.00%
Percentage of Visitation during September	52.47%
Percentage of Visitation during October	32.10%
Percentage of Visitation during Other	6.79%

Annual Visitation of Respondents per Site

The annual visitation of respondents per site follow a similar pattern. This pattern shows that during the year visitation at a site will begin in April and steadily increase throughout May, June, July, and August to peak in August and then decrease sharply during September and October to end at very low or even no visitation during the Other months.

The annual visitation of respondents per site are shown in Table 3.1-5. The pattern of annual visitation for a site is based on the number of respondents that indicated that they visit the study area and visit the site in a given month. To clarify this, for Boca Reservoir, 14 out of the 42 respondents indicated that they visit in April, 28 out of the 70 respondents indicated that they visit in May, 36 out of the 110 indicated that they visit in June, 42 out of the 126 respondents indicated that they visit in July, 46 out of the 162 respondents indicated that they visit in August, 31 out of the 85 indicated that they visit in September, 19 out of the 52 respondents indicated that they visit in October, and 6 out of the 11 respondents indicated that they visit in Other months.

These numbers are then divided by their summation and presented as a percentage of visitation during the given month. Of the total annual visitation at Boca Reservoir, 6% is during April, 13% is during May, 16% is during June, 19% is during July, 21% is during August, 14% is during September, 9% is during October, and 3% is during Other months.

The percentages taken together for all the months then show the pattern of annual visitation.

A similar interpretation can be made for the other sites.

Table 3.1-5. Annual Visitation of Respondents per Site.

	Study Area	Upper Truckee River	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Lower Truckee River	Pyramid Lake
Number of Respondents that Visit during April	42	3	3	10	14	9	3
Number of Respondents that Visit during May	70	4	3	16	28	10	9
Number of Respondents that Visit during June	110	9	3	25	36	20	17
Number of Respondents that Visit during July	126	13	4	26	42	23	18
Number of Respondents that Visit during August	162	20	6	46	46	25	19
Number of Respondents that Visit during September	85	8	3	20	31	14	9
Number of Respondents that Visit during October	52	2	3	10	19	11	7
Number of Respondents that Visit during Other	11	1	1	0	6	1	2
Total		60	26	153	222	113	84
Percentage of Visitation during April		5.00%	11.54%	6.54%	6.31%	7.96%	3.57%
Percentage of Visitation during May		6.67%	11.54%	10.46%	12.61%	8.85%	10.71%
Percentage of Visitation during June		15.00%	11.54%	16.34%	16.22%	17.70%	20.24%
Percentage of Visitation during July		21.67%	15.38%	16.99%	18.92%	20.35%	21.43%
Percentage of Visitation during August		33.33%	23.08%	30.07%	20.72%	22.12%	22.62%
Percentage of Visitation during September		13.33%	11.54%	13.07%	13.96%	12.39%	10.71%
Percentage of Visitation during October		3.33%	11.54%	6.54%	8.56%	9.73%	8.33%
Percentage of Visitation during Other		1.67%	3.85%	0.00%	2.70%	0.88%	2.38%

Number of Visits by Respondents per Site

The highest number of visits by respondents occur at Boca Reservoir, on the Lower Truckee River, and at Pyramid Lake. Opposite of this, the lowest number of visits by respondents occur on the Upper Truckee River, at Prosser Reservoir, and at Stampede Reservoir.

These numbers are shown in Table 3.1-6. On the Upper Truckee River, the 20 respondents indicated that they make 34 visits to the site for an average of 1.7 visits each. At Prosser Reservoir, the 6 respondents indicated that they make 34 visits to the site for and average of 5.7 visits each. At Stampede Reservoir, the 46 respondents indicated that they make 87 visits to the site for an average of 1.9 visits each. At Boca Reservoir, the 46 respondents indicated that they make 428 visits to the site for an average of 9.3 visits each. On the Lower Truckee River, the 25 respondents indicated that they make 720 visits to the site for an average of 28.8 visits each. At Pyramid Lake, the 19 respondents indicated that they make 192 visits to the site for an average of 10.1 visits each. The higher numbers for Boca Reservoir, Lower Truckee River, and Pyramid Lake reflect that a greater proportion of the respondents were local residents that frequented the site as day use visitors.

Table 3.1-6. Number of Visits by Respondents per Site.

	Upper Truckee River	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Lower Truckee River	Pyramid Lake
Number of Visits by Respondents	34	34	87	428	720	192
Average Number of Visits by Respondents	1.70	5.70	1.90	9.30	28.80	10.10

Local and Non-Local Respondents per Site

A higher number of respondents living within the study area were at Boca Reservoir, on the Lower Truckee, and at Pyramid Lake. Whereas, a higher number of respondents living outside the study area were on the Upper Truckee River, at Prosser Reservoir, and at Stampede Reservoir. Respondents living within the study area are considered as local respondents and respondents living outside the study area are considered as non-local respondents.

The numbers and the percentages of local and non-local respondents per site are provided in Table 3.1-7. At Boca Reservoir, 74% of the respondents were local respondents. On the Lower Truckee River, 72% of the respondents were local respondents. At Pyramid Lake, 89% of the respondents were local respondents. The higher number of local respondents at these sites is because these sites are primarily day use sites that draw visitors from Truckee and the Reno-Sparks area. In contrast, on the Upper Truckee River, 85% of the respondents were non-local respondents. At Prosser Reservoir, 67% of the respondents were non-local respondents. At Stampede Reservoir, 59% of the respondents were non-local respondents. The higher number of non-local respondents at these sites is because these sites are primarily camping sites that draw visitors from Sacramento and the San Francisco Bay area.

Table 3.1-7. Local and Non-Local Respondents per Site.

	Upper Truckee River	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Lower Truckee River	Pyramid Lake
Number of Local Respondents	3	2	19	34	18	17
Number of Non-Local Respondents	17	4	27	12	7	2
Percentage of Local Respondents	15.00%	33.33%	41.30%	73.91%	72.00%	89.47%
Percentage of Non-Local Respondents	85.00%	66.67%	58.70%	26.09%	28.00%	10.53%

Group Make-Up of Respondents per Site

Average group size of respondents among all sites ranged from 2.28 persons on the Lower Truckee River to 4.78 persons at Stampede Reservoir. As per group, the number of adults were greater than the number of children at all sites. The percentage of groups that included children ranged from 24% on the Lower Truckee River to 53% at Pyramid Lake.

This group make-up information is presented in Table 3.1-8. On the Upper Truckee River, the average group size was 3.8 persons of which 2.65 persons were adults and 45% of the groups included children. At Prosser Reservoir, the average group size was 3.33 persons of which 2.16 persons were adults and 29% of the groups included children. At Stampede Reservoir, the average group size was 4.78 persons of which 3.56 persons were adults and 43% of the groups included children. At Boca Reservoir, the average group size was 4.54 persons of which 3.15 persons were adults and 41% of the groups included children. On the Lower Truckee River, the average group size was 2.28 persons of which 1.68 persons were adults and 24% of the groups included children. At Pyramid Lake, the average group size was 3.84 persons of which 2.89 persons were adults and 53% of the groups included children.

Table 3.1-8. Group Make-Up of Respondents per Site.

	Upper Truckee River	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Lower Truckee River	Pyramid Lake
Average Group Size of Respondents	3.80	3.33	4.78	4.54	2.28	3.84
Average Number of Adults in Group of Respondents	2.65	2.16	3.56	3.15	1.68	2.89
Percentage of Groups that include Children	45.00%	28.57%	43.48%	41.30%	24.00%	52.63%

Camping and Day Use Respondents per Site

The highest percentage of camping respondents were on the Upper Truckee River and at Stampede Reservoir. The largest average group size of camping respondents was also at Stampede Reservoir. The greatest average numbers of days spent by camping respondents were at Boca Reservoir and on the Upper Truckee River.

This camping respondent information is provided in Table 3.1-9. On the Upper Truckee River, 85% of the respondents were camping respondents having a group size of 3.71 persons with 5.11 days being spent. At Stampede Reservoir, 78% of the respondents were camping respondents having a group size of 5.14 persons with 3.69 days being spent. At Boca Reservoir, 11% of the respondents were camping respondents having a group size of 3.20 persons with 6.40 days being spent. On the Lower Truckee River, 4% of the respondents were camping respondents having a group size of 2.00 persons with 2.00 days being spent. At Pyramid Lake, 63% of the respondents were camping respondents having a group size of 3.17 persons with 3.42 days being spent. At Prosser Reservoir, this information is not available because no interviews of camping visitors were made.

The highest percentage of day use respondents, except for Prosser Reservoir, were at Boca Reservoir and on the Lower Truckee River. The largest average group size of day use respondents was at Pyramid Lake. The greatest average number of hours spent by day use respondents were at Pyramid Lake and at Stampede Reservoir.

This day use respondent information is also provided in Table 3.1-9. On the Upper Truckee River, 15% of the respondents were day use respondents having a group size of 4.33 persons with 2.67 hours being spent. At Stampede Reservoir, 22% of the respondents were day use respondents having a group size of 3.50 persons with 5.50 hours being spent. At Boca Reservoir, 89% of the respondents were day use respondents having a group size of 4.71 persons with 5.10 hours being spent. On the Lower Truckee River, 96% of the respondents were day use respondents having a group size of 2.29 persons with 3.96 hours being spent. At Pyramid Lake, 37% of the respondents were day use respondents having a group size of 5.00 persons with 6.14 hours being spent. At Prosser Reservoir, 100% of the respondents were day use respondents having a group size of 3.33 persons with 3.33 hours being spent. Only interviews of day use visitors were made at Prosser Reservoir.

Table 3.1-9. Camping and Day Use Respondents per Site.

	Upper Truckee River	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Lower Truckee River	Pyramid Lake
Number of Camping Respondents	17	0	36	5	1	12
Percentage of Camping Respondents	85.00%	N.A.	78.00%	11.00%	4.00%	63.16%
Average Group Size of Camping Respondents	3.71	N.A.	5.14	3.20	2.00	3.17
Average Number of Days Spent by Camping Respondents	5.11	N.A.	3.69	6.40	2.00	3.42
Number of Day Use Respondents	3	6	10	41	24	7
Percentage of Day Use Respondents	15.00%	100.00%	22.00%	89.00%	96.00%	36.84%
Average Group Size of Day Use Respondents	4.33	3.33	3.50	4.71	2.29	5.00
Average Number of Hours Spent by Day Use Respondents	2.67	3.33	5.50	5.10	3.96	6.14

Ranking of Reasons to Visit by Respondents per Site

Location was ranked the highest by respondents at all sites as being the first reason for choosing to visit a site. Following location, however, water level, facilities, fees, and crowd level were ranked differently according to their average values.

Ranking of reasons to visit by respondents per site is shown in Table 3.1-10. On the Upper Truckee River, the respondents ranked location as first with 4.65, crowd level as second with 2.50, facilities as third with 2.10, water level as fourth with 1.85, and fees as fifth with 1.80. At Prosser Reservoir, the respondents ranked location as first with 4.20, facilities as second with 2.50, water level as third with 2.30, fees as fourth with 2.20, and crowd level as fifth with 1.80. At Stampede Reservoir, the respondents ranked location as first with 3.70, facilities as second with 2.90, water level as third with 2.50, crowd level as fourth with 2.00, and fees as fifth with 1.50. At Boca Reservoir, the respondents ranked location as first with 4.40, water level as second with 2.90, fees as third with 2.30, crowd level as fourth with 1.90, and facilities as fifth with 1.30. On the Lower Truckee River, respondents ranked location as first with 4.20, water level as second with 2.20, crowd level as third with 1.32, fees as fourth with .90, and facilities as fifth with .80. At Pyramid Lake, the respondents ranked location as first, crowd level as second with 2.80, water level as third with 2.10, fees as fourth with 2.10, and facilities as fifth with 1.40.

Table 3.1-10. Ranking of Reasons to Visit by Respondents per Site.

Reasons /1	Upper Truckee River	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Lower Truckee River	Pyramid Lake
Average Value of Location by Respondents	4.65	4.20	3.70	4.40	4.20	4.20
Average Value of Water Level by Respondents	1.85	2.30	2.50	2.90	2.20	2.10
Average Value of Facilities and Services by Respondents	2.10	2.50	2.90	1.30	0.80	1.40
Average Value of Fees by Respondents	1.80	2.20	1.50	2.30	0.90	2.10
Average Value of Crowd Level by Respondents	2.50	1.80	2.00	1.90	1.32	2.80

1. Ranking: Range Highest Value=First Reason to Lowest Value=Fifth Reason.

Expenditures by Respondents per Site

Expenditures are the highest amount for respondents at Prosser Reservoir followed by expenditures of respondents on the Upper Truckee River, at Stampede Reservoir, at Pyramid Lake, at Boca Reservoir, and on the Lower Truckee River. Main expenditures are on groceries, camping fees, restaurant, fuel, and licenses.

The expenditures by respondents are presented as average values in Table 3.1-11. On the Upper Truckee River, respondents have total expenditures of $199.83 in which the largest portion is on groceries, camping fees, restaurant, hotel, and fuel. At Prosser Reservoir, respondents have total expenditures of $289.90 in which the largest portion is on rental, restaurant, groceries, and licenses. At Stampede Reservoir, respondents have total expenditures of $165.06 in which the largest portion is on groceries, camping fees, licenses, and fuel. At Boca Reservoir, respondents have total expenditures of $117.20 in which the largest portion is on groceries, hotel, fuel, and restaurant. On the Lower Truckee River, respondents have a total expenditure of $72.30 in which the largest portion is on hotel, licenses, fuel, and rental. At Pyramid Lake, respondents have a total expenditure of $123.57 in which the largest portion is on groceries, fuel, licenses, and camping fees.

Table 3.1-11. Expenditures by Respondents per Site.

	Upper Truckee River	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Lower Truckee River	Pyramid Lake
Average Expenditures on Licenses by Respondents	9.08	23.73	21.06	10.27	16.60	20.21
Average Expenditures on Camping Fees by Respondents	34.25	0.00	37.93	6.52	0.00	10.89
Average Expenditures on Hotel or Motel by Respondents	23.15	1.00	3.48	29.13	22.20	0.00
Average Expenditures on Restaurant by Respondents	29.45	41.67	9.98	11.30	6.44	8.68
Average Expenditures on Groceries by Respondents	71.25	41.67	59.96	29.33	5.60	52.11
Average Expenditures on Equipment and Supplies by Respondents	9.90	4.50	9.90	5.17	2.84	1.58
Average Expenditures on Rental by Respondents	0.00	162.50	0.00	0.00	8.00	5.26
Average Expenditures on Fuel by Respondents	20.35	14.83	20.35	17.65	9.02	24.84
Average Expenditures on Other by Respondents	2.40	0.00	2.40	7.83	1.60	0.00
Average Total Expenditures by Respondents	$199.83	$289.90	$165.06	$117.20	$72.30	$123.57

Expenditures by Camping Respondents per Site

Expenditures are the highest amount for camping respondents at Stampede Reservoir followed by expenditures of camping respondents on the Upper Truckee River, at Pyramid Lake, at Boca Reservoir, and on the Lower Truckee River. Main expenditures are on groceries, camping fees, and fuel.

The expenditures for camping respondents are provided as average values in Table 3.1-12. On the Upper Truckee River, camping respondents have total expenditures of $176.84 in which the largest portion is on groceries, camping fees, fuel, and restaurant. At Stampede Reservoir, camping respondents have total expenditures of $199.12 in which the largest portion is on groceries, camping fees, fuel, and licenses. At Boca Reservoir, camping respondents have total expenditures of $92.40 in which the largest portion is on groceries, licenses, and fuel. On the Lower Truckee River, camping respondents have a total expenditure of $35.00 in which the largest portion is on groceries and restaurant. At Pyramid Lake, camping respondents have a total expenditure of $153.74 in which the largest portion is on groceries, fuel, licenses, and camping fees. At Prosser Reservoir, this information is not available because no interviews of camping visitors were made.

Expenditures per day by camping respondents is calculated by dividing the expenditures by camping respondents by the number of days spent by camping respondents. On the Upper Truckee River, total expenditures per day are $34.61. At Stampede Reservoir, total expenditures per day are $53.96. At Boca Reservoir, total expenditures per day are $14.44. On the Lower Truckee River, total expenditures per day are $17.50. At Pyramid Lake, total expenditures per day are $44.95.

Expenditures per day per person by camping respondents is calculated by dividing the expenditures per day by camping respondent by the average group size of camping respondents. On the Upper Truckee River, total expenditures per day per person are $9.33. At Stampede Reservoir, total expenditures per day per person are $10.50. At Boca Reservoir, total expenditures per day per person are $4.51. On the Lower Truckee River, total expenditures per day per person are $8.75. At Pyramid Lake, total expenditures per day per person are $14.18.

Table 3.1-12. Expenditures by Camping Respondents per Site.

	Upper Truckee River	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Lower Truckee River	Pyramid Lake
Average Expenditures on Licenses by Camping Respondents	8.91	N.A.	16.18	17.40	0.00	18.25
Average Expenditures on Camping Fees by Camping Respondents	40.29	N.A.	48.47	0.00	0.00	16.33
Average Expenditures on Hotel or Motel by Camping Respondents	3.71	N.A.	0.00	0.00	0.00	0.00
Average Expenditures on Restaurant by Camping Respondents	19.35	N.A.	8.58	0.00	10.00	13.33
Average Expenditures on Groceries by Camping Respondents	67.35	N.A.	70.39	46.00	25.00	70.00
Average Expenditures on Equipment and Supplies by Camping Respondents	11.65	N.A.	15.08	0.40	0.00	2.50
Average Expenditures on Rental by Camping Respondents	0.00	N.A.	0.00	0.00	0.00	8.33
Average Expenditures on Fuel by Camping Respondents	22.76	N.A.	40.42	16.60	0.00	25.00
Average Expenditures on Other by Camping Respondents	2.82	N.A.	0.00	12.00	0.00	0.00
Average Total Expenditures by Camping Respondents	$176.84	N.A.	$199.12	$92.40	$35.00	$153.74
Average Expenditures per Day on Licenses by Camping Respondents	1.74	N.A.	4.38	2.72	0.00	5.34
Average Expenditures per Day on Camping Fees by Camping Respondents	7.88	N.A.	13.14	0.00	0.00	4.77
Average Expenditures per Day on Hotel or Motel by Camping Respondents	0.73	N.A.	0.00	0.00	0.00	0.00
Average Expenditures per Day on Restaurant by Camping Respondents	3.79	N.A.	2.33	0.00	5.00	3.90
Average Expenditures per Day on Groceries by Camping Respondents	13.18	N.A.	19.08	7.19	12.50	20.47
Average Expenditures per Day on Equipment and Supplies by Camping Respondents	2.28	N.A.	4.09	0.06	0.00	0.73
Average Expenditures per Day on Rental by Camping Respondents	0.00	N.A.	0.00	0.00	0.00	2.44
Average Expenditures per Day on Fuel by Camping Respondents	4.45	N.A.	10.95	2.59	0.00	7.31
Average Expenditures per Day on Other by Camping Respondents	0.55	N.A.	0.00	1.88	0.00	0.00
Average Total Expenditures per Day by Camping Respondents	$34.61	N.A.	$53.96	$14.44	$17.50	$44.95
Average Expenditures per Day per Person on Licenses by Camping Respondents	0.47	N.A.	0.85	0.85	0.00	1.68
Average Expenditures per Day per Person on Camping Fees by Camping Respondents	2.13	N.A.	2.56	0.00	0.00	1.51
Average Expenditures per Day per Person on Hotel or Motel by Camping Respondents	0.20	N.A.	0.00	0.00	0.00	0.00
Average Expenditures per Day per Person on Restaurant by Camping Respondents	1.02	N.A.	0.45	0.00	2.50	1.23
Average Expenditures per Day per Person on Groceries by Camping Respondents	3.55	N.A.	3.71	2.25	6.25	6.46
Average Expenditures per Day per Person on Equipment and Supplies by Camping Respondents	0.61	N.A.	0.80	0.02	0.00	0.23
Average Expenditures per Day per Person on Rental by Camping Respondents	0.00	N.A.	0.00	0.00	0.00	0.77
Average Expenditures per Day per Person on Fuel by Camping Respondents	1.20	N.A.	2.13	0.81	0.00	2.31
Average Expenditures per Day per Person on Other by Camping Respondents	0.15	N.A.	0.00	0.59	0.00	0.00
Average Total Expenditures per Day per Person by Camping Respondents	$9.33	N.A.	$10.50	$4.51	$8.75	$14.18

Expenditures by Day Use Respondents per Site

Expenditures are the highest amount for day use respondents on the Upper Truckee River followed by expenditures of day use respondents at Prosser Reservoir, at Boca Reservoir, at Stampede Reservoir, on the Lower Truckee River, and at Pyramid Lake. Main expenditures are on groceries, hotel, restaurant, and fuel.

The average expenditures by day use respondents are shown in Table 3.1-13. On the Upper Truckee River, day use respondents have total expenditures of $330.00 in which the largest portion is on hotel, groceries, and restaurant. At Prosser Reservoir, day use respondents have total expenditures of $289.90 in which the largest potion is on rental, groceries, and restaurant. At Stampede Reservoir, day use respondents have total expenditures of $117.46 in which the largest portion is on groceries, licenses, and fuel. At Boca Reservoir, day use respondents have total expenditures of $120.23 in which the largest portion is on groceries, hotel, and fuel. On the Lower Truckee River, day use respondents have a total expenditure of $73.86 in which the largest portion is on hotel and licenses. At Pyramid Lake, day use respondents have a total expenditure of $71.85 in which the largest portion is on fuel, licenses, and groceries.

Expenditures per person by day use respondents is calculated by dividing the expenditures by day use respondents by the average group size of day use respondents. On the Upper Truckee River, total expenditures per person are $76.21. At Prosser Reservoir, total expenditures per person are $87.06. At Stampede Reservoir, total expenditures per person are $33.56. At Boca Reservoir, total expenditures per person are $25.33. On the Lower Truckee River, total expenditures per person are $32.25. At Pyramid Lake, total expenditures per person are $14.37.

Table 3.1-13. Expenditures by Day Use Respondents per Site.

	Upper Truckee River	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Lower Truckee River	Pyramid Lake
Average Expenditures on Licenses by Day Use Respondents	10.00	23.73	38.60	9.40	17.29	23.57
Average Expenditures on Camping Fees by Day Use Respondents	0.00	0.00	0.00	7.32	0.00	1.57
Average Expenditures on Hotel or Motel by Day Use Respondents	133.33	1.00	16.00	32.68	23.13	0.00
Average Expenditures on Restaurant by Day Use Respondents	86.67	41.67	15.00	12.68	6.29	0.71
Average Expenditures on Groceries by Day Use Respondents	93.33	41.67	22.40	27.29	4.79	21.43
Average Expenditures on Equipment and Supplies by Day Use Respondents	0.00	4.50	3.76	5.76	2.96	0.00
Average Expenditures on Rental by Day Use Respondents	0.00	162.50	0.00	0.00	8.33	0.00
Average Expenditures on Fuel by Day Use Respondents	6.67	14.83	20.20	17.78	9.40	24.57
Average Expenditures on Other by Day Use Respondents	0.00	0.00	1.50	7.32	1.67	0.00
Average Total Expenditures by Day Use Respondents	$330.00	$289.90	$117.46	$120.23	$73.86	$71.85
Average Expenditures per Person on Licenses by Day Use Respondents	2.31	7.13	11.03	2.00	7.55	4.71
Average Expenditures per Person on Camping Fees by Day Use Respondents	0.00	0.00	0.00	1.55	0.00	0.31
Average Expenditures per Person on Hotel or Motel by Day Use Respondents	30.79	0.30	4.57	6.94	10.10	0.00
Average Expenditures per Person on Restaurant by Day Use Respondents	20.02	12.51	4.29	2.69	2.75	0.14
Average Expenditures per Person on Groceries by Day Use Respondents	21.55	12.51	6.40	5.79	2.09	4.29
Average Expenditures per Person on Equipment and Supplies by Day Use Respondents	0.00	1.35	1.07	1.22	1.29	0.00
Average Expenditures per Person on Rental by Day Use Respondents	0.00	48.80	0.00	0.00	3.64	0.00
Average Expenditures per Person on Fuel by Day Use Respondents	1.54	4.45	5.77	3.77	4.10	4.91
Average Expenditures per Person on Other by Day Use Respondents	0.00	0.00	0.43	1.55	0.73	0.00
Average Total Expenditures per Person by Day Use Respondents	$76.21	$87.06	$33.56	$25.53	$32.25	$14.37

Activity Hours per Day by Respondents per Site

Hours per day spent by respondents participating in non-camping activities at all sites ranged from 3.30 hours at Prosser Reservoir to 5.75 hours at Stampede Reservoir. Activities of respondents also varied among all sites from that of fishing on the Upper Truckee River, at Prosser Reservoir, and on the Lower Truckee River to that of fishing, swimming, boating, water skiing, and jet skiing at Stampede Reservoir, at Boca Reservoir, and at Pyramid Lake.

The average activity hours per day by respondents are provided in Table 3.1-14. On the Upper Truckee River, respondents spent 4.53 hours per day participating in activities including picnicking, fishing, swimming, rafting, and biking. At Prosser Reservoir, respondents spent 3.30 hours per day fishing. At Stampede Reservoir, respondents spent 5.75 hours per day participating in activities including picnicking, fishing, swimming, boating, water skiing, rafting, and biking. At Boca Reservoir, respondents spent 5.09 hours per day participating in activities including picnicking, fishing, swimming, boating, water skiing, jet skiing, and biking. On the Lower Truckee River, respondents spent 3.92 hours per day participating in activities including fishing, swimming, boating, and rafting. At Pyramid Lake, respondents spent 5.36 hours per day participating in activities including picnicking, swimming, boating, water skiing, and jet skiing.

Camping is not included in the activities because respondents had difficulty relating to camping as a separate activity.

Table 3.1-14. Activity Hours per Day by Respondents per Site.

	Upper Truckee River	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Lower Truckee River	Pyramid Lake
Average Activity Hours per Day spent Picnicking by Respondents	0.35	0.00	0.20	0.74	0.00	0.68
Average Activity Hours per Day spent Camping by Respondents	8.30	0.00	0.98	1.04	0.00	1.26
Average Activity Hours per Day spent Fishing by Respondents	1.70	2.00	1.50	0.83	3.56	0.00
Average Activity Hours per Day spent Swimming by Respondents	0.38	0.00	0.39	0.28	0.04	1.00
Average Activity Hours per Day spent Boating by Respondents	0.00	0.00	0.20	0.20	0.16	0.68
Average Activity Hours per Day spent Fishing from Boat by Respondents	0.00	1.30	1.80	0.80	0.00	0.00
Average Activity Hours per Day spent Water Skiing by Respondents	0.00	0.00	0.83	0.87	0.00	1.29
Average Activity Hours per Day spent Jet Skiing by Respondents	0.00	0.00	0.00	1.11	0.00	0.50
Average Activity Hours per Day spent Rafting by Respondents	0.15	0.00	0.04	0.00	0.08	0.00
Average Activity Hours per Day spent Kayaking by Respondents	0.00	0.00	0.00	0.00	0.00	0.00
Average Activity Hours per Day spent Biking by Respondents	0.20	0.00	0.21	0.04	0.00	0.00
Average Activity Hours per Day spent Hiking by Respondents	0.00	0.00	0.00	0.00	0.00	0.00
Average Activity Hours per Day spent on Other activities by Respondents	1.75	0.00	0.58	0.22	0.08	1.21
Total Activity Hours per Day by Respondents	12.83	3.30	6.73	6.13	3.92	6.62
Total Activity Hours per Day spent on Non-Camping Activities by Respondents	4.53	3.30	5.75	5.09	3.92	5.36

Activity Hours per Day by Camping Respondents per Site

Hours per day spent by camping respondents participating in non-camping activities at all sites ranged from 3.00 hours on the Lower Truckee River to 5.80 hours at Stampede Reservoir. Activities of camping respondents also varied among all sites from that of fishing on the Upper Truckee River and on the Lower Truckee River to that of fishing, swimming, boating, water skiing, and jet skiing at Stampede Reservoir, at Boca Reservoir, and at Pyramid Lake.

The average activity hours per day by camping respondents are presented in Table 3.1-15. On the Upper Truckee River, camping respondents spent 4.85 hours per day participating in activities including picnicking, fishing, swimming, rafting, and biking. At Stampede Reservoir, camping respondents spent 5.80 hours per day participating in activities including picnicking, fishing, swimming, boating, water skiing, rafting, and biking. At Boca Reservoir, camping respondents spent 5.00 hours per day participating in activities including fishing, water skiing, and biking. On the Lower Truckee River, camping respondents spent 3.00 hours per day fishing. At Pyramid Lake, camping respondents spent 5.67 hours per day participating in activities including picnicking, swimming, boating, water skiing, and jet skiing. At Prosser Reservoir, this information is not available because no interviews of camping visitors were made.

Again, camping is not included in the activities because respondents had difficulty relating to camping as a separate activity.

Table 3.1-15. Activity Hours per Day by Camping Respondents per Site.

	Upper Truckee River	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Lower Truckee River	Pyramid Lake
Average Activity Hours per Day spent Picnicking by Camping Respondents	0.41	N.A.	0.25	0.00	0.00	0.25
Average Activity Hours per Day spent Camping by Camping Respondents	9.76	N.A.	1.25	9.60	0.00	2.00
Average Activity Hours per Day spent Fishing by Camping Respondents	1.74	N.A.	1.53	0.60	3.00	0.00
Average Activity Hours per Day spent Swimming by Camping Respondents	0.35	N.A.	0.50	0.00	0.00	1.17
Average Activity Hours per Day spent Boating by Camping Respondents	0.00	N.A.	0.25	0.00	0.00	0.67
Average Activity Hours per Day spent Fishing from Boat by Camping Respondents	0.00	N.A.	1.33	0.80	0.00	0.00
Average Activity Hours per Day spent Water Skiing by Camping Respondents	0.00	N.A.	0.89	2.80	0.00	0.83
Average Activity Hours per Day spent Jet Skiing by Camping Respondents	0.00	N.A.	0.00	0.00	0.00	0.83
Average Activity Hours per Day spent Rafting by Camping Respondents	0.18	N.A.	0.06	0.00	0.00	0.00
Average Activity Hours per Day spent Kayaking by Camping Respondents	0.00	N.A.	0.00	0.00	0.00	0.00
Average Activity Hours per Day spent Biking by Camping Respondents	0.18	N.A.	0.26	0.40	0.00	0.00
Average Activity Hours per Day spent Hiking by Camping Respondents	0.00	N.A.	0.00	0.00	0.00	0.00
Average Activity Hours per Day spent on Other activities by Camping Respondents	2.00	N.A.	0.74	0.40	0.00	1.92
Total Activity Hours per Day by Camping Respondents	14.62	N.A.	7.05	14.60	3.00	7.67
Total Activity Hours per Day spent on Non-Camping Activities by Camping Respondents	4.85	N.A.	5.80	5.00	3.00	5.67

Activity Hours per Day by Day Use Respondents per Site

Hours per day spent by day use respondents participating in activities at all sites ranged from 2.67 hours on the Upper Truckee River to 6.14 hours at Pyramid Lake. Activities of day use respondents also varied among all sites from that of fishing on the Upper Truckee River, at Prosser Reservoir, at Stampede Reservoir, and on the Lower Truckee River to that of fishing, swimming, boating, water skiing, and jet skiing at Boca Reservoir and at Pyramid Lake.

The average activity hours per day by day use respondents are shown in Table 3.1-16. On the Upper Truckee River, day use respondents spent 2.67 hours per day participating in activities including fishing, swimming, and biking. At Prosser Reservoir, day use respondents spent 3.33 hours per day fishing. At Stampede Reservoir, day use respondents spent 5.50 hours per day participating in activities including fishing and water skiing. At Boca Reservoir, day use respondents spent 5.10 hours per day participating in activities including picnicking, fishing, swimming, boating, water skiing, and jet skiing. On the Lower Truckee River, day use respondents spent 3.96 hours per day participating in activities including fishing, swimming, boating, and rafting. At Pyramid Lake, day use respondents spent 6.14 hours per day participating in activities including picnicking, swimming, boating, water skiing, and jet skiing.

Table 3.1-16. Activity Hours per Day by Day Use Respondents per Site.

	Upper Truckee River	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Lower Truckee River	Pyramid Lake
Average Activity Hours per Day spent Picnicking by Day Use Respondents	0.00	0.00	0.00	0.83	0.00	1.43
Average Activity Hours per Day spent Camping by Day Use Respondents	0.00	0.00	0.00	0.00	0.00	0.00
Average Activity Hours per Day spent Fishing by Day Use Respondents	1.50	2.00	1.40	0.85	3.58	0.00
Average Activity Hours per Day spent Swimming by Day Use Respondents	0.50	0.00	0.00	0.32	0.04	0.71
Average Activity Hours per Day spent Boating by Day Use Respondents	0.00	0.00	0.00	0.22	0.17	0.71
Average Activity Hours per Day spent Fishing from Boat by Day Use Respondents	0.00	1.33	3.50	0.80	0.00	0.00
Average Activity Hours per Day spent Water Skiing by Day Use Respondents	0.00	0.00	0.60	0.63	0.00	2.07
Average Activity Hours per Day spent Jet Skiing by Day Use Respondents	0.00	0.00	0.00	1.24	0.00	1.21
Average Activity Hours per Day spent Rafting by Day Use Respondents	0.00	0.00	0.00	0.00	0.08	0.00
Average Activity Hours per Day spent Kayaking by Day Use Respondents	0.00	0.00	0.00	0.00	0.00	0.00
Average Activity Hours per Day spent Biking by Day Use Respondents	0.33	0.00	0.00	0.00	0.00	0.00
Average Activity Hours per Day spent Hiking by Day Use Respondents	0.00	0.00	0.00	0.00	0.00	0.00
Average Activity Hours per Day spent on Other activities by Day Use Respondents	0.33	0.00	0.00	0.20	0.08	0.00
Total Activity Hours per Day by Day Use Respondents	2.67	3.33	5.50	5.10	3.96	6.14

Indicated Number of Visits by Respondents at Alternative Water Levels per Site

Respondents, at all sites not including Pyramid Lake, indicated more visits at higher water levels and less visits at lower water levels.

The indicated average number of visits by respondents at alternative water levels are presented in Table 3.1-17.

Alternative water levels are 1 for the highest and either 4 or 5 for the lowest. On the Upper Truckee River, water level 1 is 350 cubic feet per second and water level 4 is less than 125 cubic feet per second. At Prosser Reservoir, water level 1 is 29,840 acre-feet or maximum storage and water level 4 is 11,000 acre-feet of storage. At Stampede Reservoir, water level 1 is 226,000 acre-feet or maximum storage and water level 4 is 80,000 acre-feet of storage. At Boca Reservoir, water level 1 is 40,870 acre-feet or maximum storage and water level 5 is less than 22,000 acre-feet of storage. On the Lower Truckee River, water level 1 is 1,000 cubic feet per second and water level 4 is less than 400 cubic feet per second.

Given the alternative water levels, the number of visits by respondents vary accordingly. On the Upper Truckee River, respondents indicated 1.50 visits at water level 1 to .65 visits at water level 4. At Prosser Reservoir, respondents indicated 5.67 visits at water level 1 to .50 visits at water level 4. At Stampede Reservoir, respondents indicated 1.82 visits at water level 1 to .87 visits at water level 4. At Boca Reservoir, respondents indicated 11.09 visits at water level 1 to .37 visits at water level 5. On the Lower Truckee River, respondents indicated 8.56 visits at water level 1 to 4.56 visits at water level 4.

Assuming that there is 100% visitation at alternative water level 1, the average number of visits by respondents at other water levels are also provided in relative percentage terms. On the Upper Truckee River, visitation drops from 100% at water level 1 to 43% at water level 4. At Prosser Reservoir, visitation holds constant at 100% for water levels 1, 2 and 3 and then drops to 8% at water level 4. At Stampede Reservoir, visitation increases from 100% at water level 1 to 101% at water level 2 and then drops to 48% at water level 4. At Boca Reservoir, visitation drops from 100% at water level 1 to 3% at water level 5. On the Lower Truckee River, visitation drops from 100% at water level 1 to 53% at water level 4.

Table 3.1-17. Indicated Number of Visits by Respondents at Alternative Water Levels per Site.

	Upper Truckee River	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Lower Truckee River
Cubic Feet per Second of Flow or Acre-Feet of Storage at Alternative Water Level 1	350	29,840	226,000	41,100	1,000
Cubic Feet per Second of Flow or Acre-Feet of Storage at Alternative Water Level 2	250	28,000	170,000	38,000	700
Cubic Feet per Second of Flow or Acre-Feet of Storage at Alternative Water Level 3	125	19,000	130,000	33,000	400
Cubic Feet per Second of Flow or Acre-Feet of Storage at Alternative Water Level 4	<125	11,000	80,000	22,000	<400
Cubic Feet per Second of Flow or Acre-Feet of Storage at Alternative Water Level 5				<22,000	
Average Number of Visits by Respondents at Alternative Water Level 1	1.50	5.67	1.82	11.09	8.56
Average Number of Visits by Respondents at Alternative Water Level 2	1.00	5.67	1.85	9.11	5.56
Average Number of Visits by Respondents at Alternative Water Level 3	0.90	5.67	1.39	8.15	5.00
Average Number of Visits by Respondents at Alternative Water Level 4	0.65	0.50	0.87	4.46	4.56
Average Number of Visits by Respondents at Alternative Water Level 5				0.37	
Percentage of Visitation of Respondents at Alternative Water Level 1	100.00%	100.00%	100.00%	100.00%	100.00%
Percentage of Visitation of Respondents at Alternative Water Level 2	66.67%	100.00%	101.42%	82.16%	64.95%
Percentage of Visitation of Respondents at Alternative Water Level 3	60.00%	100.00%	76.34%	73.53%	58.41%
Percentage of Visitation of Respondents at Alternative Water Level 4	43.33%	8.82%	47.69%	40.19%	53.27%
Percentage of Visitation of Respondents at Alternative Water Level 5				3.33%	

Site Substitution of Respondents per Site

A high number of respondents indicated that they would substitute an alternative site for their preferred site when they could no longer visit their preferred site because of water level.

Site substitution of respondents per site is shown in Table 3.1-18. The number of respondents that indicated site substitution are 13 on the Upper Truckee River, 5 at Prosser Reservoir, 34 at Stampede Reservoir, 40 at Boca Reservoir, 21 on the Lower Truckee River, and, 11 at Pyramid Lake. For respondents on the Upper Truckee River, site substitution to Donner Lake is 3%, to Prosser Reservoir is 23%, to Stampede Reservoir is 27%, to Boca Reservoir is 27%, to the Lower Truckee River is 3%, to Pyramid Lake is 3%, and, to Other Sites is 13%. For respondents at Prosser Reservoir, site substitution to the Upper Truckee River is 11%, to Stampede Reservoir is 44%, to Boca Reservoir is 33%, and, to the Lower Truckee River is 11%. For respondents at Stampede Reservoir, site substitution to Lake Tahoe is 2%, to the Upper Truckee River is 10%, to Prosser Reservoir is 16%, to Boca Reservoir is 29%, to the Lower Truckee River is 2%, to Pyramid Lake is 19%, and, to Other Sites is 23%. For respondents at Boca Reservoir, site substitution to Lake Tahoe is 4%, to the Upper Truckee River is 1%, to Donner Lake is 12%, to Prosser Reservoir is 12%, to Stampede Reservoir is 34%, to Pyramid Lake is 19%, and, to Other Sites is 18%. For respondents on the Lower Truckee River, site substitution to the Upper Truckee River is 9%, to Donner Lake is 3%, to Prosser Reservoir is 18%, to Stampede Reservoir is 24%, to Boca Reservoir is 24%, to Pyramid Lake is 3%, and, to Other Sites is 18%. For respondents at Pyramid Lake, site substitution to the Upper Truckee River is 6%, to Stampede Reservoir is 35%, to Boca Reservoir is 35%, and, to Other Sites is 24%. Other Sites are located outside the Truckee River Basin.

Table 3.1-18. Site Substitution of Respondents per Site.

	Upper Truckee River	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Lower Truckee River	Pyramid Lake
Number of Respondents indicating Site Substitution	13	5	34	40	21	11
Percentage of Respondents indicating Site Substitution	65.00%	83.33%	73.91%	86.96%	84.00%	57.89%
Number of Respondents indicating Site Substitution to Lake Tahoe	0	0	1	3	0	0
Number of Respondents indicating Site Substitution to Upper Truckee River	N.A.	1	6	1	3	1
Number of Respondents indicating Site Substitution to Donner Lake	1	0	0	9	1	0
Number of Respondents indicating Site Substitution to Prosser Reservoir	7	N.A.	10	9	6	0
Number of Respondents indicating Site Substitution to Stampede Reservoir	8	4	N.A.	25	8	6
Number of Respondents indicating Site Substitution to Boca Reservoir	8	3	18	N.A.	8	6
Number of Respondents indicating Site Substitution to Lower Truckee River	1	1	1	0	N.A.	0
Number of Respondents indicating Site Substitution to Pyramid Lake	1	0	12	14	1	N.A.
Number of Respondents indicating Site Substitution to Other Sites /1	4	0	14	13	6	4
Percentage of Site Substitution to Lake Tahoe	0.00%	0.00%	1.61%	4.05%	0.00%	0.00%
Percentage of Site Substitution to Upper Truckee River	0.00%	11.11%	9.68%	1.35%	9.09%	5.88%
Percentage of Site Substitution to Donner Lake	3.33%	0.00%	0.00%	12.16%	3.03%	0.00%
Percentage of Site Substitution to Prosser Reservoir	23.33%	0.00%	16.13%	12.16%	18.18%	0.00%
Percentage of Site Substitution to Stampede Reservoir	26.67%	44.44%	0.00%	33.78%	24.24%	35.29%
Percentage of Site Substitution to Boca Reservoir	26.67%	33.33%	29.03%	0.00%	24.24%	35.29%
Percentage of Site Substitution to Lower Truckee River	3.33%	11.11%	1.61%	0.00%	0.00%	0.00%
Percentage of Site Substitution to Pyramid Lake	3.33%	0.00%	19.35%	18.92%	3.03%	0.00%
Percentage of Site Substitution to Other Sites /1	13.33%	0.00%	22.58%	17.57%	18.18%	23.53%

1. Other sites are located outside the Truckee River Basin.

Willingness of Respondents to Pay to Maintain Water Level per Site

Respondents at Boca Reservoir show a greater willingness to pay not to have the water level drop than do respondents at any other site.

The willingness to pay information is provided in Table 3.1-19. On the Upper Truckee River, with 60% of respondents indicating a "Zero" response, the average value for respondents is $12.00. At Prosser Reservoir, with 29% of the respondents indicating a "Zero" response, the average value for respondents is $12.86. At Stampede Reservoir, with 30% of the respondents indicating a "Zero" response, the average value for respondents is $30.22. At Boca Reservoir, with 17% of the respondents indicating a "Zero" response, the average value for respondents is $79.74. On the Lower Truckee River, with 20% of the respondents indicating a "Zero" response, the average value for respondents is $32.80. At Pyramid Lake, with 37% of the respondents indicating a "Zero" response, the average value for respondents is $29.47.

In addition, respondents living inside the study area show a greater willingness to pay than do respondents living outside the study area. This information is also provided in Table 3.1-19. On the Upper Truckee River, the average value for local residents is $16.67 compared to an average value of $11.18 for non-local residents. At Prosser Reservoir, the average value for local residents is $25.00 compared to an average value of $8.00 for non-local residents. At Stampede Reservoir, the average value for local residents is $31.05 compared to an average value of $29.63 for non-local residents. At Boca Reservoir, the average value for local residents is $97.15 compared to an average value of $30.42 for non-local residents. On the Lower Truckee River, the average value for local residents is $38.06 compared to an average value of $19.29 for non-local residents. At Pyramid Lake, the average value for local residents is $30.00 compared to an average value of $25.00 for non-local residents.

Table 3.1-19. Willingness of Respondents to Pay to Maintain Water Level per Site.

	Upper Truckee River	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Lower Truckee River	Pyramid Lake
Average Value for Respondents	$12.00	$12.86	$30.22	$79.74	$32.80	$29.47
Percentage of Respondents indicating a "Zero" Response	60.00%	28.57%	30.43%	17.39%	20.00%	36.84%
Average Value for Local Respondents	$16.67	$25.00	$31.05	$97.15	$38.06	$30.00
Average Value for Non-Local Respondents	$11.18	$8.00	$29.63	$30.42	$19.29	$25.00

Age Brackets of Respondents

The greatest number of respondents were between 31 and 50 years of age.

Presented in Table 3.1-20 are the age brackets with corresponding number of respondents and percentage of respondents. Of only 97 respondents, 3% were between 16 and 20 years of age, 12% were between 21 and 30 years of age, 30% were between 31 and 40 years of age, 26% were between 41 and 50 years of age, 14% were between 51 and 60 years of age, 5% were between 61 and 70 years of age, and 9% were over 70 years of age.

Table 3.1-20. Age Brackets of Respondents.

	Study Area
Number of Respondents under 16 Years of Age	0
Number of Respondents between 16 - 20 Years of Age	3
Number of Respondents between 21 - 30 Years of Age	12
Number of Respondents between 31 - 40 Years of Age	29
Number of Respondents between 41 - 50 Years of Age	25
Number of Respondents between 51 - 60 Years of Age	14
Number of Respondents between 61 - 70 Years of Age	5
Number of Respondents over 70 Years of Age	9
Percentage of Respondents under 16 Years of Age	0.00%
Percentage of Respondents between 16 - 20 Years of Age	3.09%
Percentage of Respondents between 21 - 30 Years of Age	12.37%
Percentage of Respondents between 31 - 40 Years of Age	29.90%
Percentage of Respondents between 41 - 50 Years of Age	25.77%
Percentage of Respondents between 51 - 60 Years of Age	14.43%
Percentage of Respondents between 61 - 70 Years of Age	5.15%
Percentage of Respondents over 70 Years of Age	9.28%

Education Levels of Respondents

The greatest number of respondents held a college level of education.

Provided in Table 3.1-21 are the education levels with corresponding number of respondents and percentage of respondents. Of only 97 respondents, 1% held a elementary school level of education, 18% held a high school level of education, 7% held a technical school level of education, 27% held a 2 years of college level of education, 23% held a 4 years of college level of education, and 25% held over 4 years of college level of education.

Table 3.1-21. Education Levels of Respondents.

	Study Area
Number of Respondents with a Elementary School Level of Education	1
Number of Respondents with a High School Level of Education	17
Number of Respondents with a Technical School Level of Education	7
Number of Respondents with a 2 Years of College Level of Education	26
Number of Respondents with a 4 Years of College Level of Education	22
Number of Respondents with a Over 4 Years of College Level of Education	24
Percentage of Respondents with a Elementary School Level of Education	1.03%
Percentage of Respondents with a High School Level of Education	17.53%
Percentage of Respondents with a Technical School Level of Education	7.22%
Percentage of Respondents with a 2 Years of College Level of Education	26.80%
Percentage of Respondents with a 4 Years of College Level of Education	22.68%
Percentage of Respondents with a Over 4 Years of College Level of Education	24.74%

Household Income Levels of Respondents

The greatest number of respondents had a household income level of $26,000 to $75,000 per year.

Shown in Table 3.1-22 are the household income levels with corresponding number of respondents and percentage of respondents. Of only 97 respondents, 5% had a household income level below $10,000 per year, 18% had a household income level of $10,000 to $25,000 per year, 29% had a household income level of $26,000 to $50,000 per year, 35% had a household income level of $51,000 to $75,000 per year, 3% had a household income level of $76,000 to $100,000 per year, and 10% had a household income level of over $100,000 per year.

Table 3.1-22. Household Income Levels of Respondents.

	Study Area
Number of Respondents with a Household Income Level Below $10,000 per Year	5
Number of Respondents with a Household Income Level of $10,000 - $25,000 per Year	17
Number of Respondents with a Household Income Level of $26,000 - $50,000 per Year	28
Number of Respondents with a Household Income Level of $51,000 - $75,000 per Year	34
Number of Respondents with a Household Income Level of $76,000 - $100,000 per Year	3
Number of Respondents with a Household Income Level of Over $100,000 per Year	10
Percentage of Respondents with a Household Income Level Below $10,000 per Year	5.15%
Percentage of Respondents with a Household Income Level of $10,000 - $25,000 per Year	17.53%
Percentage of Respondents with a Household Income Level of $26,000 - $50,000 per Year	28.87%
Percentage of Respondents with a Household Income Level of $51,000 - $75,000 per Year	35.05%
Percentage of Respondents with a Household Income Level of $76,000 - $100,000 per Year	3.09%
Percentage of Respondents with a Household Income Level of Over $100,000 per Year	10.31%

3.2 Estimation of the Expenditure Function

Expenditures of camping and day use visitors at each of the sites are calculated using an expenditure function. Specification of the expenditure function and estimation of the expenditure function are as follows.

Specification of the Expenditure Function

The expenditure function is an important ingredient of the modern theory of consumer behavior. It shows the minimal expenditures necessary to achieve a given utility level for a particular set of prices. The properties of the expenditure function in the areas of theoretical and applied analysis of consumer behavior are developed in the studies by Barton and Bohm (1982), Deaton and Muelbauer (1980), Hicks (1946), Samuelson (1947), Silberberg (1978), Theil (1975), and Varian (1992). Let E (P, U) be an expenditure function, where P is a vector of commodity prices and U is a given level of utility. The expenditure function is the solution to the following problem:

$$E(P, U) = \text{Min } PX \quad \text{such that } U(X) \geq U \tag{3.2-1}$$

where X is a vector of non-negative quantities of goods. The solution to this optimization problem is the expenditure function that gives the minimum cost of achieving the fixed level of utility. For the expenditure function E (P, U) to be well behaved, it must have the following properties: (i) E (P, U) is non decreasing in P, (ii) E (P, U) is homogeneous of the degree 1 in P, (iii) E (P, U) is concave in P, (iv) E (P, U) is continuous in P, for $P > 0$, and (iv) if X (P, U) is the expenditure-minimizing bundle necessary to achieve utility level U at prices P, then $X(P, U) = \delta E(P, U) / \delta P$ assuming the derivative exists and that $P > 0$.

The application of the expenditure function in empirical studies of consumer behavior requires the availability of observed market prices on goods and the existence of a well-behaved utility function. In the area of demand for recreation activities, there are no market-based transactions to determine observed market prices. Consequently, the notion of a regular utility function has to be modified in developing the expenditure function for the recreation activities. Let F be a vector of the time spent on a series of recreational activities by an individual at a particular site. The indirect utility function V for recreational activities for this individual is:

$$V = V(F, S, I) \tag{3.2-2}$$

where S is a vector of site characteristics that captures the substitutability of visits across various sites and I is the total budget allocated by an individual to participate in all the recreational activities included in F. The expenditure function E dual to the indirect utility function in (3.2-2) is the minimum expenditure required for the individual to participate in all the recreational activities in F, given the site characteristics in S. The expenditure function E derived from (3.2-2) is:

$$E = I = V^{-1}(F, S) \tag{3.2-3}$$

The expenditure function in (3.2-3) can also be modified to include the variable of the total number of visitors to the site. Let N be the total number of visitors. Then the expenditures function is:

$$E = V^{-1} (F, S, N) \tag{3.2-4}$$

The specification of the expenditure function in (3.2-4) is an empirical issue and it could be determined upon a estimation model selection technique, e.g., the Box-Cox estimation technique. One notable feature of the expenditure function in (3.2-4) is that it can be used to estimate expenditures of recreational activities at a particular site.

The expenditure function in (3.2-4) is used to evaluate the expenditures of recreational activities at the following six sites in California and Nevada: Upper Truckee River, Prosser Reservoir, Stampede Reservoir, Boca Reservoir, Lower Truckee River, and Pyramid Lake. The attributes of the characteristics of each site are captured by including dummy variable for each site in S. The definition of the dummy variables included in S are: UTR = 1 if the visitation site is Upper Truckee River and 0 otherwise; PR = 1 if the visitation site is Prosser Reservoir and 0 otherwise; SR = 1 if the visitation site is Stampede Reservoir and 0 otherwise; BR = 1 if the visitation site is Boca Reservoir and 0 otherwise; LTR = 1 if the visitation site is Lower Truckee River and 0 otherwise; and, PL = 1 if the visitation site is Pyramid Lake and 0 otherwise. The hours spent on each of the following eleven recreational activities are included in F. The activities were determined according to their availability and popularity at the sites. The activities are: picnicking, camping, fishing, swimming, boating, fishing from boat, water skiing, jet skiing, rafting, kayaking, biking, hiking, and other activities. To capture the effect of the type of visitor at a given site on their expenditures, i.e., camping versus day use, a dummy variable D, defined as D = 1 if camping visitor and 0 if day use visitor, is included in the expenditure function in (3.2-4). Following the categorization of expenditures on the recreation survey, the expenditures by a visitor to a given site are identified as licenses, camping fees, hotel or motel, restaurant, groceries, equipment and supplies, rental, fuel, and other. Using the above specification of the variables, the expenditure function in (3.2-4) can now be presented as:

$$E_i = V^{-1} (\text{UTR, PR, SR, BR, LTR, PL, D, } \sum_{1}^{13} F_j, N); i = 1,.....,6 \tag{3.2-5}$$

The functional form specification of the expenditure function in (3.2-5) is an empirical issue and it will be determined using the Box-Cox flexible functional form technique.. The Box-Cox specification of the expenditure function in (3.2-5) is:

$$\frac{E_i^{\lambda} - 1}{\lambda} = \beta_1 UTR + \beta_2 PR + \beta_3 SR + \beta_4 BR + \beta_5 LTR + \beta_6 PL + \beta_7 D \qquad (3.2\text{-}6)$$

$$+ \sum_{8}^{20} \beta_j \left(\frac{F_j^{\lambda} - 1}{\lambda} \right) + \beta_{21} \left(\frac{N^{\lambda} - 1}{\lambda} \right) + U$$

where U is the stochastic error term, β is the slope parameter, and λ is the transformation parameter. The transformation parameter may take a wide range of values that would determine the particular functional form that the variable subject to the Box-Cox transformation will assume. For example, one gets a logarithmic transformation for a variable if λ is equal to zero. All of the coefficients of the expenditure function in (3.2-5), including λ, will be estimated using the estimation of the following log-likelihood function:

$$L(\lambda, \beta, \sigma^2; E, X) = -\frac{T}{2} \text{Ln}(2\pi\sigma^2) - \frac{1}{2\sigma^2} (E^{\lambda} - X^{\lambda}B)' (E^{\lambda} - X^{\lambda}B) \qquad (3.2\text{-}7)$$

$$+ \text{Ln}(J); \text{ and } J = \det \left[\frac{\partial E^{\lambda}}{\partial E} \right] = \prod_{t=1}^{T} E_t^{\lambda - 1}$$

where X is a vector of observations on all the exogenous variables, B is a vector of all the slope parameters to be estimated, and T is the number of observations.

Estimation of the Expenditure Function

The data collected through the recreation survey for the six sites is used to estimate the expenditure function in (3.2-6). A total number of 151 out of the 162 complete questionnaires are used in the estimation. The initial diagnosis of the data revealed that there are a large number of zeros on most of the recreational activities and a number of expenditure categories making the estimation of the expenditure function in its generalized form in (3.2-6) impossible. A number of alternatives to combine some of the recreational activities are tried to estimate a modified form of the expenditure function in (3.2-6). All of these attempts resulted into some difficulties in estimation of the expenditure function in (3.2-6).

The final modified form of the expenditure function in (3.2-6) that provides meaningful estimation results is:

$$\frac{E^{\lambda}-1}{\lambda} = \beta_1 UTR + \beta_2 PR + \beta_3 SR + \beta_4 BR + \beta_5 LTR + \beta_6 PL + \beta_7 D \qquad (3.2\text{-}8)$$

$$+ \beta_8 \left(\frac{F^{\lambda}-1}{\lambda}\right) + \beta_9 \left(\frac{N^{\lambda}-1}{\lambda}\right) + U$$

The expenditure function expressed in simple notation becomes:

$$LnE = \beta_1 UTR + \beta_2 PR + \beta_3 SR + \beta_4 BR + \beta_5 LTR + \beta_6 PL + \beta_7 D \qquad (3.2\text{-}9)$$

$$+ \beta_8 LnF + \beta_9 LnN + U$$

where E is the sum of the nine expenditure categories per day, F is the sum of the hours spent per day by a visitor on the thirteen categories of recreational activities, and N is the group size. The Ln is an abbreviation for natural logarithm.

Using the survey observations on the variables E, F, N, the six location dummy variables, and the type of visitor dummy variable, the expenditure function in (3.2-8) or (3.2-9) is estimated having the following results.

$$\begin{aligned} LnE = {} & 3.6366UTR + 4.2217PR + 3.5447SR + 2.8709BR + 2.7218LTR \\ & (7.80) \quad (8.31) \quad (8.15) \quad (8.21) \quad (8.51) \\ & + 3.3791PL - 0.6129D + 0.2188LnF + 0.45664LnN \\ & (7.56) \quad (-2.30) \quad (1.268) \quad (3.255) \end{aligned} \tag{3.2-10}$$

The numbers in the parentheses are the asymptotic t-ratios for 142 degrees of freedom. The adjusted R^2 is 0.1483 for the 151 observations. The 162 observations were edited down to 151. Observations that were deleted were observations having a zero for total expenditures, or a zero for total recreation activity hours, or a zero for group size. The camping and day use visitor expenditure function observations are given in Table 3.2-1.

The maximum likelihood (ML) ratio test is then used to check the validity of alternative functional specifications of the expenditure function for specific value of λ, i.e., logarithmic ($\lambda = 0$) and linear ($\lambda = 1$) functional forms. Let S denote the parameter space under the Box-Cox specification and s denote the subspace of S restricted by the null hypothesis (H^o). The ML ratio test to test for a given functional form under H^o is a large sample test and can be conducted as follows:

$$d = -2 [L(S) - L(s)] \tag{3.2-11}$$

where L (S) is the maximum of the log likelihood function under S and L (s) is the maximum value of the log likelihood function under s. If H^o is true, the statistic d has the limiting chi-squared (χ^2) with n degrees of freedom, where n is the number of restrictions imposed by H^o.

The maximum likelihood estimation of λ in (3.2-8) is 0.07 with the maximum of the log likelihood function L(S) of – 803.568. Using estimates of the maximum log likelihood function of λ, L(s) for the logarithmic and linear specifications of the expenditure function, the test statistic in (3.2-11) is calculated. The test results provide evidence to accept H^o: $\lambda = 0$ and to reject H^o: $\lambda = 1$ against the alternative hypothesis that H^o: $\lambda = 0.07$. In other words, the final functional specification of the expenditure function is in logarithmic functional form.

The estimated expenditure function predicts the logarithm of the average expenditures per day at a particular site for both camping and day use visitors for given values of the logarithm of their hours of non-camping recreation activity and the logarithm of their group size. Then the average expenditures per day are determined by taking the anti-log of the logarithm of the average expenditures. This procedure is shown below by site.

Upper Truckee River

Camping Visitor Group Expenditures per Day

$$LnE = 3.6366(1) + 4.2217(0) + 3.5447(0) + 2.8709(0) + 2.7218(0) + 3.3791(0)$$

$$- 0.6129(1) + 0.2188Ln(5.50) + 0.45664Ln(3.47)$$

$$LnE = 3.6366 - 0.6129 + 0.2188(1.70) + 0.45664(1.24)$$

$$LnE = 3.9619$$

$$E = \$52.56$$

Day Use Visitor Group Expenditures per Day

$$LnE = 3.6366(1) + 4.2217(0) + 3.5447(0) + 2.8709(0) + 2.7218(0) + 3.3791(0)$$

$$- 0.6129(0) + 0.2188Ln(3.00) + 0.45664Ln(5.50)$$

$$LnE = 3.6366 + 0.2188(1.10) + 0.45664(1.70)$$

$$LnE = 4.6536$$

$$E = \$104.96$$

Prosser Reservoir

Camping Visitor Group Expenditures per Day

$$LnE = 3.6366(0) + 4.2217(1) + 3.5447(0) + 2.8709(0) + 2.7218(0) + 3.3791(0)$$

$$- 0.6129(1) + 0.2188Ln(5.25) + 0.45664Ln(3.50)$$

$$LnE = 4.2217 - 0.6129 + 0.2188(1.66) + 0.45664(1.25)$$

$$LnE = 4.5427$$

$$E = \$93.95$$

Day Use Visitor Group Expenditures per Day

$$LnE = 3.6366(0) + 4.2217(1) + 3.5447(0) + 2.8709(0) + 2.7218(0) + 3.3791(0)$$

$$- 0.6129(0) + 0.2188Ln(3.33) + 0.45664Ln(3.33)$$

$$LnE = 4.2217 + 0.2188(1.20) + 0.45664(1.20)$$

$$LnE = 5.0322$$

$$E = \$153.27$$

Camping visitor data for Prosser Reservoir was not available. The non-camping recreation activity hours and group size for camping visitors was taken from Boca Reservoir data.

Stampede Reservoir

Camping Visitor Group Expenditures per Day

$$LnE = 3.6366(0) + 4.2217(0) + 3.5447(1) + 2.8709(0) + 2.7218(0) + 3.3791(0)$$
$$- 0.6129(1) + 0.2188Ln(6.15) + 0.45664Ln(5.45)$$

$$LnE = 3.5447 - 0.6129 + 0.2188(1.82) + 0.45664(1.70)$$

$$LnE = 4.1063$$

$$E = \$60.72$$

Day Use Visitor Group Expenditures per Day

$$LnE = 3.6366(0) + 4.2217(0) + 3.5447(1) + 2.8709(0) + 2.7218(0) + 3.3791(0)$$
$$- 0.6129(0) + 0.2188Ln(5.67) + 0.45664Ln(3.89)$$

$$LnE = 3.5447 + 0.2188(1.73) + 0.45664(1.36)$$

$$LnE = 4.5443$$

$$E = \$94.10$$

Boca Reservoir

Camping Visitor Group Expenditures per Day

$$LnE = 3.6366(0) + 4.2217(0) + 3.5447(0) + 2.8709(1) + 2.7218(0) + 3.3791(0)$$
$$- 0.6129(1) + 0.2188Ln(5.25) + 0.45664Ln(3.50)$$

$$LnE = 2.8709 - 0.6129 + 0.2188(1.66) + 0.45664(1.25)$$

$$LnE = 3.1921$$

$$E = \$24.34$$

Day Use Visitor Group Expenditures per Day

$$LnE = 3.6366(0) + 4.2217(0) + 3.5447(0) + 2.8709(1) + 2.7218(0) + 3.3791(0)$$
$$- 0.6129(0) + 0.2188Ln(5.08) + 0.45664Ln(4.68)$$

$$LnE = 2.8709 + 0.2188(1.62) + 0.45664(1.54)$$

$$LnE = 3.9286$$

$$E = \$50.84$$

Lower Truckee River

Camping Visitor Group Expenditures per Day

$$LnE = 3.6366(0) + 4.2217(0) + 3.5447(0) + 2.8709(0) + 2.7218(1) + 3.3791(0)$$
$$- 0.6129(1) + 0.2188Ln(3.00) + 0.45664Ln(2.00)$$

$$LnE = 2.7218 - 0.6129 + 0.2188(1.10) + 0.45664(0.69)$$

$$LnE = 2.6647$$

$$E = \$14.36$$

Day Use Visitor Group Expenditures per Day

$$LnE = 3.6366(0) + 4.2217(0) + 3.5447(0) + 2.8709(0) + 2.7218(1) + 3.3791(0)$$
$$- 0.6129(0) + 0.2188Ln(3.96) + 0.45664Ln(2.29)$$

$$LnE = 2.7218 + 0.2188(1.38) + 0.45664(0.83)$$

$$LnE = 3.4028$$

$$E = \$30.05$$

Pyramid Lake

Camping Visitor Group Expenditures per Day

$$LnE = 3.6366(0) + 4.2217(0) + 3.5447(0) + 2.8709(0) + 2.7218(0) + 3.3791(1)$$

$$- 0.6129(1) + 0.2188Ln(5.90) + 0.45664Ln(3.20)$$

$$LnE = 3.3791 - 0.6129 + 0.2188(1.77) + 0.45664(1.16)$$

$$LnE = 3.6831$$

$$E = \$39.77$$

Day Use Visitor Group Expenditures per Day

$$LnE = 3.6366(0) + 4.2217(0) + 3.5447(0) + 2.8709(0) + 2.7218(0) + 3.3791(1)$$

$$- 0.6129(0) + 0.2188Ln(6.14) + 0.45664Ln(5.00)$$

$$LnE = 3.3791 + 0.2188(1.82) + 0.45664(1.61)$$

$$LnE = 4.5125$$

$$E = \$91.15$$

The above camping and day use visitor expenditure function values are presented by site in Table 3.2-2. These values are not directly comparable to the survey data because of editing the observations from 162 to 151 and estimating the values with the expenditure function.

Table 3.2-1. Camping and Day Use Visitor Expenditure Function Observations.

Observation Number	Year	Site	Questionnaire Number	Visitor Type	Expenditures	Number of Days	Expenditures per Day	Upper Truckee River UTR	Prosser Reservoir PR	Stampede Reservoir SR	Boca Reservoir BR	Lower Truckee River LTR	Pyramid Lake PL	Camping Visitor	Activity Hours	Group Size
1	1993	UTR	1	CP	267.00	7.0	38.14	1	0	0	0	0	0	1	2.5	4.0
2	1993	UTR	2	CP	240.00	10.0	24.00	1	0	0	0	0	0	1	6.0	4.0
3	1993	UTR	3	CP	100.00	2.0	50.00	1	0	0	0	0	0	1	3.0	4.0
4	1993	UTR	4	CP	290.00	2.0	145.00	1	0	0	0	0	0	1	6.0	4.0
5	1993	UTR	5	CP	183.50	3.0	61.17	1	0	0	0	0	0	1	5.0	2.0
6	1993	UTR	6	CP	83.00	7.0	11.86	1	0	0	0	0	0	1	8.0	2.0
7	1993	UTR	7	CP	50.00	1.0	50.00	1	0	0	0	0	0	1	2.0	6.0
8	1993	UTR	8	CP	71.00	1.0	71.00	1	0	0	0	0	0	1	7.0	4.0
9	1993	UTR	9	CP	36.00	3.0	12.00	1	0	0	0	0	0	1	2.0	4.0
10	1993	UTR	10	CP	198.00	5.0	39.60	1	0	0	0	0	0	1	8.0	2.0
11	1993	UTR	11	CP	78.00	2.0	39.00	1	0	0	0	0	0	1	2.0	4.0
12	1993	UTR	12	CP	223.00	4.0	55.75	1	0	0	0	0	0	1	11.0	6.0
13	1993	UTR	13	CP	290.00	14.0	20.71	1	0	0	0	0	0	1	14.0	2.0
14	1993	UTR	14	CP	75.00	1.0	75.00	1	0	0	0	0	0	1	4.0	2.0
15	1993	UTR	15	CP	317.00	10.0	31.70	1	0	0	0	0	0	1	2.0	2.0
16	1993	UTR	1	DU	450.00	0.0	450.00	1	0	0	0	0	0	0	3.0	7.0
17	1993	UTR	2	DU	540.00	0.0	540.00	1	0	0	0	0	0	0	3.0	4.0
18	1993	PR	1	DU	37.90	0.0	37.90	0	1	0	0	0	0	0	6.0	2.0
19	1993	PR	2	DU	54.00	0.0	54.00	0	1	0	0	0	0	0	2.0	1.0
20	1993	PR	3	DU	732.00	0.0	732.00	0	1	0	0	0	0	0	4.0	8.0
21	1993	PR	4	DU	268.00	0.0	268.00	0	1	0	0	0	0	0	3.0	5.0
22	1993	PR	5	DU	24.50	0.0	24.50	0	1	0	0	0	0	0	3.0	2.0
23	1993	PR	6	DU	623.00	0.0	623.00	0	1	0	0	0	0	0	2.0	2.0
24	1993	SR	1	CP	145.00	3.0	48.33	0	0	1	0	0	0	1	3.0	8.0
25	1993	SR	2	CP	66.00	3.0	22.00	0	0	1	0	0	0	1	8.0	4.0
26	1993	SR	3	CP	177.50	2.0	88.75	0	0	1	0	0	0	1	4.0	4.0
27	1993	SR	4	CP	137.00	2.0	68.50	0	0	1	0	0	0	1	2.0	2.0
28	1993	SR	5	CP	163.00	3.0	54.33	0	0	1	0	0	0	1	2.0	3.0
29	1993	SR	6	CP	180.00	3.0	60.00	0	0	1	0	0	0	1	9.0	7.0
30	1993	SR	7	CP	421.00	7.0	60.14	0	0	1	0	0	0	1	9.0	9.0
31	1993	SR	8	CP	110.90	2.0	55.45	0	0	1	0	0	0	1	7.0	2.0
32	1993	SR	9	CP	500.00	2.0	250.00	0	0	1	0	0	0	1	5.0	14.0
33	1993	SR	10	CP	239.00	3.0	79.67	0	0	1	0	0	0	1	4.0	8.0
34	1993	SR	11	CP	76.00	3.0	25.33	0	0	1	0	0	0	1	5.0	1.0
35	1993	SR	12	CP	56.00	2.0	28.00	0	0	1	0	0	0	1	5.0	2.0
36	1993	SR	13	CP	91.00	5.0	18.20	0	0	1	0	0	0	1	5.0	2.0
37	1993	SR	14	CP	325.00	4.0	81.25	0	0	1	0	0	0	1	5.0	2.0
38	1993	SR	15	CP	315.00	3.0	105.00	0	0	1	0	0	0	1	13.0	10.0
39	1993	SR	16	CP	312.00	2.0	156.00	0	0	1	0	0	0	1	8.0	5.0
40	1993	SR	17	CP	167.20	2.0	83.60	0	0	1	0	0	0	1	6.0	3.0
41	1993	SR	18	CP	76.00	1.0	76.00	0	0	1	0	0	0	1	1.5	2.0
42	1993	SR	19	CP	90.95	2.0	45.48	0	0	1	0	0	0	1	5.0	6.0
43	1993	SR	20	CP	722.00	10.0	72.20	0	0	1	0	0	0	1	12.0	19.0
44	1993	SR	21	CP	48.00	3.0	16.00	0	0	1	0	0	0	1	5.0	2.0
45	1993	SR	22	CP	239.00	8.0	29.88	0	0	1	0	0	0	1	3.0	4.0
46	1993	SR	23	CP	240.00	2.0	120.00	0	0	1	0	0	0	1	10.0	8.0
47	1993	SR	24	CP	266.00	7.0	38.00	0	0	1	0	0	0	1	6.5	5.0
48	1993	SR	25	CP	123.00	6.0	20.50	0	0	1	0	0	0	1	8.0	4.0
49	1993	SR	26	CP	169.00	6.0	28.17	0	0	1	0	0	0	1	2.0	2.0
50	1993	SR	27	CP	77.00	2.0	38.50	0	0	1	0	0	0	1	13.0	2.0
51	1993	SR	28	CP	199.00	2.0	99.50	0	0	1	0	0	0	1	4.0	12.0
52	1993	SR	29	CP	249.00	3.0	83.00	0	0	1	0	0	0	1	5.0	13.0
53	1993	SR	30	CP	90.00	2.0	45.00	0	0	1	0	0	0	1	5.0	2.0
54	1993	SR	31	CP	361.00	7.0	51.57	0	0	1	0	0	0	1	10.0	4.0
55	1993	SR	32	CP	65.50	5.0	13.10	0	0	1	0	0	0	1	5.0	2.0
56	1993	SR	33	CP	230.00	3.0	76.67	0	0	1	0	0	0	1	8.0	7.0
57	1993	SR	1	DU	43.00	0.0	43.00	0	0	1	0	0	0	0	3.0	4.0
58	1993	SR	2	DU	204.00	0.0	204.00	0	0	1	0	0	0	0	5.0	8.0
59	1993	SR	3	DU	15.00	0.0	15.00	0	0	1	0	0	0	0	4.0	4.0

Table 3.2-1. Camping and Day Use Visitor Expenditure Function Observations (continue).

Observation Number	Year	Site	Questionnaire Number	Visitor Type	Expenditures	Number of Days	Expenditures per Day	Upper Truckee River UTR	Prosser Reservoir PR	Stampede Reservoir SR	Boca Reservoir BR	Lower Truckee River LTR	Pyramid Lake PL	Camping Visitor	Activity Hours	Group Size
60	1993	SR	4	DU	271.00	0.0	271.00	0	0	1	0	0	0	0	8.0	2.0
61	1993	SR	5	DU	158.00	0.0	158.00	0	0	1	0	0	0	0	5.0	2.0
62	1993	SR	6	DU	137.00	0.0	137.00	0	0	1	0	0	0	0	5.0	2.0
63	1993	SR	7	DU	60.00	0.0	60.00	0	0	1	0	0	0	0	10.0	4.0
64	1993	SR	8	DU	35.00	0.0	35.00	0	0	1	0	0	0	0	8.0	2.0
65	1993	SR	9	DU	150.00	0.0	150.00	0	0	1	0	0	0	0	3.0	7.0
66	1993	BR	1	CP	63.00	2.0	31.50	0	0	0	1	0	0	1	7.0	4.0
67	1993	BR	2	CP	175.00	10.0	17.50	0	0	0	1	0	0	1	3.0	2.0
68	1993	BR	3	CP	124.00	2.0	62.00	0	0	0	1	0	0	1	7.0	4.0
69	1993	BR	4	CP	100.00	14.0	7.14	0	0	0	1	0	0	1	4.0	4.0
70	1993	BR	1	DU	30.00	0.0	30.00	0	0	0	1	0	0	0	5.0	5.0
71	1993	BR	2	DU	60.00	0.0	60.00	0	0	0	1	0	0	0	6.0	9.0
72	1993	BR	3	DU	70.00	0.0	70.00	0	0	0	1	0	0	0	8.0	4.0
73	1993	BR	4	DU	30.00	0.0	30.00	0	0	0	1	0	0	0	4.0	2.0
74	1993	BR	5	DU	465.00	0.0	465.00	0	0	0	1	0	0	0	6.0	2.0
75	1993	BR	6	DU	110.00	0.0	110.00	0	0	0	1	0	0	0	2.0	18.0
76	1993	BR	7	DU	75.00	0.0	75.00	0	0	0	1	0	0	0	5.0	3.0
77	1993	BR	8	DU	30.00	0.0	30.00	0	0	0	1	0	0	0	2.0	2.0
78	1993	BR	9	DU	130.00	0.0	130.00	0	0	0	1	0	0	0	8.0	4.0
79	1993	BR	10	DU	10.00	0.0	10.00	0	0	0	1	0	0	0	6.0	18.0
80	1993	BR	11	DU	12.00	0.0	12.00	0	0	0	1	0	0	0	5.0	2.0
81	1993	BR	12	DU	12.00	0.0	12.00	0	0	0	1	0	0	0	5.0	4.0
82	1993	BR	13	DU	10.00	0.0	10.00	0	0	0	1	0	0	0	4.0	1.0
83	1993	BR	14	DU	46.50	0.0	46.50	0	0	0	1	0	0	0	5.0	2.0
84	1993	BR	15	DU	129.00	0.0	129.00	0	0	0	1	0	0	0	6.0	5.0
85	1993	BR	16	DU	41.00	0.0	41.00	0	0	0	1	0	0	0	8.0	3.0
86	1993	BR	17	DU	20.00	0.0	20.00	0	0	0	1	0	0	0	2.0	3.0
87	1993	BR	18	DU	32.00	0.0	32.00	0	0	0	1	0	0	0	3.0	6.0
88	1993	BR	19	DU	70.00	0.0	70.00	0	0	0	1	0	0	0	6.0	7.0
89	1993	BR	20	DU	25.00	0.0	25.00	0	0	0	1	0	0	0	3.0	6.0
90	1993	BR	21	DU	1910.00	0.0	1910.00	0	0	0	1	0	0	0	8.0	3.0
91	1993	BR	22	DU	42.50	0.0	42.50	0	0	0	1	0	0	0	5.0	2.0
92	1993	BR	23	DU	220.00	0.0	220.00	0	0	0	1	0	0	0	2.0	10.0
93	1993	BR	24	DU	42.00	0.0	42.00	0	0	0	1	0	0	0	8.0	4.0
94	1993	BR	25	DU	25.00	0.0	25.00	0	0	0	1	0	0	0	4.0	3.0
95	1993	BR	26	DU	10.00	0.0	10.00	0	0	0	1	0	0	0	2.0	2.0
96	1993	BR	27	DU	20.00	0.0	20.00	0	0	0	1	0	0	0	5.0	1.0
97	1993	BR	28	DU	60.00	0.0	60.00	0	0	0	1	0	0	0	5.0	4.0
98	1993	BR	29	DU	40.00	0.0	40.00	0	0	0	1	0	0	0	6.0	8.0
99	1993	BR	30	DU	30.00	0.0	30.00	0	0	0	1	0	0	0	4.0	7.0
100	1993	BR	31	DU	223.00	0.0	223.00	0	0	0	1	0	0	0	9.0	1.0
101	1993	BR	32	DU	150.00	0.0	150.00	0	0	0	1	0	0	0	6.0	7.0
102	1993	BR	33	DU	10.00	0.0	10.00	0	0	0	1	0	0	0	3.0	3.0
103	1993	BR	34	DU	10.00	0.0	10.00	0	0	0	1	0	0	0	4.0	1.0
104	1993	BR	35	DU	24.00	0.0	24.00	0	0	0	1	0	0	0	5.0	3.0
105	1993	BR	36	DU	57.00	0.0	57.00	0	0	0	1	0	0	0	6.0	10.0
106	1993	BR	37	DU	0.50	0.0	0.50	0	0	0	1	0	0	0	1.0	2.0
107	1993	BR	38	DU	280.00	0.0	280.00	0	0	0	1	0	0	0	12.0	5.0
108	1993	BR	39	DU	90.00	0.0	90.00	0	0	0	1	0	0	0	5.0	2.0
109	1993	BR	40	DU	300.00	0.0	300.00	0	0	0	1	0	0	0	4.0	3.0
110	1993	LTR	1	CP	35.00	2.0	17.50	0	0	0	0	1	0	1	3.0	2.0
111	1993	LTR	1	DU	1.00	0.0	1.00	0	0	0	0	1	0	0	4.0	1.0
112	1993	LTR	2	DU	94.00	0.0	94.00	0	0	0	0	1	0	0	4.0	5.0
113	1993	LTR	3	DU	151.00	0.0	151.00	0	0	0	0	1	0	0	7.0	2.0
114	1993	LTR	4	DU	23.00	0.0	23.00	0	0	0	0	1	0	0	4.0	1.0
115	1993	LTR	5	DU	1.00	0.0	1.00	0	0	0	0	1	0	0	7.0	2.0
116	1993	LTR	6	DU	45.00	0.0	45.00	0	0	0	0	1	0	0	4.0	4.0
117	1993	LTR	7	DU	13.50	0.0	13.50	0	0	0	0	1	0	0	5.0	1.0
118	1993	LTR	8	DU	20.00	0.0	20.00	0	0	0	0	1	0	0	3.0	2.0

Table 3.2-1. Camping and Day Use Visitor Expenditure Function Observations (continue).

Observation Number	Year	Site	Questionnaire Number	Visitor Type	Expenditures	Number of Days	Expenditures per Day	Upper Truckee River UTR	Prosser Reservoir PR	Stampede Reservoir SR	Boca Reservoir BR	Lower Truckee River LTR	Pyramid Lake PL	Camping Visitor	Activity Hours	Group Size
119	1993	LTR	9	DU	21.00	0.0	21.00	0	0	0	0	1	0	0	4.0	1.0
120	1993	LTR	10	DU	34.00	0.0	34.00	0	0	0	0	1	0	0	2.0	4.0
121	1993	LTR	11	DU	775.00	0.0	775.00	0	0	0	0	1	0	0	1.0	1.0
122	1993	LTR	12	DU	44.00	0.0	44.00	0	0	0	0	1	0	0	3.0	1.0
123	1993	LTR	13	DU	52.00	0.0	52.00	0	0	0	0	1	0	0	3.0	1.0
124	1993	LTR	14	DU	0.50	0.0	0.50	0	0	0	0	1	0	0	2.0	1.0
125	1993	LTR	15	DU	70.00	0.0	70.00	0	0	0	0	1	0	0	3.0	1.0
126	1993	LTR	16	DU	21.50	0.0	21.50	0	0	0	0	1	0	0	4.0	1.0
127	1993	LTR	17	DU	28.50	0.0	28.50	0	0	0	0	1	0	0	2.0	5.0
128	1993	LTR	18	DU	182.00	0.0	182.00	0	0	0	0	1	0	0	6.0	10.0
129	1993	LTR	19	DU	22.00	0.0	22.00	0	0	0	0	1	0	0	3.0	2.0
130	1993	LTR	20	DU	14.00	0.0	14.00	0	0	0	0	1	0	0	4.0	2.0
131	1993	LTR	21	DU	21.50	0.0	21.50	0	0	0	0	1	0	0	6.0	1.0
132	1993	LTR	22	DU	73.00	0.0	73.00	0	0	0	0	1	0	0	3.0	2.0
133	1993	LTR	23	DU	23.00	0.0	23.00	0	0	0	0	1	0	0	5.0	2.0
134	1993	LTR	24	DU	42.00	0.0	42.00	0	0	0	0	1	0	0	6.0	2.0
135	1993	PL	1	CP	320.00	4.0	80.00	0	0	0	0	0	1	1	1.0	2.0
136	1993	PL	2	CP	75.00	3.0	25.00	0	0	0	0	0	1	1	7.0	5.0
137	1993	PL	3	CP	170.00	2.0	85.00	0	0	0	0	0	1	1	7.0	2.0
138	1993	PL	4	CP	41.00	1.0	41.00	0	0	0	0	0	1	1	4.0	2.0
139	1993	PL	5	CP	87.00	1.0	87.00	0	0	0	0	0	1	1	12.0	2.0
140	1993	PL	6	CP	162.00	4.0	40.50	0	0	0	0	0	1	1	10.0	3.0
141	1993	PL	7	CP	140.00	2.0	70.00	0	0	0	0	0	1	1	6.0	5.0
142	1993	PL	8	CP	75.00	3.0	25.00	0	0	0	0	0	1	1	8.0	1.0
143	1993	PL	9	CP	195.00	6.0	32.50	0	0	0	0	0	1	1	3.0	4.0
144	1993	PL	10	CP	180.00	4.0	45.00	0	0	0	0	0	1	1	1.0	6.0
145	1993	PL	1	DU	70.00	0.0	70.00	0	0	0	0	0	1	0	5.0	2.0
146	1993	PL	2	DU	20.00	0.0	20.00	0	0	0	0	0	1	0	7.0	3.0
147	1993	PL	3	DU	61.00	0.0	61.00	0	0	0	0	0	1	0	8.0	5.0
148	1993	PL	4	DU	45.00	0.0	45.00	0	0	0	0	0	1	0	5.0	3.0
149	1993	PL	5	DU	45.00	0.0	45.00	0	0	0	0	0	1	0	7.0	10.0
150	1993	PL	6	DU	42.00	0.0	42.00	0	0	0	0	0	1	0	5.0	5.0
151	1993	PL	7	DU	220.00	0.0	220.00	0	0	0	0	0	1	0	6.0	7.0

Table 3.2-2. Camping and Day Use Visitor Expenditure Function Values.

	Upper Truckee River	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Lower Truckee River	Pyramid Lake
Camping Visitor Group Expenditures per Day	$52.56	$93.95	$60.72	$24.34	$14.36	$39.77
Day Use Visitor Group Expenditures per Day	$104.96	$153.27	$94.10	$50.84	$30.05	$91.15

3.3. Formulation of the Model Equations

Model formulation incorporates the above descriptive statistics and expenditure function values. The variable that drives the model is the end of the month reservoir storage levels at Prosser, Stampede, and Boca Reservoirs. Relative to the storage levels at these reservoirs, the model calculates the annual number of camping and day use visitors at the reservoirs and the annual expenditures of the camping and day use visitors.

There are eleven functions within the model. Using only end of the month reservoir storage levels as the input into the model, the functions then generate the following data.

Visitation Relative to End of the Month Reservoir Storage Levels
Annual Visitation Relative to End of the Month Reservoir Storage Levels
Annual Number of Camping Visitors
Annual Number of Day Use Visitors
Annual Number of Camping Visitor Groups
Annual Number of Day Use Visitor Groups
Annual Camping Visitor Expenditures
Annual Day Use Visitor Expenditures
Annual Number of Camping and Day Use Visitors
Annual Camping and Day Use Visitor Expenditures
Annual Camping and Day Use Visitor Expenditures by Category

Each of the functions calculate data either by use of a single equation or multiple equations. Simultaneously, data is generated by one function and inputted into another function and so on. Throughout the model, there are twenty-seven equations with thirty-nine variables.

Visitation Relative to End of the Month Reservoir Storage Levels

The visitation relative to end of the month reservoir storage levels is derived by assigning a scale value to the end of the month reservoir storage level and then calculating a percentage of visitation corresponding to the assigned scale value. Each of these functions are based on data taken from the survey.

The scale values for reservoir storage levels are shown in Table 3.3-1. Scale values for Prosser Reservoir and Stampede Reservoir range from high to low or 4 to 1. These scale values correspond to reservoir storage levels at Prosser Reservoir from 29,840 acre-feet to 11,000 acre-feet and storage levels at Stampede Reservoir from 226,000 acre-feet to 80,000 acre-feet. Scale values for Boca Reservoir range from 5 to 1 and correspond to reservoir storage levels from 41,100 acre-feet to less than 22,000 acre-feet. These reservoir storage levels are stated in the survey questionnaire.

The end of the month reservoir storage level is assigned a scale value through the following equation.

If $A_i \geq B_{it} \geq C_i$ storage level, then scale value $D_{it} = \alpha_i + \beta_i (B_{it})$ (3.3-1)

where:
- A_i is the high storage level for reservoir i
- B_{it} is the end of the month storage level for reservoir i in month t
- C_i is the low storage level for reservoir i
- D_{it} is the scale value for the end of the month storage level for reservoir i in month t
- α_i is the scale value constant term for reservoir i
- β_i is the scale value slope coefficient term for reservoir i

This equation is formulated to linearly interpolate a end of the month storage level for a reservoir during any month to a scale value.

Separate equations for reservoir storage levels are formulared for Prosser, Stampede, and Boca Reservoirs. These equations are provided below by reservoir.

Prosser Reservoir

If $29,840 \geq B_{it} \geq 28,000$ storage level, then scale value $D_{it} = -12.2174 + .000543 (B_{it})$
If $27,999 \geq B_{it} \geq 19,000$ storage level, then scale value $D_{it} = -.1111 + .000111 (B_{it})$
If $18,999 \geq B_{it} \geq 11,000$ storage level, then scale value $D_{it} = -.3750 + .000125 (B_{it})$

Stampede Reservoir

If $226{,}000 \geq B_{it} \geq 170{,}000$ storage level, then scale value $D_{it} = -.03571 + .000018\ (B_{it})$
If $169{,}999 \geq B_{it} \geq 130{,}000$ storage level, then scale value $D_{it} = -1.2500 + .000025\ (B_{it})$
If $129{,}999 \geq B_{it} \geq 80{,}000$ storage level, then scale value $D_{it} = -.60000 + .000020\ (B_{it})$

Boca Reservoir

If $41{,}100 \geq B_{it} \geq 38{,}000$ storage level, then scale value $D_{it} = -8.258 + .00032\ (B_{it})$
If $37{,}999 \geq B_{it} \geq 33{,}000$ storage level, then scale value $D_{it} = -3.600 + .00020\ (B_{it})$
If $32{,}999 \geq B_{it} \geq 22{,}000$ storage level, then scale value $D_{it} = 0 + .00009\ (B_{it})$
If $21{,}999 \geq B_{it} \geq 0$ storage level, then scale value $D_{it} = 1.000 + .00005\ (B_{it})$

End of the month reservoir storage levels for Prosser, Stampede, and Boca Reservoirs for April through October and Other Months are given in Table 3.3-2. April through October is considered to be the recreation season in a given year. Other Months are January, February, March, November, and December of the given year. The reservoir storage levels are taken in total for April through October and as an average for the Other Months. The scale values for these end of the month reservoir storage levels are calculated using the above equations and shown by reservoir in Table 3.3-3.

The percentage of visitation corresponding to the scale value of an end of the month reservoir storage level is based on the indicated number of visits per respondent for reservoir storage levels taken from the survey.

The indicated number of visits per respondent for reservoir storage levels are provided in Table 3.3-4. For Prosser Reservoir, the number of visits per respondent at levels 1 to 3 is 5.67 and at level 4 is .50. The percentages of visitation are 100% for levels 1 to 3 and 8.82% for level 4. Likewise for Stampede Reservoir, the number of visits per respondent at levels 1, 2, 3, and 4 are 1.82, 1.85, 1.39, and .87. The percentages of visitation are 100%, 101.42%, 76.34%, and 47.69%. Number of visits per respondent for Boca Reservoir at levels 1, 2, 3, 4, and 5 are 11.09, 9.11, 8.15, 4.46, and .37. The percentages of visitation are 100%, 82.16%, 73.53%, 40.19%, and 3.33%.

The percentage of visitation corresponding to the scale value is then calculated through the following equation.

If $E_i \geq D_{it} \geq F_i$ scale value, then visitation $G_{it} = \alpha_i + \beta_i (D_{it})$ (3.3-2)

where:
- E_i is the high scale value for reservoir i
- D_{it} is the scale value for the end of the month storage level for reservoir i in month t
- F_i is the low scale value for reservoir i
- G_{it} is the percentage of visitation corresponding to the scale value for the end of the month storage level for reservoir i in month t
- α_i is the percentage of visitation constant term for reservoir i
- β_i is the percentage of visitation slope coefficient term for reservoir i

This equation is formulated to linearly interpolate a scale value for an end of the month storage level for a reservoir during any month to a percentage of visitation.

Separate equations for scale value and reservoir storage levels are formulated for Prosser, Stampede, and Boca Reservoirs. These equations are provided below by reservoir.

Prosser Reservoir

If $4 \geq D_{it} \geq 3$ scale value, then visitation $G_{it} = -1.4 + .6 (D_{it})$
If $3 \geq D_{it} \geq 2$ scale value, then visitation $G_{it} = .4 + 0 (D_{it})$
If $2 \geq D_{it} \geq 1$ scale value, then visitation $G_{it} = .2 + .1 (D_{it})$

Stampede Reservoir

If $4 \geq D_{it} \geq 3$ scale value, then visitation $G_{it} = 1.0492 - .0123 (D_{it})$
If $3 \geq D_{it} \geq 2$ scale value, then visitation $G_{it} = .2716 - .2469 (D_{it})$
If $2 \geq D_{it} \geq 1$ scale value, then visitation $G_{it} = .0976 + .2839 (D_{it})$

Boca Reservoir

If $5 \geq D_{it} \geq 4$ scale value, then visitation $G_{it} = .1080 + .1784 (D_{it})$
If $4 \geq D_{it} \geq 3$ scale value, then visitation $G_{it} = .4764 + .0863 (D_{it})$
If $3 \geq D_{it} \geq 2$ scale value, then visitation $G_{it} = .2646 + .3333 (D_{it})$
If $2 \geq D_{it} \geq 1$ scale value, then visitation $G_{it} = -.3354 + .3687 (D_{it})$

Visitation relative to end of the month reservoir storage levels at Prosser, Stampede, and Boca Reservoirs for April through October and Other months are given in Table 3.3-5. The percentages of visitation for the end of the month reservoir storage levels are calculated using the above equations. Again, percentages of visitation correspond to scale values which in turn correspond to end of the month reservoir storage levels.

Survey year visitation relative to end of the month reservoir storage levels are the same because of end of the month reservoir storage levels. The percentages of visitation are shown in Table 3.3-6. Visitation would differ under alternative reservoir storage levels.

Table 3.3-1. Scale Values for Reservoir Storage Levels.

	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Reservoir Storage Level 1 in Acre-feet	29,840	226,000	41,100
Reservoir Storage Level 2 in Acre-feet	28,000	170,000	38,000
Reservoir Storage Level 3 in Acre-feet	19,000	130,000	33,000
Reservoir Storage Level 4 in Acre-feet	11,000	80,000	22,000
Reservoir Storage Level 5 in Acre-feet			<22,000
Scale Value for Reservoir Storage Level 1	4.00	4.00	5.00
Scale Value for Reservoir Storage Level 2	3.00	3.00	4.00
Scale Value for Reservoir Storage Level 3	2.00	2.00	3.00
Scale Value for Reservoir Storage Level 4	1.00	1.00	2.00
Scale Value for Reservoir Storage Level 5			1.00

Table 3.3-2. End of the Month Reservoir Storage Levels.

	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
April End of the Month Reservoir Storage Level in Acre-Feet	9,767	80,186	26,763
May End of the Month Reservoir Storage Level in Acre-Feet	16,414	113,577	37,473
June End of the Month Reservoir Storage Level in Acre-Feet	20,957	166,955	38,557
July End of the Month Reservoir Storage Level in Acre-Feet	22,110	177,424	38,084
August End of the Month Reservoir Storage Level in Acre-Feet	21,691	174,288	34,582
September End of the Month Reservoir Storage Level in Acre-Feet	14,394	172,442	23,927
October End of the Month Reservoir Storage Level in Acre-Feet	10,050	170,696	16,419
Other Months Average End of the Month Reservoir Storage Level in Acre-Feet	9,854	113,263	9,561
January End of the Month Reservoir Storage Level in Acre-Feet	9,827	73,944	5,247
February End of the Month Reservoir Storage Level in Acre-Feet	9,723	75,751	4,396
March End of the Month Reservoir Storage Level in Acre-Feet	9,642	76,677	2,955
November End of the Month Reservoir Storage Level in Acre-Feet	9,981	170,433	17,042
December End of the Month Reservoir Storage Level in Acre-Feet	10,098	169,510	18,163

Table 3.3-3. Scale Values for End of the Month Reservoir Storage Levels.

	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Scale Value for April End of the Month Reservoir Storage Level	0.85	1.00	2.41
Scale Value for May End of the Month Reservoir Storage Level	1.68	1.67	3.89
Scale Value for June End of the Month Reservoir Storage Level	2.22	2.92	4.08
Scale Value for July End of the Month Reservoir Storage Level	2.34	3.16	3.93
Scale Value for August End of the Month Reservoir Storage Level	2.30	3.10	3.32
Scale Value for September End of the Month Reservoir Storage Level	1.42	3.07	2.15
Scale Value for October End of the Month Reservoir Storage Level	0.88	3.04	1.82
Scale Value for Other Months End of the Month Reservoir Storage Level	0.86	1.67	1.48

Table 3.3-4. Indicated Number of Visits per Respondent for Reservoir Storage Levels.

	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Number of Visits per Respondent for Reservoir Storage Level 1	5.67	1.82	11.09
Number of Visits per Respondent for Reservoir Storage Level 2	5.67	1.85	9.11
Number of Visits per Respondent for Reservoir Storage Level 3	5.67	1.39	8.15
Number of Visits per Respondent for Reservoir Storage Level 4	0.50	0.87	4.46
Number of Visits per Respondent for Reservoir Storage Level 5			0.37
Percentage of Visitation for Reservoir Storage Level 1	100.00%	100.00%	100.00%
Percentage of Visitation for Reservoir Storage Level 2	100.00%	101.42%	82.16%
Percentage of Visitation for Reservoir Storage Level 3	100.00%	76.34%	73.53%
Percentage of Visitation for Reservoir Storage Level 4	8.82%	47.69%	40.19%
Percentage of Visitation for Reservoir Storage Level 5			3.33%

Table 3.3-5. Visitation Relative to End of the Month Reservoir Storage Levels.

	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Visitation Relative to April End of the Month Reservoir Storage Level	28.46%	38.26%	53.82%
Visitation Relative to May End of the Month Reservoir Storage Level	36.77%	57.22%	81.25%
Visitation Relative to June End of the Month Reservoir Storage Level	40.00%	99.35%	83.59%
Visitation Relative to July End of the Month Reservoir Storage Level	40.00%	101.04%	81.55%
Visitation Relative to August End of the Month Reservoir Storage Level	40.00%	101.11%	76.26%
Visitation Relative to September End of the Month Reservoir Storage Level	34.24%	101.15%	45.31%
Visitation Relative to October End of the Month Reservoir Storage Level	28.81%	101.18%	33.60%
Visitation Relative to Other Months End of the Month Reservoir Storage Level	28.57%	57.04%	20.95%

Table 3.3-6. Survey Year Visitation Relative to End of the Month Reservoir Storage Levels.

	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Visitation Relative to April End of the Month Reservoir Storage Level	28.46%	38.26%	53.82%
Visitation Relative to May End of the Month Reservoir Storage Level	36.77%	57.22%	81.25%
Visitation Relative to June End of the Month Reservoir Storage Level	40.00%	99.35%	83.59%
Visitation Relative to July End of the Month Reservoir Storage Level	40.00%	101.04%	81.55%
Visitation Relative to August End of the Month Reservoir Storage Level	40.00%	101.11%	76.26%
Visitation Relative to September End of the Month Reservoir Storage Level	34.24%	101.15%	45.31%
Visitation Relative to October End of the Month Reservoir Storage Level	28.81%	101.18%	33.60%
Visitation Relative to Other Months End of the Month Reservoir Storage Level	28.57%	57.04%	20.95%

Annual Visitation Relative to End of the Month Reservoir Storage Levels

The annual visitation relative to end of the month reservoir storage levels is derived by weighting the scale values for the end of the month reservoir storage levels for the reservoir by the expected annual visitation to the reservoir for the year and then calculating a annual percentage of visitation.

The scale values are weighted by survey year annual visitation by respondents to reservoirs and expected annual visitation to the reservoirs for the year.

The survey year annual visitation by respondents to the reservoirs is shown in Table 3.3-7. The expected annual visitation is calculated through the following equation.

$$H_{it} = \frac{G_{it}\,(H_{it}^{o})}{G_{it}^{o}} \qquad (3.3\text{-}3)$$

where:

H_{it} is the expected annual visitation to reservoir i in month t

G_{it} is the percentage of visitation corresponding to the scale value for the end of the month storage level for reservoir i in month t

H_{it}^{o} is the survey year annual visitation by respondents to reservoir i in month t

G_{it}^{o} is the survey year percentage of visitation corresponding to the scale value for the end of the month storage level for reservoir i in month t

The expected annual visitation is shown in Table 3.3-8. These values are the same as the values for the survey year since the end of the month reservoir storage levels are the same. The expected annual visitation would differ under alternative reservoir storage levels.

The weights for the expected annual visitation are then calculated through the following equation.

$$I_{it} = \frac{H_{it}}{\sum H_{it}} \qquad (3.3\text{-}4)$$

where: I_{it} is the weight of the expected annual visitation to reservoir i in month t
H_{it} is the expected annual visitation to reservoir i in month t

These weights are shown in Table 3.3-9. These weights show the annual pattern of visitation to the reservoirs.

The annual scale values for the reservoirs are then calculated through the following equation.

$$D_i = \sum_t D_{it} (I_{it}) \qquad (3.3\text{-}5)$$

where: D_i is the annual scale value for reservoir i
D_{it} is the scale value for the end of the month storage level for reservoir i in month t
I_{it} is the weight of the expected annual visitation to reservoir i in month t

The weighted scale values are shown by month and by reservoir in Table 3.3-10. The summation of these weighted scale values is the annual scale value. Corresponding to a annual scale value is a annual percentage of visitation.

The annual percentage of visitation corresponding to the annual scale value is then calculated through the following equation.

If $E_i \geq D_i \geq F_i$ scale value, then visitation $G_i = \alpha_i + \beta_i (D_i)$ (3.3-6)

where:
- E_i is the high scale value for reservoir i
- D_i is the annual scale value for reservoir i
- F_i is the low scale value for reservoir i
- G_i is the annual percentage of visitation corresponding to the annual scale value for reservoir i
- α_i is the annual percentage of visitation constant term for reservoir i
- β_i is the annual percentage of visitation slope coefficient term for reservoir i

This equation is formulated to linearly interpolate an annual scale value to an annual percentage of visitation.

Separate equations for annual scale value and reservoir storage levels are formulated for Prosser, Stampede, and Boca Reservoirs. These equations are provided below by reservoir.

Prosser Reservoir

If $4 \geq D_i \geq 3$ scale value, then visitation $G_i = -1.4 + .6 (D_i)$
If $3 \geq D_i \geq 2$ scale value, then visitation $G_i = .4 + 0 (D_i)$
If $2 \geq D_i \geq 1$ scale value, then visitation $G_i = .2 + .1 (D_i)$

Stampede Reservoir

If $4 \geq D_i \geq 3$ scale value, then visitation $G_i = 1.0492 - .0123 (D_i)$
If $3 \geq D_i \geq 2$ scale value, then visitation $G_i = .2716 - .2469 (D_i)$
If $2 \geq D_i \geq 1$ scale value, then visitation $G_i = .0976 + .2839 (D_i)$

Boca Reservoir

If $5 \geq D_i \geq 4$ scale value, then visitation $G_i = .1080 + .1784 (D_i)$
If $4 \geq D_i \geq 3$ scale value, then visitation $G_i = .4764 + .0863 (D_i)$
If $3 \geq D_i \geq 2$ scale value, then visitation $G_i = .2646 + .3333 (D_i)$
If $2 \geq D_i \geq 1$ scale value, then visitation $G_i = -.3354 + .3687 (D_i)$

Annual visitation relative to end of the month reservoir storage levels for Prosser, Stampede, and Boca Reservoirs are given in Table 3.3-11. An annual percentage of visitation corresponds to an annual scale value which in turn corresponds to end of the month reservoir storage levels.

Survey year annual visitation relative to end of the month reservoir storage levels are the same because of end of the month reservoir storage levels being the same. The annual percentages of visitation are shown in Table 3.3-12. Annual visitation would differ under alternative reservoir storage levels.

Table 3.3-7. Survey Year Annual Visitation by Respondents by Month by Reservoir.

	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Number of Respondents that Visit during April	3	10	14
Number of Respondents that Visit during May	3	16	28
Number of Respondents that Visit during June	3	25	36
Number of Respondents that Visit during July	4	26	42
Number of Respondents that Visit during August	6	46	46
Number of Respondents that Visit during September	3	20	31
Number of Respondents that Visit during October	3	10	19
Number of Respondents that Visit during Other Months	1	0	6
Total	26	153	222

Table 3.3-8. Expected Annual Visitation by Month by Reservoir.

	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Expected Visitation during April	3	10	14
Expected Visitation during May	3	16	28
Expected Visitation during June	3	25	36
Expected Visitation during July	4	26	42
Expected Visitation during August	6	46	46
Expected Visitation during September	3	20	31
Expected Visitation during October	3	10	19
Expected Visitation during Other Months	1	0	6
Total	26	153	222

Table 3.3-9. Weights for Expected Annual Visitation by Month by Reservoir.

	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Weight for expected Visitation during April	11.54%	6.54%	6.31%
Weight for expected Visitation during May	11.54%	10.46%	12.61%
Weight for expected Visitation during June	11.54%	16.34%	16.22%
Weight for expected Visitation during July	15.38%	16.99%	18.92%
Weight for expected Visitation during August	23.08%	30.07%	20.72%
Weight for expected Visitation during September	11.54%	13.07%	13.96%
Weight for expected Visitation during October	11.54%	6.54%	8.56%
Weight for expected Visitation during Other Months	3.85%	0.00%	2.70%

Table 3.3-10. Annual Scale Values by Reservoir.

	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Weighted Scale Value for April End of the Month Reservoir Storage Level	0.10	0.07	0.15
Weighted Scale Value for May End of the Month Reservoir Storage Level	0.19	0.17	0.49
Weighted Scale Value for June End of the Month Reservoir Storage Level	0.26	0.48	0.66
Weighted Scale Value for July End of the Month Reservoir Storage Level	0.36	0.54	0.74
Weighted Scale Value for August End of the Month Reservoir Storage Level	0.53	0.93	0.69
Weighted Scale Value for September End of the Month Reservoir Storage Level	0.16	0.40	0.30
Weighted Scale Value for October End of the Month Reservoir Storage Level	0.10	0.20	0.16
Weighted Scale Value for Other Months End of the Month Reservoir Storage Level	0.03	0.00	0.04
Annual Scale Value	1.74	2.79	3.23

Table 3.3-11. Annual Visitation Relative to End of the Month Reservoir Storage Levels.

	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Annual Visitation Relative to the End of the Month Reservoir Storage Levels	37.36%	95.97%	75.53%

Table 3.3-12. Survey Year Annual Visitation Relative to End of the Month Reservoir Storage Levels.

	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Annual Visitation Relative to the End of the Month Reservoir Storage Levels	37.36%	95.97%	75.53%

Annual Number of Camping Visitors

The annual number of camping visitors to the reservoirs is derived by taking the survey year number of camping visitors for the campgrounds at the reservoirs and multiplying by the ratio of annual visitation for the given year to the annual visitation for survey year. The annual number of camping visitors is distributed monthly by the weights of the expected annual visitation to show the annual pattern of visitation.

The survey year number of camping visitors for the campgrounds at the reservoirs are taken from U.S. Forest Service data. This data is shown in Table 3.3-13. There are ten campgrounds in the area. Four campgrounds are near Prosser Reservoir. Another three campgrounds are near Stampede Reservoir. And the remaining three campgrounds are near Boca Reservoir. The annual number of camping visitors is provided for each campground.

The annual number of camping visitors for the given year is calculated through the following equation.

$$J_i = J_i^o \frac{G_i}{G_i^o} \qquad (3.3\text{-}7)$$

where:

J_i	is the annual number of camping visitors for reservoir i
J_i^o	is the survey year annual number of camping visitors for reservoir i
G_i	is the annual percentage of visitation corresponding to the annual scale value for reservoir i
G_i^o	is the survey year annual percentage of visitation corresponding to the annual scale value for reservoir i

The equation is formulated so that if the annual percentage of visitation for the given year is greater than the survey year annual percentage of visitation then the annual number of camping visitors for the given year is also greater. Likewise if the annual percentage of visitation for the given year is less than the survey year annual percentage of visitation then the annual number of camping visitors for the given year is also less.

The annual number of camping visitors by reservoir are shown in Table 3.3-14.

The annual number of camping visitors are then distributed by the weights for expected annual visitation to show the annual number of camping visitors by month. This is done through the following equation.

$$K_{it} = J_i (I_{it}) \qquad (3.3\text{-}8)$$

where:
- K_{it} is the number of annual camping visitors to reservoir i in month t
- J_i is the annual number of camping visitors for reservoir i
- I_{it} is the weight of the expected annual visitation to reservoir i in month t

The annual number of camping visitors by month to the reservoirs are shown in Table 3.3-15. Together the annual number of camping visitors by month show the annual pattern of visitation to the reservoir by camping visitors.

Table 3.3-13. Annual Number of Camping Visitors by Campground by Reservoir.

	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Number of Camping Visitors for Lakeside Campground	0		
Number of Camping Visitors for Prosser Family Campground	30,062		
Number of Camping Visitors for Prosser Ranch Campground	7,754		
Number of Camping Visitors for Annie McCloud Campground	0		
Number of Camping Visitors for Davies Creek Campground		2,221	
Number of Camping Visitors for Emigrant Campground /1		2,300	
Number of Camping Visitors for Logger Campground		41,357	
Number of Camping Visitors for Boca Campground			0
Number of Camping Visitors for Boca Rest Campground			58,853
Number of Camping Visitors for Boyington Mill Campground			6,960
Total Number of Camping Visitors for Campgrounds	37,816	45,878	65,813

1. Estimate provided by host at campground.

Table 3.3-14. Annual Number of Camping Visitors by Reservoir.

	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Annual Number of Camping Visitors	37,816	45,878	65,813

Table 3.3-15. Annual Number of Camping Visitors by Month by Reservoir.

	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Number of Camping Visitors during April	4,363	2,999	4,150
Number of Camping Visitors during May	4,363	4,798	8,301
Number of Camping Visitors during June	4,363	7,496	10,672
Number of Camping Visitors during July	5,818	7,796	12,451
Number of Camping Visitors during August	8,727	13,793	13,637
Number of Camping Visitors during September	4,363	5,997	9,190
Number of Camping Visitors during October	4,363	2,999	5,633
Number of Camping Visitors during Other Months	1,454	0	1,779
Annual Number of Camping Visitors	37,816	45,878	65,813

Annual Number of Day Use Visitors

The annual number of day use visitors to the reservoirs is derived by multiplying the annual number of camping visitors to the reservoirs by the ratio of day use visitors to camping visitors taken from the survey.

The ratio of day use visitors to camping visitors is calculated through the following equations.

$$L_i = M_i (N_i) \quad (3.3\text{-}9)$$

$$O_i = (P_i (Q_i)) R_i \quad (3.3\text{-}10)$$

$$S_i = \frac{L_i}{O_i} \quad (3.3\text{-}11)$$

where:

L_i	is the number of day use visitors to reservoir i
M_i	is the number of day use respondents at reservoir i
N_i	is the average group size of day use respondents at reservoir i
O_i	is the number of camping visitors to reservoir i
P_i	is the number of camping respondents at reservoir i
Q_i	is the average group size of camping respondents at reservoir i
R_i	is the average number of days spent by camping respondents at reservoir i
S_i	is the ratio of day use visitors to camping visitors to reservoir i

The ratios of day use visitors to camping visitors by reservoir are given in Table 3.3-16. However the ratio calculated for Boca Reservoir is used for Prosser and Stampede Reservoirs.

The annual number of day use visitors is then calculated through the following equation.

$$T_i = J_i (S_i) \quad (3.3\text{-}12)$$

where:

T_i	is the annual number of day use visitors for reservoir i
J_i	is the annual number of camping visitors for reservoir i
S_i	is the ratio of day use visitors to camping visitors to reservoir i

The annual number of day use visitors by reservoir are shown in Table 3.3-17.

The annual number of day use visitors are then distributed by the weights for expected annual visitation to show the annual number of day use visitors by month. This is done through the following equation.

$$U_{it} = T_i (I_{it}) \qquad (3.3\text{-}13)$$

where:
- U_{it} is the number of annual day use visitors to reservoir i in month t
- T_i is the annual number of day use visitors for reservoir i
- I_{it} is the weight of the expected annual visitation to reservoir i in month t

The annual number of day use visitors by month to the reservoirs are shown in Table 3.3-18. Together the annual number of day use visitors by month show the annual pattern of visitation to the reservoir by day use visitors.

Table 3.3-16. Ratio of Day Use Visitors to Camping Visitors by Reservoir.

	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Number of Day Use Respondents	6.00	10.00	41.00
Average Group Size of Day Use Respondents	3.33	3.50	4.71
Number of Day Use Visitors	19.98	35.00	193.11
Number of Camping Respondents	0.00	36.00	5.00
Average Group Size of Camping Respondents	N.A.	5.14	3.20
Average Number of Days Spent by Camping Respondents	N.A.	3.69	6.40
Number of Camping Visitors	0.00	682.80	102.40
Ratio of Day Use Visitors to Camping Visitors	N.A.	N.A.	1.89
Ratio of Day Use Visitors to Camping Visitors /1	1.89	1.89	1.89

1. The Boca Reservoir ratio is used for both Prosser and Stampede Reservoirs.

Table 3.3-17. Annual Number of Day Use Visitors by Reservoir.

	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Annual Number of Day Use Visitors	71,315	86,519	124,113

Table 3.3-18. Annual Number of Day Use Visitors by Month by Reservoir.

	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Number of Day Use Visitors during April	8,229	5,655	7,827
Number of Day Use Visitors during May	8,229	9,048	15,654
Number of Day Use Visitors during June	8,229	14,137	20,126
Number of Day Use Visitors during July	10,972	14,703	23,481
Number of Day Use Visitors during August	16,457	26,012	25,717
Number of Day Use Visitors during September	8,229	11,310	17,331
Number of Day Use Visitors during October	8,229	5,655	10,622
Number of Day Use Visitors during Other Months	2,743	0	3,354
Annual Number of Day Use Visitors	71,315	86,519	124,113

Annual Number of Camping Visitor Groups

The annual number of camping visitor groups to the reservoirs is derived by dividing the annual number of camping visitors by month by the group size. This is done through the following equation.

$$V_{it} = \frac{K_{it}}{Q_i} \qquad (3.3\text{-}14)$$

where:
- V_{it} is the annual number of camping visitor groups to reservoir i in month t
- K_{it} is the number of annual camping visitors to reservoir i in month t
- Q_i is the average group size of camping respondents at reservoir i

The annual number of camping visitor groups by month to the reservoirs are shown in Table 3.3-19.

Table 3.3-19. Annual Number of Camping Visitor Groups by Month by Reservoir.

	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Number of Camping Visitor Groups during April	1,310	583	1,297
Number of Camping Visitor Groups during May	1,310	933	2,594
Number of Camping Visitor Groups during June	1,310	1,458	3,335
Number of Camping Visitor Groups during July	1,747	1,517	3,891
Number of Camping Visitor Groups during August	2,621	2,684	4,262
Number of Camping Visitor Groups during September	1,310	1,167	2,872
Number of Camping Visitor Groups during October	1,310	583	1,760
Number of Camping Visitor Groups during Other Months	437	0	556
Annual Number of Camping Visitor Groups	11,356	8,926	20,567

Annual Number of Day Use Visitor Groups

The annual number of day use visitor groups to the reservoirs is derived by dividing the annual number of day use visitors by month by the group size. This is done through the following equation.

$$W_{it} = \frac{U_{it}}{N_i} \qquad (3.3\text{-}15)$$

where:
- W_{it} is the annual number of day use visitor groups to reservoir i in month t
- U_{it} is the number of annual day use visitors to reservoir i in month t
- N_i is the average group size of day use respondents at reservoir i

The annual number of day use visitor groups by month to the reservoirs are shown in Table 3.3-20.

Table 3.3-20. Annual Number of Day Use Visitor Groups by Month by Reservoir.

	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Number of Day Use Visitor Groups during April	2,471	1,616	1,662
Number of Day Use Visitor Groups during May	2,471	2,585	3,324
Number of Day Use Visitor Groups during June	2,471	4,039	4,273
Number of Day Use Visitor Groups during July	3,295	4,201	4,985
Number of Day Use Visitor Groups during August	4,942	7,432	5,460
Number of Day Use Visitor Groups during September	2,471	3,231	3,680
Number of Day Use Visitor Groups during October	2,471	1,616	2,255
Number of Day Use Visitor Groups during Other Months	824	0	712
Annual Number of Day Use Visitor Groups	21,416	24,720	26,351

Annual Camping Visitor Expenditures

The annual camping visitor expenditures by reservoir are the summation of the annual number of camping visitor groups per month multiplied by the camping visitor group expenditure function value. This is done through the following equations.

$$X_{it} = V_{it} (Y_i) \quad (3.3\text{-}16)$$

$$Z_i = \Sigma X_{it} \quad (3.3\text{-}17)$$

where:
- X_{it} is the annual camping visitor expenditures for reservoir i in month t
- V_{it} is the annual number of camping visitor groups to reservoir i in month t
- Y_i is the camping visitor group expenditure function value for reservoir i
- Z_i is the annual camping visitor expenditures for reservoir i

The camping visitor group expenditure function values for each reservoir are shown in Table 3.3-21. The annual camping visitor expenditures by month by reservoir are shown in Table 3.3-22.

The annual camping visitor expenditures are proportioned by the amount of expenditure indicated by category by respondent for the reservoir. This is done through the following equation.

$$AA_{ci} = Z_i (AB_{ci}) \quad (3.3\text{-}18)$$

where:
- AA_{ci} is the annual camping visitor expenditures by category c for reservoir i
- Z_i is the annual camping visitor expenditures for reservoir i
- AB_{ci} is the proportion of the amount of expenditure by category c for reservoir i by camping respondents

The annual camping visitor expenditures by category by reservoir are shown in Table 3.3-23.

Table 3.3-21. Camping Visitor Group Expenditure Function Values by Reservoir.

	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Camping Visitor Group Expenditure per Day	$93.95	$60.72	$24.34

Table 3.3-22. Annual Camping Visitor Expenditures by Month by Reservoir.

	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Camping Visitor Expenditures during April	123,105	35,423	31,569
Camping Visitor Expenditures during May	123,105	56,676	63,137
Camping Visitor Expenditures during June	123,105	88,557	81,177
Camping Visitor Expenditures during July	164,140	92,099	94,706
Camping Visitor Expenditures during August	246,211	162,944	103,726
Camping Visitor Expenditures during September	123,105	70,845	69,902
Camping Visitor Expenditures during October	123,105	35,423	42,843
Camping Visitor Expenditures during Other Months	41,035	0	13,529
Annual Camping Visitor Expenditures	$1,066,912	$541,967	$500,590

Table 3.3-23. Annual Camping Visitor Expenditures by Category by Reservoir.

	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Average Expenditures on Licenses by Camping Respondents	N.A.	16.18	17.40
Average Expenditures on Camping Fees by Camping Respondents	N.A.	48.47	0.00
Average Expenditures on Hotel or Motel by Camping Respondents	N.A.	0.00	0.00
Average Expenditures on Restaurant by Camping Respondents	N.A.	8.58	0.00
Average Expenditures on Groceries by Camping Respondents	N.A.	70.39	46.00
Average Expenditures on Equipment and Supplies by Camping Respondents	N.A.	15.08	0.40
Average Expenditures on Rental by Camping Respondents	N.A.	0.00	0.00
Average Expenditures on Fuel by Camping Respondents	N.A.	40.42	16.60
Average Expenditures on Other by Camping Respondents	N.A.	0.00	12.00
Average Total Expenditures by Camping Respondents	$0	$199.12	$92.40
Average Expenditures on Licenses by Camping Respondents /1	18.83%	8.13%	18.83%
Average Expenditures on Camping Fees by Camping Respondents	0.00%	24.34%	0.00%
Average Expenditures on Hotel or Motel by Camping Respondents	0.00%	0.00%	0.00%
Average Expenditures on Restaurant by Camping Respondents	0.00%	4.31%	0.00%
Average Expenditures on Groceries by Camping Respondents	49.78%	35.35%	49.78%
Average Expenditures on Equipment and Supplies by Camping Respondents	0.43%	7.57%	0.43%
Average Expenditures on Rental by Camping Respondents	0.00%	0.00%	0.00%
Average Expenditures on Fuel by Camping Respondents	17.97%	20.30%	17.97%
Average Expenditures on Other by Camping Respondents	12.99%	0.00%	12.99%
Average Total Expenditures by Camping Respondents	100.00%	100.00%	100.00%
Annual Camping Visitor Expenditures on Licenses	200,912	44,039	94,267
Annual Camping Visitor Expenditures on Camping Fees	0	131,926	0
Annual Camping Visitor Expenditures on Hotel or Motel	0	0	0
Annual Camping Visitor Expenditures on Restaurant	0	23,353	0
Annual Camping Visitor Expenditures on Groceries	531,147	191,588	249,212
Annual Camping Visitor Expenditures on Equipment and Supplies	4,619	41,045	2,167
Annual Camping Visitor Expenditures on Rental	0	0	0
Annual Camping Visitor Expenditures on Fuel	191,675	110,016	89,933
Annual Camping Visitor Expenditures on Other	138,560	0	65,012
Annual Camping Visitor Expenditures	$1,066,912	$541,967	$500,590

1. The Boca Reservoir expenditure categories are used for Prosser Reservoir.

Annual Day Use Visitor Expenditures

The annual day use visitor expenditures by reservoir are the summation of the annual number of day use visitor groups per month multiplied by the day use visitor group expenditure function value. This is done through the following equations.

$$AC_{it} = W_{it} (AD_i) \quad (3.3\text{-}19)$$

$$AE_i = \Sigma AC_{it} \quad (3.3\text{-}20)$$

where:
- AC_{it} is the annual day use visitor expenditures for reservoir i in month t
- W_{it} is the number of annual day use visitor groups to reservoir i in month t
- AD_i is the day use visitor group expenditure function value for reservoir i
- AE_i is the annual day use visitor expenditures for reservoir i

The day use visitor group expenditure function values for each reservoir are shown in Table 3.3-24. The annual day use visitor expenditures by month by reservoir are shown in Table 3.3-25.

The annual day use visitor expenditures are proportioned by the amount of expenditure indicated by category by respondent for the reservoir. This is done through the following equation.

$$AF_{ci} = AE_i (AG_{ci}) \quad (3.3\text{-}21)$$

where:
- AF_{ci} is the annual day use visitor expenditures by category c for reservoir i
- AE_i is the annual day use visitor expenditures for reservoir i
- AG_{ci} is the proportion of the amount of expenditure by category c for reservoir i by day use respondents

The annual day use visitor expenditures by category by reservoir are shown in Table 3.3-26.

Table 3.3-24. Day Use Visitor Group Expenditure Function Values by Reservoir.

	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Day Use Visitor Group Expenditure per Day	$153.27	$94.10	$50.84

Table 3.3-25. Annual Day Use Visitor Expenditures by Month by Reservoir.

	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Day Use Visitor Expenditures during April	378,741	152,034	84,484
Day Use Visitor Expenditures during May	378,741	243,254	168,969
Day Use Visitor Expenditures during June	378,741	380,084	217,245
Day Use Visitor Expenditures during July	504,987	395,287	253,453
Day Use Visitor Expenditures during August	757,481	699,354	277,591
Day Use Visitor Expenditures during September	378,741	304,067	187,072
Day Use Visitor Expenditures during October	378,741	152,034	114,657
Day Use Visitor Expenditures during Other Months	126,247	0	36,208
Annual Day Use Visitor Expenditures	$3,282,418	$2,326,113	$1,339,680

Table 3.3-26. Annual Day Use Visitor Expenditures by Category by Reservoir.

	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Average Expenditures on Licenses by Day Use Respondents	23.73	38.60	9.40
Average Expenditures on Camping Fees by Day Use Respondents	0.00	0.00	7.32
Average Expenditures on Hotel or Motel by Day Use Respondents	1.00	16.00	32.68
Average Expenditures on Restaurant by Day Use Respondents	41.67	15.00	12.68
Average Expenditures on Groceries by Day Use Respondents	41.67	22.40	27.29
Average Expenditures on Equipment and Supplies by Day Use Respondents	4.50	3.76	5.76
Average Expenditures on Rental by Day Use Respondents	162.50	0.00	0.00
Average Expenditures on Fuel by Day Use Respondents	14.83	20.20	17.78
Average Expenditures on Other by Day Use Respondents	0.00	1.50	7.32
Average Total Expenditures by Day Use Respondents	$289.90	$117.46	$120.23
Average Expenditures on Licenses by Day Use Respondents	8.19%	32.86%	7.82%
Average Expenditures on Camping Fees by Day Use Respondents	0.00%	0.00%	6.09%
Average Expenditures on Hotel or Motel by Day Use Respondents	0.34%	13.62%	27.18%
Average Expenditures on Restaurant by Day Use Respondents	14.37%	12.77%	10.55%
Average Expenditures on Groceries by Day Use Respondents	14.37%	19.07%	22.70%
Average Expenditures on Equipment and Supplies by Day Use Respondents	1.55%	3.20%	4.79%
Average Expenditures on Rental by Day Use Respondents	56.05%	0.00%	0.00%
Average Expenditures on Fuel by Day Use Respondents	5.12%	17.20%	14.79%
Average Expenditures on Other by Day Use Respondents	0.00%	1.28%	6.09%
Average Total Expenditures by Day Use Respondents	100.00%	100.00%	100.00%
Annual Day Use Visitor Expenditures on Licenses	268,685	764,413	104,741
Annual Day Use Visitor Expenditures on Camping Fees	0	0	81,564
Annual Day Use Visitor Expenditures on Hotel or Motel	11,323	316,855	364,142
Annual Day Use Visitor Expenditures on Restaurant	471,812	297,052	141,289
Annual Day Use Visitor Expenditures on Groceries	471,812	443,597	304,083
Annual Day Use Visitor Expenditures on Equipment and Supplies	50,952	74,461	64,182
Annual Day Use Visitor Expenditures on Rental	1,839,920	0	0
Annual Day Use Visitor Expenditures on Fuel	167,914	400,030	198,116
Annual Day Use Visitor Expenditures on Other	0	29,705	81,564
Annual Day Use Visitor Expenditures	$3,282,418	$2,326,113	$1,339,680

Annual Number of Camping and Day Use Visitors

The annual number of camping and day use visitors by reservoir is the summation of the annual number of camping visitors and the annual number of day use visitors. This is done through the following equations.

$$AH_{it} = K_{it} + U_{it} \quad (3.3\text{-}22)$$

$$AI_i = \Sigma AH_{it} \quad (3.3\text{-}23)$$

where:
- AH_{it} is the annual number of camping and day use visitors for reservoir i in month t
- K_{it} is the number of annual camping visitors to reservoir i in month t
- U_{it} is the number of annual day use visitors to reservoir i in month t
- AI_i is the annual number of camping and day use visitors for reservoir i

The annual number of camping and day use visitors by month by reservoir are shown in Table 3.3-27.

Table 3.3-27. Annual Number of Camping and Day Use Visitors by Month by Reservoir.

	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Number of Camping and Day Use Visitors during April	12,592	8,653	11,977
Number of Camping and Day Use Visitors during May	12,592	13,845	23,955
Number of Camping and Day Use Visitors during June	12,592	21,633	30,799
Number of Camping and Day Use Visitors during July	16,789	22,499	35,932
Number of Camping and Day Use Visitors during August	25,184	39,806	39,354
Number of Camping and Day Use Visitors during September	12,592	17,307	26,521
Number of Camping and Day Use Visitors during October	12,592	8,653	16,255
Number of Camping and Day Use Visitors during Other months	4,197	0	5,133
Annual Number of Camping and Day Use Visitors	109,131	132,397	189,926

Annual Camping and Day Use Visitor Expenditures

The annual camping and day use visitor expenditures by reservoir is the summation of the annual camping visitor expenditures and the annual day use visitor expenditures. This is done through the following equations.

$$AJ_{it} = X_{it} + AC_{it} \quad (3.3\text{-}24)$$

$$AK_i = \sum AJ_{it} \quad (3.3\text{-}25)$$

where:
- AJ_{it} is the annual camping and day use visitor expenditures for reservoir i in month t
- X_{it} is the annual camping visitor expenditures for reservoir i in month t
- AC_{it} is the annual day use visitor expenditures for reservoir i in month t
- AK_i is the annual camping and day use visitor expenditures for reservoir i

The annual camping and day use visitor expenditures by month by reservoir are shown in Table 3.3-28.

Table 3.3-28. Annual Camping and Day Use Visitor Expenditures by Month by Reservoir.

	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Camping and Day Use Visitor Expenditures during April	501,846	187,456	116,053
Camping and Day Use Visitor Expenditures during May	501,846	299,930	232,106
Camping and Day Use Visitor Expenditures during June	501,846	468,641	298,422
Camping and Day Use Visitor Expenditures during July	669,128	487,386	348,159
Camping and Day Use Visitor Expenditures during August	1,003,692	862,299	381,317
Camping and Day Use Visitor Expenditures during September	501,846	374,913	256,975
Camping and Day Use Visitor Expenditures during October	501,846	187,456	157,501
Camping and Day Use Visitor Expenditures during Other months	167,282	0	49,737
Annual Camping and Day Use Visitor Expenditures	$4,349,330	$2,868,081	$1,840,270

Annual Camping and Day Use Visitor Expenditures by Category

The annual camping and day use visitor expenditures by category by reservoir is the summation of the annual camping visitor expenditures by category and the annual day use visitor expenditures by category. This is done through the following equations.

$$AL_{ci} = AA_{ci} + AF_{ci} \quad (3.3\text{-}26)$$

$$AM_i = \Sigma AL_{ci} \quad (3.3\text{-}27)$$

where:
- AL_{ci} is the annual camping and day use visitor expenditures by category c for reservoir i
- AA_{ci} is the annual camping visitor expenditures by category c for reservoir i
- AF_{ci} is the annual day use visitor expenditures by category c for reservoir i
- AM_i is the annual camping and day use visitor expenditures for reservoir i

The annual camping and day use visitor expenditures by category by reservoir are shown in Table 3.3-29.

Table 3.3-29. Annual Camping and Day Use Visitor Expenditures by Category by Reservoir.

	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Annual Camping and Day Use Visitor Expenditures on Licenses	469,597	808,452	199,008
Annual Camping and Day Use Visitor Expenditures on Camping Fees	0	131,926	81,564
Annual Camping and Day Use Visitor Expenditures on Hotel or Motel	11,323	316,855	364,142
Annual Camping and Day Use Visitor Expenditures on Restaurant	471,812	320,405	141,289
Annual Camping and Day Use Visitor Expenditures on Groceries	1,002,959	635,186	553,294
Annual Camping and Day Use Visitor Expenditures on Equipment and Supplies	55,570	115,506	66,349
Annual Camping and Day Use Visitor Expenditures on Rental	1,839,920	0	0
Annual Camping and Day Use Visitor Expenditures on Fuel	359,589	510,045	288,049
Annual Camping and Day Use Visitor Expenditures on Other	138,560	29,705	146,576
Annual Camping and Day Use Visitor Expenditures	$4,349,330	$2,868,081	$1,840,270

4. Input-Output Model Component

The input-output model component of the regional economic impact model serves the purpose of estimating the economic impact on the regional economy from a selected sectoral change in economic activity. Development of this component involved definition of the region, collection of the control total data, and derivation of the model tables.

4.1 Definition of the Region

The region is outlined by the hydrologic boundaries of the Truckee River Basin. Within the region, there is an economic area, a population base, and economic sectors.

Economic Area

The economic area within the region is defined at state, county, and city levels. At the state level, the economic area covers part of eastern California and part of western Nevada. At the county level, parts of Sierra county, Nevada county, Placer county, El Dorado county, and Alpine county lie within the California portion of the area. Similarly, in Nevada, parts of Pershing county, Washoe county, Lyon county, Carson City (an independent city), and Douglas county lie within the area. At the city level, Reno and Sparks in Washoe county, are the major cities in the area followed by Carson City, South Lake Tahoe in El Dorado county, Truckee in Nevada county, and, Tahoe City in Placer county.

Population Base

The population base is only that portion of county population that lives within the region. This amount is determined from county subdivision level data taken from the *Census of Population* published by the Bureau of the Census. The data includes all persons.

Population in and out of the region by county is shown in Tables 4.1-1 through 4.1-5 for California and in Tables 4.1-7 through 4.1-12 for Nevada. County summaries are given in Table 4.1-6 for California and Table 4.1-13 for Nevada. From the California counties, some 50,358 persons live within the region and from the Nevada counties, some 266,023 persons live within the region.

Population in the region by county and by state is also presented in Table 4.1-14. Total population in the region is 316,381 persons. Of this amount, 16% is from the California counties and 84% is from the Nevada counties. Washoe county alone accounts for 254,020 persons or 80% of the total population in the region.

Table 4.1-1. Population In and Out of the Region for Sierra County.

County Subdivision	County Population in the Region *all persons*	County Population out of the Region *all persons*	Total County Population *all persons*
East Sierra	2,029	0	2,029
West Sierra	0	1,289	1,289
Total	2,029	1,289	3,318
Percentage of Population	61.15%	38.85%	100.00%

Table 4.1-2. Population In and Out of the Region for Nevada County.

County Subdivision	County Population in the Region *all persons*	County Population out of the Region *all persons*	Total County Population *all persons*
Donner-Truckee	9,420	0	9,420
Grass Valley	0	56,269	56,269
Nevada City	0	12,821	12,821
Total	9,420	69,090	78,510
Percentage of Population	12.00%	88.00%	100.00%

Table 4.1-3. Population In and Out of the Region for Placer County.

County Subdivision	County Population in the Region *all persons*	County Population out of the Region *all persons*	Total County Population *all persons*
Auburn	0	37,159	37,159
Colfax-Summit	0	15,546	15,546
Foresthill-Back Country	0	4,699	4,699
Lake Tahoe	9,257	0	9,257
Loomis Basin-Folsom Lake	0	44,931	44,931
Roseville	0	47,395	47,395
West Valley	0	13,809	13,809
Total	9,257	163,539	172,796
Percentage of Population	5.36%	94.64%	100.00%

Table 4.1-4. Population In and Out of the Region for El Dorado County.

County Subdivision	County Population in the Region *all persons*	County Population out of the Region *all persons*	Total County Population *all persons*
North El Dorado	0	24,396	24,396
Placerville	0	14,105	14,105
South El Dorado	0	57,842	57,842
South Lake Tahoe	29,652	0	29,652
Total	29,652	96,343	125,995
Percentage of Population	23.53%	76.47%	100.00%

Table 4.1-5. Population In and Out of the Region for Alpine County.

County Subdivision	County Population in the Region *all persons*	County Population out of the Region *all persons*	Total County Population *all persons*
Markleeville	0	1,113	1,113
Total	0	1,113	1,113
Percentage of Population	0.00%	100.00%	100.00%

Table 4.1-6. Population In and Out of the Region by County for California.

County	County Population in the Region *all persons*	County Population out of the Region *all persons*	Total County Population *all persons*
Sierra	2,029	1,289	3,318
Nevada	9,420	69,090	78,510
Placer	9,257	163,539	172,796
El Dorado	29,652	96,343	125,995
Alpine	0	1,113	1,113
Total	50,358	331,374	381,732
Percentage of Population	13.19%	86.81%	100.00%

Table 4.1-7. Population In and Out of the Region for Washoe County.

County Subdivision	County Population in the Region *all persons*	County Population out of the Region *all persons*	Total County Population *all persons*
Flanigan	790	0	790
Gerlach	0	647	647
Incline Village	7,567	0	7,567
New Washoe City	10,109	0	10,109
Pyramid Lake	1,438	0	1,438
Reno-Sparks	231,651	0	231,651
Verdi	2,465	0	2,465
Total	254,020	647	254,667
Percentage of Population	99.75%	0.25%	100.00%

Table 4.1-8. Population In and Out of the Region for Pershing County.

County Subdivision	County Population in the Region *all persons*	County Population out of the Region *all persons*	Total County Population *all persons*
Imlay	0	1,104	1,104
Lovelock	0	3,232	3,232
Total	0	4,336	4,336
Percentage of Population	0.00%	100.00%	100.00%

Table 4.1-9. Population In and Out of the Region for Storey County.

County Subdivision	County Population in the Region *all persons*	County Population out of the Region *all persons*	Total County Population *all persons*
Clark	700	0	700
Virginia City	0	1,826	1,826
Total	700	1,826	2,526
Percentage of Population	27.71%	72.29%	100.00%

Table 4.1-10. Population In and Out of the Region for Lyon County.

County Subdivision	County Population in the Region *all persons*	County Population out of the Region *all persons*	Total County Population *all persons*
Dayton	0	4,321	4,321
Fernley	5,188	0	5,188
Silver Springs	0	3,261	3,261
Smith	0	1,139	1,139
Yerington	0	6,092	6,092
Total	5,188	14,813	20,001
Percentage of Population	25.94%	74.06%	100.00%

Table 4.1-11. Population In and Out of the Region for Carson City.

County Subdivision	County Population in the Region *all persons*	County Population out of the Region *all persons*	Total County Population *all persons*
Carson City	0	40,443	40,443
Total	0	40,443	40,443
Percentage of Population	0.00%	100.00%	100.00%

Table 4.1-12. Population In and Out of the Region for Douglas County.

County Subdivision	County Population in the Region *all persons*	County Population out of the Region *all persons*	Total County Population *all persons*
Gardnerville-Minden	0	15,639	15,639
Genoa-Jacks Valley	0	4,158	4,158
Pine Nut	0	296	296
Topaz Lake	0	1,429	1,429
Zephyr Cove	6,115	0	6,115
Total	6,115	21,522	27,637
Percentage of Population	22.13%	77.87%	100.00%

Table 4.1-13. Population In and Out of the Region by County for Nevada.

County	County Population in the Region *all persons*	County Population out of the Region *all persons*	Total County Population *all persons*
Washoe	254,020	647	254,667
Pershing	0	4,336	4,336
Storey	700	1,826	2,526
Lyon	5,188	14,813	20,001
Carson City	0	40,443	40,443
Douglas	6,115	21,522	27,637
Total	266,023	83,587	349,610
Percentage of Population	76.09%	23.91%	100.00%

Table 4.1-14. Population for the Region by County and by State.

County	California Population in the Region *all persons*	Nevada Population in the Region *all persons*	Total Population in the Region *all persons*	Percentage of Population
Sierra	2,029		2,029	0.64%
Nevada	9,420		9,420	2.98%
Placer	9,257		9,257	2.93%
El Dorado	29,652		29,652	9.37%
Alpine	0		0	0.00%
Washoe		254,020	254,020	80.29%
Pershing		0	0	0.00%
Storey		700	700	0.22%
Lyon		5,188	5,188	1.64%
Carson City		0	0	0.00%
Douglas		6,115	6,115	1.93%
Total	50,358	266,023	316,381	100.00%
Percentage of Population	15.92%	84.08%	100.00%	

Economic Sectors

There are twenty economic sectors within the economy of the region. A sector is an aggregation of individual business enterprises, firms, establishments, or activities which produce the same or similar products, or which purchase the same inputs to use in production. Each economic sector is listed with a definition in Table 4.1-15. These sectors include agriculture sectors and non-agriculture sectors. The agriculture sectors are livestock production, dairy production, alfalfa hay production, other hay production, and barley production. The non-agriculture sectors are agricultural services, gold mining, other mining, construction, manufacturing, transportation and communications, utilities, trade, eating, drinking, and lodging, finance, insurance, and real estate, services, hotels, gaming, and recreation, health, local government, and households. Agricultural services is included in the non-agriculture sectors because it isn't a agriculture production sector in the sense of producing a crop or commodity. Their sector definitions are based on standard industrial codes taken from the *Standard Industrial Classification Manual*. This manual is published by the Executive Office of the President, Office of Management and Budget.

State government is not included as one of the twenty sectors mentioned above. In splitting the state and local government sector apart an adjustment factor was necessary. This factor is based on the state and local government employment data by state given in Table 4.1-16 and the distribution of state and local government employment by state presented in Table 4.1-17.

Table 4.1-15. Economic Sector Definitions.

Economic Sector	Definition
1 Livestock Production	Livestock production sector accounts for cattle production.
2 Dairy Production	Dairy production sector accounts for milk production.
3 Alfalfa Hay Production	Alfalfa hay production sector accounts for alfalfa hay production.
4 Other Hay Production	Other hay production sector accounts for hay production other than alfalfa hay.
5 Barley Production	Barley production sector accounts for barley production.
6 Agricultural Services	Agricultural services sector accounts for veterinary services, and, landscape and horticultural services.
7 Gold Mining	Gold mining sector accounts for mining of gold and silver ores.
8 Other Mining	Other mining sector accounts for mining geothermal energy, diatomaceous earth, clay, and gravel.
9 Construction	Construction sector accounts for general building, heavy construction, and special trade contractors.
10 Manufacturing	Manufacturing sector accounts for manufacturing of food products, wood products, furniture, paper products, printing, publishing, chemical products, petroleum products, plastic products, stone products, clay products, glass products, fabricated metal products, industry equipment, electronic equipment, transportation equipment, and instruments.
11 Transportation and Communications	Transportation and communications sector accounts for railroad transportation, trucking, warehousing, air transportation, passenger transit, transportation services, and communications.
12 Utilities	Utilities sector accounts for electric, gas, and sanitary services.
13 Trade	Trade sector accounts for wholesale and retail trade. Wholesale trade is trade of durable and non-durable goods. Retail trade is trade of building materials, garden supplies, general merchandise stores, food stores, automotive dealers, service stations, apparel stores, and furniture stores.
14 Eating, Drinking, and Lodging	Eating, drinking, and lodging sector accounts for non-casino restaurants, bars, hotels, and motels.
15 Finance, Insurance, and Real Estate	Finance, insurance, and real estate sector accounts for depository institutions, non-depository institutions, security brokers, commodity brokers, insurance carriers, insurance agents, insurance brokers, real estate, and investment offices.
16 Services	Services sector accounts for personal services, business services, repair services, motion pictures, recreation, legal services, educational services, social services, museums, membership organizations, engineering services, and management services.
17 Hotels, Gaming, and Recreation	Hotels, gaming, and recreation sector accounts for casinos.
18 Health	Health sector accounts for medical and dental services.
19 Local Government	Local government sector accounts for local government activities of public administration, police protection, fire protection, public works, school district, finance, taxation, human resource programs, environmental quality programs, housing programs, and economic programs.
20 Households	Household sector accounts for consumers.

Table 4.1-16. State and Local Government Employment by State.

	California *jobs*	Nevada *jobs*
Local Government	1,183,867	38,434
State Government	348,258	16,857
State and Local Government	1,532,125	55,291

Table 4.1-17. Distribution of State and Local Government Employment by State.

	California *jobs*	Nevada *jobs*
Local Government	77.27%	69.51%
State Government	22.73%	30.49%
State and Local Government	100.00%	100.00%

4.2. Collection of the Control Total Data

Control total data was collected for output, employment, income, population, housing, agriculture water use, commercial water use, and residential water use.

Output

Output is the total gross output for each economic sector. Total gross output includes total value of sales and additions to inventories. Output is also referred to as the total value of intermediate plus final goods produced in the economy. The opposite of output is total gross outlay. Total gross outlay includes total value of purchases and depletion's from inventories. Total gross outlay is commonly called input.

Output by Agriculture Sector

Data to estimate the output by agriculture sector was provided by the California Department of Food and Agriculture and the Nevada Agricultural Statistics Service.

Output for the livestock, dairy, alfalfa hay, other hay, and barley production were taken from *California Livestock and Crop Report* and the *Nevada Agricultural Statistics Bulletin.* Livestock and dairy production are value of production based on marketing receipts from sales of cattle and milk. Alfalfa hay, other hay, and barley production are value of production based on crop yields and season prices.

The estimated value of production by commodity for both California and Nevada are provided in Tables 4.2-1 through 4.2-5. Output by agriculture sector for the region by state is then given in Table 4.2-6. Within the region the total agriculture production output for California is $2,092,000 and $3,123,153 for Nevada. Total agriculture output for the region is $5,215,455.

Table 4.2-1. Value of Livestock Production for the Region by State.

	California	Nevada	Total
Acres of Pasture	7,217	7,334	14,551
Number of Beef Cows per Acre	0.50	0.50	
Number of Beef Cows	3,609	3,667	7,276
Calf Crop Percentage	0.90	0.90	
Average Weight of Calves	600	600	
Average Price of Calves per Pound	0.85	0.85	
Value of Production	$1,656,302	$1,683,153	$3,339,455

Table 4.2-2. Value of Dairy Production for the Region by State.

	California	Nevada	Total
Number of Dairy Cows	0	500	500
Pounds of Milk per Cow	0	16,000	
Average Price of Milk per Hundredweight	0.00	12.00	
Value of Production	$0	$960,000	$960,000

Table 4.2-3. Value of Alfalfa Hay Production for the Region by State.

	California	Nevada	Total
Acres of Alfalfa Hay	300	500	800
Tons per Acre	4.00	4.00	
Price per Ton	100.00	100.00	
Value of Production	$120,000	$200,000	$320,000

Table 4.2-4. Value of Other Hay Production for the Region by State.

	California	Nevada	Total
Acres of Other Hay	2,000	2,000	4,000
Tons per Acre	2.00	2.00	
Price per Ton	70.00	70.00	
Value of Production	$280,000	$280,000	$560,000

Table 4.2-5. Value of Barley Production for the Region by State.

	California	Nevada	Total
Acres of Barley	200	0	200
Tons per Acre	2.00	0.00	
Price per Ton	90.00	0.00	
Value of Production	$36,000	$0	$36,000

Table 4.2-6. Output by Agriculture Sector for the Region by State.

Agriculture Sector	California $	Nevada $	Total $
1 Livestock Production	1,656,302	1,683,153	3,339,455
2 Dairy Production	0	960,000	960,000
3 Alfalfa Hay Production	120,000	200,000	320,000
4 Other Hay Production	280,000	280,000	560,000
5 Barley Production	36,000	0	36,000
Total	$2,092,302	$3,123,153	$5,215,455

Output by Non-Agriculture Sector

Data to estimate the output by non-agriculture sector was provided by IMPLAN, the Nevada Department of Taxation, U.S. Department of Commerce, Bureau of the Census, and Bureau of Economic Analysis.

Output for all the non-agriculture sectors for the California counties was taken entirely from IMPLAN data. However, output for the non-agriculture sectors in the Nevada counties were taken from all sources. Output for agricultural services was taken from IMPLAN. Gold mining and other mining output are gross proceeds of mines taken from *Nevada Net Proceeds of Minerals*. This is a report published by the Nevada Department of Taxation. Construction output is the dollar value of construction business taken from the *Census of Construction Industries*. The dollar value of manufacturing shipments is the output for manufacturing. This is taken from the *Census of Manufacturers*. Transportation and communications and utilities industry output are taken from IMPLAN. Output for trade is all wholesale and retail trade sales except for sales to eating and drinking places. These are taken from the *Census of Wholesale Trade* and *Census of Retail Trade*. The trade output is marginalized to 25% to reflect that only the mark-up on items remains in the region. Hotels, gaming, and recreation output is total receipts from hotels with greater than 25 rooms taken from the *Census of Service Industries*. Output for eating, drinking, and lodging is the total receipts from hotels with fewer than 25 rooms and sales to eating and drinking places. This is taken from the *Census of Service Industries* and *Census of Retail Trade*. Finance, insurance, and real estate output is taken from IMPLAN. The insurance portion of the output is marginalized to 11% to represent that only a portion of the insurance premium stays in the region. Output for services is total receipts for services less total receipts for hotels and health services. This is taken from the *Census of Service Industries*. Output for health is total receipts for health services taken from the *Census of Service Industries*. Local government output is expenditures by local government taken from *Census of Governments*. Output for households is wages, salaries, other labor income, proprietors income, dividends, interest, rent, and government transfer payments. These are taken from the *Regional Economic Information System* of the Bureau of Economic Analysis.

All the data for the output of the non-agriculture sectors in the California and Nevada counties needed to be adjusted to the region. For California, the output data was taken from IMPLAN at the county level and was adjusted to the region by the portion of county population that lives within the region. For Nevada, the output data was given at the state level. This data was adjusted to the county level by the portion of county industry earnings taken from *Regional Economic Information System* of the Bureau of Economic Analysis. The county level data was then adjusted to the region based on the portion of county population that lives within the region. Also the state and local government sector output needed to be adjusted to only a local government sector output

for the California and Nevada counties. This was done by using the percentage of local government employment mention above in Tables 4.1-16 and 4.1-17.

For the California counties, output by non-agriculture sector by county is shown in Table 4.2-7. This output was adjusted to the region using the population percentage for the region by county in Table 4.2-8. The state and local government sector output was adjusted to only a local government sector output using the local government employment percentage for the region by county given in Table 4.2-9. The output for the non-agriculture sectors for the region by county is then presented in Table 4.2-10.

The total output for the non-agriculture sectors for the region by county for California is $1,988,979,271. El Dorado county generates $1,027,501,153 in output and is followed by Placer county with $494,028,807, Nevada county with $397,731,745, and Sierra county with $69,717,566. Alpine county doesn't generate any output within the region.

For the Nevada counties, output by non-agriculture sector by county is shown in Table 4.2-11. This output was adjusted to the region using the population percentage for the region by county in Table 4.2-12. The state and local government sector output was adjusted to only a local government sector output using the local government employment percentage for the region by county given in Table 4.2-13. The output for the non-agriculture sectors for the region by county is then presented in Table 4.2-14.

The total output for the non-agriculture sectors for the region by county for Nevada is $15,863,076,554. Washoe county generates $15,252,709,168 in output and is followed by Douglas county with $432,003,277, Lyon county with $159,955,163, and Storey county with $18,408,947. Pershing county and Carson City do not generate any output within the region.

Output by non-agriculture sector for the region by state is given in Table 4.2-15. Total output for both states is $17,852,055,825. Of this amount, $1,988,979,271 is generated in California and $15,863,076,554 is generated in Nevada.

Table 4.2-7. Output by Non-Agriculture Sector by County for California.

Non-Agriculture Sector	Sierra County $	Nevada County $	Placer County $	El Dorado County $	Alpine County $	Total $
6 Agricultural Services	205,004	5,812,850	34,768,350	14,477,052	373,277	55,636,533
7 Gold Mining	1,657,487	478,645	3,844,210	456,323	1,807,838	8,244,503
8 Other Mining	3,529,581	10,324,510	17,226,020	11,432,467	873,854	43,386,432
9 Construction	5,636,936	432,735,100	1,052,699,000	573,352,169	3,748,892	2,068,172,097
10 Manufacturing	23,228,780	397,622,900	833,776,500	259,813,966	2,130,323	1,516,572,469
11 Transportation and Communications	6,981,680	34,746,420	374,392,200	73,793,737	249,050	490,163,087
12 Utilities	615,584	46,638,520	199,325,900	82,443,690	856,087	329,879,781
13 Trade	2,578,238	177,657,300	510,319,000	269,764,680	2,378,338	962,697,556
14 Eating, Drinking, and Lodging	923,340	48,517,400	181,397,200	106,708,900	926,495	338,473,335
15 Finance, Insurance, and Real Estate	5,005,943	413,655,100	1,215,435,000	606,545,408	2,286,682	2,242,928,133
16 Services	9,469,890	274,931,900	705,719,600	358,931,178	4,515,586	1,353,568,154
17 Hotels, Gaming, and Recreation	948,150	34,127,440	99,645,470	107,697,319	13,706,220	256,124,599
18 Health	948,778	166,873,900	462,333,400	191,448,320	374,667	821,979,065
19 State and Local Government Sector	13,049,650	87,733,150	239,144,700	157,017,000	2,979,543	499,924,043
20 Household Sector /1	42,195,516	1,202,940,384	3,346,131,873	1,587,787,317	20,994,684	6,200,049,774
Total	116,974,557	3,334,795,519	9,276,158,423	4,401,669,526	58,201,536	17,187,799,561

1. The county totals for the household sector were adjusted upward to the same proportion of the county total as for the county totals for the household sector for Nevada.

Table 4.2-8. Population Percentage for the Region by County for California.

	Sierra County	Nevada County	Placer County	El Dorado County	Alpine County
Population Percentage	61.15%	12.00%	5.36%	23.53%	0.00%

Table 4.2-9. Local Government Employment Percentage for the Region by County for California.

	Sierra County	Nevada County	Placer County	El Dorado County	Alpine County
Employment Percentage	77.27%	77.27%	77.27%	77.27%	77.27%

Table 4.2-10. Output by Non-Agriculture Sector for the Region by County for California.

Non-Agriculture Sector	Sierra County $	Nevada County $	Placer County $	El Dorado County $	Alpine County $	Total $
6 Agricultural Services	125,363	697,453	1,862,605	3,407,068	0	6,092,488
7 Gold Mining	1,013,575	57,430	205,941	107,392	0	1,384,339
8 Other Mining	2,158,385	1,238,783	922,830	2,690,547	0	7,010,545
9 Construction	3,447,059	51,921,598	56,395,024	134,934,232	0	246,697,913
10 Manufacturing	14,204,700	47,708,670	44,666,943	61,145,313	0	167,725,626
11 Transportation and Communications	4,269,388	4,169,039	20,056,880	17,366,815	0	45,862,122
12 Utilities	376,438	5,595,910	10,678,256	19,402,518	0	36,053,121
13 Trade	1,576,626	21,316,161	27,338,729	63,487,141	0	113,718,656
14 Eating, Drinking, and Lodging	564,634	5,821,346	9,717,782	25,113,158	0	41,216,921
15 Finance, Insurance, and Real Estate	3,061,199	49,632,289	65,113,092	142,746,017	0	260,552,597
16 Services	5,790,960	32,987,626	37,806,699	84,471,823	0	161,057,108
17 Hotels, Gaming, and Recreation	579,806	4,094,771	5,338,191	25,345,775	0	35,358,543
18 Health	580,190	20,022,317	24,768,052	45,055,959	0	90,426,518
19 Local Government Sector	6,166,138	8,133,891	9,899,336	28,553,284	0	52,752,650
20 Household Sector	25,803,105	144,334,460	179,258,448	373,674,110	0	723,070,123
Total	69,717,566	397,731,745	494,028,807	1,027,501,153	0	1,988,979,271
Total with State Government	71,531,458	400,124,491	496,940,893	1,035,900,669	0	2,004,497,511

Table 4.2-11. Output by Non-Agriculture Sector by County for Nevada.

Non-Agriculture Sector	Washoe County $	Pershing County $	Storey County $	Lyon County $	Carson City $	Douglas County $	Total $
6 Agricultural Services	45,028,752	878,000	0	3,358,000	4,357,000	3,660,000	57,281,752
7 Gold Mining	47,634,393	87,052,000	9,554,000	6,414,000	15,000	24,000	150,693,393
8 Other Mining	5,386,970	9,845,000	1,081,000	725,000	2,000	3,000	17,042,970
9 Construction	1,151,593,588	3,379,000	1,698,000	64,792,000	181,662,000	126,659,000	1,529,783,588
10 Manufacturing	1,130,876,426	5,224,000	5,253,000	122,549,000	384,229,000	155,739,000	1,803,870,426
11 Transportation and Communications	686,062,413	1,240,000	0	17,456,000	27,105,000	20,470,000	752,333,413
12 Utilities	386,761,880	12,326,000	0	20,675,000	38,223,000	13,770,000	471,755,880
13 Trade	1,305,554,404	7,726,000	3,302,000	26,306,000	130,739,000	45,881,000	1,519,508,404
14 Eating, Drinking, and Lodging	235,137,545	3,924,000	5,832,000	5,958,000	33,597,000	24,351,000	308,799,545
15 Finance, Insurance, and Real Estate	1,094,172,000	1,794,000	0	18,994,000	84,858,000	112,479,000	1,312,297,000
16 Services	1,014,656,682	3,902,000	6,156,000	35,651,000	155,209,000	104,358,000	1,319,932,682
17 Hotels, Gaming, and Recreation	1,210,728,991	656,000	0	778,000	28,631,000	536,582,000	1,777,375,991
18 Health	572,526,698	683,000	0	3,982,000	49,062,000	15,182,000	641,435,698
19 State and Local Government Sector	910,056,918	15,365,644	6,183,086	43,793,740	402,569,521	74,116,468	1,452,085,377
20 Household Sector	5,772,837,000	77,434,000	29,256,000	258,586,000	874,455,000	741,779,000	7,754,347,000
Total	15,569,014,659	231,428,644	68,315,086	630,017,740	2,394,713,521	1,975,053,468	20,868,543,118

Table 4.2-12. Population Percentage for the Region by County for Nevada.

	Washoe County	Pershing County	Storey County	Lyon County	Carson City	Douglas County
Population Percentage	99.75%	0.00%	27.71%	25.94%	0.00%	22.13%

Table 4.2-13. Local Government Employment Percentage for the Region by County for Nevada.

	Washoe County	Pershing County	Storey County	Lyon County	Carson City	Douglas County
Employment Percentage	69.51%	69.51%	69.51%	69.51%	69.51%	69.51%

Table 4.2-14. Output by Non-Agriculture Sector for the Region by County for Nevada.

Economic Sector	Washoe County $	Pershing County $	Storey County $	Lyon County $	Carson City $	Douglas County $	Total $
6 Agricultural Services	44,914,353	0	0	871,022	0	809,817	46,595,191
7 Gold Mining	47,513,374	0	2,647,585	1,663,708	0	5,310	51,829,978
8 Other Mining	5,373,284	0	299,565	188,056	0	664	5,861,568
9 Construction	1,148,667,881	0	470,546	16,806,204	0	28,024,742	1,193,969,373
10 Manufacturing	1,128,003,352	0	1,455,701	31,787,621	0	34,459,022	1,195,705,696
11 Transportation and Communications	684,319,422	0	0	4,527,860	0	4,529,220	693,376,502
12 Utilities	385,779,283	0	0	5,362,827	0	3,046,769	394,188,879
13 Trade	1,302,237,548	0	915,044	6,823,435	0	10,151,692	1,320,127,719
14 Eating, Drinking, and Lodging	234,540,161	0	1,616,152	1,545,428	0	5,387,935	243,089,676
15 Finance, Insurance, and Real Estate	1,091,392,177	0	0	4,926,797	0	24,887,256	1,121,206,230
16 Services	1,012,078,873	0	1,705,938	9,247,407	0	23,090,392	1,046,122,611
17 Hotels, Gaming, and Recreation	1,207,653,046	0	0	201,803	0	118,724,859	1,326,579,708
18 Health	571,072,152	0	0	1,032,879	0	3,359,190	575,464,221
19 Local Government Sector	630,993,573	0	1,191,053	7,896,260	0	11,399,385	651,480,271
20 Household Sector	5,758,170,689	0	8,107,363	67,073,855	0	164,127,025	5,997,478,931
Total	15,252,709,168	0	18,408,947	159,955,163	0	432,003,277	15,863,076,554
Total with State Government	16,051,815,607	0	18,931,338	165,776,518	0	448,914,607	16,685,438,070

Table 4.2-15. Output by Non-Agriculture Sector for the Region by State.

Non-Agriculture Sector	California $	Nevada $	Total $
6 Agricultural Services	6,092,488	46,595,191	52,687,679
7 Gold Mining	1,384,339	51,829,978	53,214,316
8 Other Mining	7,010,545	5,861,568	12,872,113
9 Construction	246,697,913	1,193,969,373	1,440,667,287
10 Manufacturing	167,725,626	1,195,705,696	1,363,431,322
11 Transportation and Communications	45,862,122	693,376,502	739,238,624
12 Utilities	36,053,121	394,188,879	430,242,000
13 Trade	113,718,656	1,320,127,719	1,433,846,375
14 Eating, Drinking, and Lodging	41,216,921	243,089,676	284,306,597
15 Finance, Insurance, and Real Estate	260,552,597	1,121,206,230	1,381,758,827
16 Services	161,057,108	1,046,122,611	1,207,179,719
17 Hotels, Gaming, and Recreation	35,358,543	1,326,579,708	1,361,938,251
18 Health	90,426,518	575,464,221	665,890,740
19 Local Government	52,752,650	651,480,271	704,232,921
20 Households	723,070,123	5,997,478,931	6,720,549,054
Total	1,988,979,271	15,863,076,554	17,852,055,825

Output by Economic Sector

Output by economic sector for the region by state is presented in Table 4.2-16. The agriculture sectors are combined with the non-agriculture sectors. Total output for the region is $17,857,271,279. Of this amount, $1,991,071,572 is generated in California and $15,866,199,707 is generated in Nevada.

Table 4.2-16. Output by Economic Sector for the Region by State.

Economic Sector	California $	Nevada $	Total $
1 Livestock Production	1,656,302	1,683,153	3,339,455
2 Dairy Production	0	960,000	960,000
3 Alfalfa Hay Production	120,000	200,000	320,000
4 Other Hay Production	280,000	280,000	560,000
5 Barley Production	36,000	0	36,000
6 Agricultural Services	6,092,488	46,595,191	52,687,679
7 Gold Mining	1,384,339	51,829,978	53,214,316
8 Other Mining	7,010,545	5,861,568	12,872,113
9 Construction	246,697,913	1,193,969,373	1,440,667,287
10 Manufacturing	167,725,626	1,195,705,696	1,363,431,322
11 Transportation and Communications	45,862,122	693,376,502	739,238,624
12 Utilities	36,053,121	394,188,879	430,242,000
13 Trade	113,718,656	1,320,127,719	1,433,846,375
14 Eating, Drinking, and Lodging	41,216,921	243,089,676	284,306,597
15 Finance, Insurance, and Real Estate	260,552,597	1,121,206,230	1,381,758,827
16 Services	161,057,108	1,046,122,611	1,207,179,719
17 Hotels, Gaming, and Recreation	35,358,543	1,326,579,708	1,361,938,251
18 Health	90,426,518	575,464,221	665,890,740
19 Local Government	52,752,650	651,480,271	704,232,921
20 Households	723,070,123	5,997,478,931	6,720,549,054
Total	1,991,071,572	15,866,199,707	17,857,271,279

Employment

Employment is the number of full-time and part-time employees. Employment is measured by the number of jobs by place of work by economic sector.

Employment by Agriculture Sector

Data to estimate the employment by agriculture sector was provided by IMPLAN and the Bureau of Economic Analysis.

Employment for agriculture sectors in the California counties were taken from IMPLAN to correspond to the output numbers mentioned above. Employment for the Nevada counties were taken from the *Regional Economic Information System* of the Bureau of Economic Analysis.

The employment by agriculture sector for the region by state is shown in Table 4.2-17. Total employment is 101 jobs. Of these jobs, 39 jobs are in California and 62 jobs are in Nevada.

Table 4.2-17. Employment by Agriculture Sector for the Region by State.

Economic Sector	California *jobs*	Nevada *jobs*	Total *jobs*
1 Livestock Production	31	32	63
2 Dairy Production	0	21	21
3 Alfalfa Hay Production	2	4	6
4 Other Hay Production	5	5	10
5 Barley Production	1	0	1
Total	39	62	101

Employment by Non-Agriculture Sector

Data to estimate the employment by non-agriculture sector was provided by IMPLAN and the Bureau of Economic Analysis.

Employment for the non-agriculture sectors in the California counties were again taken from IMPLAN to correspond to the output numbers mentioned above. Employment for the Nevada counties were again taken from the *Regional Economic Information System* of the Bureau of Economic Analysis.

For the California counties, employment by non-agriculture sector by county is shown in Table 4.2-18. This employment was adjusted to the region using the population percentage for the region by county in Table 4.2-8. The state and local government sector employment was adjusted to only a local government sector employment using the local government employment percentage for the region by county given in Table 4.2-9. The employment by non-agriculture sector for the region by county is then presented in Table 4.2-19.

The total employment for the non-agriculture sectors for the region by county for California is 19,620 jobs. El Dorado county has 10,355 jobs followed by Placer county with 4,589 jobs, Nevada county with 3,887 jobs, and Sierra county with 789 jobs. Alpine county didn't have any jobs within the region.

For the Nevada counties, employment by non-agriculture sector by county is shown in Table 4.2-20. This employment was adjusted to the region using the population percentage for the region by county in Table 4.2-12. The state and local government sector employment was adjusted to only a local government sector employment using the local government employment percentage for the region by county given in Table 4.2-13. The employment by non-agriculture sector for the region by county is then presented in Table 4.2-21.

The total employment for the non-agriculture sectors for the region by county for Nevada is 168,400 jobs. Washoe county has 161,640 jobs followed by Douglas county with 4,800 jobs, Lyon county with 1,733 jobs, and Storey county with 227 jobs. Pershing county and Carson City did not have any jobs within the region.

Employment by non-agriculture sectors for the region by state is given in Table 4.2-22. Total employment for both states is 188,020 jobs. Of this amount, 19,620 jobs are in California and 168,400 jobs are in Nevada.

Table 4.2-18. Employment by Non-Agriculture Sector by County for California.

Non-Agriculture Sector	Sierra County *jobs*	Nevada County *jobs*	Placer County *jobs*	El Dorado County *jobs*	Alpine County *jobs*	Total *jobs*
6 Agricultural Services	5	169	877	395	7	1,453
7 Gold Mining	8	2	21	2	6	39
8 Other Mining	7	34	76	93	1	211
9 Construction	70	5,023	11,314	6,244	44	22,695
10 Manufacturing	198	3,169	7,579	2,220	8	13,174
11 Transportation and Communications	177	427	3,172	784	4	4,564
12 Utilities	3	167	562	271	4	1,007
13 Trade	114	4,953	12,646	7,123	39	24,875
14 Eating, Drinking, and Lodging	35	1,732	6,262	3,694	29	11,752
15 Finance, Insurance, and Real Estate	8	4,027	10,061	4,554	9	18,659
16 Services	243	5,294	13,465	6,620	95	25,717
17 Hotels, Gaming, and Recreation	30	1,443	3,700	3,974	416	9,563
18 Health	25	3,535	8,933	3,907	7	16,407
19 State and Local Government Sector	476	3,130	9,052	5,329	123	18,110
20 Household Sector	0	0	0	0	0	0
Total	1,399	33,105	87,720	45,210	792	168,226

Table 4.2-19. Employment by Non-Agriculture Sector for the Region by County for California.

Non-Agriculture Sector	Sierra County *jobs*	Nevada County *jobs*	Placer County *jobs*	El Dorado County *jobs*	Alpine County *jobs*	Total *jobs*
6 Agricultural Services	3	20	47	93	0	163
7 Gold Mining	5	0	1	0	0	7
8 Other Mining	4	4	4	22	0	34
9 Construction	43	603	606	1,469	0	2,721
10 Manufacturing	121	380	406	522	0	1,430
11 Transportation and Communications	108	51	170	185	0	514
12 Utilities	2	20	30	64	0	116
13 Trade	70	594	677	1,676	0	3,018
14 Eating, Drinking, and Lodging	21	208	335	869	0	1,434
15 Finance, Insurance, and Real Estate	5	483	539	1,072	0	2,099
16 Services	149	635	721	1,558	0	3,063
17 Hotels, Gaming, and Recreation	18	173	198	935	0	1,325
18 Health	15	424	479	919	0	1,837
19 Local Government Sector	225	290	375	969	0	1,859
20 Household Sector	0	0	0	0	0	0
Total	789	3,887	4,589	10,355	0	19,620
Total with State Government	856	3,972	4,699	10,640	0	20,167

Table 4.2-20. Employment by Non-Agriculture Sector by County for Nevada.

Non-Agriculture Sector	Washoe County *jobs*	Pershing County *jobs*	Storey County *jobs*	Lyon County *jobs*	Carson City *jobs*	Douglas County *jobs*	Total *jobs*
6 Agricultural Services	1,132	17	0	91	140	142	1,522
7 Gold Mining	1,442	618	145	156	48	13	2,422
8 Other Mining	163	70	16	18	6	2	275
9 Construction	9,404	28	22	718	1,556	1,182	12,910
10 Manufacturing	9,211	56	18	1,276	3,583	1,333	15,477
11 Transportation and Communications	8,103	12	0	267	322	285	8,989
12 Utilities	2,515	66	0	174	250	105	3,110
13 Trade	32,613	356	125	954	3,924	1,556	39,528
14 Eating, Drinking, and Lodging	3,743	115	141	138	643	526	5,306
15 Finance, Insurance, and Real Estate	13,015	35	0	478	1,611	1,842	16,981
16 Services	30,735	231	258	1,602	4,800	3,253	40,879
17 Hotels, Gaming, and Recreation	22,135	23	0	21	534	10,095	32,808
18 Health	17,593	41	0	182	1,539	480	19,835
19 State and Local Government Sector	14,743	333	134	871	6,834	1,263	24,178
20 Household Sector	0	0	0	0	0	0	0
Total	166,547	2,001	859	6,946	25,790	22,077	224,220

Table 4.2-21. Employment by Non-Agriculture Sector for the Region by County for Nevada.

Non-Agriculture Sector	Washoe County *jobs*	Pershing County *jobs*	Storey County *jobs*	Lyon County *jobs*	Carson City *jobs*	Douglas County *jobs*	Total *jobs*
6 Agricultural Services	1,129	0	0	24	0	31	1,184
7 Gold Mining	1,438	0	40	40	0	3	1,522
8 Other Mining	163	0	4	5	0	0	172
9 Construction	9,380	0	6	186	0	262	9,834
10 Manufacturing	9,188	0	5	331	0	295	9,819
11 Transportation and Communications	8,082	0	0	69	0	63	8,215
12 Utilities	2,509	0	0	45	0	23	2,577
13 Trade	32,530	0	35	247	0	344	33,156
14 Eating, Drinking, and Lodging	3,734	0	39	36	0	116	3,925
15 Finance, Insurance, and Real Estate	12,982	0	0	124	0	408	13,513
16 Services	30,657	0	71	416	0	720	31,864
17 Hotels, Gaming, and Recreation	22,079	0	0	5	0	2,234	24,318
18 Health	17,548	0	0	47	0	106	17,702
19 Local Government Sector	10,222	0	26	157	0	194	10,599
20 Household Sector	0	0	0	0	0	0	0
Total	161,640	0	227	1,733	0	4,800	168,400
Total with State Government	166,124	0	238	1,802	0	4,885	173,048

Table 4.2-22. Employment by Non-Agriculture Sector for the Region by State.

Non-Agriculture Sector	California *jobs*	Nevada *jobs*	Total *jobs*
6 Agricultural Services	163	1,184	1,347
7 Gold Mining	7	1,522	1,529
8 Other Mining	34	172	206
9 Construction	2,721	9,834	12,555
10 Manufacturing	1,430	9,819	11,248
11 Transportation and Communications	514	8,215	8,729
12 Utilities	116	2,577	2,693
13 Trade	3,018	33,156	36,174
14 Eating, Drinking, and Lodging	1,434	3,925	5,359
15 Finance, Insurance, and Real Estate	2,099	13,513	15,612
16 Services	3,063	31,864	34,927
17 Hotels, Gaming, and Recreation	1,325	24,318	25,643
18 Health	1,837	17,702	19,539
19 Local Government	1,859	10,599	12,458
20 Households	0	0	0
Total	19,620	168,400	188,020

Employment by Economic Sector

Employment by economic sector for the region by state is presented in Table 4.2-23. The agriculture sectors are combined with the non-agriculture sectors. Total employment for the region is 188,121 jobs. Of this amount, 19,659 jobs are in California and 168,462 jobs are in Nevada.

Table 4.2-23. Employment by Economic Sector for the Region by State.

Economic Sector	California *jobs*	Nevada *jobs*	Total *jobs*
1 Livestock Production	31	32	63
2 Dairy Production	0	21	21
3 Alfalfa Hay Production	2	4	6
4 Other Hay Production	5	5	10
5 Barley Production	1	0	1
6 Agricultural Services	163	1,184	1,347
7 Gold Mining	7	1,522	1,529
8 Other Mining	34	172	206
9 Construction	2,721	9,834	12,555
10 Manufacturing	1,430	9,819	11,248
11 Transportation and Communications	514	8,215	8,729
12 Utilities	116	2,577	2,693
13 Trade	3,018	33,156	36,174
14 Eating, Drinking, and Lodging	1,434	3,925	5,359
15 Finance, Insurance, and Real Estate	2,099	13,513	15,612
16 Services	3,063	31,864	34,927
17 Hotels, Gaming, and Recreation	1,325	24,318	25,643
18 Health	1,837	17,702	19,539
19 Local Government	1,859	10,599	12,458
20 Households	0	0	0
Total	19,659	168,462	188,121

Income

Income is personal income in the form of wages, salaries, other labor income, proprietors income, dividends, interest, rent, and government transfer payments. Income is measured by earnings by place of work by economic sector.

Income by Economic Sector

Data to estimate the income by economic sector was provided by IMPLAN.

Income coefficients were calculated for each economic sector for the California and Nevada counties using IMPLAN. An income coefficient is interpreted as the amount of income created per dollar of output. The income coefficients by economic sector for the region by state are shown in Table 4.2-24.

The income by economic sector for the region by state are presented in Table 4.2-25. Total income created is $6,720,549,054. Of this amount, $723,070,123 is created in California and $5,997,478,931 is created in Nevada. These numbers match the households output for the economic sectors for the region by state shown in Table 4.2-16.

Table 4.2-24. Income Coefficients by Economic Sector for the Region by State.

Economic Sector	California	Nevada
1 Livestock Production	0.16178555	0.16178555
2 Dairy Production	0.00000000	0.22500000
3 Alfalfa Hay Production	0.40625000	0.40625000
4 Other Hay Production	0.37857143	0.37857143
5 Barley Production	0.30555556	0.00000000
6 Agricultural Services	0.42301852	0.42301852
7 Gold Mining	0.31215470	0.31215470
8 Other Mining	0.26017713	0.26017713
9 Construction	0.28854721	0.28854721
10 Manufacturing	0.26369049	0.26369049
11 Transportation and Communications	0.40103999	0.40103999
12 Utilities	0.12544132	0.12544132
13 Trade	0.48690061	0.48690061
14 Eating, Drinking, and Lodging	0.33365810	0.33365810
15 Finance, Insurance, and Real Estate	0.13871607	0.13871607
16 Services	0.39651269	0.39651269
17 Hotels, Gaming, and Recreation	0.32280030	0.32280030
18 Health	0.42231663	0.42231663
19 Local Government	0.37108700	0.37108700
20 Households	0.47183814	0.46100076

Table 4.2-25. Income by Economic Sector for the Region by State.

Economic Sector	California $	Nevada $	Total $
1 Livestock Production	267,966	272,310	540,275
2 Dairy Production	0	216,000	216,000
3 Alfalfa Hay Production	48,750	81,250	130,000
4 Other Hay Production	106,000	106,000	212,000
5 Barley Production	11,000	0	11,000
6 Agricultural Services	2,577,235	19,710,629	22,287,864
7 Gold Mining	432,128	16,178,971	16,611,099
8 Other Mining	1,823,983	1,525,046	3,349,029
9 Construction	71,183,994	344,516,531	415,700,525
10 Manufacturing	44,227,653	315,296,223	359,523,876
11 Transportation and Communications	18,392,545	278,071,705	296,464,250
12 Utilities	4,522,551	49,447,574	53,970,125
13 Trade	55,369,683	642,770,987	698,140,670
14 Eating, Drinking, and Lodging	13,752,359	81,108,840	94,861,199
15 Finance, Insurance, and Real Estate	36,142,833	155,529,324	191,672,157
16 Services	63,861,187	414,800,891	478,662,078
17 Hotels, Gaming, and Recreation	11,413,749	428,220,333	439,634,081
18 Health	38,188,623	243,028,112	281,216,735
19 Local Government	19,575,822	241,755,859	261,331,681
20 Households	341,172,061	2,764,842,347	3,106,014,408
Total	723,070,123	5,997,478,931	6,720,549,054

Population

Population is all persons.

Population by Economic Sector

A ratio of population for the region to employment for the region by state is calculated and shown in Table 4.2-26. Population reported as all persons for California and Nevada was taken from Table 4.2-14. Employment reported as the number of jobs for California and Nevada were taken from Tables 4.2-19 and 4.2-21. The ratio of population to employment for the region is 1.64 persons to 1 job. Likewise, the ratios of population to employment for California is 2.49 persons to 1 job, and for Nevada is 1.54 persons to 1 job. These ratios are then used to calculate population for the economic sectors for the region by state.

Population by economic sector for the region by state are shown in Table 4.2-27. Total population is 307,874 persons. Of this amount, there are 48,995 persons in California and 258,879 persons in Nevada.

Table 4.2-26. Ratio of Population for the Region to Employment for the Region by State.

	California	Nevada	Total
Population as All Persons	50,358	266,023	316,381
Employment as Number of Jobs /1	20,206	173,110	193,316
Ratio of Population to Employment	2.49225904	1.53672446	1.63659871

1. Employment is with state government.

Table 4.2-27. Population by Economic Sector for the Region by State.

Economic Sector	California *all persons*	Nevada *all persons*	Total *all persons*
1 Livestock Production	77	49	126
2 Dairy Production	0	32	32
3 Alfalfa Hay Production	5	6	11
4 Other Hay Production	12	8	20
5 Barley Production	2	0	2
6 Agricultural Services	407	1,820	2,227
7 Gold Mining	17	2,339	2,355
8 Other Mining	86	265	350
9 Construction	6,782	15,112	21,894
10 Manufacturing	3,563	15,088	18,652
11 Transportation and Communications	1,281	12,624	13,904
12 Utilities	288	3,960	4,249
13 Trade	7,521	50,952	58,474
14 Eating, Drinking, and Lodging	3,574	6,031	9,605
15 Finance, Insurance, and Real Estate	5,231	20,767	25,997
16 Services	7,634	48,966	56,600
17 Hotels, Gaming, and Recreation	3,302	37,370	40,672
18 Health	4,579	27,203	31,782
19 Local Government	4,633	16,288	20,921
20 Households	0	0	0
Total	48,995	258,879	307,874

Housing

Housing is occupied housing units with households. Housing units are either single-units, multi-units of less than ten units per structure, or multi-units of ten or more units per structure. Households are either family or non-family households.

Housing by Economic Sector

Data to estimate housing by economic sector was provided by the U.S. Department of Commerce, Bureau of the Census.

Housing units, occupied housing units, and households were taken from the *Census of Housing*. Housing units are single-units, multi-units of less than ten units per structure, and multi-units of ten or more units per structure. Occupied housing units are the same but are occupied with households. Households are either family and non-family households. Housing units are measured as the number of dwellings by housing unit type and households are measured as the number of households by household type.

Housing units are analyzed in Tables 4.2-28 through 4.2-34. Housing units by type by county and for the region for California are shown in Tables 4.2-28 and 4.2-29. Housing units by type by county and for the region for Nevada are shown in Tables 4.2-30 and 4.2-31. As were output and employment, the housing units by county are also adjusted by the county population percentage to estimate the housing units for the region. Housing units by type for the region by state are given in Table 4.2-32. This table is followed by the distribution of housing units by type for the region by state and by the ratio of housing units for the region to population for the region by state presented in Tables 4.2-33 and 4.2-34.

Occupied housing units are analyzed in Tables 4.2-35 through 4.2-41. Occupied housing units by type by county and for the region for California are shown in Tables 4.2-35 and 4.2-36. Occupied units by type by county and for the region for Nevada are shown in Tables 4.2-37 and 4.2-38. As were output and employment, the occupied housing units by county are also adjusted by the county population percentage to estimate the housing units for the region. Occupied housing units by type for the region by state are given in Table 4.2-39. This table is followed by the distribution of occupied housing units by type for the region by state and by the ratio of occupied housing units for the region to population for the region by state presented in Tables 4.2-40 and 4.2-41.

Households are analyzed in Tables 4.2-42 through 4.2-48. Households by type by county and for the region for California are shown in Tables 4.2-42 and 4.2-43. Households by type by county and for the region for Nevada are shown in Tables 4.2-44 and 4.2-45. As were output and employment, the households by county are also adjusted

by the county population percentage to estimate the households for the region. Households by type for the region by state are given in Table 4.2-46. This table is followed by the distribution of households by type for the region by state and by the ratio of households for the region to population for the region by state presented in Tables 4.2-47 and 4.2-48.

The ratio of households for the region to population for the region by state shown in Table 4.2-48 are used to calculate housing for the economic sectors for the region by state. Housing is based on population. For California, there are 18,966 households and a population of 50,358 persons for a ratio of .377 households per person. For Nevada, there are 106,651 households and a population of 266,023 persons for a ratio of .401 households per person. For both states combined, there are 125,616 households and a population of 316,381 persons for a ratio of .397 households per person. The population by economic sector provided in Table 4.2-27 is then multiplied by these ratios to calculate housing for the economic sectors shown in Table 4.2-49.

Housing by economic sector for the region by state are shown in Table 4.2-49. Housing is estimated as the number of dwellings. Total housing for the region is 122,239 dwellings. Of this amount, there are 18,452 dwellings in California and 103,787 dwellings in Nevada.

Table 4.2-28. Housing Units by Type by County for California.

Type	Sierra County *dwellings*	Nevada County *dwellings*	Placer County *dwellings*	El Dorado County *dwellings*	Alpine County *dwellings*	Total *dwellings*
Single Units	1,741	30,554	61,447	48,300	878	142,921
Multi-Units of Less than Ten per Structure	390	5,751	12,539	10,815	372	29,866
Multi-Units of Ten or More per Structure	35	1,042	3,894	2,335	69	7,374
Total	2,166	37,346	77,879	61,451	1,319	180,161

Table 4.2-29. Housing Units by Type for the Region by County for California.

Type	Sierra County *dwellings*	Nevada County *dwellings*	Placer County *dwellings*	El Dorado County *dwellings*	Alpine County *dwellings*	Total *dwellings*
Single Units	1,065	3,666	3,292	11,367	0	19,390
Multi-Units of Less than Ten per Structure	238	690	672	2,545	0	4,145
Multi-Units of Ten or More per Structure	21	125	209	550	0	904
Total	1,325	4,481	4,172	14,462	0	24,440

Table 4.2-30. Housing Units by Type by County for Nevada.

Type	Washoe County *dwellings*	Pershing County *dwellings*	Storey County *dwellings*	Lyon County *dwellings*	Carson City *dwellings*	Douglas County *dwellings*	Total *dwellings*
Single Units	59,687	933	692	4,666	8,929	9,911.36	84,819
Multi-Units of Less than Ten per Structure	33,658	960	392	4,038	5,022	3,457.45	47,527
Multi-Units of Ten or More per Structure	18,848	15	1	17	2,677	790.92	22,350
Total	112,193	1,908	1,085	8,722	16,628	14,160	154,696

Table 4.2-31. Housing Units by Type for the Region by County for Nevada.

Type	Washoe County *dwellings*	Pershing County *dwellings*	Storey County *dwellings*	Lyon County *dwellings*	Carson City *dwellings*	Douglas County *dwellings*	Total *dwellings*
Single Units	59,535	0	192	1,210	0	2,193	63,130
Multi-Units of Less than Ten per Structure	33,572	0	109	1,047	0	765	35,493
Multi-Units of Ten or More per Structure	18,801	0	0	5	0	175	18,980
Total	111,908	0	301	2,262	0	3,133	117,604

Table 4.2-32. Housing Units by Type for the Region by State.

Type	California *dwellings*	Nevada *dwellings*	Total *dwellings*
Single Units	19,390	63,130	82,520
Multi-Units of Less than Ten per Structure	4,145	35,493	39,639
Multi-Units of Ten or More per Structure	904	18,980	19,885
Total	24,440	117,604	142,044

Table 4.2-33. Distribution of Housing Units by Type for the Region by State.

Type	California	Nevada	Total
Single Units	79.34%	53.68%	58.09%
Multi-Units of Less than Ten per Structure	16.96%	30.18%	27.91%
Multi-Units of Ten or More per Structure	3.70%	16.14%	14.00%
Total	100.00%	100.00%	100.00%

Table 4.2-34. Ratio of Housing Units for the Region to Population for the Region by State.

	California	Nevada	Total
Housing Units	24,440	117,604	142,044
Population as All Persons	50,358	266,023	316,381
Ratio of Housing Units to Population	0.48531914	0.44208212	0.44896411

Table 4.2-35. Occupied Housing Units by Type by County for California.

Type	Sierra County *dwellings*	Nevada County *dwellings*	Placer County *dwellings*	El Dorado County *dwellings*	Alpine County *dwellings*	Total *dwellings*
Single Units	1,074	25,160	50,576	36,820	300	113,930
Multi-Units of Less than Ten per Structure	240	4,736	10,320	8,245	127	23,668
Multi-Units of Ten or More per Structure	21	858	3,205	1,780	23	5,888
Total	1,336	30,754	64,101	46,845	450	143,486

Table 4.2-36. Occupied Housing Units by Type for the Region by County for California.

Type	Sierra County *dwellings*	Nevada County *dwellings*	Placer County *dwellings*	El Dorado County *dwellings*	Alpine County *dwellings*	Total *dwellings*
Single Units	657	3,019	2,709	8,665	0	15,051
Multi-Units of Less than Ten per Structure	147	568	553	1,940	0	3,208
Multi-Units of Ten or More per Structure	13	103	172	419	0	707
Total	817	3,690	3,434	11,025	0	18,966

Table 4.2-37. Occupied Housing Units by Type by County for Nevada.

Type	Washoe County *dwellings*	Pershing County *dwellings*	Storey County *dwellings*	Lyon County *dwellings*	Carson City *dwellings*	Douglas County *dwellings*	Total *dwellings*
Single Units	54,420	789	642	4,109	8,536	7,421	75,917
Multi-Units of Less than Ten per Structure	30,688	812	363	3,556	4,800	2,589	42,808
Multi-Units of Ten or More per Structure	17,185	13	1	15	2,559	592	20,366
Total	102,294	1,614	1,006	7,680	15,895	10,602	139,091

Table 4.2-38. Occupied Housing Units by Type for the Region by County for Nevada.

Type	Washoe County *dwellings*	Pershing County *dwellings*	Storey County *dwellings*	Lyon County *dwellings*	Carson City *dwellings*	Douglas County *dwellings*	Total *dwellings*
Single Units	54,282	0	178	1,066	0	1,642	57,168
Multi-Units of Less than Ten per Structure	30,610	0	101	922	0	573	32,206
Multi-Units of Ten or More per Structure	17,142	0	0	4	0	131	17,277
Total	102,034	0	279	1,992	0	2,346	106,651

Table 4.2-39. Occupied Housing Units by Type for the Region by State.

Type	California *dwellings*	Nevada *dwellings*	Total *dwellings*
Single Units	15,051	57,168	72,218
Multi-Units of Less than Ten per Structure	3,208	32,206	35,414
Multi-Units of Ten or More per Structure	707	17,277	17,984
Total	18,966	106,651	125,616

Table 4.2-40. Distribution of Occupied Housing Units by Type for the Region by State.

Type	California	Nevada	Total
Single Units	79.36%	53.60%	57.49%
Multi-Units of Less than Ten per Structure	16.92%	30.20%	28.19%
Multi-Units of Ten or More per Structure	3.73%	16.20%	14.32%
Total	100.00%	100.00%	100.00%

Table 4.2-41. Ratio of Occupied Housing Units for the Region to Population for the Region by State.

	California	Nevada	Total
Occupied Housing Units	18,966	106,651	125,616
Population as All Persons	50,358	266,023	316,381
Ratio of Occupied Housing Units to Population	0.37661598	0.40090819	0.39704163

Table 4.2-42. Households by Type by County for California.

Type	Sierra County *households*	Nevada County *households*	Placer County *households*	El Dorado County *households*	Alpine County *households*	Total *households*
Family Households	929	22,872	47,749	34,990	335	106,875
Non-Family Households	407	7,882	16,352	11,855	115	36,611
Total	1,336	30,754	64,101	46,845	450	143,486

Table 4.2-43. Households by Type for the Region by County for California.

Type	Sierra County *households*	Nevada County *households*	Placer County *households*	El Dorado County *households*	Alpine County *households*	Total *households*
Family Households	568	2,744	2,558	8,235	0	14,105
Non-Family Households	249	946	876	2,790	0	4,861
Total	817	3,690	3,434	11,025	0	18,966

Table 4.2-44. Households by Type by County for Nevada.

Type	Washoe County *households*	Pershing County *households*	Storey County *households*	Lyon County *households*	Carson City *households*	Douglas County *households*	Total *households*
Family Households	74,613	1,130	691	5,629	10,618	7,888	100,569
Non-Family Households	27,681	484	315	2,051	5,277	2,714	38,522
Total	102,294	1,614	1,006	7,680	15,895	10,602	139,091

Table 4.2-45. Households by Type for the Region by County for Nevada.

Type	Washoe County *households*	Pershing County *households*	Storey County *households*	Lyon County *households*	Carson City *households*	Douglas County *households*	Total *households*
Family Households	74,424	0	192	1,460	0	1,745	77,821
Non-Family Households	27,610	0	87	532	0	601	28,830
Total	102,034	0	279	1,992	0	2,346	106,651

Table 4.2-46. Households by Type for the Region by State.

Type	California *households*	Nevada *households*	Total *households*
Family Households	14,105	77,821	91,926
Non-Family Households	4,861	28,830	33,691
Total	18,966	106,651	125,616

Table 4.2-47. Distribution of Households by Type for the Region by State.

Type	California	Nevada	Total
Family Households	74.37%	72.97%	73.18%
Non-Family Households	25.63%	27.03%	26.82%
Total	100.00%	100.00%	100.00%

Table 4.2-48. Ratio of Households for the Region to Population for the Region by State.

	California	Nevada	Total
Households	18,966	106,651	125,616
Population as All Persons	50,358	266,023	316,381
Ratio of Households to Population	0.37661595	0.40090819	0.39704163

Table 4.2-49. Housing by Economic Sector for the Region by State.

Economic Sector	California *dwellings*	Nevada *dwellings*	Total *dwellings*
1 Livestock Production	29	20	49
2 Dairy Production	0	13	13
3 Alfalfa Hay Production	2	2	4
4 Other Hay Production	5	3	8
5 Barley Production	1	0	1
6 Agricultural Services	153	730	883
7 Gold Mining	6	938	944
8 Other Mining	32	106	138
9 Construction	2,554	6,059	8,613
10 Manufacturing	1,342	6,049	7,391
11 Transportation and Communications	482	5,061	5,543
12 Utilities	109	1,588	1,696
13 Trade	2,833	20,427	23,260
14 Eating, Drinking, and Lodging	1,346	2,418	3,764
15 Finance, Insurance, and Real Estate	1,970	8,325	10,295
16 Services	2,875	19,631	22,506
17 Hotels, Gaming, and Recreation	1,244	14,982	16,226
18 Health	1,725	10,906	12,630
19 Local Government	1,745	6,530	8,275
20 Households	0	0	0
Total	18,452	103,787	122,239

Agriculture Water Use

Agriculture water use is the combined use of irrigation water for crops and pasture and stock water for livestock.

Agriculture Water Use by Economic Sector

Data to estimate agriculture water use was provided by the State of California Department of Water Resources, U.S. District Court Water Master, and Department of Animal Science at the University of Nevada, Reno.

Irrigation water supply from Truckee River sources are actual water rights taken from the *Middle Fork of the Feather River Decree* and the *Orr Ditch Decree.* Stock water requirements were taken from *Livestock Feeds and Feeding.* Irrigation water supply is measured in acre-feet and stock water requirements are in gallons converted to acre-feet.

Irrigation water use is analyzed in Tables 4.2-50 through 4.2-53. Irrigation water supply from Truckee River sources for the region by state are shown in Table 4.2-50. For California, the irrigation water supply is 34,489 acre-feet. For Nevada, the irrigation water supply is 39,071 acre-feet. The total for the region is 73,560 acre-feet. Shown in Table 4.2-51 is the irrigated acreage per crop for the region by state. For California, the irrigated acreage is 9,717 acres. For Nevada, the irrigated acreage is 9,834 acres. Of the 19,551 acres, there were 14,551 acres in pasture, 800 acres in alfalfa hay, 4,000 acres in other hay, and 200 acres in barley. The application of irrigation water per crop for the region by state provided in Table 4.2-52 is 3.55 acre-feet per acre for California, 3.97 acre-feet per acre for Nevada, and 3.76 acre-feet per acre for the region. Irrigation water use per crop for the region by state is then given in Table 4.2-53. For the region, 54,754 acre-feet irrigated pasture, 3,051 irrigated alfalfa hay, 15,045 irrigated other hay, and 710 acre-feet irrigated barley.

Livestock water use is analyzed in Tables 4.2-54 through 4.2-56. Livestock water requirements per cow by state are shown in Table 4.2-54. On a daily basis, a beef cow requires 15 gallons of water per day and a dairy cow requires 25 gallons per day. Likewise, on an annual basis, a beef cow requires 5,475 gallons per year and a dairy cow requires 9,125 gallons per year. This in terms of acre-feet, a beef cow requires .016 acre-feet per year and a dairy cow requires .028 acre-feet per year. Number of cows for the region by state are provided in Table 4.2-55. Assuming two beef cows per acre of pasture, there are approximately 3,609 beef cows in California and 3,667 beef cows in Nevada for a total of 7,276 beef cows in the region. Dairy cows are only in Nevada and are estimated to be 500 cows. Livestock water use per cow for the region by state is then

given in Table 4.2-56. The beef cows use 122 acre-feet per year and the dairy cows use 14 acre-feet per year.

Agriculture water use by economic sector for the region by state are presented in Table 4.2-57. Agriculture water use for the region is 54,876 acre-feet per year for livestock production, 14 acre-feet per year for dairy production, 3,051 acre-feet for alfalfa hay production, 15,045 acre-feet for other hay production, and 710 acre-feet for barley production. Total agriculture water use for the region is 73,696 acre-feet per year.

Table 4.2-50. Irrigation Water Supply from Truckee River Sources for the Region by State.

Truckee River Sources	California *acre-feet*	Nevada *acre-feet*	Total *acre-feet*
Little Truckee River	5,292		5292
Webber Creek and Tributaries	29,197		29197
Ditchs from Truckee River		15,477	15477
Pumps from Truckee River		1,231	1231
Creeks		18,796	18796
Reservoir from Creek		948	948
Drain		2,619	2619
Total	34,489	39,071	73,560

Table 4.2-51. Irrigated Acreage per Crop for the Region by State.

Crop	California *acres*	Nevada *acres*	Total *acres*
Pasture	7,217	7,334	14,551
Alfalfa Hay	300	500	800
Other Hay	2,000	2,000	4,000
Barley	200	0	200
Total	9,717	9,834	19,551

Table 4.2-52. Application of Irrigation Water per Crop for the Region by State.

Crop	California *acre-feet / acre*	Nevada *acre-feet / acre*	Total *acre-feet / acre*
Pasture	3.54934651	3.97305267	3.76246739
Alfalfa Hay	3.54934651	3.97305267	3.76246739
Other Hay	3.54934651	3.97305267	3.76246739
Barley	3.54934651	3.97305267	3.76246739

Table 4.2-53. Irrigation Water Use per Crop for the Region by State.

Crop	California *acre-feet*	Nevada *acre-feet*	Total *acre-feet*
Pasture	25,616	29,138	54,754
Alfalfa Hay	1,065	1,987	3,051
Other Hay	7,099	7,946	15,045
Barley	710	0	710
Total	34,489	39,071	73,560

Table 4.2-54. Livestock Water Requirements per Cow by State.

Cow	California	Nevada
	gallons / cow / day	*gallons / cow / day*
Beef Cow	15	15
Dairy Cow	25	25
	gallons / cow / year	*gallons / cow / year*
Beef Cow	5,475	5,475
Dairy Cow	9,125	9,125
	acre-feet / cow / year	*acre-feet / cow / year*
Beef Cow	0.01680216	0.01680216
Dairy Cow	0.02800360	0.02800360

Table 4.2-55. Number of Cows for the Region by State.

Cow	California	Nevada	Total
	cows	*cows*	*cows*
Beef Cow	3,609	3,667	7,276
Dairy Cow	0	500	500

Table 4.2-56. Livestock Water Use per Cow for the Region by State.

Cow	California	Nevada	Total
	acre-feet	*acre-feet*	*acre-feet*
Beef Cow	61	62	122
Dairy Cow	0	14	14

Table 4.2-57. Agriculture Water Use by Economic Sector for the Region by State.

Economic Sector	California *acre-feet*	Nevada *acre-feet*	Total *acre-feet*
1 Livestock Production	25,676	29,200	54,876
2 Dairy Production	0	14	14
3 Alfalfa Hay Production	1,065	1,987	3,051
4 Other Hay Production	7,099	7,946	15,045
5 Barley Production	710	0	710
Total	34,550	39,147	73,696

Commercial Water Use

Commercial water use is the use of water for business purposes.

Commercial Water Use by Economic Sector

Data to estimate commercial water use was provided by the State of Nevada Department of Water Planning.

Commercial water use is analyzed in Tables 4.2-58 through 4.2-61. Commercial water requirements per employee by economic sector by state are provided in Tables 4.2-58 through 4.2-60. The difference among the tables is that the requirements are presented as gallons per employee per day, then again as gallons per employee per year, and then finally as acre-feet per employee per year. Using the requirements presented as acre-feet per employee per year, the employment by economic sector for the region by state given in Table 4.2-23 and measured in jobs are multiplied by the requirements to estimate the commercial water use by economic sector for the region by state in Table 4.2-61.

Commercial water use by economic sector for the region by state are shown in Table 4.2-61. Commercial water use for the region is 12,432 acre-feet. Of this amount, 1,084 acre-feet is in California and 11,348 acre-feet is in Nevada.

Table 4.2-58. Commercial Water Requirements per Employee by Economic Sector by State.

Economic Sector	California *gallons / employee / day*	Nevada *gallons / employee / day*
1 Livestock Production	42.72500000	42.72500000
2 Dairy Production	42.72500000	42.72500000
3 Alfalfa Hay Production	42.72500000	42.72500000
4 Other Hay Production	42.72500000	42.72500000
5 Barley Production	42.72500000	42.72500000
6 Agricultural Services	42.72500000	42.72500000
7 Gold Mining	9.78999893	9.78999893
8 Other Mining	10.62000537	10.62000537
9 Construction	17.01000004	17.01000004
10 Manufacturing	35.86999993	35.86999993
11 Transportation and Communications	28.57999993	28.57999993
12 Utilities	204.22000028	204.22000028
13 Trade	33.06000001	33.06000001
14 Eating, Drinking, and Lodging	96.18999995	96.18999995
15 Finance, Insurance, and Real Estate	19.51999992	19.51999992
16 Services	50.16000000	50.16000000
17 Hotels, Gaming, and Recreation	159.74999997	159.74999997
18 Health	75.11999991	75.11999991
19 Local Government	21.70999990	21.70999990
20 Households		

Table 4.2-59. Commercial Water Requirements per Employee by Economic Sector by State.

Economic Sector	California *gallons / employee / year*	Nevada *gallons / employee / year*
1 Livestock Production	15,595	15,595
2 Dairy Production	15,595	15,595
3 Alfalfa Hay Production	15,595	15,595
4 Other Hay Production	15,595	15,595
5 Barley Production	15,595	15,595
6 Agricultural Services	15,595	15,595
7 Gold Mining	3,573	3,573
8 Other Mining	3,876	3,876
9 Construction	6,209	6,209
10 Manufacturing	13,093	13,093
11 Transportation and Communications	10,432	10,432
12 Utilities	74,540	74,540
13 Trade	12,067	12,067
14 Eating, Drinking, and Lodging	35,109	35,109
15 Finance, Insurance, and Real Estate	7,125	7,125
16 Services	18,308	18,308
17 Hotels, Gaming, and Recreation	58,309	58,309
18 Health	27,419	27,419
19 Local Government	7,924	7,924
20 Households	0	0

Table 4.2-60. Commercial Water Requirements per Employee by Economic Sector by State.

Economic Sector	California *acre-feet / employee / year*	Nevada *acre-feet / employee / year*
1 Livestock Production	0.04785815	0.04785815
2 Dairy Production	0.04785815	0.04785815
3 Alfalfa Hay Production	0.04785815	0.04785815
4 Other Hay Production	0.04785815	0.04785815
5 Barley Production	0.04785815	0.04785815
6 Agricultural Services	0.04785815	0.04785815
7 Gold Mining	0.01096621	0.01096621
8 Other Mining	0.01189593	0.01189593
9 Construction	0.01905365	0.01905365
10 Manufacturing	0.04017956	0.04017956
11 Transportation and Communications	0.03201371	0.03201371
12 Utilities	0.22875578	0.22875578
13 Trade	0.03703196	0.03703196
14 Eating, Drinking, and Lodging	0.10774664	0.10774664
15 Finance, Insurance, and Real Estate	0.02186521	0.02186521
16 Services	0.05618642	0.05618642
17 Hotels, Gaming, and Recreation	0.17894298	0.17894298
18 Health	0.08414521	0.08414521
19 Local Government	0.02431832	0.02431832
20 Households	0.00000000	0.00000000

Table 4.2-61. Commercial Water Use by Economic Sector for the Region by State.

Economic Sector	California *acre-feet*	Nevada *acre-feet*	Total *acre-feet*
1 Livestock Production	1	2	3
2 Dairy Production	0	1	1
3 Alfalfa Hay Production	0	0	0
4 Other Hay Production	0	0	0
5 Barley Production	0	0	0
6 Agricultural Services	8	57	64
7 Gold Mining	0	17	17
8 Other Mining	0	2	2
9 Construction	52	187	239
10 Manufacturing	57	395	452
11 Transportation and Communications	16	263	279
12 Utilities	26	590	616
13 Trade	112	1,228	1,340
14 Eating, Drinking, and Lodging	155	423	577
15 Finance, Insurance, and Real Estate	46	295	341
16 Services	172	1,790	1,962
17 Hotels, Gaming, and Recreation	237	4,352	4,589
18 Health	155	1,490	1,644
19 Local Government	45	258	303
20 Households	0	0	0
Total	1,084	11,348	12,432

Residential Water Use

Residential water use is the use of water for household purposes, and the irrigation of lawns, gardens, and shrubbery surrounding a residence.

Residential Water Use by Economic Sector

Data to estimate residential water use was provided by Westpac Utilities.

Residential water use is analyzed in Tables 4.2-62 through 4.2-69. Residential water use is estimated by multiplying the residential water requirement per household in acre-feet by the distribution of households by type and by housing by economic sector for the region.

Residential water requirements per household by state are shown in Table 4.2-62. Requirements per household are 228,096 gallons per year for a family households, 162,926 gallons per year for a metered family household, and 97,755 gallons per year for both a non-family household and metered non-family household. In terms of acre-feet, the requirements per household are .70 acre-feet per year for a family household, .50 acre-feet per year for a metered family household, and .30 acre-feet per year for both a non-family household and metered non-family household. The distribution of households by type for the region by state is shown in Table 4.2-47. For California, of the total households, 74.37% are family households and 25.63% are non-family households. For Nevada, of the total households, 72.97% are family households and 27.03% are non-family households. The housing by economic sector is shown in Table 4.2-49. As mentioned earlier there are 18,452 occupied housing units with households in California and 103,787 occupied housing units with households in Nevada for a total of 122,239 occupied housing units with households for the region.

Residential water requirements for family households by economic sector for the region by state and residential water requirements for non-family households by economic sector for the region by state are shown in Tables 4.2-63 and 4.2-64. Then by combining these two, the residential water use by economic sector for the region by state is shown in Table 4.2-65.

Residential water use by economic sector for the region by state is shown in Table 4.2-65. Residential water use for the region is 72,453 acre-feet. Of this amount, 11,025 acre-feet is in California and 61,428 acre-feet is in Nevada.

Assuming that all residences have a water meter. Residential water requirements for metered family households by economic sector for the region by state and residential water requirements for metered non-family households by economic sector for the region by state are shown in Tables 4.2-66 and 4.2-67. Then by combining these two, the metered residential water use by economic sector for the region by state is shown in Table 4.2-68.

Metered residential water use by economic sector for the region by state is shown in Table 4.2-68. Metered residential water use for the region is 54,563 acre-feet. Of this amount, 8,280 acre-feet is in California and 46,282 acre-feet is in Nevada.

The ratio of metered residential water use to unmetered residential water use by economic sector for the region is shown in Table 4.2-69. The ratio for the region is .75 of an acre-foot of metered residential water use to 1.00 acre-foot of unmetered residential water use.

Table 4.2-62. Residential Water Requirements per Household by State.

Household	California *gallons / household / year*	Nevada *gallons / household / year*
Family Household	228,096	228,096
Metered Family Household /1	162,926	162,926
Non-Family Household	97,755	97,755
Metered Non-Family Household /1	97,755	97,755
	acre-feet / household / year	*acre-feet / household / year*
Family Household	0.70000092	0.70000092
Metered Family Household /1	0.50000153	0.50000153
Non-Family Household	0.29999908	0.29999908
Metered Non-Family Household /1	0.29999908	0.29999908

1. A water meter is required for new residential construction.

Table 4.2-63. Residential Water Requirements for Family Households by Economic Sector for the Region by State.

Economic Sector	California *acre-feet*	Nevada *acre-feet*	Total *acre-feet*
1 Livestock Production	15	10	25
2 Dairy Production	0	7	7
3 Alfalfa Hay Production	1	1	2
4 Other Hay Production	2	2	4
5 Barley Production	0	0	0
6 Agricultural Services	80	373	452
7 Gold Mining	3	479	482
8 Other Mining	17	54	71
9 Construction	1,330	3,095	4,424
10 Manufacturing	699	3,090	3,788
11 Transportation and Communications	251	2,585	2,836
12 Utilities	57	811	868
13 Trade	1,475	10,434	11,908
14 Eating, Drinking, and Lodging	701	1,235	1,936
15 Finance, Insurance, and Real Estate	1,026	4,252	5,278
16 Services	1,497	10,027	11,524
17 Hotels, Gaming, and Recreation	647	7,652	8,300
18 Health	898	5,570	6,468
19 Local Government	908	3,335	4,244
20 Households	0	0	0
Total	9,606	53,012	62,618

Table 4.2-64. Residential Water Requirements for Non-Family Households by Economic Sector for the Region by State.

Economic Sector	California *acre-feet*	Nevada *acre-feet*	Total *acre-feet*
1 Livestock Production	2	2	4
2 Dairy Production	0	1	1
3 Alfalfa Hay Production	0	0	0
4 Other Hay Production	0	0	1
5 Barley Production	0	0	0
6 Agricultural Services	12	59	71
7 Gold Mining	0	76	77
8 Other Mining	2	9	11
9 Construction	196	491	688
10 Manufacturing	103	491	594
11 Transportation and Communications	37	410	448
12 Utilities	8	129	137
13 Trade	218	1,657	1,874
14 Eating, Drinking, and Lodging	103	196	300
15 Finance, Insurance, and Real Estate	151	675	827
16 Services	221	1,592	1,813
17 Hotels, Gaming, and Recreation	96	1,215	1,311
18 Health	133	884	1,017
19 Local Government	134	530	664
20 Households	0	0	0
Total	1,419	8,417	9,835

Table 4.2-65. Residential Water Use by Economic Sector for the Region by State.

Economic Sector	California *acre-feet*	Nevada *acre-feet*	Total *acre-feet*
1 Livestock Production	17	12	29
2 Dairy Production	0	8	8
3 Alfalfa Hay Production	1	1	3
4 Other Hay Production	3	2	5
5 Barley Production	1	0	1
6 Agricultural Services	92	432	523
7 Gold Mining	4	555	559
8 Other Mining	19	63	82
9 Construction	1,526	3,586	5,112
10 Manufacturing	802	3,580	4,382
11 Transportation and Communications	288	2,995	3,284
12 Utilities	65	940	1,005
13 Trade	1,692	12,090	13,783
14 Eating, Drinking, and Lodging	804	1,431	2,235
15 Finance, Insurance, and Real Estate	1,177	4,928	6,105
16 Services	1,718	11,619	13,337
17 Hotels, Gaming, and Recreation	743	8,867	9,610
18 Health	1,030	6,455	7,485
19 Local Government	1,042	3,865	4,907
20 Households	0	0	0
Total	11,025	61,428	72,453

Table 4.2-66. Residential Water Requirements for Metered Family Households by Economic Sector for the Region by State.

Economic Sector	California *acre-feet*	Nevada *acre-feet*	Total *acre-feet*
1 Livestock Production	11	7	18
2 Dairy Production	0	5	5
3 Alfalfa Hay Production	1	1	2
4 Other Hay Production	2	1	3
5 Barley Production	0	0	0
6 Agricultural Services	57	266	323
7 Gold Mining	2	342	344
8 Other Mining	12	39	51
9 Construction	950	2,210	3,160
10 Manufacturing	499	2,207	2,706
11 Transportation and Communications	179	1,846	2,026
12 Utilities	40	579	620
13 Trade	1,053	7,453	8,506
14 Eating, Drinking, and Lodging	501	882	1,383
15 Finance, Insurance, and Real Estate	733	3,037	3,770
16 Services	1,069	7,162	8,231
17 Hotels, Gaming, and Recreation	462	5,466	5,928
18 Health	641	3,979	4,620
19 Local Government	649	2,382	3,031
20 Households	0	0	0
Total	6,862	37,866	44,727

Table 4.2-67. Residential Water Requirements for Metered Non-Family Households by Economic Sector for the Region by State.

Economic Sector	California *acre-feet*	Nevada *acre-feet*	Total *acre-feet*
1 Livestock Production	2	2	4
2 Dairy Production	0	1	1
3 Alfalfa Hay Production	0	0	0
4 Other Hay Production	0	0	1
5 Barley Production	0	0	0
6 Agricultural Services	12	59	71
7 Gold Mining	0	76	77
8 Other Mining	2	9	11
9 Construction	196	491	688
10 Manufacturing	103	491	594
11 Transportation and Communications	37	410	448
12 Utilities	8	129	137
13 Trade	218	1,657	1,874
14 Eating, Drinking, and Lodging	103	196	300
15 Finance, Insurance, and Real Estate	151	675	827
16 Services	221	1,592	1,813
17 Hotels, Gaming, and Recreation	96	1,215	1,311
18 Health	133	884	1,017
19 Local Government	134	530	664
20 Households	0	0	0
Total	1,419	8,417	9,835

Table 4.2-68. Metered Residential Water Use by Economic Sector for the Region by State.

Economic Sector	California *acre-feet*	Nevada *acre-feet*	Total *acre-feet*
1 Livestock Production	13	9	22
2 Dairy Production	0	6	6
3 Alfalfa Hay Production	1	1	2
4 Other Hay Production	2	1	3
5 Barley Production	0	0	0
6 Agricultural Services	69	325	394
7 Gold Mining	3	418	421
8 Other Mining	14	47	62
9 Construction	1,146	2,702	3,848
10 Manufacturing	602	2,697	3,300
11 Transportation and Communications	216	2,257	2,473
12 Utilities	49	708	757
13 Trade	1,271	9,109	10,380
14 Eating, Drinking, and Lodging	604	1,078	1,682
15 Finance, Insurance, and Real Estate	884	3,713	4,597
16 Services	1,290	8,754	10,044
17 Hotels, Gaming, and Recreation	558	6,681	7,239
18 Health	774	4,863	5,637
19 Local Government	783	2,912	3,695
20 Households	0	0	0
Total	8,280	46,282	54,563

Table 4.2-69. Ratio of Metered Residential Water Use to Residential Water Use by Economic Sector for the Region.

Economic Sector	Metered Residential Water Use *acre-feet*	Residential Water Use *acre-feet*	Ratio
1 Livestock Production	22	29	0.75200932
2 Dairy Production	6	8	0.75343453
3 Alfalfa Hay Production	2	3	0.75239916
4 Other Hay Production	3	5	0.75199120
5 Barley Production	0	1	0.75105275
6 Agricultural Services	394	523	0.75301781
7 Gold Mining	421	559	0.75341844
8 Other Mining	62	82	0.75287559
9 Construction	3,848	5,112	0.75272351
10 Manufacturing	3,300	4,382	0.75299870
11 Transportation and Communications	2,473	3,284	0.75322548
12 Utilities	757	1,005	0.75328062
13 Trade	10,380	13,783	0.75314206
14 Eating, Drinking, and Lodging	1,682	2,235	0.75257762
15 Finance, Insurance, and Real Estate	4,597	6,105	0.75297530
16 Services	10,044	13,337	0.75312774
17 Hotels, Gaming, and Recreation	7,239	9,610	0.75325038
18 Health	5,637	7,485	0.75310663
19 Local Government	3,695	4,907	0.75292857
20 Households	0	0	
Total	54,563	72,453	0.75307210

Output Response Coefficients

Output response coefficients represent the unit change in employment, income, population, housing, agriculture water use, commercial water use, and residential water use from a one dollar change in output.

Output Response Coefficients by Economic Sector

Control totals by economic sector for the region are shown in Table 4.2-70. The output response is read across the columns for each sector.

For the region, output is $17,857,271,279. Employment is 188,121 jobs. Income is $6,720,549,054. Population is 307,874 persons. Housing is 122,239 dwellings. Agriculture water use is 73,696 acre-feet. Commercial water use is 12,432 acre-feet. Residential water use is 72,453 acre-feet.

Output response coefficients by economic sector for the region are shown in Table 4.2-71. These are calculated by dividing employment, income, population, housing, agriculture water use, commercial water use, and residential water use by output. Employment is interpreted as jobs per dollar of output. Income is interpreted as dollars per dollar of output. Population is interpreted as persons per dollar of output. Housing is interpreted as dwellings per dollar of output. Agriculture water use, commercial water use and residential water use are interpreted as acre-feet per dollar of output.

Table 4.2-70. Control Totals by Economic Sector for the Region.

Economic Sector	Output	Employment	Income	Population	Housing	Agriculture Water Use	Commercial Water Use	Residential Water Use
	$	*jobs*	*$*	*all persons*	*dwellings*	*acre-feet*	*acre-feet*	*acre-feet*
1 Livestock Production	3,339,455	63	540,275	126	49	54,876	3	29
2 Dairy Production	960,000	21	216,000	32	13	14	1	8
3 Alfalfa Hay Production	320,000	6	130,000	11	4	3,051	0	3
4 Other Hay Production	560,000	10	212,000	20	8	15,045	0	5
5 Barley Production	36,000	1	11,000	2	1	710	0	1
6 Agricultural Services	52,687,679	1,347	22,287,864	2,227	883	0	64	523
7 Gold Mining	53,214,316	1,529	16,611,099	2,355	944	0	17	559
8 Other Mining	12,872,113	206	3,349,029	350	138	0	2	82
9 Construction	1,440,667,287	12,555	415,700,525	21,894	8,613	0	239	5,112
10 Manufacturing	1,363,431,322	11,248	359,523,876	18,652	7,391	0	452	4,382
11 Transportation and Communications	739,238,624	8,729	296,464,250	13,904	5,543	0	279	3,284
12 Utilities	430,242,000	2,693	53,970,125	4,249	1,696	0	616	1,005
13 Trade	1,433,846,375	36,174	698,140,670	58,474	23,260	0	1,340	13,783
14 Eating, Drinking, and Lodging	284,306,597	5,359	94,861,199	9,605	3,764	0	577	2,235
15 Finance, Insurance, and Real Estate	1,381,758,827	15,612	191,672,157	25,997	10,295	0	341	6,105
16 Services	1,207,179,719	34,927	478,662,078	56,600	22,506	0	1,962	13,337
17 Hotels, Gaining, and Recreation	1,361,938,251	25,643	439,634,081	40,672	16,226	0	4,589	9,610
18 Health	665,890,740	19,539	281,216,735	31,782	12,630	0	1,644	7,485
19 Local Government	704,232,921	12,458	261,331,681	20,921	8,275	0	303	4,907
20 Households	6,720,549,054	0	3,106,014,408	0	0	0	0	0
Total	17,857,271,279	188,121	6,720,549,054	307,874	122,239	73,696	12,432	72,453

Table 4.2-71. Output Response Coefficients by Economic Sector for the Region.

Economic Sector	Output	Employment	Income	Population	Housing	Agriculture Water Use	Commercial Water Use	Residential Water Use
	$	*jobs / $ of output*	*$ / $ of output*	*all persons / $ of output*	*dwellings / $ of output*	*acre-feet / $ of output*	*acre-feet / $ of output*	*acre-feet / $ of output*
1 Livestock Production	1.00000000	0.00001887	0.16178555	0.00003786	0.00001462	0.01643270	0.00000090	0.00000870
2 Dairy Production	1.00000000	0.00002188	0.22500000	0.00003362	0.00001348	0.00001459	0.00000105	0.00000798
3 Alfalfa Hay Production	1.00000000	0.00001875	0.40625000	0.00003479	0.00001357	0.00953541	0.00000090	0.00000806
4 Other Hay Production	1.00000000	0.00001786	0.37857143	0.00003597	0.00001388	0.02686571	0.00000085	0.00000826
5 Barley Production	1.00000000	0.00002778	0.30555556	0.00006923	0.00002607	0.01971859	0.00000133	0.00001558
6 Agricultural Services	1.00000000	0.00002557	0.42301852	0.00004226	0.00001676	0.00000000	0.00000122	0.00000993
7 Gold Mining	1.00000000	0.00002873	0.31215470	0.00004426	0.00001774	0.00000000	0.00000032	0.00001050
8 Other Mining	1.00000000	0.00001604	0.26017713	0.00002719	0.00001074	0.00000000	0.00000019	0.00000637
9 Construction	1.00000000	0.00000871	0.28854721	0.00001520	0.00000598	0.00000000	0.00000017	0.00000355
10 Manufacturing	1.00000000	0.00000825	0.26369049	0.00001368	0.00000542	0.00000000	0.00000033	0.00000321
11 Transportation and Communications	1.00000000	0.00001181	0.40103999	0.00001881	0.00000750	0.00000000	0.00000038	0.00000444
12 Utilities	1.00000000	0.00000626	0.12544132	0.00000988	0.00000394	0.00000000	0.00000143	0.00000234
13 Trade	1.00000000	0.00002523	0.48690061	0.00004078	0.00001622	0.00000000	0.00000093	0.00000961
14 Eating, Drinking, and Lodging	1.00000000	0.00001885	0.33365810	0.00003378	0.00001324	0.00000000	0.00000203	0.00000786
15 Finance, Insurance, and Real Estate	1.00000000	0.00001130	0.13871607	0.00001881	0.00000745	0.00000000	0.00000025	0.00000442
16 Services	1.00000000	0.00002893	0.39651269	0.00004689	0.00001864	0.00000000	0.00000163	0.00001105
17 Hotels, Gaming, and Recreation	1.00000000	0.00001883	0.32280030	0.00002986	0.00001191	0.00000000	0.00000337	0.00000706
18 Health	1.00000000	0.00002934	0.42231663	0.00004773	0.00001897	0.00000000	0.00000247	0.00001124
19 Local Government	1.00000000	0.00001769	0.37108700	0.00002971	0.00001175	0.00000000	0.00000043	0.00000697
20 Households	1.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000

Water Transfer Coefficients

Water transfer coefficients for agriculture water use are the proportions of agriculture water use in the agriculture sectors. Water transfer coefficients for commercial water use are the proportions of commercial water use in the non-agriculture sectors or commercial sectors.

Water Transfer Coefficients by Economic Sector

Water transfer coefficients by economic sector for the region are shown in Table 4.2-72. The agriculture water transfer coefficients are based on adjusted agriculture water use and the commercial water transfer coefficients are based on adjusted commercial water use. Adjusted agriculture water use reflects assignment of only the livestock production sector. Adjusted commercial water use reflects assignment of only the manufacturing, and, hotels, gaming, and recreation sectors. The water transfer coefficients are calculated by dividing the amount of water use in each of the assigned sectors by the total amount of water use for all the assigned sectors.

Table 4.2-72. Water Transfer Coefficients by Economic Sector for the Region.

Economic Sector	Agriculture Water Use *acre-feet*	Adjusted /1 Agriculture Water Use *acre-feet*	Agriculture Water Transfer Coefficient	Commercial Water Use *acre-feet*	Adjusted /2 Commercial Water Use *acre-feet*	Commercial Water Transfer Coefficient
1 Livestock Production	54,876	54,876	1.00000000	3	0	0.00000000
2 Dairy Production	14	0	0.00000000	1	0	0.00000000
3 Alfalfa Hay Production	3,051	0	0.00000000	0	0	0.00000000
4 Other Hay Production	15,045	0	0.00000000	0	0	0.00000000
5 Barley Production	710	0	0.00000000	0	0	0.00000000
6 Agricultural Services	0	0	0.00000000	64	0	0.00000000
7 Gold Mining	0	0	0.00000000	17	0	0.00000000
8 Other Mining	0	0	0.00000000	2	0	0.00000000
9 Construction	0	0	0.00000000	239	0	0.00000000
10 Manufacturing	0	0	0.00000000	452	452	0.08966279
11 Transportation and Communications	0	0	0.00000000	279	0	0.00000000
12 Utilities	0	0	0.00000000	616	0	0.00000000
13 Trade	0	0	0.00000000	1,340	0	0.00000000
14 Eating, Drinking, and Lodging	0	0	0.00000000	577	0	0.00000000
15 Finance, Insurance, and Real Estate	0	0	0.00000000	341	0	0.00000000
16 Services	0	0	0.00000000	1,962	0	0.00000000
17 Hotels, Gaming, and Recreation	0	0	0.00000000	4,589	4,589	0.91033721
18 Health	0	0	0.00000000	1,644	0	0.00000000
19 Local Government	0	0	0.00000000	303	0	0.00000000
20 Households	0	0	0.00000000	0	0	0.00000000
Total	73,696	54,876	1.00000000	12,432	5,041	1.00000000

1. Adjusted agriculture water use reflects assignment of only the livestock production sector.
2. Adjusted commercial water use reflects assignment of only the manufacturing sector, and, the hotel, gaming, and recreation sector (i.e., casino gaming industry).

4.3. Derivation of the Model Tables

Input-output tables include a transactions matrix, direct requirements, final demand requirements, output requirements, employment requirements, income requirements, and multipliers. Derivation of these tables is done using input-output procedures.

Transactions Matrix

There are twenty economic sectors within the economy of the region. Each sector is listed above with a definition in Table 4.1-15. These sectors include livestock production, dairy production, alfalfa hay production, other hay production, barley production, agricultural services, gold mining, other mining, construction, manufacturing, transportation and communications, utilities, trade, eating, drinking, and lodging, finance, insurance, and real estate, services, hotels, gaming, and recreation, health, local government, and households. The economic activity of these twenty sectors is accounted for in a transactions matrix.

A transactions matrix is a double entry accounting system. All transactions that a economic sector has within the economy are accounted for in the transactions matrix. There is an individual row and column for each sector in the matrix. Row entries represent output and include sales, other final demand, and exports by a sector. Other final demand are capital formation, inventory accumulation, state government purchases, and federal government purchases. Column entries, on the other hand, represent input and include purchases, other final payments, and imports by a sector. Other final payments are depreciation, expenditures to state government, and expenditures to federal government. The accounting identity of the matrix requires that for any sector the row total must equal the column total.

The transactions matrix for the region is shown in Table 4.3-1. Direction of entries for the matrix is across the row for output and down the column for input. The titles of the economic sectors are listed across the top and down the left side. Sectors across the top are purchasing sectors and sectors down the side are selling sectors.

The transactions matrix has four quadrants. These are outlined within the matrix in the following manner. In the top left corner of the matrix is Quadrant I. Quadrant I contains purchases and sales by sector. This quadrant is closed to the local government and households sectors in the matrix. Quadrant II is in the top right corner of the matrix and contains other final demand and exports by sector. In the bottom left corner of the matrix is Quadrant III. Quadrant III contains other final payments and imports by sector. Quadrant IV is in the bottom right corner of the matrix and contains transactions not directly linked to the other quadrants. Row totals of the sectors are on the right side and column totals of the sectors are across the bottom.

In matrix algebra notation, all entries in the transactions matrix are denoted as x_{ij}'s. Where x is the value of the intersector transaction for row sector i and column sector j. All entries include sales, other final demand, exports, purchases, other final payments, and imports. Row totals are denoted as X_i's. Where X is the total value of output for row sector i. Column totals are denoted as X_j's. Where X is the total value of

input for column sector j. Again the accounting identity requires that row sector output must be equal to column sector input or if i = j then, $X_i = X_j$.

The transactions matrix is represented by the T matrix presented below.

$$
\begin{array}{lccccccccc}
T = & & x_{11} & + & x_{12} & + & . & + & x_{1n} & = & X_1 \\
 & + & x_{21} & + & x_{22} & + & . & + & x_{2n} & = & X_2 \\
 & & . & & . & & . & & . & & . \\
 & & . & & . & & . & & . & & . \\
 & & . & & . & & . & & . & & . \\
 & + & x_{n1} & + & x_{n2} & + & . & + & x_{nn} & = & X_n \\
 & = & X_1 & & X_2 & & . & & X_n & &
\end{array}
\qquad (4.3\text{-}1)
$$

The dimensions of the T matrix include Quadrants I, II, III and IV.

Three assumptions are imposed on the transactions matrix. The first assumption is that individual businesses which make-up the economy can be grouped together into economic sectors. The reasoning here is that businesses in a given sector will be affected similarly by a given change. The second assumption is that all businesses in a given sector produce homogeneous products and services. The third assumption is that purchases of products and services by businesses in a sector from businesses in other sectors represent linear production functions. This last assumption is the assumption of fixed proportionality.

The transactions matrix for the region is based on the transactions matrix for Washoe county. The reason for this is because Washoe county makes-up 80% of the population base and 85% of the economic activity in the region.

The transactions matrix was derived in three steps. First, a transactions matrix for Washoe county was developed using IMPLAN. Second, the matrix was balanced to the output control totals mentioned above using a modified RAS technique. Third, the production functions were verified from a survey of businesses in selected sectors within the region. Particular attention was given to the hotel, gaming, and recreation sector since this sector is a large sector within the region.

Table 4.3-1. Transactions Matrix for the Region.

Economic Sector	1 Livestock Production	2 Dairy Production	3 Alfalfa Hay Production	4 Other Hay Production	5 Barley Production	6 Agricultural Services	7 Gold Mining	8 Other Mining	9 Construction
	$	$	$	$	$	$	$	$	$
1 Livestock Production	705,119	0	0	0	0	0	0	0	0
2 Dairy Production	748	948	0	0	0	0	0	0	0
3 Alfalfa Hay Production	0	68,000	0	0	0	0	0	0	0
4 Other Hay Production	294,983	0	0	0	0	0	0	0	0
5 Barley Production	2,032	0	0	0	0	0	0	0	0
6 Agricultural Services	49,690	3,000	24,000	5,000	0	89,999	11,000	0	1,729,006
7 Gold Mining	0	0	0	0	0	94,999	0	11,000	0
8 Other Mining	0	0	0	0	0	3,000	3,000	16,000	9,000
9 Construction	27,084	8,353	0	0	0	476,108	251,514	558,716	210,284,091
10 Manufacturing	92,281	51,000	0	13,000	1,000	2,063,987	1,820,011	93,001	72,445,266
11 Transportation and Communications	29,971	17,000	0	4,000	0	641,996	690,004	77,001	14,189,052
12 Utilities	16,563	8,000	7,000	7,000	0	484,997	2,994,018	772,007	6,858,025
13 Trade	118,309	19,000	18,000	29,000	3,000	721,996	101,001	197,002	71,995,264
14 Eating, Drinking, and Lodging	0	0	0	0	0	0	213,001	0	0
15 Finance, Insurance, and Real Estate	128,562	37,000	20,000	35,000	2,000	1,126,993	2,920,017	263,002	33,129,122
16 Services	28,394	8,000	27,000	7,000	0	1,441,991	2,802,017	334,003	46,805,172
17 Hotels, Gaming, and Recreation	0	0	0	0	0	0	0	0	0
18 Health	0	0	0	0	0	0	0	5,000	0
19 Local Government	71,774	10,000	12,000	33,000	0	1,178,993	895,005	257,002	11,820,043
20 Households	540,276	216,000	130,000	212,000	11,000	22,287,864	16,611,099	3,349,029	415,700,526
Other Final Payments	115,154	74,000	23,000	35,000	4,000	11,468,930	8,861,053	3,371,030	160,160,588
Imports	1,118,515	439,699	59,000	180,000	15,000	10,605,826	15,041,576	3,568,320	395,542,132
Column Total	3,339,455	960,000	320,000	560,000	36,000	52,687,679	53,214,316	12,872,113	1,440,667,287

Table 4.3-1. Transactions Matrix (continue).

	10 Manufacturing $	11 Transportation and Communications $	12 Utilities $	13 Trade $	14 Eating, Drinking, and Lodging $	15 Finance, Insurance, and Real Estate $	16 Services $	17 Hotels, Gaming, and Recreation $	18 Health $	19 Local Government $	20 Households $
1	1,294,003	0	0	0	0	0	24,000	0	0	0	426,808
2	880,842	0	0	0	0	0	4,741	0	0	0	6,373
3	10,000	0	0	0	0	0	0	0	0	0	151,231
4	0	0	0	0	0	0	0	0	0	0	185,958
5	7,086	0	0	0	0	0	12,884	0	0	0	0
6	80,000	14,000	21,000	85,000	0	6,099,999	73,000	0	0	0	249,811
7	2,277,006	0	0	0	0	0	0	0	0	0	0
8	2,908,007	0	19,000	0	0	0	1,000	0	17,000	0	5,601
9	11,952,923	14,845,768	16,107,998	9,047,975	1,510,008	62,306,505	21,348,015	1,329,028	6,452,111	48,422,620	21,665,814
10	103,934,253	9,536,008	4,328,010	22,536,022	5,239,011	8,151,999	14,470,033	24,625,005	13,636,036	4,068,358	108,396,820
11	29,260,071	30,585,026	6,183,014	27,299,026	2,139,004	12,423,998	21,944,049	9,597,002	8,310,022	4,899,054	137,867,832
12	32,842,080	3,640,003	45,055,105	32,518,031	11,435,024	15,132,998	22,480,051	24,309,004	9,709,025	12,952,602	125,074,805
13	18,952,046	3,113,003	271,001	2,923,003	15,443,032	2,551,000	8,025,018	11,276,002	11,379,030	14,618,887	553,004,922
14	0	7,902,007	526,001	11,013,011	0	10,112,999	19,679,044	0	0	0	193,521,981
15	18,011,044	13,372,011	3,243,008	77,102,074	8,892,019	149,480,981	42,926,097	5,896,001	36,889,096	15,781,275	495,995,295
16	36,104,088	36,125,030	3,356,008	75,159,072	6,214,013	40,721,995	82,389,186	23,058,004	32,953,086	20,998,323	654,674,760
17	0	0	0	0	0	0	0	59,173,011	0	0	199,381,904
18	115,000	0	0	0	0	997,000	2,076,005	42,375,008	31,602,083	1,475,489	407,323,486
19	8,723,021	3,412,003	2,667,006	8,184,008	1,795,004	12,138,998	6,336,014	50,267,009	4,227,011	123,408,808	164,776,878
20	359,523,876	296,464,250	53,970,125	698,140,669	94,861,199	191,672,157	478,662,078	439,634,081	281,216,735	261,331,681	6,487,252
	153,973,375	197,913,167	135,016,314	346,642,332	36,147,076	685,221,914	276,060,622	555,442,102	55,240,144	27,622,368	1,146,671,954
	582,582,601	122,316,348	159,478,410	123,196,152	100,631,207	184,746,284	210,667,882	114,956,994	174,259,361	168,653,456	2,504,679,569
	1,363,431,322	739,238,624	430,242,000	1,433,846,375	284,306,597	1,381,758,827	1,207,179,719	1,361,938,251	665,890,740	704,232,921	6,720,549,054

Table 4.3-1. Transactions Matrix (continue).

	Other Final Demand	Exports	Row Total
	$	$	$
1	12,620	876,905	3,339,455
2	0	66,348	960,000
3	0	90,769	320,000
4	1,000	78,059	560,000
5	0	13,998	36,000
6	0	44,153,174	52,687,679
7	0	50,831,311	53,214,316
8	317,003	9,573,502	12,872,113
9	837,936,291	176,136,365	1,440,667,287
10	118,513,289	849,416,932	1,363,431,322
11	88,313,075	344,768,427	739,238,624
12	33,858,079	50,087,583	430,242,000
13	11,349,011	707,737,848	1,433,846,375
14	1,324,003	40,014,550	284,306,597
15	0	476,508,230	1,381,758,827
16	17,971,040	126,001,537	1,207,179,719
17	15,289,003	1,088,094,333	1,361,938,251
18	3,308,009	176,613,660	665,890,740
19	7,528,125	296,491,219	704,232,921
20	1,089,550,304	2,009,976,853	6,720,549,054
	N.A.	N.A.	N.A.
	N.A.	N.A.	N.A.
	N.A.	N.A.	N.A.

Direct Requirements

Direct requirements are the fixed combinations of inputs required for production of outputs. The fixed combinations of inputs represent linear production functions.

Direct requirements are shown in Table 4.3-2. These requirements are derived by dividing the column entries in Quadrant I and III of the T matrix by their respective column totals.

Direct requirements show the dollar amount of purchases made from a row sector by a column sector in order for that column sector to produce one dollar of output. These requirements are also known as technical coefficients of production or simply technical coefficients.

In matrix algebra notation, the direct requirements are denoted as a_{ij}'s. Where a is the dollar amount of purchases made from row sector i by column sector j in order for column sector j to produce one dollar of output. These are calculated by dividing the x_{ij}'s by the X_j's of the T matrix. Where x_{ij} is the transactions value for the row sector i and column sector j and X_j is the total for column j.

The direct requirements are represented by the A matrix presented below.

$$
\begin{array}{lcccc}
A = & a_{11} & a_{12} & . & a_{1n} \\
+ & a_{21} & a_{22} & . & a_{2n} \\
 & . & . & . & . \\
 & . & . & . & . \\
 & . & . & . & . \\
+ & a_{n1} & a_{n2} & . & a_{nn} \\
 & & & & \\
= & 1.0 & 1.0 & . & 1.0
\end{array}
\qquad (4.3\text{-}2)
$$

The dimensions of the A matrix include both Quadrants I and III.

Table 4.3-2. Direct Requirements.

Economic Sector	1 Livestock Production	2 Dairy Production	3 Alfalfa Hay Production	4 Other Hay Production	5 Barley Production	6 Agricultural Services	7 Gold Mining	8 Other Mining	9 Construction
1 Livestock Production	0.21114793	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
2 Dairy Production	0.00022399	0.00098750	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
3 Alfalfa Hay Production	0.00000000	0.07083333	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
4 Other Hay Production	0.08833268	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
5 Barley Production	0.00060848	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
6 Agricultural Services	0.01487967	0.00312500	0.07500000	0.00892857	0.00000000	0.00170816	0.00020671	0.00000000	0.00120014
7 Gold Mining	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00180306	0.00000000	0.00085456	0.00000000
8 Other Mining	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00005694	0.00005638	0.00124300	0.00000625
9 Construction	0.00811031	0.00870104	0.00000000	0.00000000	0.00000000	0.00903642	0.00472643	0.04340515	0.14596298
10 Manufacturing	0.02763355	0.05312500	0.00000000	0.02321429	0.02777778	0.03917400	0.03420153	0.00722500	0.05028591
11 Transportation and Communications	0.00897482	0.01770833	0.00000000	0.00714286	0.00000000	0.01218494	0.01296651	0.00598200	0.00984894
12 Utilities	0.00495979	0.00833333	0.02187500	0.01250000	0.00000000	0.00920513	0.05626339	0.05997516	0.00476031
13 Trade	0.03542764	0.01979167	0.05625000	0.05178571	0.08333333	0.01370332	0.00189800	0.01530456	0.04997355
14 Eating, Drinking, and Lodging	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00400270	0.00000000	0.00000000
15 Finance, Insurance, and Real Estate	0.03849790	0.03854167	0.06250000	0.06250000	0.05555556	0.02139007	0.05487277	0.02043192	0.02299568
16 Services	0.00850259	0.00833333	0.08437500	0.01250000	0.00000000	0.02736866	0.05265532	0.02594780	0.03248854
17 Hotels, Gaming, and Recreation	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
18 Health	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00038844	0.00000000
19 Local Government	0.02149273	0.01041667	0.03750000	0.05892857	0.00000000	0.02237702	0.01681888	0.01996580	0.00820456
20 Households	0.16178568	0.22500000	0.40625000	0.37857143	0.30555556	0.42301852	0.31215470	0.26017710	0.28854721
Other Final Payments	0.03448287	0.07708333	0.07187500	0.06250000	0.11111111	0.21767765	0.16651634	0.26188630	0.11117111
Imports	0.33493938	0.45801979	0.18437500	0.32142857	0.41666667	0.20129613	0.28266033	0.27721323	0.27455481
Column Total	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000

Table 4.3-2. Direct Requirements (continue).

	10 Manufacturing	11 Transportation and Communications	12 Utilities	13 Trade	14 Eating, Drinking, and Lodging	15 Finance, Insurance, and Real Estate	16 Services	17 Hotels, Gaming, and Recreation	18 Health	19 Local Government	20 Households
1	0.00094908	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00001988	0.00000000	0.00000000	0.00000000	0.00006351
2	0.00064605	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000393	0.00000000	0.00000000	0.00000000	0.00000095
3	0.00000733	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00002250
4	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00002767
5	0.00000520	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00001067	0.00000000	0.00000000	0.00000000	0.00000000
6	0.00005868	0.00001894	0.00004881	0.00005928	0.00000000	0.00441466	0.00006047	0.00000000	0.00000000	0.00000000	0.00003717
7	0.00167006	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
8	0.00213286	0.00000000	0.00004416	0.00000000	0.00000000	0.00000000	0.00000083	0.00000000	0.00002553	0.00000000	0.00000083
9	0.00876680	0.02008251	0.03743939	0.00631028	0.00531120	0.04509217	0.01768421	0.00097584	0.00968944	0.06875938	0.00322382
10	0.07622991	0.01289977	0.01005948	0.01571718	0.01842733	0.00589973	0.01198664	0.01808085	0.02047789	0.00577701	0.01612916
11	0.02146061	0.04137369	0.01437101	0.01903902	0.00752358	0.00899144	0.01817795	0.00704658	0.01247956	0.00695658	0.02051437
12	0.02408781	0.00492399	0.10472038	0.02267888	0.04022075	0.01095198	0.01862196	0.01784883	0.01458051	0.01839250	0.01861080
13	0.01390026	0.00421109	0.00062988	0.00203857	0.05431823	0.00184620	0.00664774	0.00827938	0.01708843	0.02075860	0.08228568
14	0.00000000	0.01068939	0.00122257	0.00768075	0.00000000	0.00731893	0.01630167	0.00000000	0.00000000	0.00000000	0.02879556
15	0.01321009	0.01808890	0.00753764	0.05377290	0.03127616	0.10818167	0.03555899	0.00432913	0.05539812	0.02240917	0.07380279
16	0.02648031	0.04886789	0.00780028	0.05241780	0.02185673	0.02947113	0.06824931	0.01693029	0.04948723	0.02981730	0.09741388
17	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.04344765	0.00000000	0.00000000	0.02966750
18	0.00008435	0.00000000	0.00000000	0.00000000	0.00000000	0.00072154	0.00171971	0.03111375	0.04745836	0.00209517	0.06060866
19	0.00639784	0.00461556	0.00619885	0.00570773	0.00631362	0.00878518	0.00524861	0.03690843	0.00634790	0.17523862	0.02451837
20	0.26369049	0.40103999	0.12544132	0.48690061	0.33365810	0.13871607	0.39651269	0.32280030	0.42231663	0.37108700	0.00096529
	0.11293079	0.26772569	0.31381482	0.24175695	0.12714118	0.49590558	0.22868229	0.40783207	0.08295677	0.03922334	0.17062177
	0.42729149	0.16546260	0.37067141	0.08592005	0.35395312	0.13370371	0.17451244	0.08440691	0.26169362	0.23948533	0.37268972
	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000

Final Demand Requirements

Final demand requirements measure the change in total economic activity from a change in final demand. Final demand includes capital formation, inventory accumulation, state government purchases, federal government purchases, and exports.

A identity matrix and a I – A matrix are necessary to calculate the final demand requirements.

The identity matrix is shown in Table 4.3-3. The identity matrix has one's placed along the main diagonal and zero's placed in other locations.

In matrix algebra notation, the identity matrix is represented by the I matrix presented below.

$$I = \begin{matrix} 1.0 & 0.0 & . & 0.0 \\ 0.0 & 1.0 & . & 0.0 \\ . & . & . & . \\ . & . & . & . \\ . & . & . & . \\ 0.0 & 0.0 & . & 1.0 \end{matrix} \qquad (4.3\text{-}3)$$

The dimensions of the I matrix include only Quadrant I.

The I – A matrix is shown in Table 4.3-4. This matrix is derived by subtracting the direct requirements matrix from the identity matrix.

In matrix algebra notation, the I – A matrix is presented below.

$$I - A = \begin{matrix} (1.0 - a_{11}) & -a_{12} & . & -a_{1n} \\ -a_{21} & (1.0 - a_{22}) & . & -a_{2n} \\ . & . & . & . \\ . & . & . & . \\ . & . & . & . \\ -a_{n1} & -a_{n2} & . & (1.0 - a_{nn}) \end{matrix} \qquad (4.3\text{-}4)$$

The dimensions of the I – A matrix include only Quadrant I.

Final demand requirements are shown in Table 4.3-5. These requirements are derived by taking the inverse of the I – A matrix.

Final demand requirements show the dollar amount of change in economic activity of the row sector from a one dollar change in final demand of the column sector. The column totals are the final demand total requirements that show the total dollar amount of change in economic activity of all row sectors combined from a one dollar change in final demand of the column sector.

In matrix algebra notation, the final demand requirements are denoted by b_{ij}'s. Where b is the dollar amount of change in economic activity of row sector i from a one dollar change in final demand of column sector j. The C_j's are the final demand total requirements for column sector j.

The final demand requirements are represented by the B matrix presented below.

$$
\begin{array}{lcccc}
B = & b_{11} & b_{12} & . & b_{1n} \\
+ & b_{21} & b_{22} & . & b_{2n} \\
 & . & . & . & . \\
 & . & . & . & . \\
 & . & . & . & . \\
+ & b_{n1} & b_{n2} & . & b_{nn} \\
 & & & & \\
= & B_1 & B_2 & . & B_n
\end{array}
\qquad (4.3\text{-}5)
$$

The dimensions of the B matrix include only Quadrant I.

The final demand total requirements are the same as the final demand multipliers.

Table 4.3-3. Identity Matrix.

Economic Sector	1 Livestock Production	2 Dairy Production	3 Alfalfa Hay Production	4 Other Hay Production	5 Barley Production	6 Agricultural Services	7 Gold Mining	8 Other Mining	9 Construction
1 Livestock Production	1.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
2 Dairy Production	0.00000000	1.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
3 Alfalfa Hay Production	0.00000000	0.00000000	1.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
4 Other Hay Production	0.00000000	0.00000000	0.00000000	1.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
5 Barley Production	0.00000000	0.00000000	0.00000000	0.00000000	1.00000000	0.00000000	0.00000000	0.00000000	0.00000000
6 Agricultural Services	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	1.00000000	0.00000000	0.00000000	0.00000000
7 Gold Mining	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	1.00000000	0.00000000	0.00000000
8 Other Mining	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	1.00000000	0.00000000
9 Construction	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	1.00000000
10 Manufacturing	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
11 Transportation and Communications	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
12 Utilities	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
13 Trade	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
14 Eating, Drinking, and Lodging	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
15 Finance, Insurance, and Real Estate	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
16 Services	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
17 Hotels, Gaming, and Recreation	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
18 Health	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
19 Local Government	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
20 Households	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
Column Total	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000

Table 4.3-3. Identity Matrix (continue).

	10 Manufacturing	11 Transportation and Communications	12 Utilities	13 Trade	14 Eating, Drinking, and Lodging	15 Finance, Insurance, and Real Estate	16 Services	17 Hotels, Gaming, and Recreation	18 Health	19 Local Government	20 Households
1	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
2	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
3	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
4	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
5	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
6	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
7	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
8	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
9	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
10	1.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
11	0.00000000	1.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
12	0.00000000	0.00000000	1.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
13	0.00000000	0.00000000	0.00000000	1.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
14	0.00000000	0.00000000	0.00000000	0.00000000	1.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
15	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	1.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
16	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	1.00000000	0.00000000	0.00000000	0.00000000	0.00000000
17	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	1.00000000	0.00000000	0.00000000	0.00000000
18	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	1.00000000	0.00000000	0.00000000
19	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	1.00000000	0.00000000
20	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	1.00000000
	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000

Table 4.3-4. I - A Matrix.

Economic Sector	1 Livestock Production	2 Dairy Production	3 Alfalfa Hay Production	4 Other Hay Production	5 Barley Production	6 Agricultural Services	7 Gold Mining	8 Other Mining	9 Construction
1 Livestock Production	0.78885207	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
2 Dairy Production	-0.00022399	0.99901250	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
3 Alfalfa Hay Production	0.00000000	-0.07083333	1.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
4 Other Hay Production	-0.08833268	0.00000000	0.00000000	1.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
5 Barley Production	-0.00060848	0.00000000	0.00000000	0.00000000	1.00000000	0.00000000	0.00000000	0.00000000	0.00000000
6 Agricultural Services	-0.01487967	-0.00312500	-0.07500000	-0.00892857	0.00000000	0.99829184	-0.00020671	0.00000000	-0.00120014
7 Gold Mining	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	-0.00180306	1.00000000	-0.00085456	0.00000000
8 Other Mining	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	-0.00005694	-0.00005638	0.99875700	-0.00000625
9 Construction	-0.00811031	-0.00870104	0.00000000	0.00000000	0.00000000	-0.00903642	-0.00472643	-0.04340515	0.85403702
10 Manufacturing	-0.02763355	-0.05312500	0.00000000	-0.02321429	-0.02777778	-0.03917400	-0.03420153	-0.00722500	-0.05028591
11 Transportation and Communications	-0.00897482	-0.01770833	0.00000000	-0.00714286	0.00000000	-0.01218494	-0.01296651	-0.00598200	-0.00984894
12 Utilities	-0.00495979	-0.00833333	-0.02187500	-0.01250000	0.00000000	-0.00920513	-0.05626339	-0.05997516	-0.00476031
13 Trade	-0.03542764	-0.01979167	-0.05625000	-0.05178571	-0.08333333	-0.01370332	-0.00189800	-0.01530456	-0.04997355
14 Eating, Drinking, and Lodging	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	-0.00400270	0.00000000	0.00000000
15 Finance, Insurance, and Real Estate	-0.03849790	-0.03854167	-0.06250000	-0.06250000	-0.05555556	-0.02139007	-0.05487277	-0.02043192	-0.02299568
16 Services	-0.00850259	-0.00833333	-0.08437500	-0.01250000	0.00000000	-0.02736866	-0.05265532	-0.02594780	-0.03248854
17 Hotels, Gaming, and Recreation	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
18 Health	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	-0.00038844	0.00000000
19 Local Government	-0.02149273	-0.01041667	-0.03750000	-0.05892857	0.00000000	-0.02237702	-0.01681888	-0.01996580	-0.00820456
20 Households	-0.16178568	-0.22500000	-0.40625000	-0.37857143	-0.30555556	-0.42301852	-0.31215470	-0.26017710	-0.28854721
Column Total	0.36942226	0.53510313	0.25625000	0.38392857	0.52777778	0.41897378	0.44917667	0.53909952	0.38572592

Table 4.3-4. I - A Matrix (continue).

	10 Manufacturing	11 Transportation and Communications	12 Utilities	13 Trade	14 Eating, Drinking, and Lodging	15 Finance, Insurance, and Real Estate	16 Services	17 Hotels, Gaming, and Recreation	18 Health	19 Local Government	20 Households
1	-0.00094908	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	-0.00001988	0.00000000	0.00000000	0.00000000	-0.00006351
2	-0.00064605	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	-0.00000393	0.00000000	0.00000000	0.00000000	-0.00000095
3	-0.00000733	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	-0.00002250
4	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	-0.00002767
5	-0.00000520	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	-0.00001067	0.00000000	0.00000000	0.00000000	0.00000000
6	-0.00005868	-0.00001894	-0.00004881	-0.00005928	0.00000000	-0.00441466	-0.00006047	0.00000000	0.00000000	0.00000000	-0.00003717
7	-0.00167006	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
8	-0.00213286	0.00000000	-0.00004416	0.00000000	0.00000000	0.00000000	-0.00000083	0.00000000	-0.00002553	0.00000000	-0.00000083
9	-0.00876680	-0.02008251	-0.03743939	-0.00631028	-0.00531120	-0.04509217	-0.01768421	-0.00097584	-0.00968944	-0.06875938	-0.00322382
10	0.92377009	-0.01289977	-0.01005948	-0.01571718	-0.01842733	-0.00589973	-0.01198664	-0.01808085	-0.02047789	-0.00577701	-0.01612916
11	-0.02146061	0.95862631	-0.01437101	-0.01903902	-0.00752358	-0.00899144	-0.01817795	-0.00704658	-0.01247956	-0.00695658	-0.02051437
12	-0.02408781	-0.00492399	0.89527962	-0.02267888	-0.04022075	-0.01095198	-0.01862196	-0.01784883	-0.01458051	-0.01839250	-0.01861080
13	-0.01390026	-0.00421109	-0.00062988	0.99796143	-0.05431823	-0.00184620	-0.00664774	-0.00827938	-0.01708843	-0.02075860	-0.08228568
14	0.00000000	-0.01068939	-0.00122257	-0.00768075	1.00000000	-0.00731893	-0.01630167	0.00000000	0.00000000	0.00000000	-0.02879556
15	-0.01321009	-0.01808890	-0.00753764	-0.05377290	-0.03127616	0.89181833	-0.03555899	-0.00432913	-0.05539812	-0.02240917	-0.07380279
16	-0.02648031	-0.04886789	-0.00780028	-0.05241780	-0.02185673	-0.02947113	0.93175069	-0.01693029	-0.04948723	-0.02981730	-0.09741388
17	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.95655235	0.00000000	0.00000000	-0.02966750
18	-0.00008435	0.00000000	0.00000000	0.00000000	0.00000000	-0.00072154	-0.00171971	-0.03111375	0.95254164	-0.00209517	-0.06060866
19	-0.00639784	-0.00461556	-0.00619885	-0.00570773	-0.00631362	-0.00878518	-0.00524861	-0.03690843	-0.00634790	0.82476138	-0.02451837
20	-0.26369049	-0.40103999	-0.12544132	-0.48690061	-0.33365810	-0.13871607	-0.39651269	-0.32280030	-0.42231663	-0.37108700	0.99903471
	0.54022228	0.43318829	0.68448623	0.32767700	0.48109430	0.62960929	0.40319473	0.49223898	0.34465039	0.27870867	0.54331149

Table 4.3-5. Final Demand Requirements.

Economic Sector	1 Livestock Production	2 Dairy Production	3 Alfalfa Hay Production	4 Other Hay Production	5 Barley Production	6 Agricultural Services	7 Gold Mining	8 Other Mining	9 Construction
1 Livestock Production	1.26776906	0.00011998	0.00009036	0.00010315	0.00009249	0.00012434	0.00010602	0.00006396	0.00014208
2 Dairy Production	0.00032138	1.00103514	0.00001780	0.00002951	0.00002949	0.00004023	0.00003529	0.00001614	0.00005289
3 Alfalfa Hay Production	0.00003285	0.07091630	1.00001687	0.00001573	0.00001285	0.00001690	0.00001381	0.00001059	0.00001626
4 Other Hay Production	0.11199732	0.00002182	0.00002695	1.00002548	0.00002100	0.00002771	0.00002280	0.00001706	0.00002721
5 Barley Production	0.00077252	0.00000122	0.00000216	0.00000131	1.00000098	0.00000155	0.00000164	0.00000107	0.00000172
6 Agricultural Services	0.02047070	0.00893928	0.07587868	0.00962162	0.00056174	1.00218488	0.00078952	0.00042291	0.00187418
7 Gold Mining	0.00013109	0.00013495	0.00017921	0.00009115	0.00007540	0.00190840	1.00009021	0.00089620	0.00013758
8 Other Mining	0.00012401	0.00015477	0.00006286	0.00009821	0.00009719	0.00018994	0.00017495	1.00130067	0.00018162
9 Construction	0.02977421	0.02452043	0.02594517	0.02336358	0.01371873	0.02788598	0.02502261	0.06642639	1.18685061
10 Manufacturing	0.05632947	0.07107573	0.02535509	0.04413877	0.04449433	0.06061927	0.05307174	0.02380980	0.08026513
11 Transportation and Communications	0.02949527	0.03383069	0.02607464	0.02876511	0.01691848	0.03331389	0.03195035	0.02178586	0.03188783
12 Utilities	0.02751813	0.02805091	0.05301548	0.03811050	0.01885050	0.03307428	0.08248061	0.08305181	0.02831763
13 Trade	0.09238912	0.06245557	0.12109337	0.10754835	0.12568942	0.06991315	0.04783730	0.05606476	0.10778321
14 Eating, Drinking, and Lodging	0.01549750	0.01442114	0.02513621	0.02078355	0.01642180	0.02077968	0.02163507	0.01453288	0.01898053
15 Finance, Insurance, and Real Estate	0.11355460	0.09429669	0.15098844	0.13735208	0.11534741	0.08984502	0.11608365	0.07038053	0.09132535
16 Services	0.07579342	0.07241941	0.18521607	0.09575682	0.06483640	0.10876997	0.12216153	0.08458647	0.11360231
17 Hotels, Gaming, and Recreation	0.01332535	0.01257408	0.02125876	0.01834994	0.01438011	0.01874956	0.01505879	0.01278517	0.01643224
18 Health	0.02812975	0.02648609	0.04492130	0.03873344	0.03021906	0.03945725	0.03178617	0.02735277	0.03460036
19 Local Government	0.05874603	0.03214322	0.07402698	0.09442580	0.01803818	0.04982969	0.03974764	0.04068884	0.03222442
20 Households	0.42964153	0.40541884	0.68543415	0.59164650	0.46364964	0.60453132	0.48553208	0.41222501	0.52981530
Column Total	2.37181331	1.95901623	2.51474055	2.24896056	1.94345518	2.16126301	2.07360180	1.91641888	2.27451846

Table 4.3-5. Final Demand Requirements (continue).

	10 Manufacturing	11 Transportation and Communications	12 Utilities	13 Trade	14 Eating, Drinking, and Lodging	15 Finance, Insurance, and Real Estate	16 Services	17 Hotels, Gaming, and Recreation	18 Health	19 Local Government	20 Households
1	0.00135448	0.00008977	0.00004485	0.00010435	0.00008605	0.00004618	0.00011531	0.00008573	0.00010689	0.00009562	0.00014271
2	0.00070984	0.00002226	0.00001426	0.00002568	0.00002416	0.00001284	0.00002599	0.00002408	0.00002905	0.00002208	0.00002264
3	0.00006772	0.00001498	0.00000620	0.00001753	0.00001326	0.00000705	0.00001534	0.00001324	0.00001677	0.00001675	0.00002983
4	0.00013121	0.00002412	0.00001015	0.00002820	0.00002148	0.00001146	0.00002650	0.00002143	0.00002714	0.00002682	0.00004702
5	0.00000744	0.00000161	0.00000057	0.00000181	0.00000122	0.00000090	0.00001252	0.00000116	0.00000178	0.00000159	0.00000187
6	0.00042490	0.00048114	0.00029200	0.00073305	0.00047148	0.00520147	0.00061705	0.00032764	0.00068103	0.00064793	0.00065414
7	0.00183324	0.00005562	0.00003644	0.00006450	0.00006111	0.00004116	0.00005511	0.00006069	0.00007331	0.00005528	0.00005504
8	0.00234401	0.00007299	0.00009655	0.00008499	0.00008131	0.00004316	0.00007365	0.00008086	0.00012265	0.00007389	0.00007395
9	0.02369612	0.03921347	0.05549533	0.02756234	0.02209497	0.06761178	0.03833619	0.01740048	0.03129967	0.11499535	0.02293341
10	1.09605525	0.03274770	0.02145720	0.03778609	0.03603903	0.01900862	0.03229417	0.03594780	0.04309735	0.03236270	0.03221500
11	0.03849158	1.06274000	0.02473331	0.04297963	0.02605997	0.02066669	0.03961539	0.02489735	0.03583285	0.03198350	0.03639103
12	0.04459140	0.02730820	1.12566614	0.05058695	0.06436884	0.02470590	0.04367436	0.03992397	0.04122566	0.04933945	0.03935035
13	0.05378710	0.05929041	0.02385108	1.06532307	0.10055794	0.03026378	0.06253118	0.05571883	0.07706956	0.09016465	0.11041228
14	0.01477710	0.03142825	0.00918757	0.03180898	1.01773795	0.01778995	0.03746411	0.01701394	0.02272090	0.02307019	0.04049098
15	0.06242695	0.08472350	0.03505524	0.13422857	0.09190233	1.15325984	0.10574057	0.06161422	0.13524821	0.10490860	0.12553404
16	0.08607168	0.12945673	0.04079044	0.14521155	0.09148918	0.07268208	1.15074434	0.08603932	0.13998768	0.12784994	0.15154910
17	0.01295794	0.01814742	0.00693866	0.02127806	0.01555733	0.00827276	0.01828207	1.06094957	0.01984333	0.02059720	0.03857693
18	0.02736118	0.03818453	0.01460167	0.04478720	0.03272206	0.01829872	0.04032781	0.06686129	1.09161089	0.04596528	0.08086964
19	0.02435965	0.02769514	0.01727267	0.03287892	0.02705731	0.02279980	0.02902819	0.06550437	0.03253316	1.23819220	0.04370713
20	0.41779557	0.58511678	0.22371941	0.68605625	0.50160610	0.26673387	0.58945824	0.50067614	0.63979726	0.66410381	1.24381409
	1.90924436	2.13681463	1.59926976	2.32154772	2.02795308	1.72745799	2.18843808	2.03316211	2.31132517	2.54447284	1.96687119

Output Requirements

Output requirements measure the change in total economic activity from a change in output.

Output requirements are shown in Table 4.3-6. These requirements are derived by taking the final demand requirements in the B matrix and dividing them by their respective intersectoral final demand requirements. The intersectoral final demand requirements are the final demand requirements along the main diagonal in the B matrix. In so doing, the output requirements along the main diagonal become one's.

Output requirements show the dollar amount of change in economic activity of the row sector from a one dollar change in output of the column sector. The column totals are the output total requirements that show the total dollar amount of change in economic activity of all row sectors from a one dollar change in output of the column sector.

In matrix algebra notation, the output requirements are denoted by c_{ij}'s. Where c is the dollar amount of change in economic activity of row sector i from a one dollar change in output of column sector j. The C_j's are the output total requirements for column sector j.

The output requirements are represented by the C matrix presented below.

$$
\begin{array}{lcccc}
C = & c_{11} & c_{12} & \cdot & c_{1n} \\
+ & c_{21} & c_{22} & \cdot & c_{2n} \\
 & \cdot & \cdot & \cdot & \cdot \\
 & \cdot & \cdot & \cdot & \cdot \\
 & \cdot & \cdot & \cdot & \cdot \\
+ & c_{n1} & c_{n2} & \cdot & c_{nn} \\
= & C_1 & C_2 & \cdot & C_n
\end{array}
\qquad (4.3\text{-}6)
$$

The dimensions of the B matrix include only Quadrant I.

The output total requirements are the same as the output multipliers.

Table 4.3-6. Output Requirements.

Economic Sector	1 Livestock Production	2 Dairy Production	3 Alfalfa Hay Production	4 Other Hay Production	5 Barley Production	6 Agricultural Services	7 Gold Mining	8 Other Mining	9 Construction
1 Livestock Production	1.00000000	0.00011985	0.00009035	0.00010315	0.00009249	0.00012407	0.00010601	0.00006388	0.00011972
2 Dairy Production	0.00025350	1.00000000	0.00001780	0.00002950	0.00002949	0.00004014	0.00003528	0.00001611	0.00004456
3 Alfalfa Hay Production	0.00002591	0.07084297	1.00000000	0.00001573	0.00001285	0.00001686	0.00001381	0.00001058	0.00001370
4 Other Hay Production	0.08834205	0.00002179	0.00002695	1.00000000	0.00002100	0.00002765	0.00002280	0.00001703	0.00002293
5 Barley Production	0.00060935	0.00000121	0.00000216	0.00000131	1.00000000	0.00000155	0.00000164	0.00000106	0.00000145
6 Agricultural Services	0.01614703	0.00893004	0.07587740	0.00962137	0.00056174	1.00000000	0.00078945	0.00042236	0.00157912
7 Gold Mining	0.00010340	0.00013481	0.00017921	0.00009114	0.00007540	0.00190424	1.00000000	0.00089503	0.00011592
8 Other Mining	0.00009782	0.00015461	0.00006286	0.00009820	0.00009719	0.00018952	0.00017494	1.00000000	0.00015303
9 Construction	0.02348552	0.02449507	0.02594473	0.02336298	0.01371871	0.02782518	0.02502035	0.06634010	1.00000000
10 Manufacturing	0.04443197	0.07100223	0.02535466	0.04413765	0.04449428	0.06048712	0.05306695	0.02377887	0.06762867
11 Transportation and Communications	0.02326549	0.03379571	0.02607420	0.02876437	0.01691846	0.03324126	0.03194747	0.02175756	0.02686760
12 Utilities	0.02170595	0.02802190	0.05301459	0.03810953	0.01885048	0.03300218	0.08247317	0.08294393	0.02385947
13 Trade	0.07287535	0.06239098	0.12109133	0.10754560	0.12568929	0.06976074	0.04783299	0.05599193	0.09081447
14 Eating, Drinking, and Lodging	0.01222423	0.01440623	0.02513578	0.02078302	0.01642178	0.02073438	0.02163312	0.01451400	0.01599235
15 Finance, Insurance, and Real Estate	0.08957041	0.09419918	0.15098590	0.13734858	0.11534730	0.08964914	0.11607318	0.07028911	0.07694764
16 Services	0.05978488	0.07234453	0.18521294	0.09575438	0.06483634	0.10853284	0.12215052	0.08447660	0.09571745
17 Hotels, Gaming, and Recreation	0.01051086	0.01256108	0.02125840	0.01834947	0.01438009	0.01870868	0.01505743	0.01276856	0.01384525
18 Health	0.02218839	0.02645870	0.04492055	0.03873246	0.03021903	0.03937123	0.03178330	0.02731724	0.02915308
19 Local Government	0.04633812	0.03210998	0.07402573	0.09442339	0.01803816	0.04972106	0.03974405	0.04063598	0.02715120
20 Households	0.33889574	0.40499961	0.68542258	0.59163142	0.46364919	0.60321338	0.48548829	0.41168954	0.44640437
Column Total	1.87085597	1.95699048	2.51469813	2.24890326	1.94345328	2.15655122	2.07341476	1.91392950	1.91643197

Table 4.3-6. Output Requirements (continue).

	10 Manufacturing	11 Transportation and Communications	12 Utilities	13 Trade	14 Eating, Drinking, and Lodging	15 Finance, Insurance, and Real Estate	16 Services	17 Hotels, Gaming, and Recreation	18 Health	19 Local Government	20 Households
1	0.00123578	0.00008447	0.00003985	0.00009795	0.00008455	0.00004004	0.00010021	0.00008080	0.00009792	0.00007723	0.00011474
2	0.00064763	0.00002095	0.00001267	0.00002411	0.00002374	0.00001114	0.00002259	0.00002270	0.00002661	0.00001783	0.00001820
3	0.00006179	0.00001410	0.00000551	0.00001646	0.00001303	0.00000611	0.00001333	0.00001248	0.00001536	0.00001352	0.00002398
4	0.00011971	0.00002270	0.00000902	0.00002647	0.00002111	0.00000994	0.00002303	0.00002020	0.00002487	0.00002166	0.00003781
5	0.00000679	0.00000151	0.00000051	0.00000170	0.00000119	0.00000078	0.00001088	0.00000109	0.00000163	0.00000128	0.00000150
6	0.00038766	0.00045273	0.00025940	0.00068811	0.00046327	0.00451023	0.00053622	0.00030882	0.00062388	0.00052328	0.00052591
7	0.00167258	0.00005234	0.00003238	0.00006054	0.00006004	0.00003569	0.00004789	0.00005721	0.00006716	0.00004464	0.00004425
8	0.00213859	0.00006868	0.00008578	0.00007977	0.00007989	0.00003742	0.00006400	0.00007622	0.00011236	0.00005967	0.00005945
9	0.02161946	0.03689846	0.04929999	0.02587228	0.02170989	0.05862667	0.03331426	0.01640085	0.02867292	0.09287359	0.01843797
10	1.00000000	0.03081441	0.01906178	0.03546914	0.03541092	0.01648251	0.02806372	0.03388267	0.03948051	0.02613705	0.02590017
11	0.03511828	1.00000000	0.02197215	0.04034422	0.02560578	0.01792024	0.03442588	0.02346705	0.03282566	0.02583081	0.02925761
12	0.04068353	0.02569603	1.00000000	0.04748507	0.06324697	0.02142266	0.03795314	0.03763042	0.03776590	0.03984797	0.03163684
13	0.04907335	0.05579014	0.02118841	1.00000000	0.09880534	0.02624194	0.05433976	0.05251789	0.07060168	0.07281959	0.08876912
14	0.01348207	0.02957285	0.00816190	0.02985853	1.00000000	0.01542580	0.03255641	0.01603652	0.02081411	0.01863215	0.03255388
15	0.05695602	0.07972176	0.03114177	0.12599800	0.09030058	1.00000000	0.09188884	0.05807460	0.12389782	0.08472724	0.10092669
16	0.07852859	0.12181412	0.03623671	0.13630752	0.08989463	0.06302316	1.00000000	0.08109652	0.12823954	0.10325533	0.12184224
17	0.01182234	0.01707606	0.00616405	0.01997334	0.01528618	0.00717337	0.01588717	1.00000000	0.01817803	0.01663490	0.03101503
18	0.02496332	0.03593027	0.01297158	0.04204096	0.03215176	0.01586695	0.03504498	0.06302023	1.00000000	0.03712290	0.06501747
19	0.02222484	0.02606013	0.01534440	0.03086287	0.02658573	0.01976987	0.02522557	0.06174126	0.02980289	1.00000000	0.03513960
20	0.38118112	0.55057378	0.19874402	0.64398891	0.49286371	0.23128688	0.51224083	0.47191323	0.58610377	0.53634954	1.00000000
	1.74192345	2.01066547	1.42073187	2.17919595	1.99260830	1.49789140	1.90175871	1.91636074	2.11735261	2.05499020	1.58132249

Employment Requirements

Employment requirements measure the change in employment from a change in output. Employment is the number of jobs.

Employment requirements are the output response coefficients for employment. These requirements show the number of jobs required to produce one dollar of output in a given sector.

The employment requirements are shown in Table 4.3-7. These are taken from Table 4.2-71 as the output response coefficients for employment. They are placed along the main diagonal of the matrix. Zero's are placed in other locations of the matrix.

In matrix algebra notation, the employment requirements are denoted by d_{ij}'s. Where d is the number of jobs required to produce one dollar of output in row sector i and column sector j, being that i = j. Column totals are denoted by D_j's.

The employment requirements matrix is represented by the D matrix presented below.

$$
\begin{array}{lcccc}
D = & d_{11} & 0.0 & . & 0.0 \\
+ & 0.0 & d_{22} & . & 0.0 \\
 & . & . & . & . \\
 & . & . & . & . \\
 & . & . & . & . \\
+ & 0.0 & 0.0 & . & d_{nn} \\
= & D_1 & D_2 & . & D_n
\end{array}
\qquad (4.3\text{-}7)
$$

The dimensions of the D matrix include only Quadrant I.

The employment requirements are not the same as employment multipliers. Employment multipliers instead measure the total change in the number of jobs from a single job change in a given sector.

A total employment requirements matrix is necessary to calculate the employment multipliers.

Total employment requirements are shown in Table 4.3-8. These requirements are derived by multiplying the employment requirements matrix by the final demand requirements matrix.

Total employment requirements show the total number of jobs in row sector i and column sector j created by employment.

In matrix algebra notation, the total employment requirements are denoted by e_{ij}'s. Where e is the total number of jobs in row sector i and column sector j. Column totals are denoted by E_j's.

The total employment requirements are represented by the E matrix presented below.

$$
\begin{array}{lcccc}
E = & e_{11} & e_{12} & . & e_{1n} \\
+ & e_{21} & e_{22} & . & e_{2n} \\
 & . & . & . & . \\
 & . & . & . & . \\
 & . & . & . & . \\
+ & e_{n1} & e_{n2} & . & e_{nn} \\
 & & & & \\
= & E_1 & E_2 & . & E_n
\end{array}
\qquad (4.3\text{-}8)
$$

The dimensions of the E matrix include only Quadrant I.

Employment multipliers are calculated by dividing the column totals of the total employment requirements matrix by the column totals of the employment requirements matrix.

Employment multipliers show the total change in the number of jobs of all row sectors from a single job change in the column sector.

Table 4.3-7. Employment Requirements.

Economic Sector	1 Livestock Production	2 Dairy Production	3 Alfalfa Hay Production	4 Other Hay Production	5 Barley Production	6 Agricultural Services	7 Gold Mining	8 Other Mining	9 Construction
1 Livestock Production	0.00001887	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
2 Dairy Production	0.00000000	0.00002188	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
3 Alfalfa Hay Production	0.00000000	0.00000000	0.00001875	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
4 Other Hay Production	0.00000000	0.00000000	0.00000000	0.00001786	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
5 Barley Production	0.00000000	0.00000000	0.00000000	0.00000000	0.00002778	0.00000000	0.00000000	0.00000000	0.00000000
6 Agricultural Services	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00002557	0.00000000	0.00000000	0.00000000
7 Gold Mining	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00002873	0.00000000	0.00000000
8 Other Mining	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00001604	0.00000000
9 Construction	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000871
10 Manufacturing	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
11 Transportation and Communications	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000600	0.00000000	0.00000000	0.00000000
12 Utilities	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
13 Trade	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
14 Eating, Drinking, and Lodging	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
15 Finance, Insurance, and Real Estate	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
16 Services	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
17 Hotels, Gaming, and Recreation	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
18 Health	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
19 Local Government	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
20 Households	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
Column Total	0.00001887	0.00002188	0.00001875	0.00001786	0.00002778	0.00002557	0.00002873	0.00001604	0.00000871

Table 4.3-7. Employment Requirements (continue).

	10 Manufacturing	11 Transportation and Communications	12 Utilities	13 Trade	14 Eating, Drinking, and Lodging	15 Finance, Insurance, and Real Estate	16 Services	17 Hotels, Gaming, and Recreation	18 Health	19 Local Government	20 Households
1	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
2	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
3	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
4	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
5	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
6	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
7	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
8	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
9	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
10	0.00000825	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
11	0.00000000	0.00001181	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
12	0.00000000	0.00000000	0.00000626	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
13	0.00000000	0.00000000	0.00000000	0.00002523	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
14	0.00000000	0.00000000	0.00000000	0.00000000	0.00001885	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
15	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00001130	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
16	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00002893	0.00000000	0.00000000	0.00000000	0.00000000
17	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00001883	0.00000000	0.00000000	0.00000000
18	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00002934	0.00000000	0.00000000
19	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00001769	0.00000000
20	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
	0.00000825	0.00001181	0.00000626	0.00002523	0.00001885	0.00001130	0.00002893	0.00001883	0.00002934	0.00001769	0.00000000

Table 4.3-8. Total Employment Requirements.

Economic Sector	1 Livestock Production	2 Dairy Production	3 Alfalfa Hay Production	4 Other Hay Production	5 Barley Production	6 Agricultural Services	7 Gold Mining	8 Other Mining	9 Construction
1 Livestock Production	0.00002392	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
2 Dairy Production	0.00000001	0.00002190	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
3 Alfalfa Hay Production	0.00000000	0.00000133	0.00001875	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
4 Other Hay Production	0.00000200	0.00000000	0.00000000	0.00001786	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
5 Barley Production	0.00000002	0.00000000	0.00000000	0.00000000	0.00002778	0.00000000	0.00000000	0.00000000	0.00000000
6 Agricultural Services	0.00000052	0.00000023	0.00000194	0.00000025	0.00000001	0.00002563	0.00000002	0.00000001	0.00000005
7 Gold Mining	0.00000000	0.00000000	0.00000001	0.00000000	0.00000000	0.00000005	0.00002873	0.00000003	0.00000000
8 Other Mining	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00001606	0.00000000
9 Construction	0.00000026	0.00000021	0.00000023	0.00000020	0.00000012	0.00000024	0.00000022	0.00000058	0.00001034
10 Manufacturing	0.00000046	0.00000059	0.00000021	0.00000036	0.00000037	0.00000050	0.00000044	0.00000020	0.00000066
11 Transportation and Communications	0.00000035	0.00000040	0.00000031	0.00000034	0.00000020	0.00000039	0.00000038	0.00000026	0.00000038
12 Utilities	0.00000017	0.00000018	0.00000033	0.00000024	0.00000012	0.00000021	0.00000052	0.00000052	0.00000018
13 Trade	0.00000233	0.00000158	0.00000306	0.00000271	0.00000317	0.00000176	0.00000121	0.00000141	0.00000272
14 Eating, Drinking, and Lodging	0.00000029	0.00000027	0.00000047	0.00000039	0.00000031	0.00000039	0.00000041	0.00000027	0.00000036
15 Finance, Insurance, and Real Estate	0.00000128	0.00000107	0.00000171	0.00000155	0.00000130	0.00000102	0.00000131	0.00000080	0.00000103
16 Services	0.00000219	0.00000210	0.00000536	0.00000277	0.00000188	0.00000315	0.00000353	0.00000245	0.00000329
17 Hotels, Gaming, and Recreation	0.00000025	0.00000024	0.00000040	0.00000035	0.00000027	0.00000035	0.00000028	0.00000024	0.00000031
18 Health	0.00000083	0.00000078	0.00000132	0.00000114	0.00000089	0.00000116	0.00000093	0.00000080	0.00000102
19 Local Government	0.00000104	0.00000057	0.00000131	0.00000167	0.00000032	0.00000088	0.00000070	0.00000072	0.00000057
20 Households	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
Column Total	0.00003593	0.00003143	0.00003540	0.00002984	0.00003674	0.00003575	0.00003868	0.00002434	0.00002091

Table 4.3-8. Total Employment Requirements (continue).

	10 Manufacturing	11 Transportation and Communications	12 Utilities	13 Trade	14 Eating, Drinking, and Lodging	15 Finance, Insurance, and Real Estate	16 Services	17 Hotels, Gaming, and Recreation	18 Health	19 Local Government	20 Households
1	0.00000003	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
2	0.00000002	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
3	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
4	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
5	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
6	0.00000001	0.00000001	0.00000001	0.00000002	0.00000001	0.00000013	0.00000002	0.00000001	0.00000002	0.00000002	0.00000002
7	0.00000005	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
8	0.00000004	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
9	0.00000021	0.00000034	0.00000048	0.00000024	0.00000019	0.00000059	0.00000033	0.00000015	0.00000027	0.00000100	0.00000020
10	0.00000904	0.00000027	0.00000018	0.00000031	0.00000030	0.00000016	0.00000027	0.00000030	0.00000036	0.00000027	0.00000027
11	0.00000045	0.00001255	0.00000029	0.00000051	0.00000031	0.00000024	0.00000047	0.00000029	0.00000042	0.00000038	0.00000043
12	0.00000028	0.00000017	0.00000705	0.00000032	0.00000040	0.00000015	0.00000027	0.00000025	0.00000026	0.00000031	0.00000025
13	0.00000136	0.00000150	0.00000060	0.00002688	0.00000254	0.00000076	0.00000158	0.00000141	0.00000194	0.00000227	0.00000279
14	0.00000028	0.00000059	0.00000017	0.00000060	0.00001918	0.00000034	0.00000071	0.00000032	0.00000043	0.00000043	0.00000076
15	0.00000071	0.00000096	0.00000040	0.00000152	0.00000104	0.00001303	0.00000119	0.00000070	0.00000153	0.00000119	0.00000142
16	0.00000249	0.00000375	0.00000118	0.00000420	0.00000265	0.00000210	0.00003329	0.00000249	0.00000405	0.00000370	0.00000438
17	0.00000024	0.00000034	0.00000013	0.00000040	0.00000029	0.00000016	0.00000034	0.00001998	0.00000037	0.00000039	0.00000073
18	0.00000080	0.00000112	0.00000043	0.00000131	0.00000096	0.00000054	0.00000118	0.00000196	0.00003203	0.00000135	0.00000237
19	0.00000043	0.00000049	0.00000031	0.00000058	0.00000048	0.00000040	0.00000051	0.00000116	0.00000058	0.00002190	0.00000077
20	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
	0.00001644	0.00002209	0.00001123	0.00003689	0.00002836	0.00001861	0.00004018	0.00002901	0.00004227	0.00003321	0.00001439

Income Requirements

Income requirements measure the change in income from a change in output.

Income requirements are the output response coefficients for income. These requirements show the income required to produce one dollar of output in a given sector.

The income requirements are shown in Table 4.3-9. These are taken from Table 4.2-71 as the output response coefficients for employment. They are placed along the main diagonal of the matrix. Zero's are placed in other locations of the matrix.

In matrix algebra notation, the income requirements are denoted by f_{ij}'s. Where f is the income required to produce one dollar of output in row sector i and column sector j, being that i = j. Column totals are denoted by F_j's.

The income requirements matrix is represented by the F matrix presented below.

$$
\begin{array}{lcccc}
F = & f_{11} & 0.0 & . & 0.0 \\
+ & 0.0 & f_{22} & . & 0.0 \\
 & . & . & . & . \\
 & . & . & . & . \\
 & . & . & . & . \\
+ & 0.0 & 0.0 & . & f_{nn} \\
 & & & & \\
= & F_1 & F_2 & . & F_n
\end{array}
\qquad (4.3\text{-}9)
$$

The dimensions of the F matrix include only Quadrant I.

The income requirements are not the same as income multipliers. Income multipliers instead measure the total dollar amount of change in income from a one dollar change in income in a given sector.

A total income requirements matrix is necessary to calculate the income multipliers.

Total income requirements are shown in Table 4.3-10. These requirements are derived by multiplying the income requirements matrix by the final demand requirements matrix.

Total income requirements show the total dollar amount of income in row sector i and column sector j created by income.

In matrix algebra notation, the total income requirements are denoted by g_{ij}'s. Where g is the total dollar amount of income in row sector i and column sector j. Column totals are denoted by G_j's.

The total income requirements are represented by the G matrix presented below.

$$
\begin{array}{lcccc}
G = & g_{11} & g_{12} & \cdot & g_{1n} \\
+ & g_{21} & g_{22} & \cdot & g_{2n} \\
 & \cdot & \cdot & \cdot & \cdot \\
 & \cdot & \cdot & \cdot & \cdot \\
 & \cdot & \cdot & \cdot & \cdot \\
+ & g_{n1} & g_{n2} & \cdot & g_{nn} \\
 & & & & \\
= & G_1 & G_2 & \cdot & G_n
\end{array}
\qquad (4.3\text{-}10)
$$

The dimensions of the G matrix include only Quadrant I.

Income multipliers are calculated by dividing the column totals of the total income requirements matrix by the column totals of the income requirements matrix.

Income multipliers show the total dollar amount of change in income of all row sectors from a one dollar change in income of a column sector.

Table 4.3-9. Income Requirements.

Economic Sector	1 Livestock Production	2 Dairy Production	3 Alfalfa Hay Production	4 Other Hay Production	5 Barley Production	6 Agricultural Services	7 Gold Mining	8 Other Mining	9 Construction
1 Livestock Production	0.16178555	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
2 Dairy Production	0.00000000	0.22500000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
3 Alfalfa Hay Production	0.00000000	0.00000000	0.40625000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
4 Other Hay Production	0.00000000	0.00000000	0.00000000	0.37857143	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
5 Barley Production	0.00000000	0.00000000	0.00000000	0.00000000	0.30555556	0.00000000	0.00000000	0.00000000	0.00000000
6 Agricultural Services	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.42301852	0.00000000	0.00000000	0.00000000
7 Gold Mining	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.31215470	0.00000000	0.00000000
8 Other Mining	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.26017713	0.00000000
9 Construction	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.28854721
10 Manufacturing	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
11 Transportation and Communications	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
12 Utilities	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
13 Trade	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
14 Eating, Drinking, and Lodging	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
15 Finance, Insurance, and Real Estate	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
16 Services	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
17 Hotels, Gaming, and Recreation	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
18 Health	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
19 Local Government	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
20 Households	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
Column Total	0.16178555	0.22500000	0.40625000	0.37857143	0.30555556	0.42301852	0.31215470	0.26017713	0.28854721

Table 4.3-9. Income Requirements (continue).

	10 Manufacturing	11 Transportation and Communications	12 Utilities	13 Trade	14 Eating, Drinking, and Lodging	15 Finance, Insurance, and Real Estate	16 Services	17 Hotels, Gaming, and Recreation	18 Health	19 Local Government	20 Households
1	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
2	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
3	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
4	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
5	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
6	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
7	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
8	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
9	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
10	0.26369049	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
11	0.00000000	0.40103999	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
12	0.00000000	0.00000000	0.12544132	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
13	0.00000000	0.00000000	0.00000000	0.48690061	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
14	0.00000000	0.00000000	0.00000000	0.00000000	0.33365810	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
15	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.13871607	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
16	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.39651269	0.00000000	0.00000000	0.00000000	0.00000000
17	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.32280030	0.00000000	0.00000000	0.00000000
18	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.42231663	0.00000000	0.00000000
19	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.37108700	0.00000000
20	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
	0.26369049	0.40103999	0.12544132	0.48690061	0.33365810	0.13871607	0.39651269	0.32280030	0.42231663	0.37108700	0.00000000

Table 4.3-10. Total Income Requirements.

Economic Sector	1 Livestock Production	2 Dairy Production	3 Alfalfa Hay Production	4 Other Hay Production	5 Barley Production	6 Agricultural Services	7 Gold Mining	8 Other Mining	9 Construction
1 Livestock Production	0.20510671	0.00001941	0.00001462	0.00001669	0.00001496	0.00002012	0.00001715	0.00001035	0.00002299
2 Dairy Production	0.00007231	0.22523291	0.00000400	0.00000664	0.00000664	0.00000905	0.00000794	0.00000363	0.00001190
3 Alfalfa Hay Production	0.00001334	0.02880975	0.40625685	0.00000639	0.00000522	0.00000686	0.00000561	0.00000430	0.00000660
4 Other Hay Production	0.04239899	0.00000826	0.00001020	0.37858108	0.00000795	0.00001049	0.00000863	0.00000646	0.00001030
5 Barley Production	0.00023605	0.00000037	0.00000066	0.00000040	0.30555585	0.00000047	0.00000050	0.00000033	0.00000052
6 Agricultural Services	0.00865949	0.00378148	0.03209809	0.00407012	0.00023762	0.42394277	0.00033398	0.00017890	0.00079281
7 Gold Mining	0.00004092	0.00004213	0.00005594	0.00002845	0.00002354	0.00059572	0.31218285	0.00027975	0.00004295
8 Other Mining	0.00003226	0.00004027	0.00001636	0.00002555	0.00002529	0.00004942	0.00004552	0.26051553	0.00004725
9 Construction	0.00859127	0.00707530	0.00748641	0.00674150	0.00395850	0.00804642	0.00722020	0.01916715	0.34246243
10 Manufacturing	0.01485355	0.01874199	0.00668590	0.01163897	0.01173273	0.01598473	0.01399451	0.00627842	0.02116515
11 Transportation and Communications	0.01182878	0.01356746	0.01045697	0.01153596	0.00678499	0.01336020	0.01281337	0.00873700	0.01278829
12 Utilities	0.00345191	0.00351874	0.00665033	0.00478063	0.00236463	0.00414888	0.01034648	0.01041813	0.00355220
13 Trade	0.04498432	0.03040965	0.05896043	0.05236535	0.06119825	0.03404076	0.02329201	0.02729796	0.05247971
14 Eating, Drinking, and Lodging	0.00517087	0.00481173	0.00838690	0.00693460	0.00547927	0.00693331	0.00721872	0.00484901	0.00633301
15 Finance, Insurance, and Real Estate	0.01575185	0.01308047	0.02094452	0.01905294	0.01600054	0.01246295	0.01610267	0.00976291	0.01266829
16 Services	0.03005305	0.02871522	0.07344052	0.03796879	0.02570846	0.04312867	0.04843860	0.03353961	0.04504476
17 Hotels, Gaming, and Recreation	0.00430143	0.00405892	0.00686233	0.00592336	0.00464190	0.00605236	0.00486098	0.00412706	0.00530433
18 Health	0.01187966	0.01118552	0.01897101	0.01635778	0.01276201	0.01666345	0.01342383	0.01155153	0.01461231
19 Local Government	0.02179989	0.01192793	0.02747045	0.03504019	0.00669373	0.01849115	0.01474983	0.01509910	0.01195806
20 Households	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
Column Total	0.42922663	0.40502749	0.68477251	0.59107539	0.46320209	0.60394778	0.48506340	0.41182713	0.52930388

Table 4.3-10. Total Income Requirements (continue).

	10 Manufacturing	11 Transportation and Communications	12 Utilities	13 Trade	14 Eating, Drinking, and Lodging	15 Finance, Insurance, and Real Estate	16 Services	17 Hotels, Gaming, and Recreation	18 Health	19 Local Government	20 Households
1	0.00021914	0.00001452	0.00000726	0.00001688	0.00001392	0.00000747	0.00001866	0.00001387	0.00001729	0.00001547	0.00002309
2	0.00015971	0.00000501	0.00000321	0.00000578	0.00000544	0.00000289	0.00000585	0.00000542	0.00000654	0.00000497	0.00000509
3	0.00002751	0.00000609	0.00000252	0.00000712	0.00000539	0.00000286	0.00000623	0.00000538	0.00000681	0.00000680	0.00001212
4	0.00004967	0.00000913	0.00000384	0.00001068	0.00000813	0.00000434	0.00001003	0.00000811	0.00001028	0.00001015	0.00001780
5	0.00000227	0.00000049	0.00000018	0.00000055	0.00000037	0.00000028	0.00000383	0.00000035	0.00000054	0.00000049	0.00000057
6	0.00017974	0.00020353	0.00012352	0.00031010	0.00019945	0.00220032	0.00026102	0.00013860	0.00028809	0.00027409	0.00027671
7	0.00057226	0.00001736	0.00001138	0.00002013	0.00001907	0.00001285	0.00001720	0.00001895	0.00002288	0.00001726	0.00001718
8	0.00060986	0.00001899	0.00002512	0.00002211	0.00002115	0.00001123	0.00001916	0.00002104	0.00003191	0.00001922	0.00001924
9	0.00683745	0.01131494	0.01601302	0.00795304	0.00637544	0.01950919	0.01106180	0.00502086	0.00903143	0.03318159	0.00661737
10	0.28901935	0.00863526	0.00565806	0.00996383	0.00950315	0.00501239	0.00851567	0.00947909	0.01136436	0.00853374	0.00849479
11	0.01543666	0.42620124	0.00991905	0.01723655	0.01045109	0.00828817	0.01588735	0.00998483	0.01437041	0.01282666	0.01459426
12	0.00559360	0.00342558	0.14120505	0.00634569	0.00807451	0.00309914	0.00547857	0.00500812	0.00517140	0.00618921	0.00493616
13	0.02618897	0.02886854	0.01161310	0.51870645	0.04896172	0.01473545	0.03044647	0.02712953	0.03752522	0.04390122	0.05375981
14	0.00493050	0.01048629	0.00306551	0.01061332	0.33957651	0.00593576	0.01250020	0.00567684	0.00758101	0.00769755	0.01351014
15	0.00865962	0.01175251	0.00486272	0.01861966	0.01274833	0.15997567	0.01466792	0.00854688	0.01876110	0.01455251	0.01741359
16	0.03412851	0.05133124	0.01617393	0.05757822	0.03627662	0.02881937	0.45628474	0.03411568	0.05550689	0.05069412	0.06009114
17	0.00418283	0.00585799	0.00223980	0.00686856	0.00502191	0.00267045	0.00590146	0.34247484	0.00640543	0.00664878	0.01245265
18	0.01155508	0.01612596	0.00616653	0.01891438	0.01381907	0.00772785	0.01703111	0.02823663	0.46100544	0.01941190	0.03415259
19	0.00903955	0.01027731	0.00640966	0.01220094	0.01004062	0.00846071	0.01077198	0.02430782	0.01207263	0.45947703	0.01621915
20	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
	0.41739228	0.58455197	0.22350346	0.68539401	0.50112190	0.26647639	0.58888924	0.50019285	0.63917968	0.66346276	0.24261346

Multipliers

Multipliers for final demand, output, employment, and income are shown in Table 4.3-11.

Final demand multipliers show the total dollar amount of change in total economic activity from a one dollar change in final demand of a given sector.

Output multipliers show the total dollar amount of change in total economic activity from a one dollar change in output of a given sector.

Employment multipliers show the total change in the number of jobs from a single job change of a given sector.

Income multipliers show the total dollar amount of change in income from a one dollar change in income of a given sector.

Table 4.3-11. Multipliers.

Economic Sector	Final Demand Multiplier $	Output Multiplier $	Employment /1 Multiplier *jobs*	Income /1 Multiplier $
1 Livestock Production	2.37181331	1.87085597	1.90478143	2.65305922
2 Dairy Production	1.95901623	1.95699048	1.43683842	1.80012219
3 Alfalfa Hay Production	2.51474055	2.51469813	1.88779391	1.68559387
4 Other Hay Production	2.24896056	2.24890326	1.67085221	1.56133122
5 Barley Production	1.94345518	1.94345328	1.32262396	1.51593410
6 Agricultural Services	2.16126301	2.15655122	1.39772153	1.42771001
7 Gold Mining	2.07360180	2.07341476	1.34668530	1.55391991
8 Other Mining	1.91641888	1.91392950	1.51787242	1.58287214
9 Construction	2.27451846	1.91643197	2.39925602	1.83437532
10 Manufacturing	1.90924436	1.74192345	1.99242059	1.58288712
11 Transportation and Communications	2.13681463	2.01066547	1.87103488	1.45759024
12 Utilities	1.59926976	1.42073187	1.79351823	1.78173709
13 Trade	2.32154772	2.17919595	1.46230428	1.40766719
14 Eating, Drinking, and Lodging	2.02795308	1.99260830	1.50437558	1.50190240
15 Finance, Insurance, and Real Estate	1.72745799	1.49789140	1.64701348	1.92102031
16 Services	2.18843808	1.90175871	1.38866357	1.48517123
17 Hotels, Gaming, and Recreation	2.03316211	1.91636074	1.54102120	1.54954268
18 Health	2.31132517	2.11735261	1.44040138	1.51350818
19 Local Government	2.54447284	2.05499020	1.87744348	1.78789008
20 Households	1.96687119	1.58132249		

1. Employment and income multipliers are ratio multipliers. The ratio multiplier for employment is the total employment requirements to employment requirements. Similarly, the ratio multiplier for income is the total income requirements to income requirements.

5. Model Application

Two applications are performed by the regional economic impact model. The first application is the estimation of the economic impacts for alternative reservoir storage levels. The second application is the estimation of the economic impacts for reallocations of water. These two applications are performed with the aid of a computer program.

5.1. Estimation of the Economic Impacts for Alternative Reservoir Storage Levels

Estimation of the economic impacts for alternative reservoir storage levels at Prosser, Stampede, and Boca Reservoirs is done by integrating the recreation model component with the input-output model component. A direct economic impact is calculated first using the recreation model component. Then second, the total economic impact is calculated using the input-output model component. Third, the response economic impact is also calculated using the input-output model component.

Direct Economic Impact

The direct economic impact is the expenditures that camping and day use visitors at Prosser, Stampede, and Boca Reservoirs make in the regional economy during the year. Expenditures are on licenses, camping fees, hotel or motel, restaurant, groceries, equipment and supplies, rental, fuel, and other items.

Estimation of the direct economic impact is done through the following process. Using the recreation model component, the end of the month reservoir storage levels at Prosser, Stampede, and Boca Reservoirs is the input data. In turn, annual number of camping and day use visitors, annual camping and day use visitor expenditures, and, annual camping and day use visitor expenditures by category are calculated for each of the reservoirs. The total expenditures by category for all the reservoirs are then placed into economic sectors to become the direct economic impact. Underlying details of the recreation model component and equations used to calculate annual visitors, annual visitor expenditures, and annual visitor expenditures by category are given in Chapter 3.

End of the Month Reservoir Storage Levels

End of the month reservoir storage levels at Prosser, Stampede, and Boca Reservoirs are provided in Table 5.1-1.

End of the month reservoir storage levels for Prosser, Stampede, and Boca Reservoirs are given for April through October and Other Months. April through October is considered to be the recreation season in a given year. Other Months are January, February, March, November and December of the given year. The reservoir storage levels are taken in total for April through October and as an average for the Other Months.

End of the month reservoir storage levels for Prosser, Stampede, and Boca Reservoirs also have a set range of storage level. Reservoir storage levels at Prosser Reservoir can only range between 11,000 acre-feet and 29,840 acre-feet. Reservoir storage levels at Stampede Reservoir can only range between 80,000 acre-feet and 226,000 acre-feet. Reservoir storage levels at Boca Reservoir can only range between less than 22,000 acre-feet to 41,100 acre-feet.

Annual Number of Camping and Day Use Visitors

Annual number of camping and day use visitors by month by reservoir are provided in Table 5.1-2.

Annual Camping and Day Use Visitor Expenditures

Annual camping and day use visitor expenditures by month by reservoir are provided in Table 5.1-3.

Annual Camping and Day Use Visitor Expenditures by Category

Annual camping and day use visitor expenditures by category by reservoir are provided in Table 5.1-4.

Direct Economic Impact

The direct economic impact by economic sector is provided in Table 5.1-5. The total expenditures by category for the reservoirs are placed into economic sectors. The direct impact is presented as total direct expenditures.

There are twenty economic sectors within the regional economy. These sectors include livestock production, dairy production, alfalfa hay production, other hay production, barley production, agricultural services, gold mining, other mining, construction, manufacturing, transportation and communications, utilities, trade, eating, drinking, and lodging, finance, insurance, and real estate, services, hotels, gaming, and recreation, health, local government, and households. In addition to these sectors, there is also other final payments and imports.

The trade sector accounts for expenditure categories of groceries, equipment and supplies, fuel, and other. The eating, drinking, and lodging sector accounts for the expenditure categories of hotel or motel, restaurant, and rental. Other final payments account for expenditure categories of camping fees and license fees.

The total direct expenditures are trade, eating, drinking, and lodging sector expenditures, other final payments, and imports. Other final payments and imports are leakage's out of the regional economy. Other final payments are expenditures to the federal and state government. Imports make-up the balance of the marginalized trade sector expenditures. The trade sector expenditures are marginalized to 25% to reflect that only the mark-up value on goods sold remains in the regional economy.

Table 5.1-1. End of the Month Reservoir Storage Levels.

Month	Prosser Reservoir *acre-feet*	Stampede Reservoir *acre-feet*	Boca Reservoir *acre-feet*
April	9,767	80,186	26,763
May	16,414	113,577	37,473
June	20,957	166,955	38,557
July	22,110	177,424	38,084
August	21,691	174,288	34,582
September	14,394	172,442	23,927
October	10,050	170,696	16,419
Other Months Average	9,854	113,263	9,561
January	9,827	73,944	5,247
February	9,723	75,751	4,396
March	9,642	76,677	2,955
November	9,981	170,433	17,042
December	10,098	169,510	18,163

Table 5.1-2. Annual Number of Camping and Day Use Visitors by Month by Reservoir.

Month	Prosser Reservoir *visitors*	Stampede Reservoir *visitors*	Boca Reservoir *visitors*	Total *visitors*
April	12,592	8,653	11,977	33,223
May	12,592	13,845	23,955	50,392
June	12,592	21,633	30,799	65,024
July	16,789	22,499	35,932	75,220
August	25,184	39,806	39,354	104,344
September	12,592	17,307	26,521	56,420
October	12,592	8,653	16,255	37,500
Other Months	4,197	0	5,133	9,330
Total	109,131	132,397	189,926	431,453

Table 5.1-3. Annual Camping and Day Use Visitor Expenditures by Month by Reservoir.

Month	Prosser Reservoir $	Stampede Reservoir $	Boca Reservoir $	Total $
April	501,846	187,456	116,053	805,355
May	501,846	299,930	232,106	1,033,882
June	501,846	468,641	298,422	1,268,909
July	669,128	487,386	348,159	1,504,673
August	1,003,692	862,299	381,317	2,247,308
September	501,846	374,913	256,975	1,133,733
October	501,846	187,456	157,501	846,803
Other Months	167,282	0	49,737	217,019
Total	4,349,330	2,868,081	1,840,270	9,057,681

Table 5.1-4. Annual Camping and Day Use Visitor Expenditures by Category by Reservoir.

Category	Prosser Reservoir $	Stampede Reservoir $	Boca Reservoir $	Total $
Licenses	469,597	808,452	199,008	1,477,057
Camping Fees	0	131,926	81,564	213,490
Hotel or Motel	11,323	316,855	364,142	692,319
Restaurant	471,812	320,405	141,289	933,506
Groceries	1,002,959	635,186	553,294	2,191,439
Equipment and Supplies	55,570	115,506	66,349	237,425
Rental	1,839,920	0	0	1,839,920
Fuel	359,589	510,045	288,049	1,157,683
Other	138,560	29,705	146,576	314,841
Total	4,349,330	2,868,081	1,840,270	9,057,681

Table 5.1-5. Direct Economic Impact by Economic Sector.

Economic Sector	Total Direct Expenditures $
1 Livestock Production	0
2 Dairy Production	0
3 Alfalfa Hay Production	0
4 Other Hay Production	0
5 Barley Production	0
6 Agricultural Services	0
7 Gold Mining	0
8 Other Mining	0
9 Construction	0
10 Manufacturing	0
11 Transportation and Communications	0
12 Utilities	0
13 Trade	994,854
14 Eating, Drinking, and Lodging	3,465,746
15 Finance, Insurance, and Real Estate	0
16 Services	0
17 Hotels, Gaming, and Recreation	0
18 Health	0
19 Local Government	0
20 Households	0
Other Final Payments	1,690,547
Imports	2,906,534
Total	9,057,681

Total Economic Impact

The total economic impact is the total amount of economic activity in terms of output generated from the direct economic impact.

The total economic impact includes the direct economic impact plus indirect and induced economic impacts. The direct economic impact is the expenditures accounted for in the trade, and, eating, drinking, and lodging sectors. The indirect economic impact is the additional impact that occurs due to linkages that the trade, and, eating, drinking, and lodging sectors have with each other and with the other economic sectors in the regional economy, except for local government and households sectors. The induced economic impact is the additional impact that occurs due to linkages that the trade, and, eating, drinking, and lodging sectors have with the local government and households sectors.

Estimation of the total economic impact is done through the following process. The direct economic impact by economic sector is the input data. In turn, using the input-output model component, the direct economic impact by economic sector is post-multiplied by the output requirements to become the total economic impact. Underlying details of the input-output model component and output requirements are given in Chapter 4.

Total Economic Impact

The total economic impact by economic sector is provided in Table 5.1-6. The total economic impact is presented as total output and adjusted output. The adjusted output is net of agriculture production and mining sectors. The reason for this is because the agriculture production and mining sectors have a fixed resource base.

Table 5.1-6. Total Economic Impact by Economic Sector.

Economic Sector	Total Output $	Adjusted /1 Output $
1 Livestock Production	390	0
2 Dairy Production	106	0
3 Alfalfa Hay Production	62	0
4 Other Hay Production	99	0
5 Barley Production	6	0
6 Agricultural Services	2,290	2,290
7 Gold Mining	268	0
8 Other Mining	356	0
9 Construction	100,980	100,980
10 Manufacturing	158,012	158,012
11 Transportation and Communications	128,880	128,880
12 Utilities	266,439	266,439
13 Trade	1,337,288	1,337,288
14 Eating, Drinking, and Lodging	3,495,451	3,495,451
15 Finance, Insurance, and Real Estate	438,308	438,308
16 Services	447,158	447,158
17 Hotels, Gaming, and Recreation	72,849	72,849
18 Health	153,254	153,254
19 Local Government	122,843	122,843
20 Households	2,348,815	2,346,220
Other Final Payments	1,690,547	1,690,547
Imports	2,906,534	2,906,534
Total	13,670,937	13,667,054

1. Adjusted output is net of agriculture production and mining sectors.

Response Economic Impact

The response economic impact includes the employment response, income response, population response, housing response, agriculture water use response, commercial water use response, and residential water use response to the total economic impact.

Estimation of the response economic impact is done through the following process. The total economic impact by economic sector is the input data. In turn, using the input-output model component, the total economic impact by economic sector is multiplied by the output response coefficients by economic sector to become the response economic impact. Output response coefficients are given for employment, income, population, housing, agriculture water use, commercial water use, and residential water use. Underlying details of the input-output model component and output response coefficients are given in Chapter 4.

Employment Response

Employment response by economic sector is provided in Table 5.1-7. Employment is measured as jobs.

Income Response

Income response by economic sector is provided in Table 5.1-8. Income is measured in dollars.

Population Response

Population response by economic sector is provided in Table 5.1-9. Population is measured as all persons.

Housing Response

Housing response by economic sector is provided in Table 5.1-10. Housing is measured as dwellings.

Agriculture Water Use Response

Agriculture water use response by economic sector is provided in Table 5.1-11. Agriculture water use is measured in acre-feet.

Commercial Water Use Response

Commercial water use response by economic sector is provided in Table 5.1-12. Commercial water use is measured in acre-feet and in gallons.

Residential Water Use Response

Residential water use response by economic sector is provided in Table 5.1-13. Residential water use is measured in acre-feet and in gallons.

Table 5.1-7. Employment Response by Economic Sector.

Economic Sector	Employment *jobs*
1 Livestock Production	0
2 Dairy Production	0
3 Alfalfa Hay Production	0
4 Other Hay Production	0
5 Barley Production	0
6 Agricultural Services	0
7 Gold Mining	0
8 Other Mining	0
9 Construction	1
10 Manufacturing	1
11 Transportation and Communications	2
12 Utilities	2
13 Trade	34
14 Eating, Drinking, and Lodging	66
15 Finance, Insurance, and Real Estate	5
16 Services	13
17 Hotels, Gaming, and Recreation	1
18 Health	4
19 Local Government	2
20 Households	0
Total	131

Table 5.1-8. Income Response by Economic Sector.

Economic Sector	Income $
1 Livestock Production	0
2 Dairy Production	0
3 Alfalfa Hay Production	0
4 Other Hay Production	0
5 Barley Production	0
6 Agricultural Services	969
7 Gold Mining	0
8 Other Mining	0
9 Construction	29,138
10 Manufacturing	41,666
11 Transportation and Communications	51,686
12 Utilities	33,422
13 Trade	651,126
14 Eating, Drinking, and Lodging	1,166,285
15 Finance, Insurance, and Real Estate	60,800
16 Services	177,304
17 Hotels, Gaming, and Recreation	23,516
18 Health	64,722
19 Local Government	45,586
20 Households	0
Total	2,346,220

Table 5.1-9. Population Response by Economic Sector.

Economic Sector	Population *all persons*
1 Livestock Production	0
2 Dairy Production	0
3 Alfalfa Hay Production	0
4 Other Hay Production	0
5 Barley Production	0
6 Agricultural Services	0
7 Gold Mining	0
8 Other Mining	0
9 Construction	2
10 Manufacturing	2
11 Transportation and Communications	2
12 Utilities	3
13 Trade	55
14 Eating, Drinking, and Lodging	118
15 Finance, Insurance, and Real Estate	8
16 Services	21
17 Hotels, Gaming, and Recreation	2
18 Health	7
19 Local Government	4
20 Households	0
Total	224

Table 5.1-10. Housing Response by Economic Sector.

Economic Sector	Housing *dwellings*
1 Livestock Production	0
2 Dairy Production	0
3 Alfalfa Hay Production	0
4 Other Hay Production	0
5 Barley Production	0
6 Agricultural Services	0
7 Gold Mining	0
8 Other Mining	0
9 Construction	1
10 Manufacturing	1
11 Transportation and Communications	1
12 Utilities	1
13 Trade	22
14 Eating, Drinking, and Lodging	46
15 Finance, Insurance, and Real Estate	3
16 Services	8
17 Hotels, Gaming, and Recreation	1
18 Health	3
19 Local Government	1
20 Households	0
Total	88

Table 5.1-11. Agriculture Water Use Response by Economic Sector.

Economic Sector	Agriculture Water Use *acre-feet*
1 Livestock Production	0
2 Dairy Production	0
3 Alfalfa Hay Production	0
4 Other Hay Production	0
5 Barley Production	0
6 Agricultural Services	0
7 Gold Mining	0
8 Other Mining	0
9 Construction	0
10 Manufacturing	0
11 Transportation and Communications	0
12 Utilities	0
13 Trade	0
14 Eating, Drinking, and Lodging	0
15 Finance, Insurance, and Real Estate	0
16 Services	0
17 Hotels, Gaming, and Recreation	0
18 Health	0
19 Local Government	0
20 Households	0
Total	0

Table 5.1-12. Commercial Water Use Response by Economic Sector.

Economic Sector	Commercial Water Use *acre-feet*	Commercial Water Use *gallons*
1 Livestock Production	0	0
2 Dairy Production	0	0
3 Alfalfa Hay Production	0	0
4 Other Hay Production	0	0
5 Barley Production	0	0
6 Agricultural Services	0	913
7 Gold Mining	0	0
8 Other Mining	0	0
9 Construction	0	5,464
10 Manufacturing	0	17,067
11 Transportation and Communications	0	15,874
12 Utilities	0	124,305
13 Trade	1	407,116
14 Eating, Drinking, and Lodging	7	2,313,169
15 Finance, Insurance, and Real Estate	0	35,285
16 Services	1	236,863
17 Hotels, Gaming, and Recreation	0	79,977
18 Health	0	123,301
19 Local Government	0	17,220
20 Households	0	0
Total	10	3,376,554

Table 5.1-13. Residential Water Use Response by Economic Sector.

Economic Sector	Residential /1 Water Use *acre-feet*	Residential /1 Water Use *gallons*
1 Livestock Production	0	0
2 Dairy Production	0	0
3 Alfalfa Hay Production	0	0
4 Other Hay Production	0	0
5 Barley Production	0	0
6 Agricultural Services	0	7,413
7 Gold Mining	0	0
8 Other Mining	0	0
9 Construction	0	116,755
10 Manufacturing	1	165,485
11 Transportation and Communications	1	186,539
12 Utilities	1	202,728
13 Trade	13	4,188,676
14 Eating, Drinking, and Lodging	27	8,955,406
15 Finance, Insurance, and Real Estate	2	630,997
16 Services	5	1,609,741
17 Hotels, Gaming, and Recreation	1	167,504
18 Health	2	561,356
19 Local Government	1	278,939
20 Households	0	0
Total	52	17,071,539

1. Residential water use is non-metered residential water use.

Summary

A summary is provided in Table 5.1-14. This summary includes average end of the month reservoir storage for the reservoirs, camping and day use visitors for the reservoirs, direct economic impact, total economic impact, employment response, income response, population response, housing response, agriculture water use response, commercial water use response, residential water use response, and a recreation expenditure multiplier.

Table 5.1-14. Summary.

Prosser Reservoir Average End of the Month Reservoir Storage	15,655	*acre-feet*
Stampede Reservoir Average End of the Month Reservoir Storage	146,104	*acre-feet*
Boca Reservoir Average End of the Month Reservoir Storage	28,171	*acre-feet*
Prosser Reservoir Camping and Day Use Visitors	109,131	*visitors*
Stampede Reservoir Camping and Day Use Visitors	132,397	*visitors*
Boca Reservoir Camping and Day Use Visitors	189,926	*visitors*
Direct Economic Impact	9,057,681	*$s of expenditure*
Total Economic Impact	13,667,054	*$s of output*
Employment Response	131	*jobs*
Income Response	2,346,220	*$s of income*
Population Response	224	*all persons*
Housing Response	88	*dwellings*
Agriculture Water Use Response	0	*acre-feet*
Commercial Water Use Response	10	*acre-feet*
Residential Water Use Response /1	52	*acre-feet*
Recreation Expenditure Multiplier /2	1.50889099	

1. Residential water use is non-metered residential water use.
2. Recreation expenditure multiplier is a ratio multiplier. The recreation expenditure multiplier is the total economic impact to direct economic impact. Multiplier interpretation: a $1 expenditure creates an additional $.51 in economic activity.

5.2. Estimation of the Economic Impacts for Reallocations of Water

Estimation of the economic impacts for reallocations of water is done entirely with the input-output model component. Reallocations of water include an agriculture water transfer and a commercial water transfer. A direct economic impact, a total economic impact, and a response economic impact are calculated separately for each water transfer using the input-output model component.

Direct Economic Impact

The direct economic impact for an agriculture water transfer and for a commercial water transfer is output.

Estimation of the direct economic impact is done through the following process. Using the input-output model component, the water transfer amount for an agriculture water transfer and for a commercial water transfer is the input data. In turn, the water transfer amount is multiplied by water transfer coefficients for agriculture water use and for commercial water use. Water transfer coefficients distribute the water transfer amount by economic sector in the regional economy. The water transfer amount by economic sector for a agriculture water transfer and for a commercial water transfer is then divided by output response coefficients by economic sector for agriculture water use and for commercial water use to become the direct economic impact. Underlying details of the input-output model component and output response coefficients are given in Chapter 4.

Water Transfer

The water transfer amount for an agriculture water transfer and for a commercial water transfer is provided in Table 5.2-1. The water transfer amount is measured in acre-feet.

Water transfer coefficients for agriculture water use and for commercial water use are provided in Table 5.2-2. These coefficients reflect a water transfer pattern by economic sector in the regional economy.

There are twenty economic sectors within the regional economy. These sectors include livestock production, dairy production, alfalfa hay production, other hay production, barley production, agricultural services, gold mining, other mining, construction, manufacturing, transportation and communications, utilities, trade, eating, drinking, and lodging, finance, insurance, and real estate, services, hotels, gaming, and recreation, health, local government, and households.

The water transfer amount by economic sector for an agriculture water transfer and for a commercial water transfer is provided in Table 5.2-3. An agriculture water transfer affects the livestock production sector. A commercial water transfer affects the manufacturing, and, hotels, gaming, and recreation sectors.

Direct Economic Impact

The direct economic impact by economic sector for an agriculture water transfer and for a commercial water transfer is provided in Table 5.2-4. Again, the direct economic impact is output.

Table 5.2-1. Water Transfer Amount.

	Agriculture Water Transfer	Commercial Water Transfer
Water Transfer Amount	34,909 *acre-feet*	8,853 *acre-feet*

Table 5.2-2. Water Transfer Coefficients by Economic Sector.

Economic Sector	Agriculture Water Transfer: Agriculture Water Use	Commercial Water Transfer: Commercial Water Use
1 Livestock Production	1.00000000	0.00000000
2 Dairy Production	0.00000000	0.00000000
3 Alfalfa Hay Production	0.00000000	0.00000000
4 Other Hay Production	0.00000000	0.00000000
5 Barley Production	0.00000000	0.00000000
6 Agricultural Services	0.00000000	0.00000000
7 Gold Mining	0.00000000	0.00000000
8 Other Mining	0.00000000	0.00000000
9 Construction	0.00000000	0.00000000
10 Manufacturing	0.00000000	0.08966279
11 Transportation and Communications	0.00000000	0.00000000
12 Utilities	0.00000000	0.00000000
13 Trade	0.00000000	0.00000000
14 Eating, Drinking, and Lodging	0.00000000	0.00000000
15 Finance, Insurance, and Real Estate	0.00000000	0.00000000
16 Services	0.00000000	0.00000000
17 Hotels, Gaming, and Recreation	0.00000000	0.91033721
18 Health	0.00000000	0.00000000
19 Local Government	0.00000000	0.00000000
20 Households	0.00000000	0.00000000
Total	1.00000000	1.00000000

Table 5.2-3. Water Transfer Amount by Economic Sector.

Economic Sector	Agriculture Water Transfer: Water Transfer Amount *acre-feet*	Commercial Water Transfer: Water Transfer Amount *acre-feet*
1 Livestock Production	34,909	0
2 Dairy Production	0	0
3 Alfalfa Hay Production	0	0
4 Other Hay Production	0	0
5 Barley Production	0	0
6 Agricultural Services	0	0
7 Gold Mining	0	0
8 Other Mining	0	0
9 Construction	0	0
10 Manufacturing	0	794
11 Transportation and Communications	0	0
12 Utilities	0	0
13 Trade	0	0
14 Eating, Drinking, and Lodging	0	0
15 Finance, Insurance, and Real Estate	0	0
16 Services	0	0
17 Hotels, Gaming, and Recreation	0	8,059
18 Health	0	0
19 Local Government	0	0
20 Households	0	0
Total	34,909	8,853

Table 5.2-4. Direct Economic Impact by Economic Sector.

Economic Sector	Agriculture Water Transfer Output $	Commercial Water Transfer Output $
1 Livestock Production	2,124,370	0
2 Dairy Production	0	0
3 Alfalfa Hay Production	0	0
4 Other Hay Production	0	0
5 Barley Production	0	0
6 Agricultural Services	0	0
7 Gold Mining	0	0
8 Other Mining	0	0
9 Construction	0	0
10 Manufacturing	0	2,394,682,714
11 Transportation and Communications	0	0
12 Utilities	0	0
13 Trade	0	0
14 Eating, Drinking, and Lodging	0	0
15 Finance, Insurance, and Real Estate	0	0
16 Services	0	0
17 Hotels, Gaming, and Recreation	0	2,392,060,337
18 Health	0	0
19 Local Government	0	0
20 Households	0	0
Total	2,124,370	4,786,743,051

Total Economic Impact

The total economic impact for an agriculture water transfer and for a commercial water transfer is the total amount of economic activity in terms of output generated from the direct economic impact.

The total economic impact includes the direct economic impact plus indirect and induced economic impacts. The direct economic impact is the output accounted for in the livestock production sector for an agriculture water transfer and in the manufacturing, and, hotel, gaming, and recreation sectors for a commercial water transfer. The indirect economic impact is the additional impact that occurs due to linkages that the livestock production sector and manufacturing, hotels, gaming, and recreation sectors have with each other and with the other economic sectors in the regional economy, except for local government and households sectors. The induced economic impact is the additional impact that occurs due to linkages that the livestock production sector and manufacturing, hotels, gaming, and recreation sectors have with the local government and households sectors.

Estimation of the total economic impact is done through the following process. The direct economic impact by economic sector for an agriculture water transfer and for a commercial water transfer is the input data. In turn, using the input-output model component, the direct economic impact by economic sector is post-multiplied by the output requirements to become the total economic impact. Underlying details of the input-output model component and output requirements are given in Chapter 4.

Total Economic Impact

The total economic impact by economic sector for an agriculture water transfer and for a commercial water transfer is provided in Table 5.2-5. The total economic impact is presented as total output and adjusted output. The adjusted output for the agriculture water transfer is net of the mining sectors. The adjusted output for a commercial water transfer is net of the agriculture production and mining sectors. The reason for this is because the agriculture production and mining sectors have a fixed resource base.

Table 5.2-5. Total Economic Impact by Economic Sector.

Economic Sector	Agriculture Water Transfer		Commercial Water Transfer	
	Total Output $	Adjusted /1 Output $	Total Output $	Adjusted /2 Output $
1 Livestock Production	2,124,370	2,124,370	3,152,581	0
2 Dairy Production	539	539	1,605,169	0
3 Alfalfa Hay Production	55	55	177,800	0
4 Other Hay Production	187,671	187,671	334,969	0
5 Barley Production	1,294	1,294	18,863	0
6 Agricultural Services	34,302	34,302	1,667,047	1,667,047
7 Gold Mining	220	0	4,142,148	0
8 Other Mining	208	0	5,303,547	0
9 Construction	49,892	49,892	91,003,566	91,003,566
10 Manufacturing	94,390	94,390	2,475,732,106	2,475,732,106
11 Transportation and Communications	49,425	49,425	140,231,732	140,231,732
12 Utilities	46,111	46,111	187,438,371	187,438,371
13 Trade	154,814	154,814	243,141,052	243,141,052
14 Eating, Drinking, and Lodging	25,969	25,969	70,645,612	70,645,612
15 Finance, Insurance, and Real Estate	190,281	190,281	275,309,552	275,309,552
16 Services	127,005	127,005	382,038,837	382,038,837
17 Hotels, Gaming, and Recreation	22,329	22,329	2,420,371,102	2,420,371,102
18 Health	47,136	47,136	210,527,420	210,527,420
19 Local Government	98,439	98,439	200,910,260	200,910,260
20 Households	719,940	719,122	2,041,652,781	2,035,933,140
Total	3,974,391	3,973,146	8,755,404,515	8,734,949,797

1. Adjusted output is net of mining sectors.
2. Adjusted output is net of agriculture production and mining sectors.

Response Economic Impact

The response economic impact for an agriculture water transfer and for a commercial water transfer includes the employment response, income response, population response, housing response, agriculture water use response, commercial water use response, and residential water use response to the total economic impact.

Estimation of the response economic impact is done through the following process. The total economic impact by economic sector for an agriculture water transfer and for a commercial water transfer is the input data. In turn, using the input-output model component, the total economic impact by economic sector is multiplied by the output response coefficients by economic sector to become the response economic impact. Output response coefficients are given for employment, income, population, housing, agriculture water use, commercial water use, and residential water use. Underlying details of the input-output model component and output response coefficients are given in Chapter 4.

Employment Response

Employment response by economic sector for an agriculture water transfer and for a commercial water transfer is provided in Table 5.2-6. Employment is measured as jobs.

Income Response

Income response by economic sector for an agriculture water transfer and for a commercial water transfer is provided in Table 5.2-7. Income is measured in dollars.

Population Response

Population response by economic sector for an agriculture water transfer and for a commercial water transfer is provided in Table 5.2-8. Population is measured as all persons.

Housing Response

Housing response by economic sector for an agriculture water transfer and for a commercial water transfer is provided in Table 5.2-9. Housing is measured as dwellings.

Agriculture Water Use Response

Agriculture water use response by economic sector for an agriculture water transfer and for a commercial water transfer is provided in Table 5.2-10. Agriculture water use is measured in acre-feet.

Commercial Water Use Response

Commercial water use response by economic sector for an agriculture water transfer and for a commercial water transfer is provided in Table 5.2-11. Commercial water use is measured in acre-feet and in gallons.

Residential Water Use Response

Residential water use response by economic sector for an agriculture water transfer and a commercial water transfer is provided in Table 5.2-12. Residential water use is measured in acre-feet and in gallons.

Table 5.2-6. Employment Response by Economic Sector.

Economic Sector	Agriculture Water Transfer Employment *jobs*	Commercial Water Transfer Employment *jobs*
1 Livestock Production	40	0
2 Dairy Production	0	0
3 Alfalfa Hay Production	0	0
4 Other Hay Production	3	0
5 Barley Production	0	0
6 Agricultural Services	1	43
7 Gold Mining	0	0
8 Other Mining	0	0
9 Construction	0	793
10 Manufacturing	1	20,425
11 Transportation and Communications	1	1,656
12 Utilities	0	1,173
13 Trade	4	6,134
14 Eating, Drinking, and Lodging	0	1,332
15 Finance, Insurance, and Real Estate	2	3,111
16 Services	4	11,053
17 Hotels, Gaming, and Recreation	0	45,571
18 Health	1	6,177
19 Local Government	2	3,554
20 Households	0	0
Total	60	101,022

Table 5.2-7. Income Response by Economic Sector.

Economic Sector	Agriculture Water Transfer Income $	Commercial Water Transfer Income $
1 Livestock Production	343,692	0
2 Dairy Production	121	0
3 Alfalfa Hay Production	22	0
4 Other Hay Production	71,047	0
5 Barley Production	396	0
6 Agricultural Services	14,510	705,192
7 Gold Mining	0	0
8 Other Mining	0	0
9 Construction	14,396	26,258,825
10 Manufacturing	24,890	652,827,017
11 Transportation and Communications	19,821	56,238,533
12 Utilities	5,784	23,512,517
13 Trade	75,379	118,385,526
14 Eating, Drinking, and Lodging	8,665	23,571,481
15 Finance, Insurance, and Real Estate	26,395	38,189,860
16 Services	50,359	151,483,247
17 Hotels, Gaming, and Recreation	7,208	781,296,527
18 Health	19,906	88,909,231
19 Local Government	36,530	74,555,185
20 Households	0	0
Total	719,122	2,035,933,140

Table 5.2-8. Population Response by Economic Sector.

Economic Sector	Agriculture Water Transfer Population *all persons*	Commercial Water Transfer Population *all persons*
1 Livestock Production	80	0
2 Daisy Production	0	0
3 Alfalfa Hay Production	0	0
4 Other Hay Production	7	0
5 Barley Production	0	0
6 Agricultural Services	1	70
7 Gold Mining	0	0
8 Other Mining	0	0
9 Construction	1	1,383
10 Manufacturing	1	33,868
11 Transportation and Communications	1	2,638
12 Utilities	0	1,851
13 Trade	6	9,916
14 Eating, Drinking, and Lodging	1	2,387
15 Finance, Insurance, and Real Estate	4	5,180
16 Services	6	17,912
17 Hotels, Gaming, and Recreation	1	72,281
18 Health	2	10,048
19 Local Government	3	5,969
20 Households	0	0
Total	115	163,502

Table 5.2-9. Housing Response by Economic Sector.

Economic Sector	Agriculture Water Transfer Housing *dwellings*	Commercial Water Transfer Housing *dwellings*
1 Livestock Production	31	0
2 Dairy Production	0	0
3 Alfalfa Hay Production	0	0
4 Other Hay Production	3	0
5 Barley Production	0	0
6 Agricultural Services	1	28
7 Gold Mining	0	0
8 Other Mining	0	0
9 Construction	0	544
10 Manufacturing	1	13,421
11 Transportation and Communications	0	1,052
12 Utilities	0	739
13 Trade	3	3,944
14 Eating, Drinking, and Lodging	0	935
15 Finance, Insurance, and Real Estate	1	2,051
16 Services	2	7,122
17 Hotels, Gaming, and Recreation	0	28,835
18 Health	1	3,993
19 Local Government	1	2,361
20 Households	0	0
Total	45	65,026

Table 5.2-10. Agriculture Water Use Response by Economic Sector.

Economic Sector	Agriculture Water Transfer: Agriculture Water Use *acre-feet*	Commercial Water Transfer: Agriculture Water Use *acre-feet*
1 Livestock Production	34,909	0
2 Dairy Production	0	0
3 Alfalfa Hay Production	1	0
4 Other Hay Production	5,042	0
5 Barley Production	26	0
6 Agricultural Services	0	0
7 Gold Mining	0	0
8 Other Mining	0	0
9 Construction	0	0
10 Manufacturing	0	0
11 Transportation and Communications	0	0
12 Utilities	0	0
13 Trade	0	0
14 Eating, Drinking, and Lodging	0	0
15 Finance, Insurance, and Real Estate	0	0
16 Services	0	0
17 Hotels, Gaming, and Recreation	0	0
18 Health	0	0
19 Local Government	0	0
20 Households	0	0
Total	39,977	0

Table 5.2-11. Commercial Water Use Response by Economic Sector.

Economic Sector	Agriculture Water Transfer		Commercial Water Transfer	
	Commercial Water Use *acre-feet*	Commercial Water Use *gallons*	Commercial Water Use *acre-feet*	Commercial Water Use *gallons*
1 Livestock Production	2	624,986	0	0
2 Dairy Production	0	184	0	0
3 Alfalfa Hay Production	0	16	0	0
4 Other Hay Production	0	52,262	0	0
5 Barley Production	0	561	0	0
6 Agricultural Services	0	13,680	2	664,842
7 Gold Mining	0	0	0	0
8 Other Mining	0	0	0	0
9 Construction	0	2,699	15	4,923,915
10 Manufacturing	0	10,195	821	267,412,358
11 Transportation and Communications	0	6,088	53	17,272,579
12 Utilities	0	21,513	268	87,448,018
13 Trade	0	47,131	227	74,020,431
14 Eating, Drinking, and Lodging	0	17,185	143	46,750,827
15 Finance, Insurance, and Real Estate	0	15,318	68	22,162,992
16 Services	0	67,276	621	202,368,686
17 Hotels, Gaming, and Recreation	0	24,514	8,155	2,657,208,939
18 Health	0	37,924	520	169,379,628
19 Local Government	0	13,799	86	28,163,833
20 Households	0	0	0	0
Total	3	955,330	10,980	3,577,777,048

Table 5.2-12. Residential Water Use Response by Economic Sector.

Economic Sector	Agriculture Water Transfer		Commercial Water Transfer	
	Residential /1 Water Use *acre-feet*	Residential /1 Water Use *gallons*	Residential /1 Water Use *acre-feet*	Residential /1 Water Use *gallons*
1 Livestock Production	14	4,528,986	0	0
2 Dairy Production	0	1,055	0	0
3 Alfalfa Hay Production	0	109	0	0
4 Other Hay Production	1	379,987	0	0
5 Barley Production	0	4,935	0	0
6 Agricultural Services	0	83,606	12	4,063,160
7 Gold Mining	0	0	0	0
8 Other Mining	0	0	0	0
9 Construction	0	43,422	243	79,201,461
10 Manufacturing	0	74,437	5,992	1,952,388,713
11 Transportation and Communications	0	53,883	469	152,882,355
12 Utilities	0	26,429	330	107,431,642
13 Trade	1	365,207	1,760	573,570,703
14 Eating, Drinking, and Lodging	0	50,071	418	136,213,006
15 Finance, Insurance, and Real Estate	1	206,264	916	298,434,724
16 Services	1	344,338	3,179	1,035,788,382
17 Hotels, Gaming, and Recreation	0	38,673	12,865	4,192,047,146
18 Health	0	130,028	1,782	580,752,065
19 Local Government	1	168,298	1,054	343,489,595
20 Households	0	0	0	0
Total	20	6,499,730	29,020	9,456,262,952

1. Residential water use is metered residential water use.

Summary

A summary for an agriculture water transfer and for a commercial water transfer is provided in Table 5.2-13. This summary includes water transfer amount, direct economic impact, total economic impact, employment response, income response, population response, housing response, agriculture water use response, commercial water use response, residential water use response, combined water use, and a water transfer multiplier.

Table 5.2-13. Summary.

	Agriculture Water Transfer	Commercial Water Transfer
Water Transfer Amount	34,909 *acre-feet*	8,853 *acre-feet*
Direct Economic Impact	2,124,370 *$s of output*	4,786,743,051 *$s of output*
Total Economic Impact	3,973,146 *$s of output*	8,734,949,797 *$s of output*
Employment Response	60 *jobs*	101,022 *jobs*
Income Response	719,122 *$s of income*	2,035,933,140 *$s of income*
Population Response	115 *all persons*	163,502 *all persons*
Housing Response	45 *dwellings*	65,026 *dwellings*
Agriculture Water Use Response	39,977 *acre-feet*	0 *acre-feet*
Commercial Water Use Response	3 *acre-feet*	10,980 *acre-feet*
Residential Water Use Response /1	20 *acre-feet*	29,020 *acre-feet*
Combined Water Use /2	40,000 *acre-feet*	40,000 *acre-feet*
Water Transfer Multiplier /3	1.14583167	4.51820020

1. Residential water use is metered residential water use.
2. Combined water use is the summation of agriculture water use, commercial water use, and residential water use.
3. Water transfer multiplier is a ratio multiplier. The water transfer multiplier is the combined water use to water transfer amount.
   Multiplier interpretation: a 1 acre-foot agriculture water transfer requires an additional .15 acre-feet, and a 1 acre-foot commercial water transfer requires an additional 3.52 acre-feet.

6. Conclusion

The Truckee River Basin regional economic impact model has been developed following regional economic modeling procedures. An overview of this model, with respect to, model components, model applications, and model improvements, is presented here. Model components include a recreation model component and an input-output model component. Model applications include estimation of economic impacts for alternative reservoir storage levels and estimation of economic impacts for reallocations of water. Model improvements include supplement work to improve the recreation model component and model application for the estimation of the economic impacts for alternative reservoir storage levels. A description of the model components is given to describe tasks and model elements. This is followed by an explanation of the model applications to explain separate actions. A presentation of the model improvements is also given to introduce supplement work.

6.1. Description of the Model Components

The regional economic impact model has two model components. The first component is a recreation model component and the second component is an input-output model component.

Recreation Model Component

The recreation model component estimates the annual number of camping and day use visitors and the annual camping and day use visitor expenditures relative to the end of the month reservoir storage levels for each reservoir. Tasks performed to develop this component were survey of the visitation, estimation of the expenditure function, and formulation of the model equations. Model elements include end of the month reservoir storage levels, visitation and end of the month reservoir storage level relationships, annual patterns of visitation, annual number of camping and day use visitors, and annual camping and day use visitor expenditures. A summary of each task and model element is given below.

Survey of the Visitation

Surveys of the visitation and recreation use at river, lake, and reservoir sites on the Truckee River were done during August of 1993 and again during June, July, and August of 1994. These surveys were followed by separate surveys of the second-home owners and vacation-home renters in the Truckee area done during February of 1995. The purpose of the surveys were to, first, obtain and overall picture of the visitation and recreation activities occurring at the sites, second, quantify the amount of expenditures that visitors at the sites make to the local economy, and third, identify how the visitation would change in relationship to the water level at the sites. The surveys of the visitation and recreation use involved personal interviews of both camping and day use visitors along the Upper Truckee River, at Donner Lake, at Prosser Reservoir, at Stampede Reservoir, at Boca Reservoir, along the Lower Truckee River, and at Pyramid Lake. A questionnaire was used for the personal interviews. The surveys of the second-home owners and vacation-home renters involved mail-out questionnaires. The second-home owners and vacation-home renters were considered to be day use visitors at Donner Lake. There were a total of 506 respondents that participated in the surveys. Of the total respondents, 443 respondents participated in the surveys of the visitation and recreation use, and 63 respondents participated in the surveys of the second-home owners and vacation-home renters.

Estimation of the Expenditure Function

An expenditure function was estimated with data taken from the survey of the visitation. This expenditure function calculates the expenditures of camping and day use visitors per group per day by site. The sites, again, include Upper Truckee River, Donner Lake, Prosser Reservoir, Stampede Reservoir, Boca Reservoir, Lower Truckee River, and Pyramid Lake. This expenditure function was specified in a semi-logarithmic form and then estimated using a maximum-likelihood estimation technique. The expenditures per group per day by site were found to be dependent upon activity hours of respondents at the site and group size of respondents at the site.

Formulation of Model Equations

Model equations were formulated to calculate the annual number of camping and day use visitors at the reservoirs and the annual camping and day use visitor expenditures in the local economy relative to end of the month reservoir storage levels at Donner Lake, Prosser Reservoir, Stampede Reservoir, and Boca Reservoir. For each of these sites, the model equations calculate the annual number of camping and day use visitors by use of end of the month reservoir storage levels, visitation and end of the month reservoir storage level relationships, annual patterns of visitation, annual numbers of camping visitors, and ratios of day use visitors to camping visitors variables. The model equations calculate the annual camping and day use visitor expenditures by use of camping visitor expenditures and day use visitor expenditures variables. Data for these variables were taken from either the survey of the visitation, estimation of the expenditure function, or additional sources. Data taken from additional sources included the end of the month storage levels for each reservoir and number of camping visitors to the campgrounds at each reservoir.

End of the Month Reservoir Storage Levels

End of the month reservoir storage levels at Donner Lake, Prosser Reservoir, Stampede Reservoir, and Boca Reservoir serve as input data into the recreation model. The recreation model takes end of the month reservoir storage levels for April through October and the average reservoir storage level for November through March. End of the month reservoir storage levels range from a maximum of 9,660 acre-feet to 5,796 acre-feet at Donner Lake, from a maximum of 29,840 acre-feet to 0 acre-feet or drained at Prosser Reservoir, from a maximum of 226,500 acre-feet to 0 acre-feet or drained at Stampede Reservoir, and from a maximum of 40,780 acre-feet to 0 acre-feet or drained at Boca Reservoir. End of the month reservoir storage levels for 1993 were provided by the Bureau of Reclamation.

Visitation and End of the Month Reservoir Storage Level Relationships

Visitation and end of the month reservoir storage level relationships show the expected percentage of visitation at an end of the month reservoir storage level for Donner Lake, Prosser Reservoir, Stampede Reservoir, and Boca Reservoir. Visitation at Donner Lake and Boca Reservoir increases gradually as increases in storage levels occur. For Donner Lake, the visitation at a 6,000 acre-foot storage level is 83%. Visitation increases gradually to 100% as the storage levels reach the maximum of 9,660 acre-feet. For Boca Reservoir, the visitation for a drained reservoir is 5%. Visitation increases gradually from 5% to 100% as storage levels reach the maximum of 40,780 acre-feet. Visitation at Prosser Reservoir and Stampede Reservoir increases stepwise then gradually as increases in storage levels occur. For Prosser Reservoir, the visitation at a 6,000 acre-foot storage level is 15%. Visitation increases sharply to 70% as storage levels reach 9,000 acre-feet. Visitation increases gradually to 100% as storage levels reach the maximum or 29,840 acre-feet. For Stampede Reservoir, the visitation at a 46,000 acre-foot storage level is 20%. Visitation increases sharply to 60% as storage levels reach 69,000 acre-feet. Visitation increases not as sharply to 80% as storage levels reach 115,000 acre-feet. Visitation increases gradually to 100% as storage levels reach the maximum or 226,000 acre-feet. Definite visitation thresholds occur at different reservoir storage levels at Prosser and Stampede Reservoirs.

Annual Patterns of Visitation

Annual patterns of visitation show the distribution of visitation that occurs throughout the year at Donner Lake, Prosser Reservoir, Stampede Reservoir, and Boca Reservoir. The patterns of visitation for Donner Lake, Prosser Reservoir, and Stampede Reservoir are concave bell-shaped curves with the peak visitation in June, July, and August. For 100% visitation at Donner Lake, 5% occurs in April, 9% occurs in May, 17% occurs in June, 25% occurs in July, 24% occurs in August, 11% occurs in September, 4% occurs in October, and 5% occurs in November through March. For 100% visitation at Prosser Reservoir, 5% occurs in April, 10% occurs in May, 18% occurs in June, 24% occurs in July, 22% occurs in August, 12% occurs in September, 7% occurs in October, and 2% occurs in November through March. For 100% visitation at Stampede Reservoir, 5% occurs in April, 10% occurs in May, 22% occurs in June, 21% occurs in July, 25% occurs in August, 11% occurs in September, 5% occurs in October, and 1% occurs in November through March. The pattern of visitation for Boca Reservoir is a concave semi-circle-shaped curve with the peak visitation in August. For 100% visitation at Boca Reservoir, 6% occurs in April, 14% occurs in May, 18% occurs in June, 19% occurs in July, 20% occurs in August, 13% occurs in September, 7% occurs in October, and 3% occurs in November through March. Similar, for each of these sites, the visitation starts in April, reaches a peak in either July or August, and drops-off in September and October.

Annual Number of Camping and Day Use Visitors

The annual number of camping and day use visitors was calibrated to the annual number of camping for 1993. The California Department of Parks and Recreation and the Forest Service provided the annual number of camping visitors by campground at Donner Lake, Prosser Reservoir, Stampede Reservoir, and Boca Reservoir. For Donner Lake, Donner State Park had 195,099 camping visitors. For Prosser Reservoir, Lakeside, Prosser Family, Prosser Ranch, and Annie McCloud campgrounds had 37,816 camping visitors. For Stampede Reservoir, Davis Creek, Emigrant, and Logger campgrounds had 237,841 camping visitors. For Boca Reservoir, Boca, Boca Rest, Boca Spring, and Boyington Mill campgrounds had 65,813 camping visitors. The annual number of day use visitors were estimated with ratios of day use visitors to camping visitors at Donner Lake, Prosser Reservoir, Stampede Reservoir, and Boca Reservoir. Except for Donner Lake, the ratios were developed from data taken from the survey of the visitation. The Donner Lake ratio was developed from data provided by the California Department of Parks and Recreation. For Donner Lake, the ratio is .71 for 138,246 day use visitors. For Prosser Reservoir, the ratio is .38 for 14,384 day use visitors. For Stampede Reservoir, the ratio is .20 for 46,674 day use visitors. For Boca Reservoir, the ratio is 1.26 for 82,941 day use visitors. Donner Lake, Prosser Reservoir and Stampede Reservoir had fewer day use visitors than camping visitors, where as, Boca Reservoir had more day use visitors than camping visitors. The annual number of camping visitors and day use visitors deviate from the 1993 number under alternative end of the month reservoir storage levels.

Annual Camping and Day Use Visitor Expenditures

Camping and day use visitor expenditures for Donner Lake, Prosser Reservoir, Stampede Reservoir, and Boca Reservoir were taken from the estimation of the expenditure function. The expenditures were calculated as the group expenditure per day. For Donner Lake, the camping visitor group expenditure per day is $36.97 and the day use visitor group expenditure is $52.00. For Prosser Reservoir, the camping visitor group expenditure per day is $27.90 and the day use visitor group expenditure is $34.07. For Stampede Reservoir, the camping visitor group expenditure per day is $39.61 and the day use visitor group expenditure is $52.78. For Boca Reservoir, the camping visitor group expenditure per day is $34.40 and the day use visitor group expenditure is $48.85. For each of these sites, the day use visitor group expenditures per day were higher than the camping visitor group expenditures per day.

Input-Output Model Component

The input-output model component estimates the economic impacts. Tasks performed to develop this component include definition of the region, collection of the control total data, and derivation of the model tables. Model elements include output response coefficients, water transfer coefficients, and output requirements. A summary of each task and model element is given below.

Definition of the Region

The region was defined by an economic area, a population base, and several economic sectors. The hydrologic boundaries of the Truckee River Basin outline the region. Within the region, the economic area covers part of eastern California and part of western Nevada. Part of eastern California includes portions of Sierra, Nevada, Placer, El Dorado, and Alpine counties and the towns of Truckee, Tahoe City, and South Lake Tahoe. Part of western Nevada includes portions of Pershing, Washoe, Lyon, Carson City (an independent city), and Douglas counties and the cities of Reno and Sparks. The population base for the region is 316,381 persons. Of this amount, 16% is from the California counties and 84% is from the Nevada counties. There are several economic sectors in the economy in the region. These sectors include livestock production, dairy production, alfalfa hay production, other hay production, barley production, agricultural services, gold mining, other mining, construction, manufacturing, transportation and communications, utilities, trade, eating, drinking, and lodging, finance, insurance, and real estate, services, hotels, gaming, and recreation, health, local government, and households.

Collection of the Control Total Data

Control total data was collected for the region. There is a control total for output, employment, income, population, housing, agriculture water use, commercial water use, and residential water use. A definition, a source, and values by economic sector for the region by state are given for each control total. The values are estimated either by using specific information, coefficients, or county level data adjusted to the region by population. For the region, output is $17,857,271,279. Employment is 188,121 jobs. Income is $6,720,549,054. Population is 307,874 persons. Housing is 122,239 dwellings. Agriculture water use is 73,696 acre-feet. Commercial water use is 12,432 acre-feet. Residential water use is 72,453 acre-feet.

Derivation of the Model Tables

Input-output tables were derived from the transactions matrix for the region. A transactions matrix is a double entry accounting system. All transactions that an economic sector has within the economy are accounted for in the transactions matrix. There is an individual row and column for each sector in the matrix. Row entries represent output and include sales, other final demand, and exports by a sector. Other final demand are capital formation, inventory accumulation, state government purchases, and federal government purchases. Column entries, on the other hand, represent input and include purchases, other final payments, and imports by a sector. Other final payments are depreciation, expenditures to state government, and expenditures to federal government. The accounting identity of the matrix requires that for any sector the row total must equal the column total. Input-output model tables were found by performing a sequence of calculations involving matrix algebra. The input-output tables include direct requirements, final demand requirements, output requirements, employment requirements, income requirements, and multipliers.

Output Response Coefficients

Output response coefficients measure the employment, income, population, housing, agriculture water use, commercial water use and residential water use response to output from an economic sector. Key sectors include livestock production, manufacturing, trade, eating, drinking, and lodging, and hotels, gaming, and recreation. The response to a $1 million output in livestock production is 19 jobs, $161,786 in income, 38 people, 15 dwellings, 16,433 acre-feet of agriculture water use, .90 acre-feet of commercial water use, and 9 acre-feet of residential water use. The response to a $1 million output in manufacturing is 8 jobs, $263,690 in income, 14 people, 5 dwellings, .33 acre-feet of commercial water use, and 3 acre-feet of residential water use. The response to a $1 million output in trade is 25 jobs, $486,901 in income, 41 people, 16 dwellings, .93 acre-feet of commercial water use, and 10 acre-feet of residential water use. The response to a $1 million output in eating, drinking, and lodging is 19 jobs, $333,658 in income, 34 people, 13 dwellings, 2 acre-feet of commercial water use, and 8 acre-feet of residential water use. The response to a $1 million output in hotels, gaming, and recreation is 19 jobs, $322,800 of income, 30 people, 12 dwellings, 3.37 acre-feet of commercial water use, and 7 acre-feet of residential water use. These output response coefficients are taken from the collection of the control total data.

Water Transfer Coefficients

Water transfer coefficients determine the portions of agriculture water use among economic sectors for an agriculture water transfer and the portions of commercial water use among sectors for a commercial water transfer. Key sectors include livestock production for an agriculture water transfer and manufacturing, and hotels, gaming, and recreation for a commercial water transfer. The water transfer coefficient is 1 or 100% for livestock production. This coefficient is based on an agriculture water use of 54,876 acre-feet for livestock production. For a 1,000 acre-foot agriculture water transfer, the entire 1,000 acre-feet of agriculture water use is from livestock production. Water transfer coefficients are .09 or 9% for manufacturing, and .91 or 91% for hotels, gaming, and recreation These coefficients are based on a commercial water use of 452 acre-feet for manufacturing and commercial water use of 4,589 acre-feet for hotels, gaming, and recreation. For a 1,000 acre-foot commercial water transfer, the 1,000 acre-feet of commercial water use is to manufacturing and hotels, gaming, and recreation. The commercial water use for manufacturing is 90 acre-feet. The commercial water use for hotels, gaming, and recreation is 910 acre-feet. These water transfer coefficients are also taken from the collection of the control total data.

Output Requirements

Output requirements measure the total economic impact from a change in output. The output requirements table is taken from the derivation of the model tables. Output requirements show the dollar amount of change in economic activity of the row sector from a dollar change in output of the column sector. The column totals are the output total requirements that show the total dollar amount of change in economic activity of all row sectors from a dollar change in output of the column sector. Key sectors include livestock production, manufacturing, trade, eating, drinking, and lodging, and hotels, gaming, and recreation. A $1 million output change in livestock production leads to a $1.9 million change economic activity. A $1 million output change in manufacturing leads to a $1.7 million change economic activity. A $1 million output change in trade leads to a $2.2 million change economic activity. A $1 million output change in eating, drinking, and lodging leads to a $2 million change economic activity. A $1 million output change in hotels, gaming, and recreation leads to a $1.9 million change economic activity. The output total requirements are the same as output multipliers.

6.2. Explanation of the Model Applications

The regional economic model has two applications. The first application is estimation of economic impacts for alternative reservoir storage levels at Donner Lake, and at, Prosser, Stampede, and Boca Reservoirs. The second application is estimation of economic impacts for reallocations of water.

Estimation of the Economic Impacts for Alternative Reservoir Storage Levels

Estimation of the economic impacts for alternative reservoir storage levels requires an understanding of three separate actions. These actions include measurement of an economic impact, operation of the computer program, presentation of the results. A summary of each action is given below.

Measurement of an Economic Impact

The economic impact for alternative reservoir storage levels at Donner Lake, and at, Prosser, Stampede, and Boca Reservoirs is measured in the following manner. An economic impact occurs because of recreation activities at the reservoirs. At each alternative reservoir storage level there is a different level of recreation in terms of visitation to the reservoirs and expenditures in the local economy. Visitation to the reservoirs is by camping and day use visitors. Expenditures in the economy are on items necessary for recreation at the reservoirs. Items such as gas, groceries, supplies, meals at restaurants, hotel rooms, and vacation-home rent. Camping and day use visitors purchase these items from businesses and cause a direct effect to occur on the economic activity in the region. In addition to this direct effect, indirect and induced effects also occur. Given that businesses in the region sell items for recreation to camping and day use visitors, these businesses also purchase products and services from other businesses in the region. Because of these purchases being made, there is then an indirect effect on other businesses and on economic activity in the region. The induced effect on economic activity in the region is household spending by employees of these affected businesses. At each alternative reservoir storage level there is a different amount of household spending by employees. Together the direct, indirect, and induced effects on economic activity make-up the total effect or total economic impact on the region for alternative reservoir storage levels.

Operation of the Computer Program

The computer program starts with input data. The input data is the alternative end of the month reservoir storage levels at Donner Lake, and at, Prosser, Stampede, and Boca Reservoirs. The program takes the alternative reservoir storage levels and performs the first process. This process calculates the number of camping and day use visitors and

the annual camping and day use visitor expenditures with the recreation model. Output from this process is the direct economic impact by economic sector. From this, the program takes the direct economic impact by economic sector and performs the second process. This process multiplies the direct economic impact by economic sector by the output requirements of the input-output model. Output from this process is the total economic impact by economic sector. Finally, the program takes the total economic impact by economic sector and performs the third process. This process multiplies the total economic impact by economic sector by the output response coefficients of the input-output model. Output from this process is the response economic impact by economic sector. Having generated the direct economic impact, total economic impact, and response economic impact the program stops.

Presentation of the Results

Given 1993 end of the month reservoir storage levels for Donner Lake, Prosser Reservoir, Stampede Reservoir, and Boca Reservoir, the results are presented in the following sequence. Average end of the month reservoir storage is 6,742 acre-feet for Donner Lake, 15,655 acre-feet for Prosser Reservoir, 146,104 acre-feet for Stampede Reservoir, and, 28,171 acre-feet for Boca Reservoir. Relative to the end of the month reservoir storage levels, the camping and day use visitors are 333,345 visitors for Donner Lake, 52,200 visitors for Prosser Reservoir, 284,515 visitors for Stampede Reservoir, and 148,754 visitors for Boca Reservoir. The direct economic impact from the camping and day use visitors is recreation expenditures of $6,972,260. This direct economic impact generates additional economic activity for a total economic impact of $9,882,066. The response economic impact is 83 jobs for employment, $1,502,805 of income, 141 persons for population, 56 dwellings for housing, 6 acre-feet for commercial water use, and 33 acre-feet for residential water use. The recreation expenditure multiplier is 1.42. An additional dollar of recreation expenditure generates an additional forty-two cents of economic activity.

Estimation of the Economic Impacts for Reallocations of Water

Estimation of the economic impacts for reallocations of water also requires an understanding of three separate actions. These actions include, again, measurement of an economic impact, operation of the computer program, presentation of the results. A summary of each action is given below.

Measurement of an Economic Impact

The economic impact for a reallocation of water from agriculture water use to commercial water use is measured in the following manner. An economic impact occurs since water is a resource requirement for agriculture production and commercial activity. A reallocation of water transfers an amount of water from agriculture water use to commercial water use. The direct effect on economic activity in the region is a decrease in agriculture production from farms and ranches, and an increase in commercial activity from businesses. The indirect effect on economic activity in the region is also a decrease in business activity from those businesses that sell products and services to farms and ranches for agriculture production, and also an increase in business activity of the businesses that sell products and services to businesses that have an increase in commercial activity. The induced effect on economic activity in the region is a decrease in household spending by employees on farms and ranches, and an increase in household spending by employees in commercial businesses. Together the direct, indirect, and induced effects on economic activity make-up the total effect or total economic impact on the region for a reallocation of water from agriculture water use to commercial water use.

Operation of the Computer Program

The computer program starts with input data. The input data is either an agriculture water transfer amount or a commercial water transfer amount. From this, the program takes the water transfer amount and performs the first process. This process multiplies the water transfer amount by water transfer coefficients of the input-output model. Output from this process is the water transfer amount by economic sector for either an agriculture water transfer or a commercial water transfer. From this, the program then takes the water transfer amount by economic sector and performs the second process. This process divides the water transfer amount by economic sector by the output response coefficients for either agriculture water use or commercial water use of the input-output model. Output from this process is the direct economic impact by economic sector for either an agriculture water transfer or a commercial water transfer. From this, again the program takes the direct economic impact by economic sector and performs the third process. This process multiplies the direct economic impact by economic sector by the output requirements of the input-output model. Output from this process is the total economic impact by economic sector for either a agriculture water

transfer or commercial water transfer. Finally, the program takes the total economic impact by economic sector and performs the fourth process. This process multiplies the total economic impact by economic sector by output response coefficients of the input-output model. Output from this process is the response economic impact by economic sector for either a agriculture water transfer or commercial water transfer. Having generated the direct economic impact, total economic impact, and response economic impact the program stops.

Presentation of the Results

Given a 40,000 acre-foot reallocation of water from agriculture water use to commercial water use, the results are presented in the following sequence. For the agriculture water transfer, the water transfer amount is 34,909 acre-feet. The direct economic impact for the transfer amount is output of $2,124,370. The total economic impact is output of $3,973,146. The response economic impact is 60 jobs for employment, $719,122 of income, 115 persons for population, 45 dwellings for housing, 39,977 acre-feet for agriculture water use, 3 acre-feet for commercial water use, and 20 acre-feet for residential water use. Combined water use is 40,000 acre-feet. The water transfer multiplier is 1.15. To compensate for commercial and residential water use, each additional acre-foot for a agriculture water transfer requires an additional .15 acre-feet. For the commercial water transfer, the water transfer amount is 8,853 acre-feet. The direct economic impact for the transfer amount is output of $4,786,743,051. The total economic impact is output of $8,734,949,797. The response economic impact is 101,022 jobs for employment, $2,035,933,140 of income, 163,502 persons for population, 65,026 dwellings for housing, 0 acre-feet for agriculture water use, 10,980 acre-feet for commercial water use, and 29,020 acre-feet for residential water use. Combined water use is 40,000 acre-feet. The water transfer multiplier is 4.52. To compensate for residential water use, each additional acre-foot for a commercial water transfer requires an additional 3.52 acre-feet.

6.3. Presentation of the Model Improvements

Model improvements are made to the recreation model component and model application for estimation of the economic impacts for alternative reservoir storage levels. These improvements required supplement work.

Recreation Model Component Improvement

Supplement work for recreation model component improvement is a repeat of the recreation model component tasks. Tasks include survey of the visitation, estimation of the expenditure function, survey of the second-home owners, survey of the vacation-home renters, estimation of the expenditure function, and formulation of the model equations. The first estimation of the expenditure function is with 1993 and 1994 survey of visitation data. The second estimation is with 1993 and 1994 survey of visitation data plus 1995 survey of second-home owners and survey of vacation-home renters data.

Model Application Improvement

Supplement work for model application improvement is a repeat of the estimation of the economic impacts for alternative reservoir storage levels.

TECHNICAL REPORT
UCED 94-18

TRUCKEE RIVER BASIN
REGIONAL ECONOMIC IMPACT MODEL

PART 2 OF 2

UNIVERSITY OF NEVADA, RENO

Truckee River Basin
Regional Economic Impact Model

Report Prepared by

Thomas R. MacDiarmid
Karl A. McArthur
Thomas R. Harris
Robert R. Fletcher
Kambiz Raffiee
Shawn W. Stoddard
and
Rangesan Narayanan

Thomas R. MacDiarmid is a Research Associate in the Department of Agricultural Economics at the University of Nevada, Reno.

Karl A. McArthur is a Research Associate in the Department of Agricultural Economics at the University of Nevada, Reno.

Thomas R. Harris is a Professor in the Department of Agricultural Economics and Director of the University Center for Economic Development at the University of Nevada, Reno.

Robert R. Fletcher is a Professor in the Department of Agricultural Economics at the University of Wyoming.

Kambiz Raffiee is an Associate Professor in the Department of Economics at the University of Nevada, Reno.

Shawn W. Stoddard is a Research Associate in the Department of Agricultural Economics at the University of Nevada, Reno.

Rangesan Narayanan is a Professor and Chairman in the Department of Agricultural Economics at the University of Nevada, Reno.

July 1995

UNIVERSITY OF NEVADA RENO

The University of Nevada, Reno is an Equal Opportunity/Affirmative Action employer and does not discriminate on the basis of race, color, religion, sex, age, creed, national origin, veteran status, physical or mental disability, and in accordance with university policy, sexual orientation, in any program or activity it operates. The University of Nevada employs only United States citizens and aliens lawfully authorized to work in the United States.

This publication, *Truckee River Regional Economic Impact Model*, was published by the University Center for Economic Development in the Department of Agricultural Economics at the University of Nevada, Reno. Funds for this publication were provided by the United States Department of the Interior, Bureau of Reclamation. This publication's statements, conclusions, recommendations, and/or data represent solely the findings and views of the authors and do not necessarily represent the views of the United States Department of the Interior, the Bureau of Reclamation, University of Nevada, Reno, or any reference sources used or quoted by this study. Reference to research projects, programs, books, magazines, or newspaper articles does not imply an endorsement or recommendation by the authors unless otherwise stated. Correspondence regarding this document should be sent to:

Rangesan Narayanan
Chairman and Professor
Department of Agricultural Economics
Mail Stop 204
University of Nevada, Reno
Reno, Nevada 89557-0105
(702) 784-6701

and

Thomas R. Harris
Director and Professor
University Center for Economic Development
Department of Agricultural Economics
Mail Stop 204
University of Nevada, Reno
Reno, Nevada 89557-0105
(702) 784-1681

UCED
University of Nevada, Reno
Nevada Cooperative Extension
Department of Agricultural Economics

Supplement

7. Recreation Model Component Improvement

Recreation model component improvement includes survey of the visitation, estimation of the expenditure function, survey of the second-home owners, survey of the vacation-home renters, estimation of the expenditure function, and formulation of the model equations. There are two sections on estimation of the expenditure function. The first section is estimation with 1993 and 1994 survey of visitation data. The second section is estimation with 1993 and 1994 survey of visitation data plus 1995 survey of second-home owners and survey of vacation-home renters data.

7.1. Survey of the Visitation

A visitation survey of the Truckee River Basin was done from May 28th through September 3rd, 1994. Specific recreation sites visited included Donner Lake, Prosser Reservoir, Stampede Reservoir, Boca Reservoir, and Pyramid Lake. The purpose of the survey was to first obtain an overall picture of the visitation and recreation activities occurring at the sites, second, quantify the amount of expenditures that visitors at the sites make to the local economy, and third, identify how the visitation would change in relation to the level of water at the sites. To achieve this purpose, information was gathered from visitors at each site through an interview process using a questionnaire. During the interview process, observations were also made at each site. Once the interview process was completed, all the data was then compiled and analyzed to develop a set of descriptive statistics. The interview questionnaire, a list of observations, and the descriptive statistics of the data are presented below.

Interview Questionnaire

On-site interviews were done using a questionnaire. Through this questionnaire, visitors were asked to provide general information and answer general, site specific, and demographic questions. General information includes gender of respondent, type of visitor and length of stay, group size, and group make-up. General questions identify visitation in terms of number of visits to the reservoirs and lakes and in which months, and the importance of decision factors to visit any reservoir or lake. Site specific questions were asked on the site where the visitor was at the time of the interview. These questions identify the quality of site characteristics, the number of hours spent participating in recreation activities at the site, local expenditures made to visit the site, whether or not respondents would continue to visit the site if the water level were to change, which other site would be chosen in the event that the water level did change to the point they would no longer continue to visit the site, and the willingness to pay by the visitor to keep the water level at the interview site suitable for recreation. Demographic questions identify age, marital status, number of adults and children in household, education, and household income of the visitor. These demographic questions, however, due to their sensitivity, were made optional. The questions and interview schedule are given below.

General Information

Gender of Respondent:

Male _____
Female _____

Type of Visitor and Length of Stay:

Day User _____ Length of Stay _____ Hours
Camper _____ Length of Stay _____ Days

Group Size:

Number of Adults _____
Number of Children _____

Group Make-up:

Family _____
Friends _____

Number of Vehicles _____ (include cars, pickups, campers, & RVs)
Number of Boats _____
Number of Jet Ski's _____
Number of Camp Trailers _____

City: _____
County: _____
State: _____
Zip Code: _____

General Questions

1. (a) How many times in a year do you typically visit the following reservoirs or lakes?

Donner Lake _____
Prosser Reservoir _____
Stampede Reservoir _____
Boca Reservoir _____
Pyramid Lake _____

(b) Which months of the year do you visit these reservoirs or lakes?

April _____
May _____
June _____
July _____
August _____
September _____
October _____
Other _____

2. How important to you are the following factors in visiting a reservoir or lake? Please rate the factors as very important, somewhat important, somewhat unimportant, not important at all, or no opinion. We will assign 1 point for "very important", 2 for "somewhat important", 3 for "somewhat unimportant", 4 for "not important at all", or 5 for "no opinion".

Factors	1 Very Important	2 Somewhat Important	3 Somewhat Unimportant	4 Not Important at All	5 No Opinion
Activity Opportunity					
Access					
Crowd Level					
Facilities					
Water-Level					
Area Setting					

Site Specific Questions

1. How do you rate the following characteristics at this reservoir or lake? Please rate the characteristics as very good, good, satisfactory, poor, or very poor. We will assign 1 point for "very good", 2 for "good", 3 for "satisfactory", 4 for "poor", or 5 for "very poor".

Characteristics	1 Very Good	2 Good	3 Satisfactory	4 Poor	5 Very Poor
Activity Opportunity					
Access					
Crowd Level					
Facilities					
Water-Level					
Area Setting					

2. (a) What is the approximate time you will spend today on each of the following activities? Please also list any additional activities.

Activities	Hours per Day											
Fishing from Shore	1	2	3	4	5	6	7	8	9	10	11	12
Fishing from Boat	1	2	3	4	5	6	7	8	9	10	11	12
Water Skiing	1	2	3	4	5	6	7	8	9	10	11	12
Pleasure Boating	1	2	3	4	5	6	7	8	9	10	11	12
Jet Skiing	1	2	3	4	5	6	7	8	9	10	11	12
Swimming	1	2	3	4	5	6	7	8	9	10	11	12
Picnicing	1	2	3	4	5	6	7	8	9	10	11	12
Hiking	1	2	3	4	5	6	7	8	9	10	11	12
Biking	1	2	3	4	5	6	7	8	9	10	11	12
	1	2	3	4	5	6	7	8	9	10	11	12
	1	2	3	4	5	6	7	8	9	10	11	12

(b) If the water-level changed, would your activities change?

Yes _____
No _____

3. (a) How many times did you visit this reservoir or lake last month?

_____

(b) Which of the following activities did you participate in?

Activities

Fishing from Shore	
Fishing from Boat	
Water Skiing	
Pleasure Boating	
Jet Skiing	
Swimming	
Picnicing	
Hiking	
Biking	

4. How much did you spend on the following items to visit this reservoir or lake this trip? Indicate the percentage of the total spent in Truckee, Reno/Sparks or Other Area.

Items	Total	Truckee	Reno/Sparks	Other-Area
	$	*%*	*%*	*%*
Camping Fees				
License Fees				
Hotel and Motel				
Restaurant				
Groceries and Supplies				
Gas				
Shopping				
Rental				
Total				

Today the water-levels at these reservoirs or lakes are:

Donner Lake	_____ acre-feet	or _____ % of full storage.
Prosser Reservoir	_____ acre-feet	or _____ % of full storage.
Stampede Reservoir	_____ acre-feet	or _____ % of full storage.
Boca Reservoir	_____ acre-feet	or _____ % of full storage.

5. (a) If this water-level is maintained at the level you see today, how many times would you visit this reservoir or lake during this month including this trip?

_____

(b) If the water-level at this reservoir or lake were higher than the level you see today, would you change the number of visits during this month?

Yes _____
No _____

(c) If the water-level at this reservoir or lake were lower than the level you see today, would you change the number of visits during this month?

Yes _____
No _____

(d) If (b) and or (c) is yes, on the chart, indicate the number of times you would visit at the following water-levels during this month:

Donner Lake

Storage as a % of Full Capacity	Number of Visits per Month	Acre-Feet of Storage	Acres of Surface Area	Elevation Lowering in Feet	Boat Ramp Status
100%		9,670	748	0	usable
90%		8,703	707	1	usable
80%		7,736	672	2	not usable
70%		6,769	633	3	not usable
60%		5,802	587	4	not usable

Prosser Reservoir

Storage as a % of Full Capacity	Number of Visits per Month	Acre-Feet of Storage	Acres of Surface Area	Elevation Lowering in Feet	Boat Ramp Status
100%		29,840	748	0	usable
90%		26,856	707	8	usable
80%		23,872	672	16	usable
70%		20,888	633	24	usable
60%		17,904	587	32	usable
50%		14,920	533	40	usable
40%		11,936	468	48	usable
30%		8,952	389	56	not usable
20%		5,968	291	64	not usable
10%		2,984	166	72	not usable
0%		0	0	80	not usable

Stampede Reservoir

Storage as a % of Full Capacity	Number of Visits per Month	Acre-Feet of Storage	Acres of Surface Area	Elevation Lowering in Feet	Boat Ramp Status
100%		226,500	3,440	0	usable
90%		203,850	3,185	15	usable
80%		181,200	3,020	30	usable
70%		158,550	2,831	45	usable
60%		135,900	2,613	60	usable
50%		113,250	2,359	75	usable
40%		90,600	2,059	90	usable
30%		67,950	1,699	105	not usable
20%		45,300	1,258	120	not usable
10%		22,650	708	135	not usable
0%		0	0	151	not usable

Boca Reservoir

Storage as a % of Full Capacity	Number of Visits per Month	Acre-Feet of Storage	Acres of Surface Area	Elevation Lowering in Feet	Boat Ramp Status
100%		40,870	977	0	usable
90%		36,783	920	8	usable
80%		32,696	896	16	usable
70%		28,609	867	24	not usable
60%		24,522	831	32	not usable
50%		20,435	786	40	not usable
40%		16,348	727	48	not usable
30%		12,261	645	56	not usable
20%		8,174	527	64	not usable
10%		4,087	341	72	not usable
0%		0	0	82	not usable

6. If you no longer choose to visit this reservoir or lake because of water-level, which of the following reservoirs or lakes would you then choose to visit assuming the water-levels at these other reservoirs and lakes remained at today's level?

Donner Lake _____
Prosser Reservoir _____
Stampede Reservoir _____
Boca Reservoir _____
Pyramid Lake _____
Other _____

7. How much would you be willing to pay per year not to have the water-level at this reservoir or lake fall below today's level?

$0 _____
$1 - 5 _____
$6 - 10 _____
$11 -25 _____
$26 - 50 _____
$51 - 100 _____
Over $100 _____

Demographic Questions

1. Indicate your age:

Under 16 years	_____
16 - 20	_____
21 - 30	_____
31 - 40	_____
41 - 50	_____
51 - 60	_____
61 - 70	_____
Over 70	_____

2. What is your marital status:

Single	_____
Married	_____

3. How many adults are in your household:

Male	_____
Female	_____

4. How many children are in your household:

Male	_____
Female	_____

5. Indicate your education level:

Elementary School	_____
High School	_____
Technical School	_____
2 Years of College	_____
4 Years of College	_____
Graduate School	_____

6. Indicate your annual household income level:

Below $10,000	_____
$10,000 - $25,000	_____
$26,000 - $50,000	_____
$51,000 - $75,000	_____
$76,000 - $100,000	_____
$100,000 - $150,000	_____
Over $150,000	_____

Interview Schedule

The interview schedule is given below. Trips were made to each site on a week day, a weekend day, and a holiday weekend day. Trips to Boca, Stampede, and Prosser Reservoirs were combined because of visitation and water-levels.

May (1 day)		
May 28, 1994	Saturday	Boca, Stampede, and Prosser
June (5 days)		
June 10, 1994	Friday	Pyramid Lake
June 11, 1994	Saturday	Boca, Stampede, and Prosser Reservoirs
June 17, 1994	Friday	Boca, Stampede, and Prosser Reservoirs
June 24, 1994	Friday	Donner Lake
June 25, 1994	Saturday	Boca, Stampede, and Prosser Reservoirs
July (6 days)		
July 2, 1994	Saturday	Boca, Stampede, and Prosser Reservoirs Donner Lake
July 8, 1994	Friday	Boca, Stampede, and Prosser Reservoirs
July 9, 1994	Saturday	Pyramid Lake
July 16, 1994	Saturday	Boca, Stampede, and Prosser Reservoirs
July 22, 1994	Friday	Boca, Stampede, and Prosser Reservoirs
July 23, 1994	Saturday	Donner Lake
August (4 days)		
August 5, 1994	Friday	Pyramid Lake
August 6, 1994	Saturday	Boca, Stampede, and Prosser Reservoirs
August 12, 1994	Friday	Donner Lake
August 20, 1994	Saturday	Boca, Stampede, and Prosser Reservoirs
September (1 day)		
September 3, 1994	Saturday	Boca, Stampede, and Prosser Reservoirs Donner Lake

The total number of visitors that participated in an interview was 281. There were 83 interviews at Donner Lake, 32 interviews at Prosser Reservoir, 64 interviews at Stampede Reservoir, 31 interviews at Boca Reservoir, and 71 interviews at Pyramid Lake.

List of Observations

Observations were made at each site during the interview process. Key observations are listed below.

1. Approximately 90,000 acre-feet of water was released from Stampede Reservoir prior to the summer season of June, July, and August. This water increased river flows in the Truckee River so that the cui ui fish could spawn upstream from Pyramid Lake. On account of this, storage in Stampede Reservoir went from 170,000 acre-feet in March to 80,000 acre-feet in May.

2. At Donner Lake, storage was at the maximum of 9,700 acre-feet in June. In July, however, water was released from storage and the lake water-level dropped approximately three feet to a storage of 6,800 acre-feet. Another foot could have been released but the Town of Truckee forced an exchange agreement to have water released from Boca Reservoir instead of Donner Lake. Donner Lake was then held at 6,800 acre-feet of storage through August.

3. At Prosser Reservoir, storage went from 9,700 acre-feet in June to 9,600 acre-feet in August. This storage is approximately 32% of full storage. Full storage at Prosser Reservoir is 29,840 acre-feet.

4. At Stampede Reservoir, storage went from 80,000 acre-feet or 35% of full storage in June to 69,000 acre-feet or 30% of full storage in August. Full storage at Stampede Reservoir is 226,500 acre-feet.

5. At Boca Reservoir, storage went from 28,700 acre-feet or 70% of full storage to 7,300 acre-feet or 18% of full storage in June. Through July and August, Boca Reservoir went from the 7,300 acre-feet to 4,300 acre-feet or 10% of full storage in August. Full storage for Boca Reservoir is 40,870 acre-feet.

6. Visitation to Donner Lake and Pyramid Lake peaked in August whereas visitation to Prosser, Stampede, and Boca Reservoirs peaked in July. The reason for the shorten summer season at Prosser, Stampede, and Boca Reservoirs was because of low water-levels, drought conditions, and the threat of wild fires.

7. The highest number of camping visitors were at Donner Lake followed by Stampede Reservoir, Pyramid Lake, and Prosser Reservoir. The highest number of day use visitors were also at Donner Lake followed by Pyramid Lake and Boca Reservoir.

8. The proportionate split of camping visitors to day use visitors was approximately 50% camping visitors to 50% day use visitors at Donner Lake, 100% camping visitors at Prosser Reservoir, 90% camping visitors to 10% day use visitors at Stampede Reservoir, 20% camping visitors to 80% day use visitors at Boca Reservoir, and 10% camping visitors to 90% day use visitors at Pyramid Lake.

9. At improved campgrounds, the occupancy throughout the summer season was 100% at Donner Lake, 40% at Prosser Reservoir, 60% at Stampede Reservoir, and 10% at Boca Reservoir.

10. Boat ramps were out of the water throughout the summer season at Prosser, Stampede, and Boca Reservoirs. At Prosser and Stampede Reservoirs, however, the boat ramps were still in use because of natural hard pack beyond the paved portions of the boat ramps. At Boca Reservoir, natural boat ramps were in use.

11. Water related activities at Donner Lake and Pyramid Lake were swimming, boating, water skiing, and jet skiing. Water related activities at Prosser Reservoir were fishing from shore, and fishing from a boat. Water related activities at Stampede Reservoir were swimming, fishing from shore, boating, fishing from a boat, water skiing, and jet skiing. Water related activities at Boca Reservoir were swimming, fishing from shore, and jet skiing.

Descriptive Statistics

The descriptive statistics of the data are presented below with an explanation of their interpretation. The descriptive statistics include number of respondents, site visitation of respondents, activities of respondents, annual visitation of respondents, annual visitation of respondents per site, number of visits by respondents per site, local and non-local respondents per site, group make-up of respondents per site, camping and day use respondents per site, ranking of reasons to visit by respondents per site, expenditures by respondents per site, expenditures by camping respondents per site, expenditures by day use respondents per site, activity hours per day by respondents per site, activity hours per day by camping respondents per site, activity hours per day by day use respondents per site, indicated number of visits by respondents at alternative water levels per site, site substitution of respondents per site, willingness of respondents to pay to maintain water level per site, age brackets of respondents, education levels of respondents, and household income levels of respondents.

Number of Respondents

The number of respondents successfully interviewed were 281 visitors.

The breakdown of the number of respondents for each site is provided in Table 7.1-1. There were 83 respondents at Donner Lake, 32 respondents at Prosser Reservoir, 64 respondents at Stampede Reservoir, 31 respondents at Boca Reservoir, and 71 respondents at Pyramid Lake.

Table 7.1-1. Number of Respondents.

	Study Area	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Pyramid Lake
Number of Respondents	281	83	32	64	31	71
Percentage of Respondents		29.54%	11.39%	22.78%	11.03%	25.27%

Site Visitation of Respondents

The overall greatest site visitation of respondents was at Donner Lake.

The site visitation of respondents is presented in Table 7.1-2. Of the 281 respondents, 46% indicated that they visited Donner Lake an average of 5 visits during the year, 16% indicated that they visited Prosser Reservoir an average of 6 visits during the year, 37% indicated that they visited Stampede Reservoir an average of 4 visits during the year, 26% indicated that they visited Boca Reservoir an average of 6 visits during the year, 36% indicated that they visited Pyramid Lake an average of 10 visits during the year. The highest percentage of respondents indicated that they visited Donner Lake and Stampede Reservoir. The highest average number of visits by respondents are indicated for Pyramid Lake and Boca Reservoir. These numbers are influenced by local day use visitors choosing to visit the sites more frequently. In contrast, the lowest number of visits by respondents are for Donner Lake and Stampede Reservoir. These numbers are influenced by non-local camping visitors choosing to visit the sites less frequently.

Table 7.1-2. Site Visitation of Respondents.

	Study Area	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Pyramid Lake
Number of Respondents	281	130	46	104	73	100
Percentage of Respondents		46.26%	16.37%	37.01%	25.98%	35.59%
Number of Visits by Respondents		685	256	432	445	1037
Average Number of Visits by Respondents		5.27	5.57	4.15	6.10	10.37

Activities of Respondents

Most of the respondents participated in picnicking, hiking, swimming, and fishing activities.

Activities of respondents are shown in Table 7.1-3. The activities include picnicking, camping, fishing, swimming, boating, fishing from a boat, water skiing, jet skiing, rafting, kayaking, biking, hiking, and other activities. Of the 281 respondents, 56% indicated that they were picnicking, 27% indicated that they were fishing, 38% indicated that they were swimming, 9% indicated that they were boating, 18% indicated that they were fishing from a boat, 5% indicated that they were water skiing, 4% indicated that they were jet skiing, 18% indicated that they were biking, 39% indicated that they were hiking, and 15% indicated that they were doing other activities. The other activities mentioned by the respondents include relaxing, getting away from it all, reading, and drinking beer.

Table 7.1-3. Activities of Respondents.

	Study Area
Number of Respondents Picnicking	157
Number of Respondents Camping	N.A.
Number of Respondents Fishing	77
Number of Respondents Swimming	106
Number of Respondents Boating	25
Number of Respondents Fishing from Boat	50
Number of Respondents Water Skiing	15
Number of Respondents Jet Skiing	11
Number of Respondents Rafting	N.A.
Number of Respondents Kayaking	N.A.
Number of Respondents Biking	50
Number of Respondents Hiking	109
Number of Respondents Other	42
Percentage of Respondents Picnicking	55.87%
Percentage of Respondents Camping	N.A.
Percentage of Respondents Fishing	27.40%
Percentage of Respondents Swimming	37.72%
Percentage of Respondents Boating	8.90%
Percentage of Respondents Fishing from Boat	17.79%
Percentage of Respondents Water Skiing	5.34%
Percentage of Respondents Jet Skiing	3.91%
Percentage of Respondents Rafting	N.A.
Percentage of Respondents Kayaking	N.A.
Percentage of Respondents Biking	17.79%
Percentage of Respondents Hiking	38.79%
Percentage of Respondents Other	14.95%

Annual Visitation of Respondents

Annual visitation of respondents to the study area is the highest in the summer months of June, July, and August.

Annual visitation of respondents is presented in Table 7.1-4. Of the 281 respondents, 18% indicated that they visit the study area in April, 40% indicated that they visit the study area in May, 79% indicated that they visit the study area in June, 88% indicated that they visit the study area in July, 79% indicated that they visit the study area in August, 43% indicated that they visit the study area in September, 22% indicated that they visit the study area in October, and 11% indicated that they visit the study area in Other months. Other months include January, February, March, November, and December.

Table 7.1-4. Annual Visitation of Respondents.

	Study Area
Number of Respondents that Visit during April	50
Number of Respondents that Visit during May	111
Number of Respondents that Visit during June	221
Number of Respondents that Visit during July	248
Number of Respondents that Visit during August	223
Number of Respondents that Visit during September	120
Number of Respondents that Visit during October	61
Number of Respondents that Visit during Other	30
Percentage of Visitation during April	17.79%
Percentage of Visitation during May	39.50%
Percentage of Visitation during June	78.65%
Percentage of Visitation during July	88.26%
Percentage of Visitation during August	79.36%
Percentage of Visitation during September	42.70%
Percentage of Visitation during October	21.71%
Percentage of Visitation during Other	10.68%

Annual Visitation of Respondents per Site

The annual visitation of respondents per site follow a similar pattern. This pattern shows that during the year visitation at a site will begin in April and steadily increase throughout May, June, July, and August and then decrease sharply during September and October to end at very low visitation during the Other months.

The annual visitation of respondents per site are shown in Table 7.1-5. The pattern of annual visitation for a site is based on the number of respondents that indicated that they visit the study area and visit the site in a given month. To clarify this, for Boca Reservoir, 8 out of the 50 respondents indicated that they visit in April, 22 out of the 111 respondents indicated that they visit in May, 30 out of the 221 indicated that they visit in June, 28 out of the 248 respondents indicated that they visit in July, 26 out of the 223 respondents indicated that they visit in August, 17 out of the 120 indicated that they visit in September, 9 out of the 61 respondents indicated that they visit in October, and 5 out of the 30 respondents indicated that they visit in Other months.

These numbers are then divided by their summation and presented as a percentage of visitation during the given month. Of the total annual visitation at Boca Reservoir, 6% is during April, 15% is during May, 21% is during June, 19% is during July, 18% is during August, 12% is during September, 6% is during October, and 3% is during Other months.

The percentages taken together for all the months then show the pattern of annual visitation.

A similar interpretation can be made for the other sites.

Table 7.1-5. Annual Visitation of Respondents per Site.

	Study Area	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Pyramid Lake
Number of Respondents that Visit during April	50	9	4	9	8	20
Number of Respondents that Visit during May	111	21	10	24	22	34
Number of Respondents that Visit during June	221	50	20	58	30	63
Number of Respondents that Visit during July	248	71	26	55	28	68
Number of Respondents that Visit during August	223	63	22	47	26	65
Number of Respondents that Visit during September	120	25	12	23	17	43
Number of Respondents that Visit during October	61	10	8	11	9	23
Number of Respondents that Visit during Other	30	12	2	2	5	9
Total		261	104	229	145	325
Percentage of Visitation during April		3.45%	3.85%	3.93%	5.52%	6.15%
Percentage of Visitation during May		8.05%	9.62%	10.48%	15.17%	10.46%
Percentage of Visitation during June		19.16%	19.23%	25.33%	20.69%	19.38%
Percentage of Visitation during July		27.20%	25.00%	24.02%	19.31%	20.92%
Percentage of Visitation during August		24.14%	21.15%	20.52%	17.93%	20.00%
Percentage of Visitation during September		9.58%	11.54%	10.04%	11.72%	13.23%
Percentage of Visitation during October		3.83%	7.69%	4.80%	6.21%	7.08%
Percentage of Visitation during Other		4.60%	1.92%	0.87%	3.45%	2.77%

Number of Visits by Respondents per Site

The highest number of visits by respondents occur at Pyramid Lake, at Donner Lake, and at Boca Reservoir. Opposite of this, the lowest number of visits by respondents occur at Prosser Reservoir, and at Stampede Reservoir.

These numbers are shown in Table 7.1-6. At Donner Lake, the 83 respondents indicated that they make 459 visits to the site for an average of 5.5 visits each. At Prosser Reservoir, the 32 respondents indicated that they make 161 visits to the site for and average of 5 visits each. At Stampede Reservoir, the 64 respondents indicated that they make 227 visits to the site for an average of 3.5 visits each. At Boca Reservoir, the 31 respondents indicated that they make 280 visits to the site for an average of 9 visits each. At Pyramid Lake, the 71 respondents indicated that they make 890 visits to the site for an average of 12.5 visits each. The higher numbers for Boca Reservoir and Pyramid Lake reflect that a greater proportion of the respondents were local residents that frequented the site as day use visitors.

Table 7.1-6. Number of Visits by Respondents per Site.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Pyramid Lake
Number of Visits by Respondents	459	161	227	280	890
Average Number of Visits by Respondents	5.53	5.03	3.55	9.03	12.54

Local and Non-Local Respondents per Site

A higher number of respondents living within the study area were at Boca Reservoir and at Pyramid Lake. Whereas, a higher number of respondents living outside the study area were at Donner Lake, at Prosser Reservoir, and at Stampede Reservoir. Respondents living within the study area are considered as local respondents and respondents living outside the study area are considered as non-local respondents.

The numbers and the percentages of local and non-local respondents per site are provided in Table 7.1-7. At Boca Reservoir, 81% of the respondents were local respondents. At Pyramid Lake, 87% of the respondents were local respondents. The higher number of local respondents at these sites is because these sites are primarily day use sites that draw visitors from Truckee and the Reno-Sparks area. In contrast, at Donner Lake, 71% of the respondents were non-local respondents. At Prosser Reservoir, 84% of the respondents were non-local respondents. At Stampede Reservoir, 70% of the respondents were non-local respondents. The higher number of non-local respondents at these sites is because these sites are primarily camping sites that draw visitors from Sacramento and the San Francisco Bay area.

Table 7.1-7. Local and Non-Local Respondents per Site.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Pyramid Lake
Number of Local Respondents	24	5	19	25	62
Number of Non-Local Respondents	59	27	45	6	9
Percentage of Local Respondents	28.92%	15.63%	29.69%	80.65%	87.32%
Percentage of Non-Local Respondents	71.08%	84.38%	70.31%	19.35%	12.68%

Group Make-Up of Respondents per Site

Average group size of respondents among all sites ranged from 3.66 persons at Prosser Reservoir to 5.9 persons at Pyramid Lake. As per group, the number of adults were greater than the number of children at all sites. The percentage of groups that included children ranged from 45% at Boca Reservoir to 70% at Stampede Reservoir.

This group make-up information is presented in Table 7.1-8. At Donner Lake, the average group size was 5.1 persons of which 3 persons were adults and 65% of the groups included children. At Prosser Reservoir, the average group size was 3.66 persons of which 2.53 persons were adults and 47% of the groups included children. At Stampede Reservoir, the average group size was 4.95 persons of which 3.25 persons were adults and 70% of the groups included children. At Boca Reservoir, the average group size was 5.71 persons of which 4.06 persons were adults and 45% of the groups included children. At Pyramid Lake, the average group size was 5.9 persons of which 3.38 persons were adults and 69% of the groups included children.

Table 7.1-8. Group Make-Up of Respondents per Site.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Pyramid Lake
Average Group Size of Respondents	5.11	3.66	4.95	5.71	5.90
Average Number of Adults in Group of Respondents	3.00	2.53	3.25	4.06	3.38
Percentage of Groups that include Children	65.06%	46.88%	70.31%	45.16%	69.01%

Camping and Day Use Respondents per Site

The highest percentage of camping respondents were at Prosser Reservoir and at Stampede Reservoir. The largest average group size of camping respondents was at Pyramid Lake. The greatest average numbers of days spent by camping respondents were at Prosser Reservoir and at Boca Reservoir.

This camping respondent information is provided in Table 7.1-9. At Donner Lake, 51% of the respondents were camping respondents having a group size of 5.24 persons with 3.63 days being spent. At Prosser Reservoir, 94% of the respondents were camping respondents having a group size of 3.73 persons with 3.9 days being spent. At Boca Reservoir, 55% of the respondents were camping respondents having a group size of 5.47 persons with 3.65 days being spent. At Pyramid Lake, 27% of the respondents were camping respondents having a group size of 5.53 persons with 2.95 days being spent. At Stampede Reservoir, 100% of the respondents were camping respondents having a group size of 4.95 persons with 4.44 days being spent. Only interviews of camping visitors were made at Stampede Reservoir.

The highest percentage of day use respondents, except for Stampede Reservoir, were at Donner Lake and at Pyramid Lake. The largest average group size of day use respondents was at Pyramid Lake. The greatest average number of hours spent by day use respondents were at Boca Reservoir and at Pyramid Lake.

This day use respondent information is also provided in Table 7.1-9. At Donner Lake, 49% of the respondents were day use respondents having a group size of 4.98 persons with 4.92 hours being spent. At Prosser Reservoir, 6% of the respondents were day use respondents having a group size of 2.50 persons with 3.50 hours being spent. At Boca Reservoir, 45% of the respondents were day use respondents having a group size of 6 persons with 4.28 hours being spent. At Pyramid Lake, 73% of the respondents were day use respondents having a group size of 6.04 persons with 5.42 hours being spent. At Stampede Reservoir, this information is not available because no interviews of day use visitors were made.

Table 7.1-9. Camping and Day Use Respondents per Site.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Pyramid Lake
Number of Camping Respondents	42	30	64	17	19
Percentage of Camping Respondents	50.60%	93.75%	100.00%	54.84%	26.76%
Average Group Size of Camping Respondents	5.24	3.73	4.95	5.47	5.53
Average Number of Days Spent by Camping Respondents	3.63	3.90	4.44	3.65	2.95
Number of Day Use Respondents	41	2	0	14	52
Percentage of Day Use Respondents	49.40%	6.25%	N.A.	45.16%	73.24%
Average Group Size of Day Use Respondents	4.98	2.50	N.A.	6.00	6.04
Average Number of Hours Spent by Day Use Respondents	4.92	3.50	N.A.	4.28	5.42

Ranking of Reasons to Visit by Respondents per Site

Reasons to visit include importance of decision factors and quality of site characteristics.

The decision factors ranked very important to somewhat unimportant in visiting a reservoir or lake. These factors are activity opportunity, access, crowd level, facilities, water-level, and area setting.

Ranking the importance of decision factors to visit by respondents per site is shown in Table 7.1-10. Activity opportunity is ranked very important by respondents at Prosser Reservoir, at Boca Reservoir, and at Pyramid Lake. Activity opportunity is ranked somewhat important by respondents at Donner Lake and at Stampede Reservoir. Access is ranked very important by respondents at Donner Lake, at Stampede Reservoir, and at Pyramid Lake. Access is ranked somewhat important by respondents at Prosser Reservoir and at Boca Reservoir. Crowd level is ranked very important by respondents at Prosser Reservoir and somewhat important by respondents at Donner Lake, at Stampede Reservoir, at Boca Reservoir, and at Pyramid Lake. Facilities is ranked somewhat important by respondents at Donner Lake, at Prosser Reservoir, at Stampede Reservoir, and at Pyramid Lake. Facilities is ranked somewhat unimportant by respondents at Boca Reservoir. Water-level is ranked very important by respondents at Pyramid Lake and somewhat important by respondents at Donner Lake, at Prosser Reservoir, at Stampede Reservoir, and at Boca Reservoir. Area setting is ranked very important by respondents at Donner Lake, at Prosser Reservoir, at Stampede Reservoir, and at Boca Reservoir. Area setting is ranked somewhat important by respondents at Pyramid Lake.

The site characteristics ranked very good to poor. These site characteristics are activity, access, crowd level, facilities, water-level, and area setting.

Ranking the quality of site characteristics by respondents per site is also shown in Table 7.1-10. Activity opportunity is ranked very good by respondents at Pyramid Lake and good by respondents at Donner Lake, at Prosser Reservoir, at Stampede Reservoir, and at Boca Reservoir. Access is ranked very good by respondents at Donner Lake and good by respondents at Prosser Reservoir, at Stampede Reservoir, at Boca Reservoir, and at Pyramid Lake. Crowd level is ranked good by respondents at all the reservoirs and lakes. Facilities is ranked good by respondents at Donner Lake, at Prosser Reservoir, and at Stampede Reservoir. Facilities is ranked satisfactory by respondents at Boca Reservoir and at Pyramid Lake. Water-level is ranked good by respondents at Donner Lake and at Pyramid Lake. Water-level is ranked poor by respondents at Prosser Reservoir, at Stampede Reservoir, and at Boca Reservoir. Area setting is ranked very good by respondents at Donner Lake and good by respondents at Prosser Reservoir, at Stampede Reservoir, at Boca Reservoir, and at Pyramid Lake.

Table 7.1-10. Ranking of Reasons to Visit by Respondents per Site.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Pyramid Lake
Decision Factors /1					
Average Value of Activity Opportunity by Respondents	1.73	1.44	1.50	1.16	1.48
Average Value of Access by Respondents	1.45	1.69	1.44	1.71	1.39
Average Value of Crowd Level by Respondents	1.59	1.44	1.66	1.58	1.66
Average Value of Facilities by Respondents	1.70	2.09	1.98	2.52	2.14
Average Value of Water-Level by Respondents	1.84	1.88	1.55	1.52	1.48
Average Value of Area Setting by Respondents	1.37	1.47	1.38	1.42	1.99
Site Characteristics /2					
Average Value of Activity Opportunity by Respondents	1.62	1.94	2.03	2.29	1.45
Average Value of Access by Respondents	1.35	1.56	1.69	2.13	1.68
Average Value of Crowd Level by Respondents	1.94	1.66	1.86	2.13	2.08
Average Value of Facilities by Respondents	1.59	2.34	2.06	3.00	3.21
Average Value of Water-Level by Respondents	1.84	3.75	3.50	4.06	2.01
Average Value of Area Setting by Respondents	1.28	1.72	1.61	2.03	2.04

1. Ranking: 1=Very Important; 2=Somewhat Important; 3=Somewhat Unimportant; 4=Not Important at All; and, 5=No Opinion.
2. Ranking: 1=Very Good; 2=Good; 3=Satisfactory; 4=Poor; and, 5=Very Poor.

Expenditures by Respondents per Site

Expenditures are the highest amount for respondents at Stampede Reservoir followed by expenditures of respondents at Boca Reservoir, at Donner Lake, at Prosser Reservoir, and at Pyramid Lake. Main expenditures are on groceries, camping fees, and fuel.

The expenditures by respondents are presented as average values in Table 7.1-11. At Donner Lake, respondents have total expenditures of $115.14 in which the largest portion is on groceries, camping fees, restaurant, other, and fuel. At Prosser Reservoir, respondents have total expenditures of $111.75 in which the largest portion is on groceries, camping fees, other, and fuel. At Stampede Reservoir, respondents have total expenditures of $188.74 in which the largest portion is on other, groceries, camping fees, and fuel. At Boca Reservoir, respondents have total expenditures of $134.46 in which the largest portion is on groceries, other, fuel, and camping fees. At Pyramid Lake, respondents have a total expenditure of $89.44 in which the largest portion is on groceries, fuel, and camping fees.

Table 7.1-11. Expenditures by Respondents per Site.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Pyramid Lake
Average Expenditures on Licenses by Respondents	N.A.	N.A.	N.A.	N.A.	N.A.
Average Expenditures on Camping Fees by Respondents	26.64	19.47	41.12	14.00	7.65
Average Expenditures on Hotel or Motel by Respondents	4.13	0.00	0.00	7.42	0.00
Average Expenditures on Restaurant by Respondents	18.08	7.72	12.47	4.84	0.28
Average Expenditures on Groceries by Respondents	37.36	57.52	55.47	69.77	53.44
Average Expenditures on Equipment and Supplies by Respondents	N.A.	N.A.	N.A.	N.A.	N.A.
Average Expenditures on Rental by Respondents	4.34	0.00	0.00	0.10	1.55
Average Expenditures on Fuel by Respondents	10.24	12.40	20.83	17.68	25.11
Average Expenditures on Other by Respondents	14.35	14.64	58.85	20.65	1.41
Average Total Expenditures by Respondents	$115.14	$111.75	$188.74	$134.46	$89.44

Expenditures by Camping Respondents per Site

Expenditures are the highest amount for camping respondents at Boca Reservoir followed by expenditures of camping respondents at Stampede Reservoir, at Donner Lake, at Pyramid Lake, and at Prosser Reservoir. Main expenditures are on groceries, camping fees, other, and fuel.

The expenditures for camping respondents are provided as average values in Table 7.1-12. At Donner Lake, camping respondents have total expenditures of $181.14 in which the largest portion is on groceries, camping fees, restaurant, other, and fuel. At Prosser Reservoir, camping respondents have total expenditures of $116.50 in which the largest portion is on groceries, camping fees, other, and fuel. At Stampede Reservoir, camping respondents have total expenditures of $188.74 in which the largest portion is on other, groceries, camping fees, and fuel. At Boca Reservoir, camping respondents have total expenditures of $213.89 in which the largest portion is on groceries, other, camping fees, and fuel. At Pyramid Lake, camping respondents have a total expenditure of $178.47 in which the largest portion is on groceries, fuel, and camping fees.

Expenditures per day by camping respondents is calculated by dividing the expenditures by camping respondents by the number of days spent by camping respondents. At Donner Lake, total expenditures per day are $49.90. At Prosser Reservoir, total expenditures per day are $29.87. At Stampede Reservoir, total expenditures per day are $42.51. At Boca Reservoir, total expenditures per day are $58.60. At Pyramid Lake, total expenditures per day are $60.50.

Expenditures per day per person by camping respondents is calculated by dividing the expenditures per day by camping respondent by the average group size of camping respondents. At Donner Lake, total expenditures per day per person are $9.52. At Prosser Reservoir, total expenditures per day per person are $8.01. At Stampede Reservoir, total expenditures per day per person are $8.59. At Boca Reservoir, total expenditures per day per person are $10.71. At Pyramid Lake, total expenditures per day per person are $10.94.

Table 7.1-12. Expenditures by Camping Respondents per Site.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Pyramid Lake
Average Expenditures on Licenses by Camping Respondents	N.A.	N.A.	N.A.	N.A.	N.A.
Average Expenditures on Camping Fees by Camping Respondents	48.71	20.77	41.12	25.53	16.89
Average Expenditures on Hotel or Motel by Camping Respondents	5.60	0.00	0.00	12.94	0.00
Average Expenditures on Restaurant by Camping Respondents	28.33	8.23	12.47	7.06	0.00
Average Expenditures on Groceries by Camping Respondents	56.96	61.36	55.47	108.59	117.37
Average Expenditures on Equipment and Supplies by Camping Respondents	N.A.	N.A.	N.A.	N.A.	N.A.
Average Expenditures on Rental by Camping Respondents	0.60	0.00	0.00	0.18	0.00
Average Expenditures on Fuel by Camping Respondents	15.58	12.19	20.83	21.94	43.16
Average Expenditures on Other by Camping Respondents	25.36	13.95	58.85	37.65	1.05
Average Total Expenditures by Camping Respondents	$181.14	$116.50	$188.74	$213.89	$178.47
Average Expenditures per Day on Licenses by Camping Respondents	N.A.	N.A.	N.A.	N.A.	N.A.
Average Expenditures per Day on Camping Fees by Camping Respondents	13.42	5.33	9.26	6.99	5.73
Average Expenditures per Day on Hotel or Motel by Camping Respondents	1.54	0.00	0.00	3.55	0.00
Average Expenditures per Day on Restaurant by Camping Respondents	7.80	2.11	2.81	1.93	0.00
Average Expenditures per Day on Groceries by Camping Respondents	15.69	15.73	12.49	29.75	39.79
Average Expenditures per Day on Equipment and Supplies by Camping Respondents	N.A.	N.A.	N.A.	N.A.	N.A.
Average Expenditures per Day on Rental by Camping Respondents	0.17	0.00	0.00	0.05	0.00
Average Expenditures per Day on Fuel by Camping Respondents	4.29	3.13	4.69	6.01	14.63
Average Expenditures per Day on Other by Camping Respondents	6.99	3.58	13.25	10.32	0.36
Average Total Expenditures per Day by Camping Respondents	$49.90	$29.87	$42.51	$58.60	$60.50
Average Expenditures per Day per Person on Licenses by Camping Respondents	N.A.	N.A.	N.A.	N.A.	N.A.
Average Expenditures per Day per Person on Camping Fees by Camping Respondents	2.56	1.43	1.87	1.28	1.04
Average Expenditures per Day per Person on Hotel or Motel by Camping Respondents	0.29	0.00	0.00	0.65	0.00
Average Expenditures per Day per Person on Restaurant by Camping Respondents	1.49	0.57	0.57	0.35	0.00
Average Expenditures per Day per Person on Groceries by Camping Respondents	2.99	4.22	2.52	5.44	7.19
Average Expenditures per Day per Person on Equipment and Supplies by Camping Respondents	N.A.	N.A.	N.A.	N.A.	N.A.
Average Expenditures per Day per Person on Rental by Camping Respondents	0.03	0.00	0.00	0.01	0.00
Average Expenditures per Day per Person on Fuel by Camping Respondents	0.82	0.84	0.95	1.10	2.65
Average Expenditures per Day per Person on Other by Camping Respondents	1.33	0.96	2.68	1.89	0.06
Average Total Expenditures per Day per Person by Camping Respondents	$9.52	$8.01	$8.59	$10.71	$10.94

Expenditures by Day Use Respondents per Site

Expenditures are the highest amount for day use respondents at Pyramid Lake followed by expenditures of day use respondents at Donner Lake, at Prosser Reservoir, and at Boca Reservoir. Main expenditures are on groceries and fuel.

The average expenditures by day use respondents are shown in Table 7.1-13. At Donner Lake, day use respondents have total expenditures of $47.55 in which the largest portion is on groceries, rental, restaurant, and fuel. At Prosser Reservoir, day use respondents have total expenditures of $40.50 in which the largest potion is on other and fuel. At Boca Reservoir, day use respondents have total expenditures of $37.99 in which the largest portion is on groceries and fuel. At Pyramid Lake, day use respondents have a total expenditure of $56.91 in which the largest portion is on groceries and fuel.

Expenditures per person by day use respondents is calculated by dividing the expenditures by day use respondents by the average group size of day use respondents. At Donner Lake, total expenditures per person are $9.55. At Prosser Reservoir, total expenditures per person are $16.20. At Boca Reservoir, total expenditures per person are $6.33. At Pyramid Lake, total expenditures per person are $9.42.

Table 7.1-13. Expenditures by Day Use Respondents per Site.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Pyramid Lake
Average Expenditures on Licenses by Day Use Respondents	N.A.	N.A.	N.A.	N.A.	N.A.
Average Expenditures on Camping Fees by Day Use Respondents	4.04	0.00	N.A.	0.00	4.27
Average Expenditures on Hotel or Motel by Day Use Respondents	2.63	0.00	N.A.	0.71	0.00
Average Expenditures on Restaurant by Day Use Respondents	7.58	0.00	N.A.	2.14	0.38
Average Expenditures on Groceries by Day Use Respondents	17.29	0.00	N.A.	22.64	30.08
Average Expenditures on Equipment and Supplies by Day Use Respondents	N.A.	N.A.	N.A.	N.A.	N.A.
Average Expenditures on Rental by Day Use Respondents	8.18	0.00	N.A.	0.00	2.12
Average Expenditures on Fuel by Day Use Respondents	4.76	15.50	N.A.	12.50	18.52
Average Expenditures on Other by Day Use Respondents	3.07	25.00	N.A.	0.00	1.54
Average Total Expenditures by Day Use Respondents	$47.55	$40.50	N.A.	$37.99	$56.91
Average Expenditures per Person on Licenses by Day Use Respondents	N.A.	N.A.	N.A.	N.A.	N.A.
Average Expenditures per Person on Camping Fees by Day Use Respondents	0.81	0.00	N.A.	0.00	0.71
Average Expenditures per Person on Hotel or Motel by Day Use Respondents	0.53	0.00	N.A.	0.12	0.00
Average Expenditures per Person on Restaurant by Day Use Respondents	1.52	0.00	N.A.	0.36	0.06
Average Expenditures per Person on Groceries by Day Use Respondents	3.47	0.00	N.A.	3.77	4.98
Average Expenditures per Person on Equipment and Supplies by Day Use Respondents	N.A.	N.A.	N.A.	N.A.	N.A.
Average Expenditures per Person on Rental by Day Use Respondents	1.64	0.00	N.A.	0.00	0.35
Average Expenditures per Person on Fuel by Day Use Respondents	0.96	6.20	N.A.	2.08	3.07
Average Expenditures per Person on Other by Day Use Respondents	0.62	10.00	N.A.	0.00	0.25
Average Total Expenditures per Person by Day Use Respondents	$9.55	$16.20	N.A.	$6.33	$9.42

Activity Hours per Day by Respondents per Site

Hours per day spent by respondents participating in non-camping activities at all sites ranged from 6.88 hours at Pyramid Lake to 10.31 hours at Stampede Reservoir. Activities of respondents also varied among all sites from that of picnicking, fishing, swimming, boating, fishing from boat, water skiing, jet skiing, biking, hiking, and other activities.

The average activity hours per day by respondents are provided in Table 7.1-14. At Donner Lake, respondents spent 6.95 hours per day participating in activities including picnicking, fishing, swimming, hiking, and other. At Prosser Reservoir, respondents spent 7.47 hours per day participating in activities including picnicking, fishing, hiking, and other. At Stampede Reservoir, respondents spent 10.31 hours per day participating in activities including picnicking, fishing, fishing from boat, and hiking. At Boca Reservoir, respondents spent 7.64 hours per day participating in activities including picnicking, fishing, swimming, and hiking. At Pyramid Lake, respondents spent 6.88 hours per day participating in activities including picnicking, swimming, boating, water skiing, and jet skiing.

Table 7.1-14. Activity Hours per Day by Respondents per Site.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Pyramid Lake
Average Activity Hours per Day spent Picnicking by Respondents	2.10	2.00	2.44	2.03	1.22
Average Activity Hours per Day spent Camping by Respondents	N.A.	N.A.	N.A.	N.A.	N.A.
Average Activity Hours per Day spent Fishing by Respondents	0.73	1.53	1.52	1.90	0.02
Average Activity Hours per Day spent Swimming by Respondents	1.30	0.38	0.75	0.89	1.85
Average Activity Hours per Day spent Boating by Respondents	0.24	0.06	0.30	0.33	0.80
Average Activity Hours per Day spent Fishing from Boat by Respondents	0.06	0.84	2.66	0.46	0.09
Average Activity Hours per Day spent Water Skiing by Respondents	0.12	0.00	0.31	0.32	1.28
Average Activity Hours per Day spent Jet Skiing by Respondents	0.12	0.00	0.06	0.58	1.45
Average Activity Hours per Day spent Rafting by Respondents	N.A.	N.A.	N.A.	N.A.	N.A.
Average Activity Hours per Day spent Kayaking by Respondents	N.A.	N.A.	N.A.	N.A.	N.A.
Average Activity Hours per Day spent Biking by Respondents	0.53	0.41	0.47	0.26	0.03
Average Activity Hours per Day spent Hiking by Respondents	0.73	1.00	1.07	0.71	0.04
Average Activity Hours per Day spent on Other activities by Respondents	1.02	1.25	0.73	0.16	0.10
Total Activity Hours per Day by Respondents	6.95	7.47	10.31	7.64	6.88
Total Activity Hours per Day spent on Non-Camping Activities by Respondents	6.95	7.47	10.31	7.64	6.88

Activity Hours per Day by Camping Respondents per Site

Hours per day spent by camping respondents participating in non-camping activities at all sites ranged from 7.73 hours at Prosser Reservoir to 10.96 hours at Pyramid Lake. Activities of camping respondents also varied among all sites from that of picnicking, fishing, swimming, boating, fishing from boat, water skiing, jet skiing, biking, hiking, and other activities.

The average activity hours per day by camping respondents are presented in Table 7.1-15. At Donner Lake, camping respondents spent 8.95 hours per day participating in activities including picnicking, fishing, swimming, hiking, and other. At Prosser Reservoir, camping respondents spent 7.73 hours per day participating in activities including picnicking, fishing, hiking, and other. At Stampede Reservoir, camping respondents spent 10.31 hours per day participating in activities including picnicking, fishing, swimming, fishing from boat, hiking, and other. At Boca Reservoir, camping respondents spent 10.38 hours per day participating in activities including picnicking, fishing, swimming, fishing from boat, and hiking. At Pyramid Lake, camping respondents spent 10.96 hours per day participating in activities including picnicking, swimming, boating, water skiing, and jet skiing.

Table 7.1-15. Activity Hours per Day by Camping Respondents per Site.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Pyramid Lake
Average Activity Hours per Day spent Picnicking by Camping Respondents	2.67	2.13	2.44	2.85	2.05
Average Activity Hours per Day spent Camping by Camping Respondents	N.A.	N.A.	N.A.	N.A.	N.A.
Average Activity Hours per Day spent Fishing by Camping Respondents	1.10	1.50	1.52	2.68	0.03
Average Activity Hours per Day spent Swimming by Camping Respondents	1.45	0.40	0.75	1.31	3.32
Average Activity Hours per Day spent Boating by Camping Respondents	0.14	0.07	0.30	0.54	1.32
Average Activity Hours per Day spent Fishing from Boat by Camping Respondents	0.07	0.80	2.66	0.78	0.35
Average Activity Hours per Day spent Water Skiing by Camping Respondents	0.02	0.00	0.31	0.34	2.14
Average Activity Hours per Day spent Jet Skiing by Camping Respondents	0.00	0.00	0.06	0.12	1.53
Average Activity Hours per Day spent Rafting by Camping Respondents	N.A.	N.A.	N.A.	N.A.	N.A.
Average Activity Hours per Day spent Kayaking by Camping Respondents	N.A.	N.A.	N.A.	N.A.	N.A.
Average Activity Hours per Day spent Biking by Camping Respondents	0.79	0.43	0.47	0.47	0.03
Average Activity Hours per Day spent Hiking by Camping Respondents	1.31	1.07	1.07	1.23	0.08
Average Activity Hours per Day spent on Other activities by Camping Respondents	1.40	1.33	0.73	0.06	0.11
Total Activity Hours per Day by Camping Respondents	8.95	7.73	10.31	10.38	10.96
Total Activity Hours per Day spent on Non-Camping Activities by Camping Respondents	8.95	7.73	10.31	10.38	10.96

Activity Hours per Day by Day Use Respondents per Site

Hours per day spent by day use respondents participating in activities at all sites ranged from 3.50 hours at Prosser Reservoir to 5.42 hours at Pyramid Lake. Activities of day use respondents also varied among all sites from that of picnicking, fishing, swimming, boating, fishing from boat, water skiing, jet skiing, biking, hiking, and other activities.

The average activity hours per day by day use respondents are shown in Table 7.1-16. At Donner Lake, day use respondents spent 4.92 hours per day participating in activities including picnicking, fishing, swimming, and other. At Prosser Reservoir, day use respondents spent 3.50 hours per day participating in activities including fishing and fishing from boat. At Boca Reservoir, day use respondents spent 4.28 hours per day participating in activities including picnicking, fishing, swimming, and jet skiing. At Pyramid Lake, day use respondents spent 5.42 hours per day participating in activities including picnicking, swimming, boating, water skiing, and jet skiing.

Table 7.1-16. Activity Hours per Day by Day Use Respondents per Site.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Pyramid Lake
Average Activity Hours per Day spent Picnicking by Day Use Respondents	1.51	0.00	N.A.	1.02	0.92
Average Activity Hours per Day spent Camping by Day Use Respondents	N.A.	N.A.	N.A.	N.A.	N.A.
Average Activity Hours per Day spent Fishing by Day Use Respondents	0.37	2.00	N.A.	0.95	0.02
Average Activity Hours per Day spent Swimming by Day Use Respondents	1.15	0.00	N.A.	0.38	1.31
Average Activity Hours per Day spent Boating by Day Use Respondents	0.34	0.00	N.A.	0.07	0.62
Average Activity Hours per Day spent Fishing from Boat by Day Use Respondents	0.05	1.50	N.A.	0.07	0.00
Average Activity Hours per Day spent Water Skiing by Day Use Respondents	0.22	0.00	N.A.	0.29	0.96
Average Activity Hours per Day spent Jet Skiing by Day Use Respondents	0.24	0.00	N.A.	1.14	1.43
Average Activity Hours per Day spent Rafting by Day Use Respondents	N.A.	N.A.	N.A.	N.A.	N.A.
Average Activity Hours per Day spent Kayaking by Day Use Respondents	N.A.	N.A.	N.A.	N.A.	N.A.
Average Activity Hours per Day spent Biking by Day Use Respondents	0.27	0.00	N.A.	0.00	0.03
Average Activity Hours per Day spent Hiking by Day Use Respondents	0.15	0.00	N.A.	0.07	0.03
Average Activity Hours per Day spent on Other activities by Day Use Respondents	0.62	0.00	N.A.	0.29	0.10
Total Activity Hours per Day by Day Use Respondents	4.92	3.50	N.A.	4.28	5.42

Indicated Number of Visits by Respondents at Alternative Water Levels per Site

Respondents, at all sites not including Pyramid Lake, indicated more visits at higher water levels and less visits at lower water levels.

The indicated average number of visits by respondents at alternative water levels are presented in Table 7.1-17.

Alternative water levels are 1 for the highest and either 5 or 11 for the lowest. At Donner Lake, water level 1 is 9,660 acre-feet or maximum storage and water level 5 is 5,796 acre-feet or minimum storage for June, July, and August. At Prosser Reservoir, water level 1 is 29,840 acre-feet or maximum storage and water level 11 is 0 acre-feet or no storage. At Stampede Reservoir, water level 1 is 226,000 acre-feet or maximum storage and water level 11 is 0 acre-feet or no storage. At Boca Reservoir, water level 1 is 40,870 acre-feet or maximum storage and water level 11 is 0 acre-feet or no storage.

Given the alternative water levels, the number of visits by respondents vary accordingly. At Donner Lake, respondents indicated 3.11 visits at water level 1 to 2.57 visits at water level 5. At Prosser Reservoir, respondents indicated 3.03 visits at water level 1 to .25 visits at water level 11. At Stampede Reservoir, respondents indicated 3.08 visits at water level 1 to .48 visits at water level 11. At Boca Reservoir, respondents indicated 5.55 visits at water level 1 to .26 visits at water level 11.

Assuming that there is 100% visitation at alternative water level 1, the average number of visits by respondents at other water levels are also provided in relative percentage terms. At Donner Lake, visitation drops from 100% at water level 1 to 83% at water level 5. At Prosser Reservoir, visitation holds constant at 100% for water levels 1 and 2 and then drops to 8% at water level 11. At Stampede Reservoir, visitation drops from 100% at water level 1 to 16% at water level 11. At Boca Reservoir, visitation holds constant at 100% for water levels 1 and 2 and then drops to 5% at water level 11.

Table 7.1-17. Indicated Number of Visits by Respondents at Alternative Water Levels per Site.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Acre-Feet of Storage at Alternative Water Level 1	9,660	29,840	226,500	40,870
Acre-Feet of Storage at Alternative Water Level 2	8,694	26,856	203,850	36,783
Acre-Feet of Storage at Alternative Water Level 3	7,728	23,872	181,200	32,696
Acre-Feet of Storage at Alternative Water Level 4	6,762	20,888	158,550	28,609
Acre-Feet of Storage at Alternative Water Level 5	5,796	17,904	135,900	24,522
Acre-Feet of Storage at Alternative Water Level 6		14,920	113,250	20,435
Acre-Feet of Storage at Alternative Water Level 7		11,936	90,600	16,348
Acre-Feet of Storage at Alternative Water Level 8		8,952	67,950	12,261
Acre-Feet of Storage at Alternative Water Level 9		5,968	45,300	8,174
Acre-Feet of Storage at Alternative Water Level 10		2,984	22,650	4,087
Acre-Feet of Storage at Alternative Water Level 11		0	0	0
Average Number of Visits by Respondents at Alternative Water Level 1	3.11	3.03	3.08	5.55
Average Number of Visits by Respondents at Alternative Water Level 2	3.07	3.03	3.02	5.55
Average Number of Visits by Respondents at Alternative Water Level 3	2.94	2.94	2.94	5.06
Average Number of Visits by Respondents at Alternative Water Level 4	2.72	2.78	2.77	4.68
Average Number of Visits by Respondents at Alternative Water Level 5	2.57	2.59	2.61	4.03
Average Number of Visits by Respondents at Alternative Water Level 6		2.50	2.47	3.68
Average Number of Visits by Respondents at Alternative Water Level 7		2.16	1.88	2.90
Average Number of Visits by Respondents at Alternative Water Level 8		2.06	1.84	2.81
Average Number of Visits by Respondents at Alternative Water Level 9		0.47	0.63	1.84
Average Number of Visits by Respondents at Alternative Water Level 10		0.25	0.55	1.29
Average Number of Visits by Respondents at Alternative Water Level 11		0.25	0.48	0.26
Percentage of Visitation of Respondents at Alternative Water Level 1	100.00%	100.00%	100.00%	100.00%
Percentage of Visitation of Respondents at Alternative Water Level 2	98.71%	100.00%	98.05%	100.00%
Percentage of Visitation of Respondents at Alternative Water Level 3	94.53%	97.03%	95.45%	91.17%
Percentage of Visitation of Respondents at Alternative Water Level 4	87.46%	91.75%	89.94%	84.32%
Percentage of Visitation of Respondents at Alternative Water Level 5	82.64%	85.48%	84.74%	72.61%
Percentage of Visitation of Respondents at Alternative Water Level 6		82.51%	80.19%	66.31%
Percentage of Visitation of Respondents at Alternative Water Level 7		71.29%	61.04%	52.25%
Percentage of Visitation of Respondents at Alternative Water Level 8		67.99%	59.74%	50.63%
Percentage of Visitation of Respondents at Alternative Water Level 9		15.51%	20.45%	33.15%
Percentage of Visitation of Respondents at Alternative Water Level 10		8.25%	17.86%	23.24%
Percentage of Visitation of Respondents at Alternative Water Level 11		8.25%	15.58%	4.68%

Site Substitution of Respondents per Site

A high number of respondents indicated that they would substitute an alternative site for their preferred site when they could no longer visit their preferred site because of water level.

Site substitution of respondents per site is shown in Table 7.1-18. The number of respondents that indicated site substitution are 57 at Donner Lake, 27 at Prosser Reservoir, 53 at Stampede Reservoir, 28 at Boca Reservoir, and, 66 at Pyramid Lake. For respondents at Donner Lake, site substitution to Lake Tahoe is 41%, to Prosser Reservoir is 3%, to Stampede Reservoir is 11%, to Boca Reservoir is 3%, to Pyramid Lake is 3%, and, to Other Sites is 38%. For respondents at Prosser Reservoir, site substitution to Donner Lake is 38%, to Stampede Reservoir is 19%, to Pyramid Lake is 8%, and, to Other Sites is 35%. For respondents at Stampede Reservoir, site substitution to Lake Tahoe is 4%, to Donner Lake is 30%, to Prosser Reservoir is 3%, to Boca Reservoir is 1%, to Pyramid Lake is 10%, and, to Other Sites is 51%. For respondents at Boca Reservoir, site substitution to Lake Tahoe is 6%, to Donner Lake is 35%, to Prosser Reservoir is 4%, to Stampede Reservoir is 21%, to Pyramid Lake is 21%, and, to Other Sites is 13%. For respondents at Pyramid Lake, site substitution to Lake Tahoe is 19%, to Donner Lake is 30%, to Stampede Reservoir is 9%, to Boca Reservoir is 17%, and, to Other Sites is 25%. Other Sites are located outside the Truckee River Basin.

Table 7.1-18. Site Substitution of Respondents per Site.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Pyramid Lake
Number of Respondents indicating Site Substitution	57	27	53	28	66
Percentage of Respondents indicating Site Substitution	68.70%	84.40%	82.90%	90.30%	93.00%
Number of Respondents indicating Site Substitution to Lake Tahoe	25	0	3	3	17
Number of Respondents indicating Site Substitution to Upper Truckee River	0	0	0	0	0
Number of Respondents indicating Site Substitution to Donner Lake	N.A.	14	21	18	27
Number of Respondents indicating Site Substitution to Prosser Reservoir	2	N.A.	2	2	0
Number of Respondents indicating Site Substitution to Stampede Reservoir	7	7	N.A.	11	8
Number of Respondents indicating Site Substitution to Boca Reservoir	2	0	1	N.A.	15
Number of Respondents indicating Site Substitution to Lower Truckee River	0	0	0	0	0
Number of Respondents indicating Site Substitution to Pyramid Lake	2	3	7	11	N.A.
Number of Respondents indicating Site Substitution to Other Sites /1	23	13	36	7	22
Percentage of Site Substitution to Lake Tahoe	40.98%	0.00%	4.29%	5.77%	19.10%
Percentage of Site Substitution to Upper Truckee River	0.00%	0.00%	0.00%	0.00%	0.00%
Percentage of Site Substitution to Donner Lake	0.00%	37.84%	30.00%	34.62%	30.34%
Percentage of Site Substitution to Prosser Reservoir	3.28%	0.00%	2.86%	3.85%	0.00%
Percentage of Site Substitution to Stampede Reservoir	11.48%	18.92%	0.00%	21.15%	8.99%
Percentage of Site Substitution to Boca Reservoir	3.28%	0.00%	1.43%	0.00%	16.85%
Percentage of Site Substitution to Lower Truckee River	0.00%	0.00%	0.00%	0.00%	0.00%
Percentage of Site Substitution to Pyramid Lake	3.28%	8.11%	10.00%	21.15%	0.00%
Percentage of Site Substitution to Other Sites /1	37.70%	35.14%	51.43%	13.46%	24.72%

1. Other sites are located outside the Truckee River Basin.

Willingness of Respondents to Pay to Maintain Water Level per Site

Respondents at Pyramid Lake show a greater willingness to pay not to have the water level drop than do respondents at any other site.

The willingness to pay information is provided in Table 7.1-19. At Donner Lake, with 34% of respondents indicating a "Zero" response, the average value for respondents is $16.97. At Prosser Reservoir, with 47% of the respondents indicating a "Zero" response, the average value for respondents is $16.58. At Stampede Reservoir, with 42% of the respondents indicating a "Zero" response, the average value for respondents is $14.68. At Boca Reservoir, with 19% of the respondents indicating a "Zero" response, the average value for respondents is $18.85. At Pyramid Lake, with 15% of the respondents indicating a "Zero" response, the average value for respondents is $25.63.

Table 7.1-19. Willingness of Respondents to Pay to Maintain Water Level per Site.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Pyramid Lake
Average Value for Respondents	$16.97	$16.58	$14.68	$18.85	$25.63
Percentage of Respondents indicating a "Zero" Response	33.73%	46.88%	42.19%	19.35%	15.49%
Average Value for Local Respondents	N.A.	N.A.	N.A.	N.A.	N.A.
Average Value for Non-Local Respondents	N.A.	N.A.	N.A.	N.A.	N.A.

Age Brackets of Respondents

The greatest number of respondents were between 31 and 50 years of age.

Presented in Table 7.1-20 are the age brackets with corresponding number of respondents and percentage of respondents. Of the 281 respondents, 1% were under 16 years of age, 4% were between 16 and 20 years of age, 15% were between 21 and 30 years of age, 34% were between 31 and 40 years of age, 28% were between 41 and 50 years of age, 10% were between 51 and 60 years of age, 7% were between 61 and 70 years of age, and 2% were over 70 years of age.

Table 7.1-20. Age Brackets of Respondents.

	Study Area
Number of Respondents under 16 Years of Age	2
Number of Respondents between 16 - 20 Years of Age	10
Number of Respondents between 21 - 30 Years of Age	41
Number of Respondents between 31 - 40 Years of Age	96
Number of Respondents between 41 - 50 Years of Age	78
Number of Respondents between 51 - 60 Years of Age	29
Number of Respondents between 61 - 70 Years of Age	20
Number of Respondents over 70 Years of Age	5
Percentage of Respondents under 16 Years of Age	0.71%
Percentage of Respondents between 16 - 20 Years of Age	3.56%
Percentage of Respondents between 21 - 30 Years of Age	14.59%
Percentage of Respondents between 31 - 40 Years of Age	34.16%
Percentage of Respondents between 41 - 50 Years of Age	27.76%
Percentage of Respondents between 51 - 60 Years of Age	10.32%
Percentage of Respondents between 61 - 70 Years of Age	7.12%
Percentage of Respondents over 70 Years of Age	1.78%

Education Levels of Respondents

The greatest number of respondents held a college level of education.

Provided in Table 7.1-21 are the education levels with corresponding number of respondents and percentage of respondents. Of only 280 respondents, 1% held a elementary school level of education, 24% held a high school level of education, 10% held a technical school level of education, 25% held a 2 years of college level of education, 25% held a 4 years of college level of education, and 15% held over 4 years of college level of education.

Table 7.1-21. Education Levels of Respondents.

	Study Area
Number of Respondents with a Elementary School Level of Education	2
Number of Respondents with a High School Level of Education	68
Number of Respondents with a Technical School Level of Education	28
Number of Respondents with a 2 Years of College Level of Education	70
Number of Respondents with a 4 Years of College Level of Education	69
Number of Respondents with a Over 4 Years of College Level of Education	43
Percentage of Respondents with a Elementary School Level of Education	0.71%
Percentage of Respondents with a High School Level of Education	24.29%
Percentage of Respondents with a Technical School Level of Education	10.00%
Percentage of Respondents with a 2 Years of College Level of Education	25.00%
Percentage of Respondents with a 4 Years of College Level of Education	24.64%
Percentage of Respondents with a Over 4 Years of College Level of Education	15.36%

Household Income Levels of Respondents

The greatest number of respondents had a household income level of $26,000 to $75,000 per year.

Shown in Table 7.1-22 are the household income levels with corresponding number of respondents and percentage of respondents. Of only 262 respondents, 2% had a household income level below $10,000 per year, 11% had a household income level of $10,000 to $25,000 per year, 38% had a household income level of $26,000 to $50,000 per year, 27% had a household income level of $51,000 to $75,000 per year, 13% had a household income level of $76,000 to $100,000 per year, and 9% had a household income level of over $100,000 per year.

Table 7.1-22. Household Income Levels of Respondents.

	Study Area
Number of Respondents with a Household Income Level Below $10,000 per Year	5
Number of Respondents with a Household Income Level of $10,000 - $25,000 per Year	28
Number of Respondents with a Household Income Level of $26,000 - $50,000 per Year	100
Number of Respondents with a Household Income Level of $51,000 - $75,000 per Year	71
Number of Respondents with a Household Income Level of $76,000 - $100,000 per Year	35
Number of Respondents with a Household Income Level of Over $100,000 per Year	23
Percentage of Respondents with a Household Income Level Below $10,000 per Year	1.91%
Percentage of Respondents with a Household Income Level of $10,000 - $25,000 per Year	10.69%
Percentage of Respondents with a Household Income Level of $26,000 - $50,000 per Year	38.17%
Percentage of Respondents with a Household Income Level of $51,000 - $75,000 per Year	27.10%
Percentage of Respondents with a Household Income Level of $76,000 - $100,000 per Year	13.36%
Percentage of Respondents with a Household Income Level of Over $100,000 per Year	8.78%

7.2. Estimation of the Expenditure Function

Expenditures of camping and day use visitors at each of the sites are calculated using an expenditure function. Specification of the expenditure function and estimation of the expenditure function are as follows.

Specification of the Expenditure Function

The expenditure function is an important ingredient of the modern theory of consumer behavior. It shows the minimal expenditures necessary to achieve a given utility level for a particular set of prices. The properties of the expenditure function in the areas of theoretical and applied analysis of consumer behavior are developed in the studies by Barton and Bohm (1982), Deaton and Muelbauer (1980), Hicks (1946), Samuelson (1947), Silberberg (1978), Theil (1975), and Varian (1992). Let E (P, U) be an expenditure function, where P is a vector of commodity prices and U is a given level of utility. The expenditure function is the solution to the following problem:

$$E(P, U) = \text{Min } PX \quad \text{such that } U(X) \geq U \tag{7.2-1}$$

where X is a vector of non-negative quantities of goods. The solution to this optimization problem is the expenditure function that gives the minimum cost of achieving the fixed level of utility. For the expenditure function E (P, U) to be well behaved, it must have the following properties: (i) E (P, U) is non decreasing in P, (ii) E (P, U) is homogeneous of the degree 1 in P, (iii) E (P, U) is concave in P, (iv) E (P, U) is continuous in P, for $P > 0$, and (iv) if X (P, U) is the expenditure-minimizing bundle necessary to achieve utility level U at prices P, then $X(P, U) = \delta E(P, U) / \delta P$ assuming the derivative exists and that $P > 0$.

The application of the expenditure function in empirical studies of consumer behavior requires the availability of observed market prices on goods and the existence of a well-behaved utility function. In the area of demand for recreation activities, there are no market-based transactions to determine observed market prices. Consequently, the notion of a regular utility function has to be modified in developing the expenditure function for the recreation activities. Let F be a vector of the time spent on a series of recreational activities by an individual at a particular site. The indirect utility function V for recreational activities for this individual is:

$$V = V(F, S, I) \tag{7.2-2}$$

where S is a vector of site characteristics that captures the substitutability of visits across various sites and I is the total budget allocated by an individual to participate in all the recreational activities included in F. The expenditure function E dual to the indirect utility function in (7.2-2) is the minimum expenditure required for the individual to participate in all the recreational activities in F, given the site characteristics in S. The expenditure function E derived from (7.2-2) is:

$$E = I = V^{-1}(F, S) \tag{7.2-3}$$

The expenditure function in (7.2-3) can also be modified to include the variable of the total number of visitors to the site. Let N be the total number of visitors. Then the expenditures function is:

$$E = V^{-1} (F, S, N) \qquad (7.2\text{-}4)$$

The specification of the expenditure function in (7.2-4) is an empirical issue and it could be determined upon a estimation model selection technique, e.g., the Box-Cox estimation technique. One notable feature of the expenditure function in (7.2-4) is that it can be used to estimate expenditures of recreational activities at a particular site.

The expenditure function in (7.2-4) is used to evaluate the expenditures of recreational activities at the following seven sites in California and Nevada: Upper Truckee River, Donner Lake, Prosser Reservoir, Stampede Reservoir, Boca Reservoir, Lower Truckee River, and Pyramid Lake. The attributes of the characteristics of each site are captured by including dummy variable for each site in S. The definition of the dummy variables included in S are: UTR = 1 if the visitation site is Upper Truckee River and 0 otherwise; DL = 1 if the visitation site is Donner Lake and 0 otherwise; PR = 1 if the visitation site is Prosser Reservoir and 0 otherwise; SR = 1 if the visitation site is Stampede Reservoir and 0 otherwise; BR = 1 if the visitation site is Boca Reservoir and 0 otherwise; LTR = 1 if the visitation site is Lower Truckee River and 0 otherwise; and, PL = 1 if the visitation site is Pyramid Lake and 0 otherwise. The hours spent on each of the following eleven recreational activities are included in F. The activities were determined according to their availability and popularity at the sites. The activities are: picnicking, camping, fishing, swimming, boating, fishing from boat, water skiing, jet skiing, rafting, kayaking, biking, hiking, and other activities. To capture the effect of the type of visitor at a given site on their expenditures, i.e., camping versus day use, a dummy variable D, defined as D = 1 if camping visitor and 0 if day use visitor, is included in the expenditure function in (7.2-4). Following the categorization of expenditures on the recreation survey, the expenditures by a visitor to a given site are identified as licenses, camping fees, hotel or motel, restaurant, groceries, equipment and supplies, rental, fuel, and other. Using the above specification of the variables, the expenditure function in (7.2-4) can now be presented as:

$$E_i = V^{-1} \left(UTR, DL, PR, SR, BR, LTR, PL, D, \sum_{1}^{13} F_j, N \right); i = 1,.....,7 \qquad (7.2\text{-}5)$$

The functional form specification of the expenditure function in (7.2-5) is an empirical issue and it will be determined using the Box-Cox flexible functional form technique. The Box-Cox specification of the expenditure function in (7.2-5) is:

$$\frac{E_i^{\lambda} - 1}{\lambda} = \beta_1 UTR + \beta_2 DL + \beta_3 PR + \beta_4 SR + \beta_5 BR + \beta_6 LTR + \beta_7 PL + \beta_8 D \quad (7.2\text{-}6)$$

$$+ \sum_{9}^{21} \beta_j \left(\frac{F_j^{\lambda} - 1}{\lambda} \right) + \beta_{22} \left(\frac{N^{\lambda} - 1}{\lambda} \right) + U$$

where U is the stochastic error term, β is the slope parameter, and λ is the transformation parameter. The transformation parameter may take a wide range of values that would determine the particular functional form that the variable subject to the Box-Cox transformation will assume. For example, one gets a logarithmic transformation for a variable if λ is equal to zero. All of the coefficients of the expenditure function in (7.2-5), including λ, will be estimated using the estimation of the following log-likelihood function:

$$L(\lambda, \beta, \sigma^2; E, X) = -\frac{T}{2} \text{Ln}(2\pi\sigma^2) - \frac{1}{2\sigma^2} (E^{\lambda} - X^{\lambda}B)' (E^{\lambda} - X^{\lambda}B) \quad (7.2\text{-}7)$$

$$+ \text{Ln}(J); \text{ and } J = \det \left[\frac{\partial E^{\lambda}}{\partial E} \right] = \prod_{t=1}^{T} E_t^{\lambda - 1}$$

where X is a vector of observations on all the exogenous variables, B is a vector of all the slope parameters to be estimated, and T is the number of observations.

Estimation of the Expenditure Function

The data collected through the recreation survey for the seven sites is used to estimate the expenditure function in (7.2-6). A total number of 432 out of the 443 complete questionnaires are used in the estimation. The initial diagnosis of the data revealed that there are a large number of zeros on most of the recreational activities and a number of expenditure categories making the estimation of the expenditure function in its generalized form in (7.2-6) impossible. A number of alternatives to combine some of the recreational activities are tried to estimate a modified form of the expenditure function in (7.2-6). All of these attempts resulted into some difficulties in estimation of the expenditure function in (7.2-6).

The final modified form of the expenditure function in (7.2-6) that provides meaningful estimation results is:

$$\frac{E^{\lambda}-1}{\lambda} = \beta_1 UTR + \beta_2 DL + \beta_3 PR + \beta_4 SR + \beta_5 BR + \beta_6 LTR + \beta_7 PL + \beta_8 D \qquad (7.2\text{-}8)$$

$$+ \beta_9 \left(\frac{F^{\lambda}-1}{\lambda}\right) + \beta_{10} \left(\frac{N^{\lambda}-1}{\lambda}\right) + U$$

The expenditure function expressed in simple notation becomes:

$$LnE = \beta_1 UTR + \beta_2 DL + \beta_3 PR + \beta_4 SR + \beta_5 BR + \beta_6 LTR + \beta_7 PL + \beta_8 D \qquad (7.2\text{-}9)$$

$$+ \beta_9 LnF + \beta_{10} LnN + U$$

where E is the sum of the nine expenditure categories per day, F is the sum of the hours spent per day by a visitor on the thirteen categories of recreational activities, and N is the group size. The Ln is an abbreviation for natural logarithm.

Using the survey observations on the variables E, F, N, the seven location dummy variables, and the type of visitor dummy variable, the expenditure function in (7.2-8) or (7.2-9) is estimated having the following results.

$$\begin{aligned} LnE = {} & 3.5638UTR + 2.7958DL + 2.8436PR + 3.0767SR + 3.0267BR \\ & (11.44) \quad (11.07) \quad (8.43) \quad (11.42) \quad (11.93) \\ & + 2.8453LTR + 3.0900PL - 0.2791D + 0.1653LnF + 0.3388LnN \\ & (7.85) \quad (13.45) \quad (-1.98) \quad (1.43) \quad (4.30) \end{aligned} \tag{7.2-10}$$

The numbers in the parentheses are the asymptotic t-ratios for 422 degrees of freedom. The adjusted R^2 is 0.0659 for the 432 observations. The 443 observations were edited down to 432. Observations that were deleted were observations having a zero for total expenditures, or a zero for total recreation activity hours, or a zero for group size. The camping and day use visitor expenditure function observations are given in Table 7.2-1.

The maximum likelihood (ML) ratio test is then used to check the validity of alternative functional specifications of the expenditure function for specific value of λ, i.e., logarithmic ($\lambda = 0$) and linear ($\lambda = 1$) functional forms. Let S denote the parameter space under the Box-Cox specification and s denote the subspace of S restricted by the null hypothesis (H^o). The ML ratio test to test for a given functional form under H^o is a large sample test and can be conducted as follows:

$$d = -2 [L(S) - L(s)] \tag{7.2-11}$$

where L (S) is the maximum of the log likelihood function under S and L (s) is the maximum value of the log likelihood function under s. If H^o is true, the statistic d has the limiting chi-squared (χ^2) with n degrees of freedom, where n is the number of restrictions imposed by H^o.

The maximum likelihood estimation of λ in (7.2-8) is 0.07 with the maximum of the log likelihood function L(S) of – 803.568. Using estimates of the maximum log likelihood function of λ, L(s) for the logarithmic and linear specifications of the expenditure function, the test statistic in (7.2-11) is calculated. The test results provide evidence to accept H^o: $\lambda = 0$ and to reject H^o: $\lambda = 1$ against the alternative hypothesis that H^o: $\lambda = 0.07$. In other words, the final functional specification of the expenditure function is in logarithmic functional form.

The estimated expenditure function predicts the logarithm of the average expenditures per day at a particular site for both camping and day use visitors for given values of the logarithm of their hours of non-camping recreation activity and the logarithm of their group size. Then the average expenditures per day are determined by taking the anti-log of the logarithm of the average expenditures. This procedure is shown below by site.

Upper Truckee River

Camping Visitor Group Expenditures per Day

$$LnE = 3.5638(1) + 2.7958(0) + 2.8436(0) + 3.0767(0) + 3.0267(0)$$

$$+ 2.8453(0) + 3.0900(0) - 0.2791(1) + 0.1653Ln(5.50) + 0.3388Ln(3.47)$$

$$LnE = 3.5638 - 0.2791 + 0.1653(1.70) + 0.3388(1.24)$$

$$LnE = 3.9881$$

$$E = \$53.95$$

Day Use Visitor Group Expenditures per Day

$$LnE = 3.5638(1) + 2.7958(0) + 2.8436(0) + 3.0767(0) + 3.0267(0)$$

$$+ 2.8453(0) + 3.0900(0) - 0.2791(0) + 0.1653Ln(3.00) + 0.3388Ln(5.50)$$

$$LnE = 3.5638 + 0.1653(1.10) + 0.3388(1.70)$$

$$LnE = 4.3231$$

$$E = \$75.42$$

Donner Lake

Camping Visitor Group Expenditures per Day

LnE = 3.5638(0) + 2.7958(1) +2.8436(0) + 3.0767(0) + 3.0267(0)

+ 2.8453(0) + 3.0900(0) – 0.2791(1) + 0.1653Ln(8.29) + 0.3388Ln(5.24)

LnE = 2.7958 – 0.2791 + 0.1653(2.12) + 0.3388(1.66)

LnE = 3.4276

E = $30.80

Day Use Visitor Group Expenditures per Day

LnE = 3.5638(0) + 2.7958(1) + 2.8436(0) + 3.0767(0) + 3.0267(0)

+ 2.8453(0) + 3.0900(0) – 0.2791(0) + 0.1653Ln(4.87) + 0.3388Ln(4.98)

LnE = 2.7958 + 0.1653(1.58) + 0.3388(1.61)

LnE = 3.6014

E = $36.65

Prosser Reservoir

Camping Visitor Group Expenditures per Day

$$LnE = 3.5638(0) + 2.7958(0) + 2.8436(1) + 3.0767(0) + 3.0267(0)$$

$$+ 2.8453(0) + 3.0900(0) - 0.2791(1) + 0.1653Ln(7.67) + 0.3388Ln(3.73)$$

$$LnE = 2.8436 - 0.2791 + 0.1653(2.04) + 0.3388(1.32)$$

$$LnE = 3.3473$$

$$E = \$28.43$$

Day Use Visitor Group Expenditures per Day

$$LnE = 3.5638(0) + 2.7958(0) + 2.8436(1) + 3.0767(0) + 3.0267(0)$$

$$+ 2.8453(0) + 3.0900(0) - 0.2791(0) + 0.1653Ln(3.38) + 0.3388Ln(3.13)$$

$$LnE = 2.8436 + 0.1653(1.22) + 0.3388(1.14)$$

$$LnE = 3.4316$$

$$E = \$30.93$$

Stampede Reservoir

Camping Visitor Group Expenditures per Day

$$LnE = 3.5638(0) + 2.7958(0) + 2.8436(0) + 3.0767(1) + 3.0267(0)$$

$$+ 2.8453(0) + 3.0900(0) - 0.2791(1) + 0.1653Ln(7.82) + 0.3388Ln(5.12)$$

$$LnE = 3.0767 - 0.2791 + 0.1653(2.06) + 0.3388(1.63)$$

$$LnE = 3.6909$$

$$E = \$40.08$$

Day Use Visitor Group Expenditures per Day

$$LnE = 3.5638(0) + 2.7958(0) + 2.8436(0) + 3.0767(1) + 3.0267(0)$$

$$+ 2.8453(0) + 3.0900(0) - 0.27913(0) + 0.1653Ln(5.67) + 0.3388Ln(3.89)$$

$$LnE = 3.0767 + 0.1653(1.74) + 0.3388(1.36)$$

$$LnE = 3.8238$$

$$E = \$45.78$$

Boca Reservoir

Camping Visitor Group Expenditures per Day

$$LnE = 3.5638(0) + 2.7958(0) + 2.8436(0) + 3.0767(0) + 3.0267(1)$$

$$+ 2.8453(0) + 3.0900(0) - 0.2791(1) + 0.1653Ln(7.83) + 0.3388Ln(5.10)$$

$$LnE = 3.0267 - 0.27913 + 0.1653(2.05) + 0.3388(1.63)$$

$$LnE = 3.6398$$

$$E = \$38.09$$

Day Use Visitor Group Expenditures per Day

$$LnE = 3.5638(0) + 2.7958(0) + 2.8436(0) + 3.0767(0) + 3.0267(1)$$

$$+ 2.8453(0) + 3.0900(0) - 0.2791(0) + 0.1653Ln(5.24) + 0.3388Ln(5.02)$$

$$LnE = 3.0267 + 0.1653(1.66) + 0.3388(1.61)$$

$$LnE = 3.8472$$

$$E = \$46.86$$

Lower Truckee River

Camping Visitor Group Expenditures per Day

$$LnE = 3.5638(0) + 2.7958(0) + 2.8436(0) + 3.0767(0) + 3.0267(0)$$

$$+ 2.8453(1) + 3.0900(0) - 0.2791(1) + 0.1653Ln(3.00) + 0.3388Ln(2.00)$$

$$LnE = 2.8453 - 0.2791 + 0.1653(1.10) + 0.3388(0.69)$$

$$LnE = 2.9827$$

$$E = \$19.74$$

Day Use Visitor Group Expenditures per Day

$$LnE = 3.5638(0) + 2.7958(0) + 2.8436(0) + 3.0767(0) + 3.0267(0)$$

$$+ 2.8453(1) + 3.0900(0) - 0.2791(0) + 0.1653Ln(3.96) + 0.3388Ln(2.29)$$

$$LnE = 2.8453 + 0.1653(1.38) + 0.3388(0.83)$$

$$LnE = 3.3536$$

$$E = \$28.60$$

Pyramid Lake

Camping Visitor Group Expenditures per Day

$$LnE = 3.5638(0) + 2.7958(0) + 2.8436(0) + 3.0767(0) + 3.0267(0)$$

$$+ 2.8453(0) + 3.0900(1) - 0.2791(1) + 0.1653Ln(8.20) + 0.3388Ln(4.72)$$

$$LnE = 3.0900 - 0.2791 + 0.1653(2.10) + 0.3388(1.55)$$

$$LnE = 3.6845$$

$$E = \$39.83$$

Day Use Visitor Group Expenditures per Day

$$LnE = 3.5638(0) + 2.7958(0) + 2.8436(0) + 3.0767(0) + 3.0267(0)$$

$$+ 2.8453(0) + 3.0900(1) - 0.2791(0) + 0.1653Ln(5.74) + 0.3388Ln(5.92)$$

$$LnE = 3.0900 + 0.1653(1.75) + 0.3388(1.78)$$

$$LnE = 3.9815$$

$$E = \$53.60$$

The above camping and day use visitor expenditure function values are presented by site in Table 7.2-2.

Table 7.2-1. Camping and Day Use Visitor Expenditure Function Observations.

Observation Number	Year	Site	Questionnaire Number	Visitor Type	Expenditures	Number of Days	Expenditures per Day	Upper Truckee River UTR	Donner Lake DL	Prosser Reservoir PR	Stampede Reservoir SR	Boca Reservoir BR	Lower Truckee River LTR	Pyramid Lake PL	Camping Visitor	Activity Hours	Group Size
1	1993	UTR	1	CP	267.00	7.0	38.14	1	0	0	0	0	0	0	1	2.5	4.0
2	1993	UTR	2	CP	240.00	10.0	24.00	1	0	0	0	0	0	0	1	6.0	4.0
3	1993	UTR	3	CP	100.00	2.0	50.00	1	0	0	0	0	0	0	1	3.0	4.0
4	1993	UTR	4	CP	290.00	2.0	145.00	1	0	0	0	0	0	0	1	6.0	4.0
5	1993	UTR	5	CP	183.50	3.0	61.17	1	0	0	0	0	0	0	1	5.0	2.0
6	1993	UTR	6	CP	83.00	7.0	11.86	1	0	0	0	0	0	0	1	8.0	2.0
7	1993	UTR	7	CP	50.00	1.0	50.00	1	0	0	0	0	0	0	1	2.0	6.0
8	1993	UTR	8	CP	71.00	1.0	71.00	1	0	0	0	0	0	0	1	7.0	4.0
9	1993	UTR	9	CP	36.00	3.0	12.00	1	0	0	0	0	0	0	1	2.0	4.0
10	1993	UTR	10	CP	198.00	5.0	39.60	1	0	0	0	0	0	0	1	8.0	2.0
11	1993	UTR	11	CP	78.00	2.0	39.00	1	0	0	0	0	0	0	1	2.0	4.0
12	1993	UTR	12	CP	223.00	4.0	55.75	1	0	0	0	0	0	0	1	11.0	6.0
13	1993	UTR	13	CP	290.00	14.0	20.71	1	0	0	0	0	0	0	1	14.0	2.0
14	1993	UTR	14	CP	75.00	1.0	75.00	1	0	0	0	0	0	0	1	4.0	2.0
15	1993	UTR	15	CP	317.00	10.0	31.70	1	0	0	0	0	0	0	1	2.0	2.0
16	1993	UTR	1	DU	450.00	0.0	450.00	1	0	0	0	0	0	0	0	3.0	7.0
17	1993	UTR	2	DU	540.00	0.0	540.00	1	0	0	0	0	0	0	0	3.0	4.0
18	1993	PR	1	DU	37.90	0.0	37.90	0	0	1	0	0	0	0	0	6.0	2.0
19	1993	PR	2	DU	54.00	0.0	54.00	0	0	1	0	0	0	0	0	2.0	1.0
20	1993	PR	3	DU	732.00	0.0	732.00	0	0	1	0	0	0	0	0	4.0	8.0
21	1993	PR	4	DU	268.00	0.0	268.00	0	0	1	0	0	0	0	0	3.0	5.0
22	1993	PR	5	DU	24.50	0.0	24.50	0	0	1	0	0	0	0	0	3.0	2.0
23	1993	PR	6	DU	623.00	0.0	623.00	0	0	1	0	0	0	0	0	2.0	2.0
24	1993	SR	1	CP	145.00	3.0	48.33	0	0	0	1	0	0	0	1	3.0	8.0
25	1993	SR	2	CP	66.00	3.0	22.00	0	0	0	1	0	0	0	1	8.0	4.0
26	1993	SR	3	CP	177.50	2.0	88.75	0	0	0	1	0	0	0	1	4.0	4.0
27	1993	SR	4	CP	137.00	2.0	68.50	0	0	0	1	0	0	0	1	2.0	2.0
28	1993	SR	5	CP	163.00	3.0	54.33	0	0	0	1	0	0	0	1	2.0	3.0
29	1993	SR	6	CP	180.00	3.0	60.00	0	0	0	1	0	0	0	1	9.0	7.0
30	1993	SR	7	CP	421.80	7.0	60.14	0	0	0	1	0	0	0	1	9.0	9.0
31	1993	SR	8	CP	110.90	2.0	55.45	0	0	0	1	0	0	0	1	7.0	2.0
32	1993	SR	9	CP	500.00	2.0	250.00	0	0	0	1	0	0	0	1	5.0	14.0
33	1993	SR	10	CP	239.00	3.0	79.67	0	0	0	1	0	0	0	1	4.0	8.0
34	1993	SR	11	CP	76.00	3.0	25.33	0	0	0	1	0	0	0	1	5.0	1.0
35	1993	SR	12	CP	56.00	2.0	28.00	0	0	0	1	0	0	0	1	5.0	2.0
36	1993	SR	13	CP	91.00	5.0	18.20	0	0	0	1	0	0	0	1	5.0	2.0
37	1993	SR	14	CP	325.00	4.0	81.25	0	0	0	1	0	0	0	1	5.0	2.0
38	1993	SR	15	CP	315.00	3.0	105.00	0	0	0	1	0	0	0	1	13.0	10.0
39	1993	SR	16	CP	312.00	2.0	156.00	0	0	0	1	0	0	0	1	8.0	5.0
40	1993	SR	17	CP	167.20	2.0	83.60	0	0	0	1	0	0	0	1	6.0	3.0
41	1993	SR	18	CP	76.00	1.0	76.00	0	0	0	1	0	0	0	1	1.5	2.0
42	1993	SR	19	CP	90.95	2.0	45.48	0	0	0	1	0	0	0	1	5.0	6.0
43	1993	SR	20	CP	722.00	10.0	72.20	0	0	0	1	0	0	0	1	12.0	19.0
44	1993	SR	21	CP	48.00	3.0	16.00	0	0	0	1	0	0	0	1	5.0	2.0
45	1993	SR	22	CP	239.00	8.0	29.88	0	0	0	1	0	0	0	1	3.0	4.0
46	1993	SR	23	CP	240.00	2.0	120.00	0	0	0	1	0	0	0	1	10.0	8.0
47	1993	SR	24	CP	266.00	7.0	38.00	0	0	0	1	0	0	0	1	6.5	5.0
48	1993	SR	25	CP	123.00	6.0	20.50	0	0	0	1	0	0	0	1	8.0	4.0
49	1993	SR	26	CP	169.00	6.0	28.17	0	0	0	1	0	0	0	1	2.0	2.0
50	1993	SR	27	CP	77.00	2.0	38.50	0	0	0	1	0	0	0	1	13.0	2.0
51	1993	SR	28	CP	199.00	2.0	99.50	0	0	0	1	0	0	0	1	4.0	12.0
52	1993	SR	29	CP	249.00	3.0	83.00	0	0	0	1	0	0	0	1	5.0	13.0
53	1993	SR	30	CP	90.00	2.0	45.00	0	0	0	1	0	0	0	1	5.0	2.0
54	1993	SR	31	CP	361.00	7.0	51.57	0	0	0	1	0	0	0	1	10.0	4.0
55	1993	SR	32	CP	65.50	5.0	13.10	0	0	0	1	0	0	0	1	5.0	2.0
56	1993	SR	33	CP	230.00	3.0	76.67	0	0	0	1	0	0	0	1	8.0	7.0
57	1993	SR	1	DU	43.00	0.0	43.00	0	0	0	1	0	0	0	0	3.0	4.0
58	1993	SR	2	DU	204.00	0.0	204.00	0	0	0	1	0	0	0	0	5.0	8.0
59	1993	SR	3	DU	15.00	0.0	15.00	0	0	0	1	0	0	0	0	4.0	4.0

Table 7.2-1. Camping and Day Use Visitor Expenditure Function Observations (continue).

Observation Number	Year	Site	Questionnaire Number	Visitor Type	Expenditures	Number of Days	Expenditures per Day	Upper Truckee River UTR	Donner Lake DL	Fronser Reservoir FR	Stampede Reservoir SR	Boca Reservoir BR	Lower Truckee River LTR	Pyramid Lake PL	Camping Visitor	Activity Hours	Group Size
60	1993	SR	4	DU	271.00	0.0	271.00	0	0	0	1	0	0	0	0	8.0	2.0
61	1993	SR	5	DU	158.00	0.0	158.00	0	0	0	1	0	0	0	0	5.0	2.0
62	1993	SR	6	DU	137.00	0.0	137.00	0	0	0	1	0	0	0	0	5.0	2.0
63	1993	SR	7	DU	60.00	0.0	60.00	0	0	0	1	0	0	0	0	10.0	4.0
64	1993	SR	8	DU	35.00	0.0	35.00	0	0	0	1	0	0	0	0	8.0	2.0
65	1993	SR	9	DU	150.00	0.0	150.00	0	0	0	1	0	0	0	0	5.0	7.0
66	1993	BR	1	CP	63.00	2.0	31.50	0	0	0	0	1	0	0	1	7.0	4.0
67	1993	BR	2	CP	175.00	10.0	17.50	0	0	0	0	1	0	0	1	3.0	2.0
68	1993	BR	3	CP	124.00	2.0	62.00	0	0	0	0	1	0	0	1	7.0	4.0
69	1993	BR	4	CP	100.00	14.0	7.14	0	0	0	0	1	0	0	1	4.0	4.0
70	1993	BR	1	DU	30.00	0.0	30.00	0	0	0	0	1	0	0	0	5.0	5.0
71	1993	BR	2	DU	60.00	0.0	60.00	0	0	0	0	1	0	0	0	6.0	9.0
72	1993	BR	3	DU	70.00	0.0	70.00	0	0	0	0	1	0	0	0	8.0	4.0
73	1993	BR	4	DU	30.00	0.0	30.00	0	0	0	0	1	0	0	0	4.0	2.0
74	1993	BR	5	DU	465.00	0.0	465.00	0	0	0	0	1	0	0	0	6.0	2.0
75	1993	BR	6	DU	110.00	0.0	110.00	0	0	0	0	1	0	0	0	2.0	18.0
76	1993	BR	7	DU	73.00	0.0	73.00	0	0	0	0	1	0	0	0	5.0	3.0
77	1993	BR	8	DU	30.00	0.0	30.00	0	0	0	0	1	0	0	0	2.0	2.0
78	1993	BR	9	DU	130.00	0.0	130.00	0	0	0	0	1	0	0	0	8.0	4.0
79	1993	BR	10	DU	10.00	0.0	10.00	0	0	0	0	1	0	0	0	6.0	18.0
80	1993	BR	11	DU	12.00	0.0	12.00	0	0	0	0	1	0	0	0	5.0	2.0
81	1993	BR	12	DU	12.00	0.0	12.00	0	0	0	0	1	0	0	0	5.0	4.0
82	1993	BR	13	DU	10.00	0.0	10.00	0	0	0	0	1	0	0	0	4.0	1.0
83	1993	BR	14	DU	46.50	0.0	46.50	0	0	0	0	1	0	0	0	5.0	2.0
84	1993	BR	15	DU	129.00	0.0	129.00	0	0	0	0	1	0	0	0	6.0	5.0
85	1993	BR	16	DU	41.00	0.0	41.00	0	0	0	0	1	0	0	0	8.0	3.0
86	1993	BR	17	DU	20.00	0.0	20.00	0	0	0	0	1	0	0	0	2.0	3.0
87	1993	BR	18	DU	32.00	0.0	32.00	0	0	0	0	1	0	0	0	3.0	6.0
88	1993	BR	19	DU	70.00	0.0	70.00	0	0	0	0	1	0	0	0	6.0	7.0
89	1993	BR	20	DU	25.00	0.0	25.00	0	0	0	0	1	0	0	0	3.0	6.0
90	1993	BR	21	DU	1910.00	0.0	1910.00	0	0	0	0	1	0	0	0	8.0	3.0
91	1993	BR	22	DU	42.50	0.0	42.50	0	0	0	0	1	0	0	0	5.0	2.0
92	1993	BR	23	DU	220.00	0.0	220.00	0	0	0	0	1	0	0	0	2.0	10.0
93	1993	BR	24	DU	42.00	0.0	42.00	0	0	0	0	1	0	0	0	8.0	4.0
94	1993	BR	25	DU	25.00	0.0	25.00	0	0	0	0	1	0	0	0	4.0	3.0
95	1993	BR	26	DU	10.00	0.0	10.00	0	0	0	0	1	0	0	0	2.0	2.0
96	1993	BR	27	DU	20.00	0.0	20.00	0	0	0	0	1	0	0	0	5.0	1.0
97	1993	BR	28	DU	60.00	0.0	60.00	0	0	0	0	1	0	0	0	5.0	4.0
98	1993	BR	29	DU	40.00	0.0	40.00	0	0	0	0	1	0	0	0	6.0	8.0
99	1993	BR	30	DU	30.00	0.0	30.00	0	0	0	0	1	0	0	0	4.0	7.0
100	1993	BR	31	DU	223.00	0.0	223.00	0	0	0	0	1	0	0	0	9.0	1.0
101	1993	BR	32	DU	150.00	0.0	150.00	0	0	0	0	1	0	0	0	6.0	7.0
102	1993	BR	33	DU	10.00	0.0	10.00	0	0	0	0	1	0	0	0	3.0	3.0
103	1993	BR	34	DU	10.00	0.0	10.00	0	0	0	0	1	0	0	0	4.0	1.0
104	1993	BR	35	DU	24.00	0.0	24.00	0	0	0	0	1	0	0	0	5.0	3.0
105	1993	BR	36	DU	37.00	0.0	37.00	0	0	0	0	1	0	0	0	6.0	10.0
106	1993	BR	37	DU	8.50	0.0	8.50	0	0	0	0	1	0	0	0	1.0	2.0
107	1993	BR	38	DU	280.00	0.0	280.00	0	0	0	0	1	0	0	0	12.0	5.0
108	1993	BR	39	DU	90.00	0.0	90.00	0	0	0	0	1	0	0	0	5.0	2.0
109	1993	BR	40	DU	300.00	0.0	300.00	0	0	0	0	1	0	0	0	4.0	3.0
110	1993	LTR	1	CP	35.00	2.0	17.50	0	0	0	0	0	1	0	1	3.0	2.0
111	1993	LTR	1	DU	1.00	0.0	1.00	0	0	0	0	0	1	0	0	4.0	1.0
112	1993	LTR	2	DU	94.00	0.0	94.00	0	0	0	0	0	1	0	0	4.0	5.0
113	1993	LTR	3	DU	151.00	0.0	151.00	0	0	0	0	0	1	0	0	7.0	2.0
114	1993	LTR	4	DU	23.00	0.0	23.00	0	0	0	0	0	1	0	0	4.0	1.0
115	1993	LTR	5	DU	1.00	0.0	1.00	0	0	0	0	0	1	0	0	7.0	2.0
116	1993	LTR	6	DU	45.00	0.0	45.00	0	0	0	0	0	1	0	0	4.0	4.0
117	1993	LTR	7	DU	13.50	0.0	13.50	0	0	0	0	0	1	0	0	5.0	1.0
118	1993	LTR	8	DU	20.00	0.0	20.00	0	0	0	0	0	1	0	0	3.0	2.0

Table 7.2-1. Camping and Day Use Visitor Expenditure Function Observations (continue).

Observation Number	Year	Site	Questionnaire Number	Visitor Type	Expenditures	Number of Days	Expenditures per Day	Upper Truckee River UTR	Donner Lake DL	Prosser Reservoir PR	Stampede Reservoir SR	Boca Reservoir BR	Lower Truckee River LTR	Pyramid Lake PL	Camping Visitor	Activity Hours	Group Size
119	1993	LTR	9	DU	21.00	0.0	21.00	0	0	0	0	0	1	0	0	4.0	1.0
120	1993	LTR	10	DU	34.00	0.0	34.00	0	0	0	0	0	1	0	0	2.0	4.0
121	1993	LTR	11	DU	775.00	0.0	775.00	0	0	0	0	0	1	0	0	1.0	1.0
122	1993	LTR	12	DU	44.00	0.0	44.00	0	0	0	0	0	1	0	0	3.0	1.0
123	1993	LTR	13	DU	52.00	0.0	52.00	0	0	0	0	0	1	0	0	3.0	1.0
124	1993	LTR	14	DU	0.50	0.0	0.50	0	0	0	0	0	1	0	0	2.0	1.0
125	1993	LTR	15	DU	70.00	0.0	70.00	0	0	0	0	0	1	0	0	3.0	1.0
126	1993	LTR	16	DU	21.50	0.0	21.50	0	0	0	0	0	1	0	0	4.0	1.0
127	1993	LTR	17	DU	28.50	0.0	28.50	0	0	0	0	0	1	0	0	2.0	5.0
128	1993	LTR	18	DU	182.00	0.0	182.00	0	0	0	0	0	1	0	0	6.0	10.0
129	1993	LTR	19	DU	22.00	0.0	22.00	0	0	0	0	0	1	0	0	3.0	2.0
130	1993	LTR	20	DU	14.00	0.0	14.00	0	0	0	0	0	1	0	0	4.0	2.0
131	1993	LTR	21	DU	21.50	0.0	21.50	0	0	0	0	0	1	0	0	6.0	1.0
132	1993	LTR	22	DU	73.00	0.0	73.00	0	0	0	0	0	1	0	0	3.0	2.0
133	1993	LTR	23	DU	23.00	0.0	23.00	0	0	0	0	0	1	0	0	5.0	2.0
134	1993	LTR	24	DU	42.00	0.0	42.00	0	0	0	0	0	1	0	0	6.0	2.0
135	1993	PL	1	CP	320.00	4.0	80.00	0	0	0	0	0	0	1	1	1.0	2.0
136	1993	PL	2	CP	75.00	3.0	25.00	0	0	0	0	0	0	1	1	7.0	5.0
137	1993	PL	3	CP	170.00	2.0	85.00	0	0	0	0	0	0	1	1	7.0	2.0
138	1993	PL	4	CP	41.00	1.0	41.00	0	0	0	0	0	0	1	1	4.0	2.0
139	1993	PL	5	CP	87.00	1.0	87.00	0	0	0	0	0	0	1	1	12.0	2.0
140	1993	PL	6	CP	162.00	4.0	40.50	0	0	0	0	0	0	1	1	10.0	3.0
141	1993	PL	7	CP	140.00	2.0	70.00	0	0	0	0	0	0	1	1	6.0	5.0
142	1993	PL	8	CP	75.00	3.0	25.00	0	0	0	0	0	0	1	1	8.0	1.0
143	1993	PL	9	CP	195.00	6.0	32.50	0	0	0	0	0	0	1	1	3.0	4.0
144	1993	PL	10	CP	180.00	4.0	45.00	0	0	0	0	0	0	1	1	1.0	6.0
145	1993	PL	1	DU	70.00	0.0	70.00	0	0	0	0	0	0	1	0	5.0	2.0
146	1993	PL	2	DU	20.00	0.0	20.00	0	0	0	0	0	0	1	0	7.0	3.0
147	1993	PL	3	DU	61.00	0.0	61.00	0	0	0	0	0	0	1	0	8.0	5.0
148	1993	PL	4	DU	45.00	0.0	45.00	0	0	0	0	0	0	1	0	5.0	3.0
149	1993	PL	5	DU	45.00	0.0	45.00	0	0	0	0	0	0	1	0	7.0	10.0
150	1993	PL	6	DU	42.00	0.0	42.00	0	0	0	0	0	0	1	0	5.0	5.0
151	1993	PL	7	DU	220.00	0.0	220.00	0	0	0	0	0	0	1	0	6.0	7.0
152	1994	DL	1	CP	68.00	4.0	17.00	0	1	0	0	0	0	0	1	4.0	4.0
153	1994	DL	2	CP	343.00	5.0	68.60	0	1	0	0	0	0	0	1	9.0	6.0
154	1994	DL	3	CP	108.00	3.0	36.00	0	1	0	0	0	0	0	1	6.0	2.0
155	1994	DL	4	CP	335.00	6.0	55.83	0	1	0	0	0	0	0	1	8.0	2.0
156	1994	DL	5	CP	210.00	3.0	70.00	0	1	0	0	0	0	0	1	12.0	4.0
157	1994	DL	6	CP	56.25	2.0	28.13	0	1	0	0	0	0	0	1	12.0	9.0
158	1994	DL	7	CP	160.00	5.0	32.00	0	1	0	0	0	0	0	1	10.0	6.0
159	1994	DL	8	CP	135.00	2.0	67.50	0	1	0	0	0	0	0	1	12.0	2.0
160	1994	DL	9	CP	163.00	1.0	163.00	0	1	0	0	0	0	0	1	6.0	2.0
161	1994	DL	10	CP	48.00	2.0	24.00	0	1	0	0	0	0	0	1	5.0	2.0
162	1994	DL	11	CP	181.00	4.0	45.25	0	1	0	0	0	0	0	1	5.0	14.0
163	1994	DL	12	CP	490.60	4.0	122.65	0	1	0	0	0	0	0	1	10.0	3.0
164	1994	DL	13	CP	980.00	8.0	122.50	0	1	0	0	0	0	0	1	7.0	8.0
165	1994	DL	14	CP	111.00	5.0	22.20	0	1	0	0	0	0	0	1	7.0	2.0
166	1994	DL	15	CP	385.00	8.0	48.13	0	1	0	0	0	0	0	1	11.0	7.0
167	1994	DL	16	CP	10.00	6.0	1.67	0	1	0	0	0	0	0	1	6.0	7.0
168	1994	DL	17	CP	130.00	2.0	65.00	0	1	0	0	0	0	0	1	8.0	3.0
169	1994	DL	18	CP	68.00	2.0	34.00	0	1	0	0	0	0	0	1	10.0	10.0
170	1994	DL	19	CP	150.00	3.0	50.00	0	1	0	0	0	0	0	1	11.0	2.0
171	1994	DL	20	CP	87.00	2.0	43.50	0	1	0	0	0	0	0	1	3.0	2.0
172	1994	DL	21	CP	162.00	2.0	81.00	0	1	0	0	0	0	0	1	10.0	9.0
173	1994	DL	22	CP	165.00	4.0	41.25	0	1	0	0	0	0	0	1	8.0	4.0
174	1994	DL	23	CP	200.00	3.0	66.67	0	1	0	0	0	0	0	1	11.0	7.0
175	1994	DL	24	CP	271.25	6.0	45.21	0	1	0	0	0	0	0	1	10.0	7.0
176	1994	DL	25	CP	47.00	3.0	15.67	0	1	0	0	0	0	0	1	12.0	10.0
177	1994	DL	26	CP	190.00	2.0	95.00	0	1	0	0	0	0	0	1	12.0	7.0

Table 7.2-1. Camping and Day Use Visitor Expenditure Function Observations (continue).

Observation Number	Year	Site	Questionnaire Number	Visitor Type	Expenditures	Number of Days	Expenditures per Day	Upper Truckee River UTR	Donner Lake DL	Fromer Reservoir FR	Stampede Reservoir SR	Boca Reservoir BR	Lower Truckee River LTR	Pyramid Lake PL	Camping Visitor	Activity Hours	Group Size
178	1994	DL	27	CP	121.25	2.0	60.63	0	1	0	0	0	0	0	1	7.0	14.0
179	1994	DL	28	CP	354.00	7.0	50.57	0	1	0	0	0	0	0	1	2.0	2.0
180	1994	DL	29	CP	51.00	2.5	20.40	0	1	0	0	0	0	0	1	9.0	6.0
181	1994	DL	30	CP	140.00	2.0	70.00	0	1	0	0	0	0	0	1	12.0	2.0
182	1994	DL	31	CP	144.25	2.0	72.13	0	1	0	0	0	0	0	1	12.0	1.0
183	1994	DL	32	CP	830.00	7.0	118.57	0	1	0	0	0	0	0	1	8.0	8.0
184	1994	DL	33	CP	64.75	2.0	32.38	0	1	0	0	0	0	0	1	12.0	4.0
185	1994	DL	34	CP	38.00	2.0	19.00	0	1	0	0	0	0	0	1	5.0	4.0
186	1994	DL	35	CP	25.00	2.0	12.50	0	1	0	0	0	0	0	1	7.0	6.0
187	1994	DL	36	CP	14.00	5.0	2.80	0	1	0	0	0	0	0	1	8.0	3.0
188	1994	DL	37	CP	30.00	3.0	10.00	0	1	0	0	0	0	0	1	1.0	2.0
189	1994	DL	38	CP	121.00	4.0	30.25	0	1	0	0	0	0	0	1	5.0	8.0
190	1994	DL	39	CP	73.00	3.0	24.33	0	1	0	0	0	0	0	1	6.0	6.0
191	1994	DL	40	CP	110.50	5.0	22.10	0	1	0	0	0	0	0	1	10.0	4.0
192	1994	DL	41	CP	140.00	3.0	46.67	0	1	0	0	0	0	0	1	7.0	7.0
193	1994	DL	42	CP	74.00	4.0	18.50	0	1	0	0	0	0	0	1	12.0	2.0
194	1994	DL	1	DU	25.00	0.0	25.00	0	1	0	0	0	0	0	0	3.0	2.0
195	1994	DL	2	DU	63.00	0.0	63.00	0	1	0	0	0	0	0	0	4.0	4.0
196	1994	DL	3	DU	19.00	0.0	19.00	0	1	0	0	0	0	0	0	4.0	3.0
197	1994	DL	4	DU	53.00	0.0	53.00	0	1	0	0	0	0	0	0	2.0	4.0
198	1994	DL	5	DU	34.00	0.0	34.00	0	1	0	0	0	0	0	0	5.0	6.0
199	1994	DL	6	DU	95.00	0.0	95.00	0	1	0	0	0	0	0	0	6.0	11.0
200	1994	DL	7	DU	27.00	0.0	27.00	0	1	0	0	0	0	0	0	3.0	10.0
201	1994	DL	8	DU	3.00	0.0	3.00	0	1	0	0	0	0	0	0	4.0	4.0
202	1994	DL	9	DU	5.00	0.0	5.00	0	1	0	0	0	0	0	0	6.0	3.0
203	1994	DL	10	DU	7.00	0.0	7.00	0	1	0	0	0	0	0	0	10.0	4.0
204	1994	DL	11	DU	60.50	0.0	60.50	0	1	0	0	0	0	0	0	9.0	7.0
205	1994	DL	12	DU	125.00	0.0	125.00	0	1	0	0	0	0	0	0	7.0	5.0
206	1994	DL	13	DU	22.50	0.0	22.50	0	1	0	0	0	0	0	0	3.0	6.0
207	1994	DL	14	DU	85.00	0.0	85.00	0	1	0	0	0	0	0	0	3.5	5.0
208	1994	DL	15	DU	43.00	0.0	43.00	0	1	0	0	0	0	0	0	4.0	4.0
209	1994	DL	16	DU	20.00	0.0	20.00	0	1	0	0	0	0	0	0	1.5	2.0
210	1994	DL	17	DU	140.00	0.0	140.00	0	1	0	0	0	0	0	0	6.0	9.0
211	1994	DL	18	DU	25.00	0.0	25.00	0	1	0	0	0	0	0	0	10.0	2.0
212	1994	DL	19	DU	35.00	0.0	35.00	0	1	0	0	0	0	0	0	5.0	2.0
213	1994	DL	20	DU	5.00	0.0	5.00	0	1	0	0	0	0	0	0	7.0	16.0
214	1994	DL	21	DU	60.00	0.0	60.00	0	1	0	0	0	0	0	0	8.0	7.0
215	1994	DL	22	DU	11.00	0.0	11.00	0	1	0	0	0	0	0	0	4.0	9.0
216	1994	DL	23	DU	31.00	0.0	31.00	0	1	0	0	0	0	0	0	3.0	6.0
217	1994	DL	24	DU	10.00	0.0	10.00	0	1	0	0	0	0	0	0	4.0	9.0
218	1994	DL	25	DU	81.65	0.0	81.65	0	1	0	0	0	0	0	0	2.5	4.0
219	1994	DL	26	DU	5.00	0.0	5.00	0	1	0	0	0	0	0	0	8.0	4.0
220	1994	DL	27	DU	177.99	0.0	177.99	0	1	0	0	0	0	0	0	8.0	8.0
221	1994	DL	28	DU	46.00	0.0	46.00	0	1	0	0	0	0	0	0	6.0	5.0
222	1994	DL	29	DU	149.51	0.0	149.51	0	1	0	0	0	0	0	0	3.0	5.0
223	1994	DL	30	DU	12.00	0.0	12.00	0	1	0	0	0	0	0	0	3.0	2.0
224	1994	DL	31	DU	156.06	0.0	156.06	0	1	0	0	0	0	0	0	4.0	8.0
225	1994	DL	32	DU	92.50	0.0	92.50	0	1	0	0	0	0	0	0	2.0	1.0
226	1994	DL	33	DU	21.00	0.0	21.00	0	1	0	0	0	0	0	0	6.0	4.0
227	1994	DL	34	DU	5.00	0.0	5.00	0	1	0	0	0	0	0	0	5.0	2.0
228	1994	DL	35	DU	50.00	0.0	50.00	0	1	0	0	0	0	0	0	5.0	3.0
229	1994	DL	36	DU	11.00	0.0	11.00	0	1	0	0	0	0	0	0	4.0	2.0
230	1994	DL	37	DU	15.00	0.0	15.00	0	1	0	0	0	0	0	0	8.0	2.0
231	1994	DL	38	DU	4.50	0.0	4.50	0	1	0	0	0	0	0	0	3.0	1.0
232	1994	DL	39	DU	137.00	0.0	137.00	0	1	0	0	0	0	0	0	2.0	4.0
233	1994	DL	40	DU	2.00	0.0	2.00	0	1	0	0	0	0	0	0	6.0	7.0
234	1994	DL	41	DU	5.00	0.0	5.00	0	1	0	0	0	0	0	0	2.0	2.0
235	1994	PR	1	CP	177.70	4.0	44.43	0	0	1	0	0	0	0	1	9.0	2.0
236	1994	PR	2	CP	10.00	3.0	3.33	0	0	1	0	0	0	0	1	2.0	2.0

Table 7.2-1. Camping and Day Use Visitor Expenditure Function Observations (continue).

Observation Number	Year	Site	Questionnaire Number	Visitor Type	Expenditures	Number of Days	Expenditures per Day	Upper Truckee River UTR	Donner Lake DL	Prosser Reservoir PR	Stampede Reservoir SR	Boca Reservoir BR	Lower Truckee River LTR	Pyramid Lake PL	Camping Visitor	Activity Hours	Group Size
237	1994	PR	3	CP	193.00	2.0	96.50	0	0	1	0	0	0	0	1	10.0	9.0
238	1994	PR	4	CP	114.00	14.0	8.14	0	0	1	0	0	0	0	1	12.0	3.0
239	1994	PR	5	CP	125.00	7.0	17.86	0	0	1	0	0	0	0	1	1.0	2.0
240	1994	PR	6	CP	185.00	2.0	92.50	0	0	1	0	0	0	0	1	7.0	3.0
241	1994	PR	7	CP	245.00	3.0	81.67	0	0	1	0	0	0	0	1	4.0	7.0
242	1994	PR	8	CP	6.00	1.0	6.00	0	0	1	0	0	0	0	1	5.0	6.0
243	1994	PR	9	CP	279.00	3.0	93.00	0	0	1	0	0	0	0	1	3.0	1.0
244	1994	PR	10	CP	8.00	2.0	4.00	0	0	1	0	0	0	0	1	12.0	2.0
245	1994	PR	11	CP	8.00	3.0	2.67	0	0	1	0	0	0	0	1	9.0	4.0
246	1994	PR	12	CP	31.00	4.0	7.75	0	0	1	0	0	0	0	1	6.0	2.0
247	1994	PR	13	CP	63.00	1.0	63.00	0	0	1	0	0	0	0	1	6.0	2.0
248	1994	PR	14	CP	87.50	4.0	21.88	0	0	1	0	0	0	0	1	8.0	1.0
249	1994	PR	15	CP	522.00	4.0	130.50	0	0	1	0	0	0	0	1	12.0	2.0
250	1994	PR	16	CP	64.00	9.0	7.11	0	0	1	0	0	0	0	1	12.0	6.0
251	1994	PR	17	CP	244.00	3.0	81.33	0	0	1	0	0	0	0	1	10.0	8.0
252	1994	PR	18	CP	76.00	2.0	38.00	0	0	1	0	0	0	0	1	8.0	2.0
253	1994	PR	19	CP	16.00	2.0	8.00	0	0	1	0	0	0	0	1	12.0	3.0
254	1994	PR	20	CP	120.00	7.0	17.14	0	0	1	0	0	0	0	1	12.0	1.0
255	1994	PR	21	CP	426.00	12.0	35.50	0	0	1	0	0	0	0	1	8.0	4.0
256	1994	PR	22	CP	30.00	5.0	6.00	0	0	1	0	0	0	0	1	8.0	4.0
257	1994	PR	23	CP	24.00	2.0	12.00	0	0	1	0	0	0	0	1	7.0	8.0
258	1994	PR	24	CP	96.00	3.0	32.00	0	0	1	0	0	0	0	1	9.0	7.0
259	1994	PR	25	CP	59.25	4.0	14.81	0	0	1	0	0	0	0	1	5.0	5.0
260	1994	PR	26	CP	24.00	2.0	12.00	0	0	1	0	0	0	0	1	2.0	4.0
261	1994	PR	27	CP	136.00	2.0	68.00	0	0	1	0	0	0	0	1	5.0	2.0
262	1994	PR	28	CP	16.00	2.0	8.00	0	0	1	0	0	0	0	1	10.0	5.0
263	1994	PR	29	CP	74.00	3.0	24.67	0	0	1	0	0	0	0	1	10.0	2.0
264	1994	PR	30	CP	66.00	2.0	33.00	0	0	1	0	0	0	0	1	6.0	3.0
265	1994	PR	1	DU	1.00	0.0	1.00	0	0	1	0	0	0	0	0	4.0	1.0
266	1994	PR	2	DU	80.00	0.0	80.00	0	0	1	0	0	0	0	0	3.0	4.0
267	1994	SR	1	CP	11.00	2.0	5.50	0	0	0	1	0	0	0	1	11.0	2.0
268	1994	SR	2	CP	232.00	3.0	77.33	0	0	0	1	0	0	0	1	8.5	2.0
269	1994	SR	3	CP	11.00	1.0	11.00	0	0	0	1	0	0	0	1	8.0	2.0
270	1994	SR	4	CP	72.00	4.0	18.00	0	0	0	1	0	0	0	1	9.0	2.0
271	1994	SR	5	CP	22.88	2.0	11.44	0	0	0	1	0	0	0	1	6.0	2.0
272	1994	SR	6	CP	300.00	3.0	100.00	0	0	0	1	0	0	0	1	10.0	4.0
273	1994	SR	7	CP	242.00	2.0	121.00	0	0	0	1	0	0	0	1	8.0	5.0
274	1994	SR	8	CP	237.00	7.0	33.86	0	0	0	1	0	0	0	1	8.0	2.0
275	1994	SR	9	CP	11.00	1.0	11.00	0	0	0	1	0	0	0	1	10.0	3.0
276	1994	SR	10	CP	16.00	4.0	4.00	0	0	0	1	0	0	0	1	4.0	6.0
277	1994	SR	11	CP	227.00	14.0	16.21	0	0	0	1	0	0	0	1	5.0	2.0
278	1994	SR	12	CP	135.00	4.0	33.75	0	0	0	1	0	0	0	1	4.0	4.0
279	1994	SR	13	CP	40.00	4.0	10.00	0	0	0	1	0	0	0	1	10.0	6.0
280	1994	SR	14	CP	43.00	6.0	7.17	0	0	0	1	0	0	0	1	7.0	4.0
281	1994	SR	15	CP	16.50	3.0	5.50	0	0	0	1	0	0	0	1	7.0	3.0
282	1994	SR	16	CP	95.00	5.0	19.00	0	0	0	1	0	0	0	1	5.0	2.0
283	1994	SR	17	CP	132.00	2.0	66.00	0	0	0	1	0	0	0	1	12.0	8.0
284	1994	SR	18	CP	142.50	8.0	17.81	0	0	0	1	0	0	0	1	8.0	3.0
285	1994	SR	19	CP	3108.00	14.0	222.00	0	0	0	1	0	0	0	1	4.0	4.0
286	1994	SR	20	CP	165.00	5.0	33.00	0	0	0	1	0	0	0	1	8.0	16.0
287	1994	SR	21	CP	170.00	3.0	56.67	0	0	0	1	0	0	0	1	12.0	4.0
288	1994	SR	22	CP	44.00	5.0	8.80	0	0	0	1	0	0	0	1	7.0	2.0
289	1994	SR	23	CP	322.00	14.0	23.00	0	0	0	1	0	0	0	1	8.0	2.0
290	1994	SR	24	CP	48.00	3.0	16.00	0	0	0	1	0	0	0	1	9.0	4.0
291	1994	SR	25	CP	149.00	4.0	37.25	0	0	0	1	0	0	0	1	9.0	2.0
292	1994	SR	26	CP	142.00	2.0	71.00	0	0	0	1	0	0	0	1	11.0	3.0
293	1994	SR	27	CP	190.00	3.0	63.33	0	0	0	1	0	0	0	1	10.0	4.0
294	1994	SR	28	CP	152.00	3.0	50.67	0	0	0	1	0	0	0	1	12.0	8.0
295	1994	SR	29	CP	92.00	2.0	46.00	0	0	0	1	0	0	0	1	7.0	2.0

Table 7.2-1. Camping and Day Use Visitor Expenditure Function Observations (continue).

Observation Number	Year	Site	Questionnaire Number	Visitor Type	Expenditures	Number of Days	Expenditures per Day	Upper Truckee River UTR	Donner Lake DL	Prosser Reservoir PR	Stampede Reservoir SR	Boca Reservoir BR	Lower Truckee River LTR	Pyramid Lake PL	Camping Visitor	Activity Hours	Group Size
296	1994	SR	30	CP	163.00	4.0	40.75	0	0	0	1	0	0	0	1	7.0	6.0
297	1994	SR	31	CP	78.00	6.0	13.00	0	0	0	1	0	0	0	1	8.0	2.0
298	1994	SR	32	CP	106.50	4.0	26.63	0	0	0	1	0	0	0	1	10.0	4.0
299	1994	SR	33	CP	90.00	2.0	15.00	0	0	0	1	0	0	0	1	8.0	5.0
300	1994	SR	34	CP	22.00	4.0	5.50	0	0	0	1	0	0	0	1	8.0	2.0
301	1994	SR	35	CP	68.00	2.0	34.00	0	0	0	1	0	0	0	1	11.0	4.0
302	1994	SR	36	CP	153.00	4.0	38.25	0	0	0	1	0	0	0	1	12.0	20.0
303	1994	SR	37	CP	11.00	1.0	11.00	0	0	0	1	0	0	0	1	2.0	2.0
304	1994	SR	38	CP	19.00	2.0	9.50	0	0	0	1	0	0	0	1	8.0	3.0
305	1994	SR	39	CP	481.00	20.0	24.05	0	0	0	1	0	0	0	1	7.0	5.0
306	1994	SR	40	CP	330.00	4.0	82.50	0	0	0	1	0	0	0	1	12.0	9.0
307	1994	SR	41	CP	206.00	2.0	103.00	0	0	0	1	0	0	0	1	12.0	6.0
308	1994	SR	42	CP	72.00	2.0	36.00	0	0	0	1	0	0	0	1	12.0	7.0
309	1994	SR	43	CP	163.00	8.0	20.38	0	0	0	1	0	0	0	1	5.0	2.0
310	1994	SR	44	CP	253.00	3.0	84.33	0	0	0	1	0	0	0	1	8.0	4.0
311	1994	SR	45	CP	183.00	3.0	61.00	0	0	0	1	0	0	0	1	12.0	2.0
312	1994	SR	46	CP	57.00	3.0	19.00	0	0	0	1	0	0	0	1	7.0	2.0
313	1994	SR	47	CP	78.50	7.0	11.21	0	0	0	1	0	0	0	1	6.0	2.0
314	1994	SR	48	CP	33.00	4.0	8.25	0	0	0	1	0	0	0	1	7.0	9.0
315	1994	SR	49	CP	103.00	3.0	34.33	0	0	0	1	0	0	0	1	12.0	4.0
316	1994	SR	50	CP	267.50	4.0	66.88	0	0	0	1	0	0	0	1	8.0	4.0
317	1994	SR	51	CP	180.00	6.0	30.00	0	0	0	1	0	0	0	1	8.0	11.0
318	1994	SR	52	CP	47.00	2.0	23.50	0	0	0	1	0	0	0	1	5.0	2.0
319	1994	SR	53	CP	88.00	3.0	29.33	0	0	0	1	0	0	0	1	11.0	4.0
320	1994	SR	54	CP	242.00	8.0	30.25	0	0	0	1	0	0	0	1	12.0	2.0
321	1994	SR	55	CP	114.00	2.0	57.00	0	0	0	1	0	0	0	1	10.0	2.0
322	1994	SR	56	CP	483.00	10.0	48.30	0	0	0	1	0	0	0	1	11.0	2.0
323	1994	SR	57	CP	64.00	2.0	32.00	0	0	0	1	0	0	0	1	12.0	4.0
324	1994	SR	58	CP	226.50	4.0	56.63	0	0	0	1	0	0	0	1	12.0	22.0
325	1994	SR	59	CP	134.00	3.0	44.67	0	0	0	1	0	0	0	1	12.0	4.0
326	1994	SR	60	CP	142.50	4.0	35.63	0	0	0	1	0	0	0	1	12.0	5.0
327	1994	SR	61	CP	440.00	3.0	146.67	0	0	0	1	0	0	0	1	12.0	25.0
328	1994	SR	62	CP	343.50	7.0	49.07	0	0	0	1	0	0	0	1	7.0	2.0
329	1994	SR	63	CP	3.50	2.0	1.75	0	0	0	1	0	0	0	1	4.0	10.0
330	1994	SR	64	CP	98.00	3.0	32.67	0	0	0	1	0	0	0	1	8.0	5.0
331	1994	BR	1	CP	960.00	7.0	137.14	0	0	0	0	1	0	0	1	12.0	10.0
332	1994	BR	2	CP	250.00	1.0	250.00	0	0	0	0	1	0	0	1	12.0	2.0
333	1994	BR	3	CP	237.00	2.0	118.50	0	0	0	0	1	0	0	1	10.0	6.0
334	1994	BR	4	CP	6.00	2.0	3.00	0	0	0	0	1	0	0	1	11.9	3.0
335	1994	BR	5	CP	89.00	3.0	29.67	0	0	0	0	1	0	0	1	5.5	3.0
336	1994	BR	6	CP	66.00	2.0	33.00	0	0	0	0	1	0	0	1	7.0	3.0
337	1994	BR	7	CP	66.00	1.0	66.00	0	0	0	0	1	0	0	1	4.0	20.0
338	1994	BR	8	CP	12.00	2.0	6.00	0	0	0	0	1	0	0	1	9.0	4.0
339	1994	BR	9	CP	86.00	2.0	43.00	0	0	0	0	1	0	0	1	12.0	3.0
340	1994	BR	10	CP	58.00	3.0	19.33	0	0	0	0	1	0	0	1	5.0	1.0
341	1994	BR	11	CP	122.00	1.0	122.00	0	0	0	0	1	0	0	1	8.0	4.0
342	1994	BR	12	CP	206.00	14.0	14.71	0	0	0	0	1	0	0	1	8.0	9.0
343	1994	BR	13	CP	52.00	1.0	52.00	0	0	0	0	1	0	0	1	4.0	2.0
344	1994	BR	14	CP	207.00	14.0	14.79	0	0	0	0	1	0	0	1	1.0	3.0
345	1994	BR	15	CP	458.00	2.0	229.00	0	0	0	0	1	0	0	1	12.0	2.0
346	1994	BR	16	CP	353.00	2.0	176.50	0	0	0	0	1	0	0	1	12.0	14.0
347	1994	BR	17	CP	12.00	3.0	4.00	0	0	0	0	1	0	0	1	10.0	4.0
348	1994	BR	1	DU	10.00	0.0	10.00	0	0	0	0	1	0	0	0	3.0	3.0
349	1994	BR	2	DU	15.00	0.0	15.00	0	0	0	0	1	0	0	0	5.0	2.0
350	1994	BR	3	DU	100.00	0.0	100.00	0	0	0	0	1	0	0	0	8.0	25.0
351	1994	BR	4	DU	100.00	0.0	100.00	0	0	0	0	1	0	0	0	8.0	6.0
352	1994	BR	5	DU	20.00	0.0	20.00	0	0	0	0	1	0	0	0	4.0	2.0
353	1994	BR	6	DU	50.00	0.0	50.00	0	0	0	0	1	0	0	0	4.0	9.0
354	1994	BR	7	DU	60.00	0.0	60.00	0	0	0	0	1	0	0	0	4.0	3.0

Table 7.2-1. Camping and Day Use Visitor Expenditure Function Observations (continue).

Observation Number	Year	Site	Questionnaire Number	Visitor Type	Expenditures	Number of Days	Expenditures per Day	Upper Truckee River UTR	Donner Lake DL	Prosser Reservoir PR	Stampede Reservoir SR	Boca Reservoir BR	Lower Truckee River LTR	Pyramid Lake PL	Camping Visitor	Activity Hours	Group Size
355	1994	BR	8	DU	20.00	0.0	20.00	0	0	0	0	1	0	0	0	4.0	5.0
356	1994	BR	9	DU	25.00	0.0	25.00	0	0	0	0	1	0	0	0	5.0	5.0
357	1994	BR	10	DU	22.00	0.0	22.00	0	0	0	0	1	0	0	0	12.0	2.0
358	1994	BR	11	DU	70.00	0.0	70.00	0	0	0	0	1	0	0	0	10.0	1.0
359	1994	BR	12	DU	95.00	0.0	95.00	0	0	0	0	1	0	0	0	6.0	13.0
360	1994	BR	13	DU	8.00	0.0	8.00	0	0	0	0	1	0	0	0	4.0	2.0
361	1994	BR	14	DU	45.00	0.0	45.00	0	0	0	0	1	0	0	0	3.0	6.0
362	1994	PL	1	CP	120.00	3.0	40.00	0	0	0	0	0	0	1	1	11.9	2.0
363	1994	PL	2	CP	500.00	4.0	125.00	0	0	0	0	0	0	1	1	12.0	9.0
364	1994	PL	3	CP	10.00	3.0	3.33	0	0	0	0	0	0	1	1	10.0	15.0
365	1994	PL	4	CP	150.00	2.0	75.00	0	0	0	0	0	0	1	1	9.0	4.0
366	1994	PL	5	CP	83.75	2.0	41.88	0	0	0	0	0	0	1	1	7.0	8.0
367	1994	PL	6	CP	86.00	2.0	43.00	0	0	0	0	0	0	1	1	9.0	3.0
368	1994	PL	7	CP	125.00	2.0	62.50	0	0	0	0	0	0	1	1	5.0	4.0
369	1994	PL	8	CP	56.00	3.0	18.67	0	0	0	0	0	0	1	1	7.0	2.0
370	1994	PL	9	CP	15.00	3.0	5.00	0	0	0	0	0	0	1	1	6.0	4.0
371	1994	PL	10	CP	130.00	3.0	43.33	0	0	0	0	0	0	1	1	12.0	5.0
372	1994	PL	11	CP	100.00	2.0	50.00	0	0	0	0	0	0	1	1	12.0	14.0
373	1994	PL	12	CP	105.00	2.0	52.50	0	0	0	0	0	0	1	1	12.0	4.0
374	1994	PL	13	CP	150.00	2.0	75.00	0	0	0	0	0	0	1	1	2.0	4.0
375	1994	PL	14	CP	445.00	4.0	111.25	0	0	0	0	0	0	1	1	12.0	5.0
376	1994	PL	15	CP	314.00	2.0	157.00	0	0	0	0	0	0	1	1	11.0	6.0
377	1994	PL	16	CP	253.00	3.0	84.33	0	0	0	0	0	0	1	1	12.0	4.0
378	1994	PL	17	CP	155.00	10.0	15.50	0	0	0	0	0	0	1	1	6.0	3.0
379	1994	PL	18	CP	300.00	4.0	75.00	0	0	0	0	0	0	1	1	11.0	5.0
380	1994	PL	19	CP	152.00	2.0	76.00	0	0	0	0	0	0	1	1	12.0	4.0
381	1994	PL	1	DU	20.00	0.0	20.00	0	0	0	0	0	0	1	0	4.0	6.0
382	1994	PL	2	DU	240.00	0.0	240.00	0	0	0	0	0	0	1	0	7.0	26.0
383	1994	PL	3	DU	50.00	0.0	50.00	0	0	0	0	0	0	1	0	5.0	3.0
384	1994	PL	4	DU	6.00	0.0	6.00	0	0	0	0	0	0	1	0	6.0	4.0
385	1994	PL	5	DU	65.00	0.0	65.00	0	0	0	0	0	0	1	0	6.0	9.0
386	1994	PL	6	DU	72.00	0.0	72.00	0	0	0	0	0	0	1	0	4.0	3.0
387	1994	PL	7	DU	60.00	0.0	60.00	0	0	0	0	0	0	1	0	8.0	2.0
388	1994	PL	8	DU	36.00	0.0	36.00	0	0	0	0	0	0	1	0	2.0	4.0
389	1994	PL	9	DU	70.00	0.0	70.00	0	0	0	0	0	0	1	0	5.0	5.0
390	1994	PL	10	DU	116.00	0.0	116.00	0	0	0	0	0	0	1	0	2.0	5.0
391	1994	PL	11	DU	45.00	0.0	45.00	0	0	0	0	0	0	1	0	8.0	4.0
392	1994	PL	12	DU	70.00	0.0	70.00	0	0	0	0	0	0	1	0	8.0	2.0
393	1994	PL	13	DU	41.00	0.0	41.00	0	0	0	0	0	0	1	0	8.0	2.0
394	1994	PL	14	DU	25.00	0.0	25.00	0	0	0	0	0	0	1	0	3.0	3.0
395	1994	PL	15	DU	40.00	0.0	40.00	0	0	0	0	0	0	1	0	7.0	4.0
396	1994	PL	16	DU	25.00	0.0	25.00	0	0	0	0	0	0	1	0	2.0	3.0
397	1994	PL	17	DU	50.00	0.0	50.00	0	0	0	0	0	0	1	0	6.0	4.0
398	1994	PL	18	DU	20.00	0.0	20.00	0	0	0	0	0	0	1	0	2.0	2.0
399	1994	PL	19	DU	75.00	0.0	75.00	0	0	0	0	0	0	1	0	7.0	5.0
400	1994	PL	20	DU	15.00	0.0	15.00	0	0	0	0	0	0	1	0	10.0	4.0
401	1994	PL	21	DU	51.00	0.0	51.00	0	0	0	0	0	0	1	0	6.0	4.0
402	1994	PL	22	DU	121.00	0.0	121.00	0	0	0	0	0	0	1	0	6.0	13.0
403	1994	PL	23	DU	76.00	0.0	76.00	0	0	0	0	0	0	1	0	6.0	14.0
404	1994	PL	24	DU	35.00	0.0	35.00	0	0	0	0	0	0	1	0	2.0	3.0
405	1994	PL	25	DU	95.00	0.0	95.00	0	0	0	0	0	0	1	0	8.0	15.0
406	1994	PL	26	DU	25.00	0.0	25.00	0	0	0	0	0	0	1	0	5.0	3.0
407	1994	PL	27	DU	12.00	0.0	12.00	0	0	0	0	0	0	1	0	7.0	6.0
408	1994	PL	28	DU	55.00	0.0	55.00	0	0	0	0	0	0	1	0	6.0	4.0
409	1994	PL	29	DU	56.00	0.0	56.00	0	0	0	0	0	0	1	0	8.0	15.0
410	1994	PL	30	DU	56.00	0.0	56.00	0	0	0	0	0	0	1	0	6.0	4.0
411	1994	PL	31	DU	25.00	0.0	25.00	0	0	0	0	0	0	1	0	6.0	6.0
412	1994	PL	32	DU	15.00	0.0	15.00	0	0	0	0	0	0	1	0	5.0	2.0
413	1994	PL	33	DU	90.00	0.0	90.00	0	0	0	0	0	0	1	0	6.0	6.0

Table 7.2-1. Camping and Day Use Visitor Expenditure Function Observations (continue).

Observation Number	Year	Site	Questionnaire Number	Visitor Type	Expenditures	Number of Days	Expenditures per Day	Upper Truckee River UTR	Donner Lake DL	Prosser Reservoir PR	Stampede Reservoir SR	Boca Reservoir BR	Lower Truckee River LTR	Pyramid Lake PL	Camping Visitor	Activity Hours	Group Size
414	1994	PL	34	DU	67.00	0.0	67.00	0	0	0	0	0	0	1	0	3.0	8.0
415	1994	PL	35	DU	19.00	0.0	19.00	0	0	0	0	0	0	1	0	5.0	2.0
416	1994	PL	36	DU	55.00	0.0	55.00	0	0	0	0	0	0	1	0	10.0	6.0
417	1994	PL	37	DU	130.00	0.0	130.00	0	0	0	0	0	0	1	0	3.0	5.0
418	1994	PL	38	DU	31.00	0.0	31.00	0	0	0	0	0	0	1	0	5.0	5.0
419	1994	PL	39	DU	35.00	0.0	35.00	0	0	0	0	0	0	1	0	4.0	5.0
420	1994	PL	40	DU	65.00	0.0	65.00	0	0	0	0	0	0	1	0	8.0	10.0
421	1994	PL	41	DU	195.00	0.0	195.00	0	0	0	0	0	0	1	0	8.0	13.0
422	1994	PL	42	DU	70.00	0.0	70.00	0	0	0	0	0	0	1	0	5.0	6.0
423	1994	PL	43	DU	25.00	0.0	25.00	0	0	0	0	0	0	1	0	2.0	2.0
424	1994	PL	44	DU	55.00	0.0	55.00	0	0	0	0	0	0	1	0	5.0	11.0
425	1994	PL	45	DU	57.00	0.0	57.00	0	0	0	0	0	0	1	0	6.0	7.0
426	1994	PL	46	DU	50.00	0.0	50.00	0	0	0	0	0	0	1	0	12.0	2.0
427	1994	PL	47	DU	7.00	0.0	7.00	0	0	0	0	0	0	1	0	3.5	5.0
428	1994	PL	48	DU	190.00	0.0	190.00	0	0	0	0	0	0	1	0	5.0	15.0
429	1994	PL	49	DU	17.00	0.0	17.00	0	0	0	0	0	0	1	0	4.0	3.0
430	1994	PL	50	DU	30.00	0.0	30.00	0	0	0	0	0	0	1	0	5.0	2.0
431	1994	PL	51	DU	28.00	0.0	28.00	0	0	0	0	0	0	1	0	5.0	2.0
432	1994	PL	52	DU	36.00	0.0	36.00	0	0	0	0	0	0	1	0	10.0	10.0

Table 7.2-2. Camping and Day Use Visitor Expenditure Function Values.

	Upper Truckee River	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Lower Truckee River	Pyramid Lake
Camping Visitor Group Expenditures per Day	$53.95	$30.80	$28.43	$40.08	$38.09	$19.74	$39.83
Day Use Visitor Group Expenditures per Day	$75.42	$36.65	$30.93	$45.78	$46.86	$28.60	$53.60

7.3. Survey of the Second-Home Owners

A survey of second-home owners for the Truckee area was done during February 1995. The purpose of the survey was to first obtain an overall picture of the summer season visitation and recreation activities of second-home owners, second, quantify the amount of expenditures that second-home owners make to the local economy, and third, identify how second-home visitation would change during the summer season in relation to alternative lake-levels at Donner Lake. To achieve this purpose, information was collected from second-home owners using a questionnaire. Questionnaires were mailed-out to second-home owners and when returned the data was compiled and analyzed to develop a set of descriptive statistics. The cover letter to the questionnaire, the questionnaire, a response summary, descriptive statistics of the data, and comments are presented below.

Cover Letter

February 15, 1995

Dear Second-Home Owner:

The Town of Truckee requests your participation in a survey. This survey is being conducted by the University of Nevada, Reno. Information collected will be used in assessing the economic and recreation issues associated with lakes and reservoirs in the Truckee area. This information will help local, state, and federal officials make informed decisions on how best to manage the lakes, reservoirs, and rivers in the Truckee River Basin.

The enclosed questionnaire takes less than 15 minutes to complete. A limited number of second-home owners are receiving this questionnaire, so your response means a lot. Please complete the questionnaire as best you can and then mail the questionnaire in the stamped pre-addressed envelope.

The tabulated results of this survey will be made available for your review at the Truckee Town Hall. The Town of Truckee appreciates your participation in this survey and thanks you for your time.

PLEASE RETURN YOUR COMPLETED QUESTIONNAIRE BEFORE MARCH 1ST.

Sincerely,

Embree B. (Breeze) Cross
Mayor

Questionnaire

The questionnaire is made-up of ten questions and a comment page. Through the questionnaire, second-home owners were asked to provide information on the location of main residence, influence of decision factors to purchase or build a second-home, second-home ownership, group make-up, second-home visitation in terms of both the number of visits per month and number of days per visit, site visitation at area lakes and reservoirs, summer season visitation and recreation activities at Donner Lake, summer season characteristics of Donner Lake, sensitivity to alternative lake-levels at Donner Lake, expenditures per visit, and annual expenditures on second-home upkeep and repairs. Also through the questionnaire, second-home owners were asked to mention any comments about owning a second-home in the Truckee area. Each of the ten questions and the comment page are presented below.

1. Where is your main residence?

City _____
State _____
Zip Code _____

2. How did the following factors influence your decision to purchase or build a second-home in the Truckee area? Please indicate, as a percentage, the level of influence each factor had on your decision. Be sure that the total is equal to 100%.

Decision Factors	Level of Influence %
Business / Job / Retirement	
Financial / Investment / Tax Purposes	
Family / Community / Rural Lifestyle	
Natural Setting / Environment / Climate	
Winter Recreation / Proximity to Ski Areas	
Water-Related Summer Recreation / Proximity to Lakes and Reservoirs	
Other Summer Recreation / Proximity to Golf Courses and Hiking Trials	
Total	*100%*

3. Do you share ownership of your second-home with others not in your family?

No _____
Yes _____

4. How many adults and children are included in a typical visit to your second-home?

Typical Number of Adults per Visit _____
Typical Number of Children per Visit _____

5. How many times do you visit your second-home and how many days do you spend per visit during each of the following months?

Months	Typical Number of Visits per Month	Typical Number of Days per Visit
January		
February		
March		
April		
May		
June		
July		
August		
September		
October		
November		
December		

6. How many times do you visit Lake Tahoe, Donner Lake, Prosser Reservoir, Stampede Reservoir, Boca Reservoir, and Pyramid Lake for recreation during each of the following months?

Months	Typical Number of Visits per Month					
	Lake Tahoe	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Pyramid Lake
April						
May						
June						
July						
August						
September						
October						
November through March						

7. The summer recreation season is comprised of the months of June, July, and August including Memorial Day and Labor Day weekends. During this season: (please answer questions a, b, and c)

a. How many days per visit to your second-home do you spend on recreation at Donner Lake?

Typical Number of Days per Visit _____

b. How many hours per day do you spend on the following recreation activities at Donner Lake? Please indicate by marking the appropriate box, the number of hours per day for each recreation activity. Extra space is provided for other activities.

Recreation Activities	Typical Number of Hours per Day												
Fishing from Shore	0	1	2	3	4	5	6	7	8	9	10	11	12
Fishing from Boat	0	1	2	3	4	5	6	7	8	9	10	11	12
Water Skiing	0	1	2	3	4	5	6	7	8	9	10	11	12
Pleasure Boating	0	1	2	3	4	5	6	7	8	9	10	11	12
Jet Skiing	0	1	2	3	4	5	6	7	8	9	10	11	12
Swimming	0	1	2	3	4	5	6	7	8	9	10	11	12
Picnicing	0	1	2	3	4	5	6	7	8	9	10	11	12
Hiking	0	1	2	3	4	5	6	7	8	9	10	11	12
Biking	0	1	2	3	4	5	6	7	8	9	10	11	12
	0	1	2	3	4	5	6	7	8	9	10	11	12
	0	1	2	3	4	5	6	7	8	9	10	11	12

c. How do you rate the following characteristics of Donner Lake? Please rate the characteristics as very good, good, satisfactory, poor, or very poor.

Characteristics	Very Good	Good	Satisfactory	Poor	Very Poor
Natural Setting and Environment					
Recreation Opportunities					
Lake-Level					
Boat Ramp and Dock Access					
Crowd Level					
Facilities					

8. The summer recreation season is comprised of the months of June, July, and August including Memorial Day and Labor Day weekends. During this season, the lake-level at Donner Lake is regulated between the following five lake-levels: (please answer questions a, b, and c)

	Lake-Levels		Boat Ramp and Boat Dock Status			
Lake-Level	Lake Elevation	Lake Elevation Drop	Public Boat Ramp Status	Tahoe Donner Boat Ramp Status	Donner Lake Property Owner Boat Ramp Status	Public Boat Docks Status
	feet	*feet*				
1	5,936 maximum	0	usable	usable	usable	usable / safe
2	5,935	1	usable	usable	usable	usable / safe
3	5,934	2	usable	marginal	marginal	marginal
4	5,933	3	usable	unusable	unusable	unusable / unsafe
5	5,932	4	usable	unusable	unusable	unusable / unsafe

a. Would the number of visits you make during each month to your second-home change at any of the above lake-levels?

No _____ (if No, please go to question 9)
Yes _____

b. If Yes, please indicate below, how you would change your number of visits per month to your second-home? At each lake-level, circle whether you would have no change, an increase, or a decrease in the number of visits per month to your second-home. Also indicate the corresponding increase or decrease in the number of visits per month.

Lake-Level	Change in Number of Visits per Month			
	Circle One			*Increase / Decrease*
1	No Change	Increase	Decrease	
2	No Change	Increase	Decrease	
3	No Change	Increase	Decrease	
4	No Change	Increase	Decrease	
5	No Change	Increase	Decrease	

c. If Yes, how would you then rate the following characteristics of Donner Lake at the lake-level where you first indicated that you would change the number of visits to your second-home? Please rate the following characteristics as very good, good, satisfactory, poor, or very poor.

Characteristics	Very Good	Good	Satisfactory	Poor	Very Poor
Natural Setting and Environment					
Recreation Opportunities					
Lake-Level					
Boat Ramp and Dock Access					
Crowd Level					
Facilities					

9. The summer recreation season is comprised of the months of June, July, and August including Memorial Day and Labor Day weekends. During this season: (please answer question a)

a. How much do you spend on the following items per visit to your second-home? Please indicate your expenditure on each item and the portion that you spend in the Truckee-Donner Lake area, Reno-Sparks area, Lake Tahoe area, and Other area. Extra space is provided for other items.

Items	Typical Expenditure per Visit	Truckee-Donner Lake Area Portion	Reno-Sparks Area Portion	Lake Tahoe Area Portion	Other Area Portion
	$	%	%	%	%
Restaurant					
Groceries and Supplies					
Gasoline					
Other Shopping					
Recreation Rental (boats, bikes, horses, etc.)					
Golf Fees					
Other User Fees					
Gaming					
Total					

10. How much do you spend per year on the following upkeep and repair items to your second-home? Extra space is provided for other items.

Items	Typical Expenditure per Year $
Painting, Sealing, and Staining	
Landscape Maintenance	
House Cleaning	
Driveway Crack Sealing	
Total	

Anything you would like to mention about owning a second-home in the Truckee area? Please write your comments here: (comments may include: reasons for owning a second-home; natural setting and environment, summer recreation expectations for lakes, reservoirs, and rivers; water-level concerns; community and rural lifestyle; local economy; prospects of future growth; etc.)

Response Summary

Questionnaire response, question response, and comment response is given below. There were 100 questionnaires mailed-out and 42 returned for a 42% response. Question response, meaning the number of respondents that answered each question, varied from 42 respondents that answered question 1 to 28 respondents that answered question 9a. This indicates that of the 42 questionnaires returned only 28 respondents completed the questionnaire. The comment response, meaning the number of respondents that made comments, was 29.

Number of Questionnaires Mailed-Out	100
Number of Questionnaires Returned	42
Number of Respondents that Answered Question 1	42
Number of Respondents that Answered Question 2	41
Number of Respondents that Answered Question 3	40
Number of Respondents that Answered Question 4	39
Number of Respondents that Answered Question 5	38
Number of Respondents that Answered Question 6	38
Number of Respondents that Answered Question 7a	37
Number of Respondents that Answered Question 7b	36
Number of Respondents that Answered Question 7c	31
Number of Respondents that Answered Question 8a	38
Number of Respondents that Answered Question 8b	3
Number of Respondents that Answered Question 8c	3
Number of Respondents that Answered Question 9a	28
Number of Respondents that Answered Question 10	30
Number of Respondents that Made Comments	29

Descriptive Statistics

The descriptive statistics of the data are presented below with an explanation of their interpretation. The descriptive statistics include the location of main residence, decision factor influence to purchase or build a second-home, second-home ownership, group make-up, annual second-home visitation, site visitation, annual site visitation, summer season Donner Lake visitation, summer season Donner Lake activities, summer season Donner Lake activity hours, ranking of summer season Donner Lake characteristics, summer season Donner Lake alternative lake-level sensitivity, summer season visitation expenditures, and annual second-home upkeep and repair expenditures.

Location of Main Residence

The highest number of respondents are respondents with a main residence in the San Francisco Bay area.

Table 7.3-1 provides the number of respondents with a main residence in the Sacramento area, the San Francisco Bay area, and Other areas. There are 8 respondents with a main residence in the Sacramento area, 29 respondents with a main residence in the San Francisco Bay area, and 5 respondents with a main residence in Other areas. Other areas being areas of California and out of state.

Table 7.3-1. Location of Main Residence.

Number of Respondents with a Main Residence in the Sacramento Area	8
Number of Respondents with a Main Residence in the San Francisco Bay Area	29
Number of Respondents with a Main Residence in Other Areas	5
Total Number of Respondents	42

Decision Factor Influence to Purchase or Build a Second-Home

Winter recreation/proximity to ski areas is the decision factor that has the highest level of influence on the decision to build or purchase a second-home in the Truckee area.

Decision factor influence to purchase or build a second-home by respondents is presented in Table 7.3-2. Decision factors include business/job/retirement, financial/investment/tax purposes, family/community/rural lifestyle, natural setting/environment/climate, winter recreation/proximity to ski areas, water-related summer recreation/proximity to lakes and reservoirs, and other summer recreation/proximity to golf courses and hiking trails. An average level of influence, as a percentage, is given for each decision factor.

The average level of influence is 7% for business/job/retirement, 11% for financial/investment/tax purposes, 7% for family/community/rural lifestyle, 21% for natural setting/environment/climate, 28% for winter recreation/proximity to ski areas, 13% for water-related summer recreation/proximity to lakes and reservoirs, and 13% for other summer recreation/proximity to golf courses and hiking trails. Together the decision factor influence equals 100%.

Table 7.3-2. Decision Factor Influence to Purchase or Build a Second-Home.

Average Level of Influence for Business / Job / Retirement by Respondents	7.14%
Average Level of Influence for Financial / Investment / Tax Purposes by Respondents	10.52%
Average Level of Influence for Family / Community / Rural Lifestyle by Respondents	6.55%
Average Level of Influence for Natural Setting / Environment / Climate by Respondents	21.23%
Average Level of Influence for Winter Recreation / Proximity to Ski Areas by Respondents	27.68%
Average Level of Influence for Water-Related Summer Recreation / Proximity to Lakes and Reservoirs by Respondents	13.49%
Average Level of Influence for Other Summer Recreation / Proximity to Golf Courses and Hiking Trails by Respondents	13.39%
Total	100.00%

Second-Home Ownership

The highest number of respondents are respondents that do not share ownership of second-home.

Table 7.3-3 provides the number of respondents that share ownership of second-home with others and the number of respondents that do not share ownership of second-home. Of 40 respondents, only one respondent did indicate that they share ownership of second-home with others.

Table 7.3-3. Second-Home Ownership.

Number of Respondents that Share Ownership of Second-Home with Others	1
Number of Respondents that do not Share Ownership of Second-Home	39
Total Number of Respondents	40

Group Make-Up

Average group size of respondents is 4.41 persons. Average number of adults per group is 2.69 persons and average number of children per group is 1.72 persons.

Table 7.3-4 provides group make-up of respondents.

Table 7.3-4. Group Make-Up.

Average Group Size per Visit of Respondents	4.41
Average Number of Adults in Group of Respondents	2.69
Average Number of Children in Group of Respondents	1.72

Annual Second-Home Visitation

Second-home visitation by respondents occurs in all months of the year. The greatest visitation, in terms of both the number of visits by respondents and the number of days per visit by respondents, is in the winter months of December, January, and February. This is followed by visitation in the summer months of June, July, and August.

The average number of visits per month by respondents are presented in Table 7.3-5. Average number of visits by respondents is 1.84 in January, 1.74 in February, 1.66 in March, 1.47 in April, 1.53 in May, 1.67 in June, 1.70 in July, 1.75 in August, 1.62 in September, 1.28 in October, 1.50 in November, and 1.75 in December. The annual or total average number of visits by respondents is 19.51.

The average number of days per visit per month by respondents are also presented in Table 7.3-5. Average number of days per visit by respondents is 3.24 in January, 3.55 in February, 3.14 in March, 3.16 in April, 3.29 in May, 3.10 in June, 3.61 in July, 4.62 in August, 3.40 in September, 2.89 in October, 3.68 in November, and 5.24 in December.

Table 7.3-5. Annual Second-Home Visitation.

Average Number of Visits by Respondents during January	1.84
Average Number of Visits by Respondents during February	1.74
Average Number of Visits by Respondents during March	1.66
Average Number of Visits by Respondents during April	1.47
Average Number of Visits by Respondents during May	1.53
Average Number of Visits by Respondents during June	1.67
Average Number of Visits by Respondents during July	1.70
Average Number of Visits by Respondents during August	1.75
Average Number of Visits by Respondents during September	1.62
Average Number of Visits by Respondents during October	1.28
Average Number of Visits by Respondents during November	1.50
Average Number of Visits by Respondents during December	1.75
Total Average Number of Visits by Respondents	19.51
Average Number of Days per Visit by Respondents during January	3.24
Average Number of Days per Visit by Respondents during February	3.55
Average Number of Days per Visit by Respondents during March	3.14
Average Number of Days per Visit by Respondents during April	3.16
Average Number of Days per Visit by Respondents during May	3.29
Average Number of Days per Visit by Respondents during June	3.10
Average Number of Days per Visit by Respondents during July	3.61
Average Number of Days per Visit by Respondents during August	4.62
Average Number of Days per Visit by Respondents during September	3.40
Average Number of Days per Visit by Respondents during October	2.89
Average Number of Days per Visit by Respondents during November	3.68
Average Number of Days per Visit by Respondents during December	5.24

Site Visitation

The overall greatest site visitation of respondents occurs at Donner Lake.

The site visitation of respondents is presented in Table 7.3-6. Study area sites include Lake Tahoe, Donner Lake, Prosser Reservoir, Stampede Reservoir, and Boca Reservoir.

Of the 38 respondents, 63% indicate they visit Lake Tahoe an average of 5 visits during the year, 89% indicate they visit Donner Lake an average of 10 visits during the year, 21% indicate they visit Prosser Reservoir an average of 3 visits during the year, 13% indicate they visit Stampede Reservoir an average of 3 visits during the year, and 16% indicate they visit Boca Reservoir an average of 6 visits during the year.

None of the respondents indicate they visit Pyramid Lake. Pyramid Lake was also listed as a study area site in the question.

Table 7.3-6. Site Visitation.

	Study Area	Lake Tahoe	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Number of Respondents	38	24	34	8	5	6
Percentage of Respondents		63.16%	89.47%	21.05%	13.16%	15.79%
Number of Visits by Respondents		128.90	352.50	26.00	15.00	34.00
Average Number of Visits by Respondents		5.37	10.37	3.25	3.00	5.67

Annual Site Visitation

The annual site visitation of respondents follow a similar pattern. This pattern shows that during the year, visitation to a site will begin in April and steadily increase throughout May, June, July, and August and then decrease sharply during September and October to end at a very low visitation during the Other months.

The annual site visitation of respondents is shown in Table 7.3-7. Again, study area sites include Lake Tahoe, Donner Lake, Prosser Reservoir, Stampede Reservoir, and Boca Reservoir.

The pattern of annual visitation for a site is based on the number of respondents that indicate they visit the study area and visit the site in a given month. To clarify this, for Donner Lake, 9 out of 17 respondents indicate they visit in April, 13 out of 29 respondents indicate they visit in May, 20 out of 41 respondents indicate they visit in June, 28 out of 55 respondents indicate they visit in July, 29 out of 63 respondents indicate they visit in August, 19 out of 37 respondents indicate they visit in September, 6 out of 14 respondents indicate they visit in October, and 6 out of 14 respondents indicate they visit in Other months.

These numbers are then divided by their summation and presented as a percentage of visitation during the given month. Of the total annual visitation at Donner Lake, 7% is during April, 10% is during May, 15% is during June, 21% is during July, 22% is during August, 15% is during September, 5% is during October, and 5% is during Other months.

The percentages taken together for all the months show the pattern of annual site visitation.

A similar interpretation can be made for the other sites.

Table 7.3-7. Annual Site Visitation.

	Study Area	Lake Tahoe	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Number of Respondents that Visit during April	17	5	9	1	0	2
Number of Respondents that Visit during May	29	10	13	2	1	3
Number of Respondents that Visit during June	41	13	20	2	3	3
Number of Respondents that Visit during July	55	16	28	5	2	4
Number of Respondents that Visit during August	63	21	29	5	4	4
Number of Respondents that Visit during September	37	13	19	2	0	3
Number of Respondents that Visit during October	14	7	6	0	0	1
Number of Respondents that Visit during Other	14	8	6	0	0	0
Total Number of Respondents		93	130	17	10	20
Percentage of Visitation during April		5.38%	6.92%	5.88%	0.00%	10.00%
Percentage of Visitation during May		10.75%	10.00%	11.76%	10.00%	15.00%
Percentage of Visitation during June		13.98%	15.38%	11.76%	30.00%	15.00%
Percentage of Visitation during July		17.20%	21.54%	29.41%	20.00%	20.00%
Percentage of Visitation during August		22.58%	22.31%	29.41%	40.00%	20.00%
Percentage of Visitation during September		13.98%	14.62%	11.76%	0.00%	15.00%
Percentage of Visitation during October		7.53%	4.62%	0.00%	0.00%	5.00%
Percentage of Visitation during Other		8.60%	4.62%	0.00%	0.00%	0.00%

Summer Season Donner Lake Visitation

The number of respondents that visit Donner Lake during the summer season months of June, July, and August is 32. This number of respondents is out of 37 respondents that visit their second-home during the summer season months. Average number of days per visit at Donner Lake by these 32 respondents during the summer season months is 2.42 days.

Table 7.3-8 presents the summer season Donner Lake visitation.

Table 7.3-8. Summer Season Donner Lake Visitation.

Number of Respondents	32
Average Number of Days per Visit by Respondents	2.42

Summer Season Donner Lake Activities

Respondents that visit Donner Lake during the summer season participate in picnicking, hiking, swimming, fishing and biking activities.

Summer season Donner Lake activities of respondents are shown in Table 7.3-9. The activities include fishing from shore, fishing from a boat, water skiing, boating, jet skiing, swimming, picnicking, hiking, biking and other activities.

Of 36 respondents, 43% indicate fishing from shore, 23% indicate fishing from a boat, 17% indicate water skiing, 33% indicate boating, 7% indicate jet skiing, 57% indicate swimming, 70% indicate picnicking, 70% indicate hiking, and 43% indicate biking.

Table 7.3-9. Summer Season Donner Lake Activities.

Number of Respondents Fishing	13
Number of Respondents Fishing from Boat	7
Number of Respondents Water Skiing	5
Number of Respondents Boating	10
Number of Respondents Jet Skiing	2
Number of Respondents Swimming	17
Number of Respondents Picnicking	21
Number of Respondents Hiking	21
Number of Respondents Biking	13
Number of Respondents Other	0
Percentage of Respondents Fishing	43.33%
Percentage of Respondents Fishing from Boat	23.33%
Percentage of Respondents Water Skiing	16.67%
Percentage of Respondents Boating	33.33%
Percentage of Respondents Jet Skiing	6.67%
Percentage of Respondents Swimming	56.67%
Percentage of Respondents Picnicking	70.00%
Percentage of Respondents Hiking	70.00%
Percentage of Respondents Biking	43.33%
Percentage of Respondents Other	0.00%

Summer Season Donner Lake Activity Hours

Respondents that visit Donner Lake during the summer season spend an average of 6.62 hours per day on activities.

Summer season Donner Lake activity hours per day of respondents are provided in Table 7.3-10. Again the activities include fishing from shore, fishing from a boat, water skiing, boating, jet skiing, swimming, picnicking, hiking, biking and other activities.

Respondents indicate they spend an average of 0.74 hours per day fishing from shore, 0.52 hours per day fishing from a boat, 0.32 hours per day water skiing, 0.74 hours per day boating, 0.23 hours per day jet skiing, 1.00 hour per day swimming, 1.23 hours per day picnicking, 1.16 hours per day hiking, 0.68 hours per day biking, and 0.00 hours per day on other activities.

Table 7.3-10. Summer Season Donner Lake Activity Hours.

Average Activity Hours per Day spent Fishing by Respondents	0.74
Average Activity Hours per Day spent Fishing from Boat by Respondents	0.52
Average Activity Hours per Day spent Water Skiing by Respondents	0.32
Average Activity Hours per Day spent Boating by Respondents	0.74
Average Activity Hours per Day spent Jet Skiing by Respondents	0.23
Average Activity Hours per Day spent Swimming by Respondents	1.00
Average Activity Hours per Day spent Picnicking by Respondents	1.23
Average Activity Hours per Day spent Hiking by Respondents	1.16
Average Activity Hours per Day spent Biking by Respondents	0.68
Average Activity Hours per Day spent on Other activities by Respondents	0.00
Total Activity Hours per Day by Respondents	6.62

Ranking of Summer Season Donner Lake Characteristics

Respondents that visit Donner Lake during the summer season rank site characteristics as very good to satisfactory.

Ranking of summer season Donner Lake Characteristics by respondents is shown in Table 7.3-11. Site characteristics include natural setting and environment, recreation opportunities, lake-level, boat ramp and dock access, crowd level, and facilities. The ranking of each can range from 1 being very good to 5 being very poor.

Respondents rank natural setting and environment as very good, recreation opportunities as good, lake-level as satisfactory, boat ramp and dock access as good, crowd level as satisfactory, and facilities as good.

Table 7.3-11. Ranking of Summer Season Donner Lake Characteristics.

Average Value of Natural Setting and Environment by Respondents	1.24
Average Value of Recreation Opportunities by Respondents	1.78
Average Value of Lake-Level by Respondents	2.57
Average Value of Boat Ramp and Dock Access by Respondents	2.37
Average Value of Crowd Level by Respondents	2.51
Average Value of Facilities by Respondents	2.34

Ranking: 1=Very Good; 2=Good; 3=Satisfactory; 4=Poor; and, 5=Very Poor.

Summer Season Donner Lake Alternative Lake Level Sensitivity

The number of respondents that indicate a change in the number of second-home visits at alternative lake-levels for Donner Lake during the summer season is 7. The number of respondents that indicate no change in the number of second-home visits at alternative lake levels for Donner Lake during the summer season is 30.

Table 7.3-12 provides the summer season Donner Lake alternative lake-level sensitivity.

Table 7.3-12. Summer Season Donner Lake Alternative Lake-Level Sensitivity.

Number of Respondents that indicated a Change in the Number of Second-Home Visits at Alternative Lake-Levels	7
Number of Respondents that indicated No Change in the Number of Second-Home Visits at Alternative Lake-Levels	30
Total Number of Respondents	37

Summer Season Visitation Expenditures

Visitation expenditures by respondents during the summer season are highest on restaurant and groceries.

Summer season visitation expenditures by respondents are presented in Table 7.3-13. Average expenditure per visit, average expenditure per visit per day, and average expenditure per visit per day per person are given for restaurant, groceries, gasoline, other shopping, recreation rental, golf fees, other user fees, gaming, and other.

Respondents indicate an average total expenditure per visit of $343.26, an average total expenditure per visit per day of $92.73, and an average total expenditure per visit per day per person of $26.09.

Table 7.3-13. Summer Season Visitation Expenditures.

Average Expenditure per Visit on Restaurant by Respondents	94.38
Average Expenditure per Visit on Groceries by Respondents	88.89
Average Expenditure per Visit on Gasoline by Respondents	28.75
Average Expenditure per Visit on Other Shopping by Respondents	32.32
Average Expenditure per Visit on Recreation Rental by Respondents	30.89
Average Expenditure per Visit on Golf Fees by Respondents	33.3
Average Expenditure per Visit on Other User Fees by Respondents	2.59
Average Expenditure per Visit on Gaming by Respondents	28.57
Average Expenditure per Visit on Other by Respondents	3.57
Average Total Expenditure per Visit by Respondents	$343.26
Average Expenditure per Visit per Day on Restaurant by Respondents	26.95
Average Expenditure per Visit per Day on Groceries by Respondents	23.25
Average Expenditure per Visit per Day on Gasoline by Respondents	7.81
Average Expenditure per Visit per Day on Other Shopping by Respondents	9.38
Average Expenditure per Visit per Day on Recreation Rental by Respondents	9.07
Average Expenditure per Visit per Day on Golf Fees by Respondents	8.02
Average Expenditure per Visit per Day on Other User Fees by Respondents	0.70
Average Expenditure per Visit per Day on Gaming by Respondents	6.66
Average Expenditure per Visit per Day on Other by Respondents	0.89
Average Total Expenditure per Visit per Day by Respondents	$92.73
Average Expenditure per Visit per Day per Person on Restaurant by Respondents	7.95
Average Expenditure per Visit per Day per Person on Groceries by Respondents	6.73
Average Expenditure per Visit per Day per Person on Gasoline by Respondents	2.33
Average Expenditure per Visit per Day per Person on Other Shopping by Respondents	2.61
Average Expenditure per Visit per Day per Person on Recreation Rental by Respondents	2.29
Average Expenditure per Visit per Day per Person on Golf Fees by Respondents	2.20
Average Expenditure per Visit per Day per Person on Other User Fees by Respondents	0.15
Average Expenditure per Visit per Day per Person on Gaming by Respondents	1.74
Average Expenditure per Visit per Day per Person on Other by Respondents	0.09
Average Total Expenditure per Visit per Day per Person by Respondents	$26.09

Annual Second-Home Upkeep and Repair Expenditures

The average annual total expenditure by respondents on second-home upkeep and repair is $1,201.67.

Annual second-home upkeep and repair expenditures by respondents are provided in Table 7.3-14. Expenditures are average annual expenditures on painting, sealing, staining, landscape maintenance, house cleaning, driveway crack sealing, and other.

Respondents indicate an average annual expenditure on painting, sealing, and staining of $507.50, on landscape maintenance of $158.33, on house cleaning of $271.00, on driveway crack sealing of $110.67, and on other upkeep of $154.17. Again, the average annual total expenditure is $1,201.67.

Table 7.3-14. Annual Second-Home Upkeep and Repair Expenditures.

Average Annual Expenditure on Painting, Sealing, and Staining by Respondents	507.50
Average Annual Expenditure on Landscape Maintenance by Respondents	158.33
Average Annual Expenditure on House Cleaning by Respondents	271.00
Average Annual Expenditure on Driveway Crack Sealing by Respondents	110.67
Average Annual Expenditure on Other by Respondents	154.17
Average Annual Total Expenditure by Respondents	$1,201.67

Comments

Excerpts taken from a few comments made by respondents on owning a second-home in the Truckee area are listed below.

1. "A good vacation area near the Bay Area, Family oriented climate in Tahoe-Donner"

2. "Recreation surroundings are very nice - water level is a concern and it is too bad that so much is taken from it each year for the valley..."

3. "We like the Tahoe Donner and Truckee area very much. Our main concern is over development...We are concerned that Tahoe Donner will get too crowded. ...Re: The Tahoe Donner Marina - the swimming area needs to be improved to make wading into the water easier for children...sand needs to be added in the shallow area so children are not walking on rocks... pool areas too crowded."

4. "...Tahoe Donner is a beautiful setting for a second home - the area is perfect year round...We like the small community lifestyle...We'd like to see the Tahoe Donner Area remain beautiful, scenic and that growth be controlled."

5. "Great place to get away. Love the natural mountain environment and the town of Truckee."

6. "We love our home. However...Tahoe Donner ski area would be more appealing if it were expanded...Another golf course perhaps not so difficult would be a big plus...We would like to see an expanded Trout Creek facility..."

7. "I don't use Donner Lake because of the crowds and noise...My decision to purchase a second home is based mainly on access to streams and rivers in the summer, winter sports in the winter...The total lack of water conservation in Reno/Sparks and the over use of water in Carson Valley (and related areas) on agri-business is my #1 concern for the area."

8. "I would like to see growth slowed in the region to minimize the impact on the environment...If it gets too crowded in future years I will have to sell and relocate."

9. "The Truckee area is as beautiful of an area as any I have seen...a rare mix...amenities available and still having a feeling of being by an unspoiled mountain lake...it is of utmost importance to preserve this balance from an economic viewpoint as well as an ecological one. I answered "NO" to your question #8 but I do feel that the lake is much more enjoyable both aesthetically as well as from a useful point of view, when lake levels are kept as high as possible. Please do whatever is possible to keep these levels high. Thank you"

10. "Would prefer No more development either commercial or residential as too many people destroy the environment's beauty that is inherent in this setting"

7.4. Survey of the Vacation-Home Renters

A survey of vacation-home renters for the Truckee area was done during February 1995. The purpose of the survey was to first obtain an overall picture of the summer season visitation and recreation activities of vacation-home renters, second, quantify the amount of expenditures that vacation-home renters make to the local economy, and third, identify how vacation-home visitation would change during the summer season in relation to alternative lake-levels at Donner Lake. To achieve this purpose, information was collected from vacation-home renters using a questionnaire. Questionnaires were mailed-out to vacation-home renters and when returned the data was compiled and analyzed to develop a set of descriptive statistics. The cover letter to the questionnaire, the questionnaire, a response summary, descriptive statistics of the data, and comments are presented below.

Cover Letter

February 15, 1995

Dear Vacation-Home Renter:

The Town of Truckee requests your participation in a survey. This survey is being conducted by the University of Nevada, Reno. Information collected will be used in assessing the economic and recreation issues associated with lakes and reservoirs in the Truckee area. This information will help local, state, and federal officials make informed decisions on how best to manage the lakes, reservoirs, and rivers in the Truckee River Basin.

The enclosed questionnaire takes less than 15 minutes to complete. A limited number of vacation-home renters are receiving this questionnaire, so your response means a lot. Please complete the questionnaire as best you can and then mail the questionnaire in the stamped pre-addressed envelope.

The tabulated results of this survey will be made available for your review at the Truckee Town Hall. The Town of Truckee appreciates your participation in this survey and thanks you for your time.

PLEASE RETURN YOUR COMPLETED QUESTIONNAIRE BEFORE MARCH 1ST.

Sincerely,

Embree B. (Breeze) Cross
Mayor

Questionnaire

The questionnaire is made-up of eight questions and a comment page. Through the questionnaire, vacation-home renters were asked to provide information on the location of main residence, influence of decision factors to rent a vacation-home, group make-up, vacation-home visitation in terms of both the number of visits per month and number of days per visit, site visitation at area lakes and reservoirs, summer season visitation and recreation activities at Donner Lake, summer season characteristics of Donner Lake, sensitivity to alternative lake-levels at Donner Lake, expenditures per visit, and vacation-home rent. Also through the questionnaire, vacation-home renters were asked to mention any comments about renting a vacation-home in the Truckee area. Each of the eight questions and the comment page are presented below.

1. Where is your main residence?

City _____
State _____
Zip Code _____

2. How did the following factors influence your decision to rent a vacation-home in the Truckee area? Please indicate, as a percentage, the level of influence each factor had on your decision. Be sure that the total is equal to 100%.

Decision Factors	Level of Influence %
Family / Community / Rural Lifestyle	
Natural Setting / Environment / Climate	
Winter Recreation / Proximity to Ski Areas	
Water-Related Summer Recreation / Proximity to Lakes and Reservoirs	
Other Summer Recreation / Proximity to Golf Courses and Hiking Trials	
Total	*100%*

3. How many adults and children are included in a typical visit to the Truckee area?

Typical Number of Adults per Visit _____
Typical Number of Children per Visit _____

4. How many times do you visit the Truckee area and how many days do you spend per visit during each of the following months?

Months	Typical Number of Visits per Month	Typical Number of Days per Visit
January		
February		
March		
April		
May		
June		
July		
August		
September		
October		
November		
December		

5. How many times do you visit Lake Tahoe, Donner Lake, Prosser Reservoir, Stampede Reservoir, Boca Reservoir, and Pyramid Lake for recreation during each of the following months?

Months	Typical Number of Visits per Month					
	Lake Tahoe	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Pyramid Lake
April						
May						
June						
July						
August						
September						
October						
November through March						

6. The summer recreation season is comprised of the months of June, July, and August including Memorial Day and Labor Day weekends. During this season: (please answer questions a, b, and c)

a. How many days per visit to the Truckee area do you spend on recreation at Donner Lake?

Typical Number of Days per Visit_____

b. How many hours per day do you spend on the following recreation activities at Donner Lake? Please indicate by marking the appropriate box, the number of hours per day for each recreation activity. Extra space is provided for other activities.

Recreation Activities	Typical Number of Hours per Day												
Fishing from Shore	0	1	2	3	4	5	6	7	8	9	10	11	12
Fishing from Boat	0	1	2	3	4	5	6	7	8	9	10	11	12
Water Skiing	0	1	2	3	4	5	6	7	8	9	10	11	12
Pleasure Boating	0	1	2	3	4	5	6	7	8	9	10	11	12
Jet Skiing	0	1	2	3	4	5	6	7	8	9	10	11	12
Swimming	0	1	2	3	4	5	6	7	8	9	10	11	12
Picnicing	0	1	2	3	4	5	6	7	8	9	10	11	12
Hiking	0	1	2	3	4	5	6	7	8	9	10	11	12
Biking	0	1	2	3	4	5	6	7	8	9	10	11	12
	0	1	2	3	4	5	6	7	8	9	10	11	12
	0	1	2	3	4	5	6	7	8	9	10	11	12

c. How do you rate the following characteristics of Donner Lake? Please rate the characteristics as very good, good, satisfactory, poor, or very poor.

Characteristics	Very Good	Good	Satisfactory	Poor	Very Poor
Natural Setting and Environment					
Recreation Opportunities					
Lake-Level					
Boat Ramp and Dock Access					
Crowd Level					
Facilities					

7. The summer recreation season is comprised of the months of June, July, and August including Memorial Day and Labor Day weekends. During this season, the lake-level at Donner Lake is regulated between the following five lake-levels: (please answer questions a, b, and c)

	Lake-Levels		Boat Ramp and Boat Dock Status			
Lake-Level	Lake Elevation	Lake Elevation Drop	Public Boat Ramp Status	Tahoe Donner Boat Ramp Status	Donner Lake Property Owner Boat Ramp Status	Public Boat Docks Status
	feet	*feet*				
1	5,936 maximum	0	usable	usable	usable	usable / safe
2	5,935	1	usable	usable	usable	usable / safe
3	5,934	2	usable	marginal	marginal	marginal
4	5,933	3	usable	unusable	unusable	unusable / unsafe
5	5,932	4	usable	unusable	unusable	unusable / unsafe

a. Would the number of visits you make during each month to the Truckee area change at any of the above lake-levels?

No _____ (if No, please go to question 8)
Yes _____

b. If Yes, please indicate below, how you would change your number of visits per month to the Truckee area? At each lake-level, circle whether you would have no change, an increase, or a decrease in the number of visits per month. Also indicate the corresponding increase or decrease in the number of visits per month.

Lake-Level	Change in Number of Visits per Month			
	Circle One			*Increase / Decrease*
1	No Change	Increase	Decrease	
2	No Change	Increase	Decrease	
3	No Change	Increase	Decrease	
4	No Change	Increase	Decrease	
5	No Change	Increase	Decrease	

c. If Yes, how would you then rate the following characteristics of Donner Lake at the lake-level where you first indicated that you would change the number of visits to the Truckee area? Please rate the following characteristics as very good, good, satisfactory, poor, or very poor.

Characteristics	Very Good	Good	Satisfactory	Poor	Very Poor
Natural Setting and Environment					
Recreation Opportunities					
Lake-Level					
Boat Ramp and Dock Access					
Crowd Level					
Facilities					

8. The summer recreation season is comprised of the months of June, July, and August including Memorial Day and Labor Day weekends. During this season: (please answer question a)

a. How much do you spend on the following items per visit to the Truckee area? Please indicate your expenditure on each item and the portion that you spend in the Truckee-Donner Lake area, Reno-Sparks area, Lake Tahoe area, and Other area. Extra space is provided for other items.

Items	Typical Expenditure per Visit	Truckee-Donner Lake Area Portion	Reno-Sparks Area Portion	Lake Tahoe Area Portion	Other Area Portion
	$	*%*	*%*	*%*	*%*
Restaurant					
Groceries and Supplies					
Gasoline					
Other Shopping					
Recreation Rental (boats, bikes, horses, etc.)					
Golf Fees					
Other User Fees					
Gaming					
Total					

b. How much do you spend per visit to rent a vacation-home in the Truckee area?

Typical Vacation-Home Rent Expenditure per Visit $_____

Anything you would like to mention about renting a vacation-home in the Truckee area? Please write your comments here: (comments may include: reasons for renting a vacation-home; natural setting and environment, summer recreation expectations for lakes, reservoirs, and rivers; water-level concerns; community and rural lifestyle; local economy; prospects of future growth; etc.)

Response Summary

Questionnaire response, question response, and comment response is given below. There were 100 questionnaires mailed-out and 21 returned for a 21% response. Question response, meaning the number of respondents that answered each question, varied from 21 respondents that answered question 1 to 8 respondents that answered question 8a. This indicates that of the 21 questionnaires returned only 8 respondents completed the questionnaire. The comment response, meaning the number of respondents that made comments, was 15.

Questionnaires Mailed-Out	100
Questionnaires Returned	21
Number of Respondents that Answered Question 1	21
Number of Respondents that Answered Question 2	21
Number of Respondents that Answered Question 3	20
Number of Respondents that Answered Question 4	20
Number of Respondents that Answered Question 5	20
Number of Respondents that Answered Question 6a	20
Number of Respondents that Answered Question 6b	8
Number of Respondents that Answered Question 6c	8
Number of Respondents that Answered Question 7a	19
Number of Respondents that Answered Question 7b	0
Number of Respondents that Answered Question 7c	0
Number of Respondents that Answered Question 8a	8
Number of Respondents that Answered Question 8b	8
Number of Respondents that Made Comments	15

Descriptive Statistics

The descriptive statistics of the data are presented below with an explanation of their interpretation. The descriptive statistics include the location of main residence, decision factor influence to rent a vacation home, group make-up, annual vacation-home visitation, site visitation, annual site visitation, summer season Donner Lake visitation, summer season Donner Lake activities, summer season Donner Lake activity hours, ranking of summer season Donner Lake characteristics, summer season Donner Lake alternative lake-level sensitivity, summer season visitation expenditures, and rent expenditures.

Location of Main Residence

The highest number of respondents are respondents with a main residence in the San Francisco Bay area.

Table 7.4-1 provides the number of respondents with a main residence in the Sacramento area, the San Francisco Bay area, and Other areas. There are 4 respondents with a main residence in the Sacramento area, 14 respondents with a main residence in the San Francisco Bay area, and 3 respondents with a main residence in Other areas. Other areas being areas of California and out of state.

Table 7.4-1. Location of Main Residence.

Number of Respondents with a Main Residence in the Sacramento Area	4
Number of Respondents with a Main Residence in the San Francisco Bay Area	14
Number of Respondents with a Main Residence in Other Areas	3
Total Number of Respondents	21

Decision Factor Influence to Rent a Vacation-Home

Winter recreation/proximity to ski areas is the decision factor that has the highest level of influence on the decision to rent a vacation-home in the Truckee area.

Decision factor influence to rent a vacation-home by respondents is presented in Table 7.4-2. Decision factors include family/community/rural lifestyle, natural setting/environment/climate, winter recreation/proximity to ski areas, water-related summer recreation/proximity to lakes and reservoirs, and other summer recreation/proximity to golf courses and hiking trails. An average level of influence, as a percentage, is given for each decision factor.

The average level of influence is 12% for family/community/rural lifestyle, 25% for natural setting/environment/climate, 52% for winter recreation/proximity to ski areas, 7% for water-related summer recreation/proximity to lakes and reservoirs, and 4% for other summer recreation/proximity to golf courses and hiking trails. Together the decision factor influence equals 100%.

Table 7.4-2. Decision Factor Influence to Rent a Vacation-Home.

Average Level of Influence for Family / Community / Rural Lifestyle by Respondents	12.30%
Average Level of Influence for Natural Setting / Environment / Climate by Respondents	25.30%
Average Level of Influence for Winter Recreation / Proximity to Ski Areas by Respondents	51.90%
Average Level of Influence for Water-Related Summer Recreation / Proximity to Lakes and Reservoirs by Respondents	6.35%
Average Level of Influence for Other Summer Recreation / Proximity to Golf Courses and Hiking Trails by Respondents	4.15%
Total	100.00%

Group Make-Up

Average group size of respondents is 6.15 persons. Average number of adults per group is 4.85 persons and average number of children per group is 1.30 persons.

Table 7.4-3 provides group make-up of respondents.

Table 7.4-3. Group Make-Up.

Average Group Size per Visit of Respondents	6.15
Average Number of Adults in Group of Respondents	4.85
Average Number of Children in Group of Respondents	1.30

Annual Vacation-Home Visitation

Vacation-home visitation by respondents occurs in all months of the year. The greatest number of visits by respondents is in the months of December, January, February, March, and April. This is followed by visits in the months of July and August. The greatest number of days per visit by respondents, however, is in the months of July and August. This is followed by days per visit in the months of December, January, February, March, and April.

The average number of visits per month by respondents are presented in Table 7.4-4. Average number of visits by respondents is 1.05 in January, 1.20 in February, 0.73 in March, 0.43 in April, 0.05 in May, 0.10 in June, 0.30 in July, 0.30 in August, 0.00 in September, 0.05 in October, 0.05 in November, and 0.65 in December. The annual or total average number of visits by respondents is 4.91.

The average number of days per visit per month by respondents are also presented in Table 7.4-4. Average number of days per visit by respondents is 2.57 in January, 2.63 in February, 2.97 in March, 2.41 in April, 3.00 in May, 2.25 in June, 4.42 in July, 4.08 in August, 0.00 in September, 1.00 in October, 2.00 in November, and 2.35 in December.

Table 7.4-4. Annual Vacation-Home Visitation.

Average Number of Visits by Respondents during January	1.05
Average Number of Visits by Respondents during February	1.20
Average Number of Visits by Respondents during March	0.73
Average Number of Visits by Respondents during April	0.43
Average Number of Visits by Respondents during May	0.05
Average Number of Visits by Respondents during June	0.10
Average Number of Visits by Respondents during July	0.30
Average Number of Visits by Respondents during August	0.30
Average Number of Visits by Respondents during September	0.00
Average Number of Visits by Respondents during October	0.05
Average Number of Visits by Respondents during November	0.05
Average Number of Visits by Respondents during December	0.65
Total Average Number of Visits by Respondents	4.91
Average Number of Days per Visit by Respondents during January	2.57
Average Number of Days per Visit by Respondents during February	2.63
Average Number of Days per Visit by Respondents during March	2.97
Average Number of Days per Visit by Respondents during April	2.41
Average Number of Days per Visit by Respondents during May	3.00
Average Number of Days per Visit by Respondents during June	2.25
Average Number of Days per Visit by Respondents during July	4.42
Average Number of Days per Visit by Respondents during August	4.08
Average Number of Days per Visit by Respondents during September	0.00
Average Number of Days per Visit by Respondents during October	1.00
Average Number of Days per Visit by Respondents during November	2.00
Average Number of Days per Visit by Respondents during December	2.35

Site Visitation

The overall greatest site visitation of respondents occurs at Donner Lake.

The site visitation of respondents is presented in Table 7.4-5. Study area sites include Lake Tahoe, Donner Lake, Prosser Reservoir, Stampede Reservoir, and Boca Reservoir.

Of the 20 respondents, 50% indicate they visit Lake Tahoe an average of 3 visits during the year, 45% indicate they visit Donner Lake an average of 3 visits during the year, 5% indicate they visit Prosser Reservoir an average of 1 visit during the year, 0% indicate they visit Stampede Reservoir an average of 0 visits during the year, and 10% indicate they visit Boca Reservoir an average of 3 visits during the year.

None of the respondents indicate they visit Pyramid Lake. Pyramid Lake was also listed as a study area site in the question.

Table 7.4-5. Site Visitation.

	Study Area	Lake Tahoe	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Number of Respondents	20	10	9	1	0	2
Percentage of Respondents		50.00%	45.00%	5.00%	0.00%	10.00%
Number of Visits by Respondents		26.00	27.50	1.00	0.00	6.00
Average Number of Visits by Respondents		2.60	3.06	1.00	0.00	3.00

Annual Site Visitation

The annual site visitation of respondents follow a similar pattern. This pattern shows that visitation at a site is the highest in June, July, and August.

The annual site visitation of respondents is shown in Table 7.4-6 Again, study area sites include Lake Tahoe, Donner Lake, Prosser Reservoir, Stampede Reservoir, and Boca Reservoir.

The pattern of annual visitation for a site is based on the number of respondents that indicate they visit the study area and visit the site in a given month. To clarify this, for Donner Lake, 2 out of 2 respondents indicate they visit in April, 1 out of 2 respondents indicate they visit in May, 1 out of 6 respondents indicate they visit in June, 4 out of 9 respondents indicate they visit in July, 4 out of 10 respondents indicate they visit in August, 0 out of 2 respondents indicate they visit in September, 0 out of 0 respondents indicate they visit in October, and 3 out of 6 respondents indicate they visit in Other months.

These numbers are then divided by their summation and presented as a percentage of visitation during the given month. Of the total annual visitation at Donner Lake, 13% is during April, 7% is during May, 7% is during June, 27% is during July, 27% is during August, 0% is during September, 0% is during October and 19% is during other months.

The percentages taken together for all the months then show the pattern of annual site visitation.

A similar interpretation can be made for the other sites.

Table 7.4-6. Annual Site Visitation.

	Study Area	Lake Tahoe	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Number of Respondents that Visit during April	2	0	2	0	0	0
Number of Respondents that Visit during May	2	1	1	0	0	0
Number of Respondents that Visit during June	6	4	1	1	0	0
Number of Respondents that Visit during July	9	4	4	0	0	1
Number of Respondents that Visit during August	10	4	4	0	0	2
Number of Respondents that Visit during September	2	2	0	0	0	0
Number of Respondents that Visit during October	0	0	0	0	0	0
Number of Respondents that Visit during Other	6	3	3	0	0	0
Total Number of Respondents		18	15	1	0	3
Percentage of Visitation during April		0.00%	13.33%	0.00%	0.00%	0.00%
Percentage of Visitation during May		5.56%	6.67%	0.00%	0.00%	0.00%
Percentage of Visitation during June		22.22%	6.67%	100.00%	0.00%	0.00%
Percentage of Visitation during July		22.22%	26.67%	0.00%	0.00%	33.33%
Percentage of Visitation during August		22.22%	26.67%	0.00%	0.00%	66.67%
Percentage of Visitation during September		11.11%	0.00%	0.00%	0.00%	0.00%
Percentage of Visitation during October		0.00%	0.00%	0.00%	0.00%	0.00%
Percentage of Visitation during Other		16.67%	20.00%	0.00%	0.00%	0.00%

Summer Season Donner Lake Visitation

The number of respondents that visit Donner Lake during the summer season months of June, July, and August is 8. This number of respondents is out of 9 respondents that rent a vacation-home during the summer season months. Average number of days per visit at Donner Lake by these 8 respondents during the summer season months is 3.25 days.

Table 7.4-7 presents the summer season Donner Lake visitation.

Table 7.4-7. Summer Season Donner Lake Visitation.

Number of Respondents	8
Average Number of Days per Visit by Respondents	3.25

Summer Season Donner Lake Activities

Respondents that visit Donner Lake during the summer season participate in swimming, picnicking, hiking, boating, fishing, jet skiing, and biking activities.

Summer season Donner Lake activities of respondents are shown in Table 7.4-8. The activities include fishing from shore, fishing from a boat, water skiing, boating, jet skiing, swimming, picnicking, hiking, biking and other activities.

Of 8 respondents, 25% indicate fishing from shore, 13% indicate fishing from a boat, 0% indicate water skiing, 63% indicate boating, 0% indicate jet skiing, 63% indicate swimming, 75% indicate picnicking, 63% indicate hiking, and 13% indicate biking.

Table 7.4-8. Summer Season Donner Lake Activities.

Number of Respondents Fishing	2
Number of Respondents Fishing from Boat	1
Number of Respondents Water Skiing	0
Number of Respondents Boating	5
Number of Respondents Jet Skiing	1
Number of Respondents Swimming	5
Number of Respondents Picnicking	6
Number of Respondents Hiking	5
Number of Respondents Biking	1
Number of Respondents Other	0
Percentage of Respondents Fishing	25.00%
Percentage of Respondents Fishing from Boat	12.50%
Percentage of Respondents Water Skiing	0.00%
Percentage of Respondents Boating	62.50%
Percentage of Respondents Jet Skiing	12.50%
Percentage of Respondents Swimming	62.50%
Percentage of Respondents Picnicking	75.00%
Percentage of Respondents Hiking	62.50%
Percentage of Respondents Biking	12.50%
Percentage of Respondents Other	0.00%

Summer Season Donner Lake Activity Hours

Respondents that visit Donner Lake during the summer season spend an average of 8.40 hours per day on activities.

Summer season Donner Lake activity hours per day of respondents are provided in Table 7.4-9. Again the activities include fishing from shore, fishing from a boat, water skiing, boating, jet skiing, swimming, picnicking, hiking, biking and other activities.

Respondents indicate they spend an average of 1.13 hours per day fishing from shore, 0.25 hours per day fishing from a boat, 0.00 hours per day water skiing, 1.38 hours per day boating, 0.25 hours per day jet skiing, 2.13 hour per day swimming, 1.88 hours per day picnicking, 1.25 hours per day hiking, 0.13 hours per day biking, and 0.00 hours per day on other activities.

Table 7.4-9. Summer Season Donner Lake Activity Hours.

Average Activity Hours per Day spent Fishing by Respondents	1.13
Average Activity Hours per Day spent Fishing from Boat by Respondents	0.25
Average Activity Hours per Day spent Water Skiing by Respondents	0.00
Average Activity Hours per Day spent Boating by Respondents	1.38
Average Activity Hours per Day spent Jet Skiing by Respondents	0.25
Average Activity Hours per Day spent Swimming by Respondents	2.13
Average Activity Hours per Day spent Picnicking by Respondents	1.88
Average Activity Hours per Day spent Hiking by Respondents	1.25
Average Activity Hours per Day spent Biking by Respondents	0.13
Average Activity Hours per Day spent on Other activities by Respondents	0.00
Total Activity Hours per Day by Respondents	8.40

Ranking of Summer Season Donner Lake Characteristics

Respondents that visit Donner Lake during the summer season rank site characteristics as good to satisfactory.

Ranking of summer season Donner Lake Characteristics by respondents is shown in Table 7.4-10. Site characteristics include natural setting and environment, recreation opportunities, lake-level, boat ramp and dock access, crowd level, and facilities. The ranking of each can range from 1 being very good to 5 being very poor.

Respondents rank natural setting and environment as good, recreation opportunities as good, lake-level as good, boat ramp and dock access as good, crowd level as satisfactory, and facilities as good.

Table 7.4-10. Ranking of Summer Season Donner Lake Characteristics.

Average Value of Natural Setting and Environment by Respondents	1.88
Average Value of Recreation Opportunities by Respondents	2.00
Average Value of Lake-Level by Respondents	2.38
Average Value of Boat Ramp and Dock Access by Respondents	2.43
Average Value of Crowd Level by Respondents	3.00
Average Value of Facilities by Respondents	2.38

Ranking: 1=Very Good; 2=Good; 3=Satisfactory; 4=Poor; and, 5=Very Poor.

Summer Season Donner Lake Alternative Lake Level Sensitivity

The number of respondents that indicate a change in the number of vacation-home visits at alternative lake-levels for Donner Lake during the summer season is 1. The number of respondents that indicate no change in the number of vacation-home visits at alternative lake levels for Donner Lake during the summer season is 18.

Table 7.4-11 provides the summer season Donner Lake alternative lake-level sensitivity.

Table 7.4-11. Summer Season Donner Lake Alternative Lake-Level Sensitivity.

Number of Respondents that indicated a Change in the Number of Vacation-Home Visits at Alternative Lake-Levels	1
Number of Respondents that indicated No Change in the Number of Vacation-Home Visits at Alternative Lake-Levels	18
Total Number of Respondents	19

Summer Season Visitation Expenditures

Visitation expenditures by respondents during the summer season are highest on restaurant and groceries.

Summer season visitation expenditures by respondents are presented in Table 7.4-12. Average expenditure per visit, average expenditure per visit per day, and average expenditure per visit per day per person are given for restaurant, groceries, gasoline, other shopping, recreation rental, golf fees, other user fees, gaming, and other.

Respondents indicate an average total expenditure per visit of $560.25, an average total expenditure per visit per day of $143.03, and an average total expenditure per visit per day per person of $26.12.

Vacation-home rent is treated separately and not included in the above expenditure values.

Table 7.4-12. Summer Season Visitation Expenditures.

Average Expenditure per Visit on Restaurant by Respondents	132.50
Average Expenditure per Visit on Groceries by Respondents	165.31
Average Expenditure per Visit on Gasoline by Respondents	43.75
Average Expenditure per Visit on Other Shopping by Respondents	86.88
Average Expenditure per Visit on Recreation Rental by Respondents	63.06
Average Expenditure per Visit on Golf Fees by Respondents	25.00
Average Expenditure per Visit on Other User Fees by Respondents	25.00
Average Expenditure per Visit on Gaming by Respondents	18.75
Average Expenditure per Visit on Other by Respondents	0.00
Average Total Expenditure per Visit by Respondents	$560.25
Average Expenditure per Visit per Day on Restaurant by Respondents	35.33
Average Expenditure per Visit per Day on Groceries by Respondents	40.58
Average Expenditure per Visit per Day on Gasoline by Respondents	11.07
Average Expenditure per Visit per Day on Other Shopping by Respondents	21.03
Average Expenditure per Visit per Day on Recreation Rental by Respondents	12.69
Average Expenditure per Visit per Day on Golf Fees by Respondents	15.00
Average Expenditure per Visit per Day on Other User Fees by Respondents	4.65
Average Expenditure per Visit per Day on Gaming by Respondents	2.68
Average Expenditure per Visit per Day on Other by Respondents	0.00
Average Total Expenditure per Visit per Day by Respondents	$143.03
Average Expenditure per Visit per Day per Person on Restaurant by Respondents	6.41
Average Expenditure per Visit per Day per Person on Groceries by Respondents	7.90
Average Expenditure per Visit per Day per Person on Gasoline by Respondents	1.99
Average Expenditure per Visit per Day per Person on Other Shopping by Respondents	4.24
Average Expenditure per Visit per Day per Person on Recreation Rental by Respondents	2.23
Average Expenditure per Visit per Day per Person on Golf Fees by Respondents	1.88
Average Expenditure per Visit per Day per Person on Other User Fees by Respondents	0.99
Average Expenditure per Visit per Day per Person on Gaming by Respondents	0.48
Average Expenditure per Visit per Day per Person on Other by Respondents	0.00
Average Total Expenditure per Visit per Day per Person by Respondents	$26.12

Summer Season Vacation-Home Rent Expenditure

The average rent expenditure per visit by respondents on vacation-home rent during the summer season is $671.88.

The summer season vacation-home rent expenditure by respondents is provided in Table 7.4-13. An average rent expenditure per visit with an average rent expenditure per visit per day and average rent expenditure per visit per day per person is given.

Respondents indicate an average rent expenditure per visit of $671.88, and average rent expenditure per visit per day of $165.53, and an average rent expenditure per visit per day per person of $29.00.

Table 7.4-13. Summer Season Vacation-Home Rent Expenditure.

Average Rent Expenditure per Visit by Respondents	$671.88
Average Rent Expenditure per Visit per Day by Respondents	$165.53
Average Rent Expenditure per Visit per Day per Person by Respondents	$29.00

Comments

Excerpts taken from a few comments made by respondents on renting a vacation-home in the Truckee area are listed below.

1. "...Great location and cute town. We hope it doesn't Grow too much. Beautiful area."

2. "We love the Truckee area and have increased the amount of time spent there over Tahoe due to water level in Tahoe and the crowds there. If the lake level were decreased I'm sure it would influence us to choose another place to stay but that would be sad as we have truly grown to love Truckees beauty and small town charm."

3. "I rent in the Tahoe area because the climate is radically different from that in the Bay Area during the winter and because of the social interaction we can create by gathering friends in a large house. I would come more often if real-estate rental were cheaper."

4. "We have enjoyed coming to Truckee to play in the adult coed soccer tournament..."

5. "We are not boaters but came for some snow fun and minimal skiing."

6. "We rent a home in Truckee for the summer months of July, Aug, Sept. We live in the desert so we come there for the summer climate -we spend most of our time golfing - Rent boats on Lake Tahoe and Donner once in a while - so I am not qualified to answer detail questions"

7. "Typically we enjoy the Truckee area most in the winter. Usually we rent a home in the winter months from one of the property management offices. Skiing is our favorite sport."

8. "This was the first time we rented a vacation home. Have stayed in hotels before. Really did enjoy it...have decided to buy a home in Incline Village. We are selling our home in California."

9. "We don't visit during the summer months...enjoy Truckee area best....It's also near enough to everything we need."

10. "We tend to rent in Tahoe-Donner for the following reasons: ...Rustic Truckee vs "Tacky" South Shore...Donner Lake setting vs Tahoe...trains above Donner Lake...family atmosphere...walking/hiking around TD and Donner lake... Casinos in Boomtown..." "Concerns: water-level..skidoo drivers rude and out of control...Tahoe-Donner needs to offer renters a pass option for amenities... it is often impossible to plan ahead with small children - they offer no refund on unused amenity tickets..."

7.5. Estimation of the Expenditure Function

Expenditures of camping and day use visitors at each of the sites are calculated using an expenditure function. Specification of the expenditure function and estimation of the expenditure function are as follows.

Specification of the Expenditure Function

The expenditure function is an important ingredient of the modern theory of consumer behavior. It shows the minimal expenditures necessary to achieve a given utility level for a particular set of prices. The properties of the expenditure function in the areas of theoretical and applied analysis of consumer behavior are developed in the studies by Barton and Bohm (1982), Deaton and Muelbauer (1980), Hicks (1946), Samuelson (1947), Silberberg (1978), Theil (1975), and Varian (1992). Let E (P, U) be an expenditure function, where P is a vector of commodity prices and U is a given level of utility. The expenditure function is the solution to the following problem:

$$E(P, U) = \text{Min } PX \quad \text{such that } U(X) \geq U \tag{7.5-1}$$

where X is a vector of non-negative quantities of goods. The solution to this optimization problem is the expenditure function that gives the minimum cost of achieving the fixed level of utility. For the expenditure function E (P, U) to be well behaved, it must have the following properties: (i) E (P, U) is non decreasing in P, (ii) E (P, U) is homogeneous of the degree 1 in P, (iii) E (P, U) is concave in P, (iv) E (P, U) is continuous in P, for $P > 0$, and (iv) if X (P, U) is the expenditure-minimizing bundle necessary to achieve utility level U at prices P, then $X(P, U) = \delta E(P, U) / \delta P$ assuming the derivative exists and that $P > 0$.

The application of the expenditure function in empirical studies of consumer behavior requires the availability of observed market prices on goods and the existence of a well-behaved utility function. In the area of demand for recreation activities, there are no market-based transactions to determine observed market prices. Consequently, the notion of a regular utility function has to be modified in developing the expenditure function for the recreation activities. Let F be a vector of the time spent on a series of recreational activities by an individual at a particular site. The indirect utility function V for recreational activities for this individual is:

$$V = V(F, S, I) \tag{7.5-2}$$

where S is a vector of site characteristics that captures the substitutability of visits across various sites and I is the total budget allocated by an individual to participate in all the recreational activities included in F. The expenditure function E dual to the indirect utility function in (7.5-2) is the minimum expenditure required for the individual to participate in all the recreational activities in F, given the site characteristics in S. The expenditure function E derived from (7.5-2) is:

$$E = I = V^{-1}(F, S) \tag{7.5-3}$$

The expenditure function in (7.5-3) can also be modified to include the variable of the total number of visitors to the site. Let N be the total number of visitors. Then the expenditures function is:

$$E = V^{-1}(F, S, N) \tag{7.5-4}$$

The specification of the expenditure function in (7.5-4) is an empirical issue and it could be determined upon a estimation model selection technique, e.g., the Box-Cox estimation technique. One notable feature of the expenditure function in (7.5-4) is that it can be used to estimate expenditures of recreational activities at a particular site.

The expenditure function in (7.5-4) is used to evaluate the expenditures of recreational activities at the following seven sites in California and Nevada: Upper Truckee River, Donner Lake, Prosser Reservoir, Stampede Reservoir, Boca Reservoir, Lower Truckee River, and Pyramid Lake. The attributes of the characteristics of each site are captured by including dummy variable for each site in S. The definition of the dummy variables included in S are: UTR = 1 if the visitation site is Upper Truckee River and 0 otherwise; DL = 1 if the visitation site is Donner Lake and 0 otherwise; PR = 1 if the visitation site is Prosser Reservoir and 0 otherwise; SR = 1 if the visitation site is Stampede Reservoir and 0 otherwise; BR = 1 if the visitation site is Boca Reservoir and 0 otherwise; LTR = 1 if the visitation site is Lower Truckee River and 0 otherwise; and, PL = 1 if the visitation site is Pyramid Lake and 0 otherwise. The hours spent on each of the following eleven recreational activities are included in F. The activities were determined according to their availability and popularity at the sites. The activities are: picnicking, camping, fishing, swimming, boating, fishing from boat, water skiing, jet skiing, rafting, kayaking, biking, hiking, and other activities. To capture the effect of the type of visitor at a given site on their expenditures, i.e., camping versus day use, a dummy variable D, defined as D = 1 if camping visitor and 0 if day use visitor, is included in the expenditure function in (7.5-4). Following the categorization of expenditures on the recreation survey, the expenditures by a visitor to a given site are identified as licenses, camping fees, hotel or motel, restaurant, groceries, equipment and supplies, rental, fuel, and other. Using the above specification of the variables, the expenditure function in (7.5-4) can now be presented as:

$$E_i = V^{-1}\left(UTR, DL, PR, SR, BR, LTR, PL, D, \sum_{1}^{13} F_j, N\right); i = 1,.....,7 \tag{7.5-5}$$

The functional form specification of the expenditure function in (7.5-5) is an empirical issue and it will be determined using the Box-Cox flexible functional form technique. The Box-Cox specification of the expenditure function in (7.5-5) is:

$$\frac{E_i^{\lambda} - 1}{\lambda} = \beta_1 UTR + \beta_2 DL + \beta_3 PR + \beta_4 SR + \beta_5 BR + \beta_6 LTR + \beta_7 PL + \beta_8 D \quad (7.5\text{-}6)$$

$$+ \sum_{9}^{21} \beta_j \left(\frac{F_j^{\lambda} - 1}{\lambda} \right) + \beta_{22} \left(\frac{N^{\lambda} - 1}{\lambda} \right) + U$$

where U is the stochastic error term, β is the slope parameter, and λ is the transformation parameter. The transformation parameter may take a wide range of values that would determine the particular functional form that the variable subject to the Box-Cox transformation will assume. For example, one gets a logarithmic transformation for a variable if λ is equal to zero. All of the coefficients of the expenditure function in (7.5-5), including λ, will be estimated using the estimation of the following log-likelihood function:

$$L(\lambda, \beta, \sigma^2; E, X) = -\frac{T}{2} \text{Ln}(2\pi\sigma^2) - \frac{1}{2\sigma^2} (E^{\lambda} - X^{\lambda}B)' (E^{\lambda} - X^{\lambda}B) \quad (7.5\text{-}7)$$

$$+ \text{Ln}(J); \text{ and } J = \det \left[\frac{\partial E^{\lambda}}{\partial E} \right] = \prod_{t=1}^{T} E_t^{\lambda - 1}$$

where X is a vector of observations on all the exogenous variables, B is a vector of all the slope parameters to be estimated, and T is the number of observations.

Estimation of the Expenditure Function

The data collected through the recreation survey for the seven sites is used to estimate the expenditure function in (7.5-6). A total number of 432 out of the 443 complete questionnaires are used in the estimation. The initial diagnosis of the data revealed that there are a large number of zeros on most of the recreational activities and a number of expenditure categories making the estimation of the expenditure function in its generalized form in (7.5-6) impossible. A number of alternatives to combine some of the recreational activities are tried to estimate a modified form of the expenditure function in (7.5-6). All of these attempts resulted into some difficulties in estimation of the expenditure function in (7.5-6).

The final modified form of the expenditure function in (7.5-6) that provides meaningful estimation results is:

$$\frac{E^{\lambda}-1}{\lambda} = \beta_1 UTR + \beta_2 DL + \beta_3 PR + \beta_4 SR + \beta_5 BR + \beta_6 LTR + \beta_7 PL + \beta_8 D \qquad (7.5\text{-}8)$$

$$+ \beta_9 \left(\frac{F^{\lambda}-1}{\lambda}\right) + \beta_{10} \left(\frac{N^{\lambda}-1}{\lambda}\right) + U$$

The expenditure function expressed in simple notation becomes:

$$LnE = \beta_1 UTR + \beta_2 DL + \beta_3 PR + \beta_4 SR + \beta_5 BR + \beta_6 LTR + \beta_7 PL + \beta_8 D \qquad (7.5\text{-}9)$$

$$+ \beta_9 LnF + \beta_{10} LnN + U$$

where E is the sum of the nine expenditure categories per day, F is the sum of the hours spent per day by a visitor on the thirteen categories of recreational activities, and N is the group size. The Ln is an abbreviation for natural logarithm.

Using the survey observations on the variables E, F, N, the seven location dummy variables, and the type of visitor dummy variable, the expenditure function in (7.5-8) or (7.5-9) is estimated having the following results.

$$\begin{aligned} LnE = {} & 3.6390UTR + 3.0354DL + 2.8812PR + 3.1279SR + 2.9892BR \\ & (12.20) \quad (13.07) \quad (8.79) \quad (12.16) \quad (12.21) \\ & + 2.7781LTR + 3.0575PL - 0.4474D + 0.2320LnF + 0.3195LnN \\ & (7.73) \quad (13.76) \quad (-3.38) \quad (2.15) \quad (4.10) \end{aligned} \tag{7.5-10}$$

The numbers in the parentheses are the asymptotic t-ratios for 452 degrees of freedom. The adjusted R^2 is 0.0753 for the 462 observations. The 473 observations were edited down to 462. Observations that were deleted were observations having a zero for total expenditures, or a zero for total recreation activity hours, or a zero for group size. The camping and day use visitor expenditure function observations are given in Table 7.5-1.

The maximum likelihood (ML) ratio test is then used to check the validity of alternative functional specifications of the expenditure function for specific value of λ, i.e., logarithmic ($\lambda = 0$) and linear ($\lambda = 1$) functional forms. Let S denote the parameter space under the Box-Cox specification and s denote the subspace of S restricted by the null hypothesis (H^o). The ML ratio test to test for a given functional form under H^o is a large sample test and can be conducted as follows:

$$d = -2 [L(S) - L(s)] \tag{7.5-11}$$

where L (S) is the maximum of the log likelihood function under S and L (s) is the maximum value of the log likelihood function under s. If H^o is true, the statistic d has the limiting chi-squared (χ^2) with n degrees of freedom, where n is the number of restrictions imposed by H^o.

The maximum likelihood estimation of λ in (7.5-8) is 0.07 with the maximum of the log likelihood function L(S) of – 803.568. Using estimates of the maximum log likelihood function of λ, L(s) for the logarithmic and linear specifications of the expenditure function, the test statistic in (7.5-11) is calculated. The test results provide evidence to accept H^o: $\lambda = 0$ and to reject H^o: $\lambda = 1$ against the alternative hypothesis that H^o: $\lambda = 0.07$. In other words, the final functional specification of the expenditure function is in logarithmic functional form.

The estimated expenditure function predicts the logarithm of the average expenditures per day at a particular site for both camping and day use visitors for given values of the logarithm of their hours of non-camping recreation activity and the logarithm of their group size. Then the average expenditures per day are determined by taking the anti-log of the logarithm of the average expenditures. This procedure is shown below by site.

Upper Truckee River

Camping Visitor Group Expenditures per Day

$$LnE = 3.6390(1) + 3.0354(0) + 2.8812(0) + 3.1279(0) + 2.9892(0)$$

$$+ 2.7781(0) + 3.0575(0) - 0.4474(1) + 0.2320Ln(5.50) + 0.3195(3.47)$$

$$LnE = 3.6390 - 0.4474 + 0.2320(1.70) + 0.3195(1.24)$$

$$LnE = 3.9822$$

$$E = \$53.63$$

Day Use Visitor Group Expenditures per Day

$$LnE = 3.6390(1) + 3.0354(0) + 2.8812(0) + 3.1279(0) + 2.9892(0)$$

$$+ 2.7781(0) + 3.0575(0) - 0.4474(0) + 0.2320Ln(3.00) + 0.3195Ln(5.50)$$

$$LnE = 3.6390 + 0.2320(1.10) + 0.3195(1.70)$$

$$LnE = 4.4374$$

$$E = \$84.55$$

Donner Lake

Camping Visitor Group Expenditures per Day

LnE = 3.6390(0) + 3.0354(1) +2.8812(0) + 3.1279(0) + 2.9892(0)

+ 2.7781(0) + 3.0575(0) – 0.4474(1) + 0.2320Ln(8.29) + 0.3195Ln(5.24)

LnE = 3.0354 – 0.4474 + 0.2320(2.12) + 0.3195(1.66)

LnE = 3.6102

E = $36.97

Day Use Visitor Group Expenditures per Day

LnE = 3.6390(0) + 3.0354(1) + 2.8812(0) + 3.1279(0) + 2.9892(0)

+ 2.7781(0) + 3.0575(0) – 0.4474(0) + 0.2320Ln(5.63) + 0.3195Ln(5.02)

LnE = 3.0354 + 0.2320(1.73) + 0.3195(1.61)

LnE = 3.9512

E = $52.00

Prosser Reservoir

Camping Visitor Group Expenditures per Day

$$LnE = 3.6390(0) + 3.0354(0) + 2.8812(1) + 3.1279(0) + 2.9892(0)$$

$$+ 2.7781(0) + 3.0575(0) - 0.4474(1) + 0.2320Ln(7.67) + 0.3195Ln(3.73)$$

$$LnE = 2.8812 - 0.4474 + 0.2320(2.04) + 0.3195(1.32)$$

$$LnE = 3.3288$$

$$E = \$27.90$$

Day Use Visitor Group Expenditures per Day

$$LnE = 3.6390(0) + 3.0354(0) + 2.8812(1) + 3.1279(0) + 2.9892(0)$$

$$+ 2.7781(0) + 3.0575(0) - 0.4474(0) + 0.2320Ln(3.38) + 0.3195Ln(3.13)$$

$$LnE = 2.8812 + 0.2320(1.22) + 0.3195(1.14)$$

$$LnE = 3.5284$$

$$E = \$34.07$$

Stampede Reservoir

Camping Visitor Group Expenditures per Day

$$LnE = 3.6390(0) + 3.0354(0) + 2.8812(0) + 3.1279(1) + 2.9892(0)$$

$$+ 2.7781(0) + 3.0575(0) - 0.4474(1) + 0.2320Ln(7.82) + 0.3195Ln(5.12)$$

$$LnE = 3.1279 - 0.4474 + 0.2320(2.06) + 0.3195(1.63)$$

$$LnE = 3.6792$$

$$E = \$39.61$$

Day Use Visitor Group Expenditures per Day

$$LnE = 3.6390(0) + 3.0354(0) + 2.8812(0) + 3.1279(1) + 2.9892(0)$$

$$+ 2.7781(0) + 3.0575(0) - 0.44743(0) + 0.2320Ln(5.67) + 0.3195Ln(3.89)$$

$$LnE = 3.1279 + 0.2320(1.74) + 0.3195(1.36)$$

$$LnE = 3.9661$$

$$E = \$52.78$$

Boca Reservoir

Camping Visitor Group Expenditures per Day

$$LnE = 3.6390(0) + 3.0354(0) + 2.8812(0) + 3.1279(0) + 2.9892(1)$$

$$+ 2.7781(0) + 3.0575(0) - 0.4474(1) + 0.2320Ln(7.83) + 0.3195Ln(5.10)$$

$$LnE = 2.9892 - 0.44743 + 0.2320(2.05) + 0.3195(1.63)$$

$$LnE = 3.5382$$

$$E = \$34.40$$

Day Use Visitor Group Expenditures per Day

$$LnE = 3.6390(0) + 3.0354(0) + 2.8812(0) + 3.1279(0) + 2.9892(1)$$

$$+ 2.7781(0) + 3.0575(0) - 0.4474(0) + 0.2320Ln(5.24) + 0.3195Ln(5.02)$$

$$LnE = 2.9892 + 0.2320(1.66) + 0.3195(1.61)$$

$$LnE = 3.8887$$

$$E = \$48.85$$

Lower Truckee River

Camping Visitor Group Expenditures per Day

$$LnE = 3.6390(0) + 3.0354(0) + 2.8812(0) + 3.1279(0) + 2.9892(0)$$

$$+ 2.7781(1) + 3.0575(0) - 0.4474(1) + 0.2320Ln(3.00) + 0.3195Ln(2.00)$$

$$LnE = 2.7781 - 0.4474 + 0.2320(1.10) + 0.3195(0.69)$$

$$LnE = 2.8064$$

$$E = \$16.55$$

Day Use Visitor Group Expenditures per Day

$$LnE = 3.6390(0) + 3.0354(0) + 2.8812(0) + 3.1279(0) + 2.9892(0)$$

$$+ 2.7781(1) + 3.0575(0) - 0.4474(0) + 0.2320Ln(3.96) + 0.3195Ln(2.29)$$

$$LnE = 2.7781 + 0.2320(1.38) + 0.3195(0.83)$$

$$LnE = 3.3635$$

$$E = \$28.89$$

Pyramid Lake

Camping Visitor Group Expenditures per Day

$$LnE = 3.6390(0) + 3.0354(0) + 2.8812(0) + 3.1279(0) + 2.9892(0)$$

$$+ 2.7781(0) + 3.0575(1) - 0.4474(1) + 0.2320Ln(8.20) + 0.3195Ln(4.72)$$

$$LnE = 3.0575 - 0.4474 + 0.2320(2.10) + 0.3195(1.55)$$

$$LnE = 3.5925$$

$$E = \$36.32$$

Day Use Visitor Group Expenditures per Day

$$LnE = 3.6390(0) + 3.0354(0) + 2.8812(0) + 3.1279(0) + 2.9892(0)$$

$$+ 2.7781(0) + 3.0575(1) - 0.4474(0) + 0.2320Ln(5.74) + 0.3195Ln(5.92)$$

$$LnE = 3.0575 + 0.2320(1.75) + 0.3195(1.78)$$

$$LnE = 4.0322$$

$$E = \$56.38$$

The above camping and day use visitor expenditure function values are presented by site in Table 7.5-2.

Table 7.5-1. Camping and Day Use Visitor Expenditure Function Observations.

Observation Number	Year	Site	Questionnaire Number	Visitor Type	Expenditures	Number of Days	Expenditures per Day	Upper Truckee River UTR	Donner Lake DL	Prosser Reservoir PR	Stampede Reservoir SR	Boca Reservoir BR	Lower Truckee River LTR	Pyramid Lake PL	Camping Visitor	Activity Hours	Group Size
1	1993	UTR	1	CP	267.00	7.0	38.14	1	0	0	0	0	0	0	1	2.5	4.0
2	1993	UTR	2	CP	240.00	10.0	24.00	1	0	0	0	0	0	0	1	6.0	4.0
3	1993	UTR	3	CP	100.00	2.0	50.00	1	0	0	0	0	0	0	1	3.0	4.0
4	1993	UTR	4	CP	290.00	2.0	145.00	1	0	0	0	0	0	0	1	6.0	4.0
5	1993	UTR	5	CP	183.50	3.0	61.17	1	0	0	0	0	0	0	1	5.0	2.0
6	1993	UTR	6	CP	83.00	7.0	11.86	1	0	0	0	0	0	0	1	8.0	2.0
7	1993	UTR	7	CP	50.00	1.0	50.00	1	0	0	0	0	0	0	1	2.0	6.0
8	1993	UTR	8	CP	71.00	1.0	71.00	1	0	0	0	0	0	0	1	7.0	4.0
9	1993	UTR	9	CP	36.00	3.0	12.00	1	0	0	0	0	0	0	1	2.0	4.0
10	1993	UTR	10	CP	198.00	5.0	39.60	1	0	0	0	0	0	0	1	8.0	2.0
11	1993	UTR	11	CP	78.00	2.0	39.00	1	0	0	0	0	0	0	1	2.0	4.0
12	1993	UTR	12	CP	223.00	4.0	55.75	1	0	0	0	0	0	0	1	11.0	6.0
13	1993	UTR	13	CP	290.00	14.0	20.71	1	0	0	0	0	0	0	1	14.0	2.0
14	1993	UTR	14	CP	75.00	1.0	75.00	1	0	0	0	0	0	0	1	4.0	2.0
15	1993	UTR	15	CP	317.00	10.0	31.70	1	0	0	0	0	0	0	1	2.0	2.0
16	1993	UTR	1	DU	450.00	0.0	450.00	1	0	0	0	0	0	0	0	3.0	7.0
17	1993	UTR	2	DU	540.00	0.0	540.00	1	0	0	0	0	0	0	0	3.0	4.0
18	1993	PR	1	DU	37.90	0.0	37.90	0	0	1	0	0	0	0	0	6.0	2.0
19	1993	PR	2	DU	54.00	0.0	54.00	0	0	1	0	0	0	0	0	2.0	1.0
20	1993	PR	3	DU	732.00	0.0	732.00	0	0	1	0	0	0	0	0	4.0	8.0
21	1993	PR	4	DU	268.00	0.0	268.00	0	0	1	0	0	0	0	0	3.0	5.0
22	1993	PR	5	DU	24.50	0.0	24.50	0	0	1	0	0	0	0	0	3.0	2.0
23	1993	PR	6	DU	623.00	0.0	623.00	0	0	1	0	0	0	0	0	2.0	2.0
24	1993	SR	1	CP	145.00	3.0	48.33	0	0	0	1	0	0	0	1	3.0	8.0
25	1993	SR	2	CP	66.00	3.0	22.00	0	0	0	1	0	0	0	1	8.0	4.0
26	1993	SR	3	CP	177.50	2.0	88.75	0	0	0	1	0	0	0	1	4.0	4.0
27	1993	SR	4	CP	137.00	2.0	68.50	0	0	0	1	0	0	0	1	2.0	2.0
28	1993	SR	5	CP	163.00	3.0	54.33	0	0	0	1	0	0	0	1	2.0	3.0
29	1993	SR	6	CP	180.00	3.0	60.00	0	0	0	1	0	0	0	1	9.0	7.0
30	1993	SR	7	CP	421.00	7.0	60.14	0	0	0	1	0	0	0	1	9.0	9.0
31	1993	SR	8	CP	110.90	2.0	55.45	0	0	0	1	0	0	0	1	7.0	2.0
32	1993	SR	9	CP	500.00	2.0	250.00	0	0	0	1	0	0	0	1	5.0	14.0
33	1993	SR	10	CP	239.00	3.0	79.67	0	0	0	1	0	0	0	1	4.0	8.0
34	1993	SR	11	CP	76.00	3.0	25.33	0	0	0	1	0	0	0	1	5.0	1.0
35	1993	SR	12	CP	56.00	2.0	28.00	0	0	0	1	0	0	0	1	5.0	2.0
36	1993	SR	13	CP	91.00	5.0	18.20	0	0	0	1	0	0	0	1	5.0	2.0
37	1993	SR	14	CP	325.00	4.0	81.25	0	0	0	1	0	0	0	1	5.0	2.0
38	1993	SR	15	CP	315.00	3.0	105.00	0	0	0	1	0	0	0	1	13.0	10.0
39	1993	SR	16	CP	312.00	2.0	156.00	0	0	0	1	0	0	0	1	8.0	5.0
40	1993	SR	17	CP	167.20	2.0	83.60	0	0	0	1	0	0	0	1	6.0	3.0
41	1993	SR	18	CP	76.00	1.0	76.00	0	0	0	1	0	0	0	1	1.5	2.0
42	1993	SR	19	CP	90.95	2.0	45.48	0	0	0	1	0	0	0	1	5.0	6.0
43	1993	SR	20	CP	722.00	10.0	72.20	0	0	0	1	0	0	0	1	12.0	19.0
44	1993	SR	21	CP	48.00	3.0	16.00	0	0	0	1	0	0	0	1	5.0	2.0
45	1993	SR	22	CP	239.00	8.0	29.88	0	0	0	1	0	0	0	1	3.0	4.0
46	1993	SR	23	CP	240.00	2.0	120.00	0	0	0	1	0	0	0	1	10.0	8.0
47	1993	SR	24	CP	266.00	7.0	38.00	0	0	0	1	0	0	0	1	6.5	5.0
48	1993	SR	25	CP	123.00	6.0	20.50	0	0	0	1	0	0	0	1	8.0	4.0
49	1993	SR	26	CP	169.00	6.0	28.17	0	0	0	1	0	0	0	1	2.0	2.0
50	1993	SR	27	CP	77.00	2.0	38.50	0	0	0	1	0	0	0	1	13.0	2.0
51	1993	SR	28	CP	199.00	2.0	99.50	0	0	0	1	0	0	0	1	4.0	12.0
52	1993	SR	29	CP	249.00	3.0	83.00	0	0	0	1	0	0	0	1	5.0	13.0
53	1993	SR	30	CP	90.00	2.0	45.00	0	0	0	1	0	0	0	1	5.0	2.0
54	1993	SR	31	CP	361.00	7.0	51.57	0	0	0	1	0	0	0	1	10.0	4.0
55	1993	SR	32	CP	65.50	5.0	13.10	0	0	0	1	0	0	0	1	5.0	2.0
56	1993	SR	33	CP	230.00	3.0	76.67	0	0	0	1	0	0	0	1	8.0	7.0
57	1993	SR	1	DU	43.00	0.0	43.00	0	0	0	1	0	0	0	0	3.0	4.0
58	1993	SR	2	DU	204.00	0.0	204.00	0	0	0	1	0	0	0	0	5.0	8.0
59	1993	SR	3	DU	15.00	0.0	15.00	0	0	0	1	0	0	0	0	4.0	4.0

Table 7.5-1. Camping and Day Use Visitor Expenditure Function Observations (continue).

Observation Number	Year	Site	Questionnaire Number	Visitor Type	Expenditures	Number of Days	Expenditures per Day	Upper Truckee River UTR	Donner Lake DL	Prosser Reservoir PR	Stampede Reservoir SR	Boca Reservoir BR	Lower Truckee River LTR	Pyramid Lake PL	Camping Visitor	Activity Hours	Group Size
60	1993	SR	4	DU	271.00	0.0	271.00	0	0	0	1	0	0	0	0	8.0	2.0
61	1993	SR	5	DU	158.00	0.0	158.00	0	0	0	1	0	0	0	0	5.0	2.0
62	1993	SR	6	DU	137.00	0.0	137.00	0	0	0	1	0	0	0	0	5.0	2.0
63	1993	SR	7	DU	60.00	0.0	60.00	0	0	0	1	0	0	0	0	10.0	4.0
64	1993	SR	8	DU	35.00	0.0	35.00	0	0	0	1	0	0	0	0	8.0	2.0
65	1993	SR	9	DU	150.00	0.0	150.00	0	0	0	1	0	0	0	0	3.0	7.0
66	1993	BR	1	CP	63.00	2.0	31.50	0	0	0	0	1	0	0	1	7.0	4.0
67	1993	BR	2	CP	175.00	10.0	17.50	0	0	0	0	1	0	0	1	3.0	2.0
68	1993	BR	3	CP	124.00	2.0	62.00	0	0	0	0	1	0	0	1	7.0	4.0
69	1993	BR	4	CP	100.00	14.0	7.14	0	0	0	0	1	0	0	1	4.0	4.0
70	1993	BR	1	DU	30.00	0.0	30.00	0	0	0	0	1	0	0	0	5.0	5.0
71	1993	BR	2	DU	60.00	0.0	60.00	0	0	0	0	1	0	0	0	6.0	9.0
72	1993	BR	3	DU	70.00	0.0	70.00	0	0	0	0	1	0	0	0	8.0	4.0
73	1993	BR	4	DU	30.00	0.0	30.00	0	0	0	0	1	0	0	0	4.0	2.0
74	1993	BR	5	DU	465.00	0.0	465.00	0	0	0	0	1	0	0	0	6.0	2.0
75	1993	BR	6	DU	110.00	0.0	110.00	0	0	0	0	1	0	0	0	2.0	18.0
76	1993	BR	7	DU	75.00	0.0	75.00	0	0	0	0	1	0	0	0	5.0	3.0
77	1993	BR	8	DU	30.00	0.0	30.00	0	0	0	0	1	0	0	0	2.0	2.0
78	1993	BR	9	DU	130.00	0.0	130.00	0	0	0	0	1	0	0	0	8.0	4.0
79	1993	BR	10	DU	10.00	0.0	10.00	0	0	0	0	1	0	0	0	6.0	18.0
80	1993	BR	11	DU	12.00	0.0	12.00	0	0	0	0	1	0	0	0	5.0	2.0
81	1993	BR	12	DU	12.00	0.0	12.00	0	0	0	0	1	0	0	0	5.0	4.0
82	1993	BR	13	DU	10.00	0.0	10.00	0	0	0	0	1	0	0	0	4.0	1.0
83	1993	BR	14	DU	46.50	0.0	46.50	0	0	0	0	1	0	0	0	5.0	2.0
84	1993	BR	15	DU	129.00	0.0	129.00	0	0	0	0	1	0	0	0	6.0	5.0
85	1993	BR	16	DU	41.00	0.0	41.00	0	0	0	0	1	0	0	0	8.0	3.0
86	1993	BR	17	DU	20.00	0.0	20.00	0	0	0	0	1	0	0	0	2.0	3.0
87	1993	BR	18	DU	32.00	0.0	32.00	0	0	0	0	1	0	0	0	3.0	6.0
88	1993	BR	19	DU	70.00	0.0	70.00	0	0	0	0	1	0	0	0	6.0	7.0
89	1993	BR	20	DU	25.00	0.0	25.00	0	0	0	0	1	0	0	0	3.0	6.0
90	1993	BR	21	DU	1910.00	0.0	1910.00	0	0	0	0	1	0	0	0	8.0	3.0
91	1993	BR	22	DU	42.50	0.0	42.50	0	0	0	0	1	0	0	0	5.0	2.0
92	1993	BR	23	DU	220.00	0.0	220.00	0	0	0	0	1	0	0	0	2.0	10.0
93	1993	BR	24	DU	42.00	0.0	42.00	0	0	0	0	1	0	0	0	8.0	4.0
94	1993	BR	25	DU	25.00	0.0	25.00	0	0	0	0	1	0	0	0	4.0	3.0
95	1993	BR	26	DU	10.00	0.0	10.00	0	0	0	0	1	0	0	0	2.0	2.0
96	1993	BR	27	DU	20.00	0.0	20.00	0	0	0	0	1	0	0	0	5.0	1.0
97	1993	BR	28	DU	60.00	0.0	60.00	0	0	0	0	1	0	0	0	5.0	4.0
98	1993	BR	29	DU	40.00	0.0	40.00	0	0	0	0	1	0	0	0	6.0	8.0
99	1993	BR	30	DU	30.00	0.0	30.00	0	0	0	0	1	0	0	0	4.0	7.0
100	1993	BR	31	DU	223.00	0.0	223.00	0	0	0	0	1	0	0	0	9.0	1.0
101	1993	BR	32	DU	150.00	0.0	150.00	0	0	0	0	1	0	0	0	6.0	7.0
102	1993	BR	33	DU	10.00	0.0	10.00	0	0	0	0	1	0	0	0	3.0	3.0
103	1993	BR	34	DU	10.00	0.0	10.00	0	0	0	0	1	0	0	0	4.0	1.0
104	1993	BR	35	DU	24.00	0.0	24.00	0	0	0	0	1	0	0	0	5.0	3.0
105	1993	BR	36	DU	37.00	0.0	37.00	0	0	0	0	1	0	0	0	6.0	10.0
106	1993	BR	37	DU	0.50	0.0	0.50	0	0	0	0	1	0	0	0	1.0	2.0
107	1993	BR	38	DU	280.00	0.0	280.00	0	0	0	0	1	0	0	0	12.0	5.0
108	1993	BR	39	DU	90.00	0.0	90.00	0	0	0	0	1	0	0	0	5.0	2.0
109	1993	BR	40	DU	300.00	0.0	300.00	0	0	0	0	1	0	0	0	4.0	3.0
110	1993	LTR	1	CP	35.00	2.0	17.50	0	0	0	0	0	1	0	1	3.0	2.0
111	1993	LTR	1	DU	1.00	0.0	1.00	0	0	0	0	0	1	0	0	4.0	1.0
112	1993	LTR	2	DU	94.00	0.0	94.00	0	0	0	0	0	1	0	0	4.0	5.0
113	1993	LTR	3	DU	151.00	0.0	151.00	0	0	0	0	0	1	0	0	7.0	2.0
114	1993	LTR	4	DU	23.00	0.0	23.00	0	0	0	0	0	1	0	0	4.0	1.0
115	1993	LTR	5	DU	1.00	0.0	1.00	0	0	0	0	0	1	0	0	7.0	2.0
116	1993	LTR	6	DU	45.00	0.0	45.00	0	0	0	0	0	1	0	0	4.0	4.0
117	1993	LTR	7	DU	13.50	0.0	13.50	0	0	0	0	0	1	0	0	5.0	1.0
118	1993	LTR	8	DU	20.00	0.0	20.00	0	0	0	0	0	1	0	0	3.0	2.0

Table 7.5-1. Camping and Day Use Visitor Expenditure Function Observations (continue).

Observation Number	Year	Site	Questionnaire Number	Visitor Type	Expenditures	Number of Days	Expenditures per Day	Upper Truckee River UTR	Donner Lake DL	Prosser Reservoir PR	Stampede Reservoir SR	Boca Reservoir BR	Lower Truckee River LTR	Pyramid Lake PL	Camping Visitor	Activity Hours	Group Size
119	1993	LTR	9	DU	21.00	0.0	21.00	0	0	0	0	0	1	0	0	4.0	1.0
120	1993	LTR	10	DU	34.00	0.0	34.00	0	0	0	0	0	1	0	0	2.0	4.0
121	1993	LTR	11	DU	775.00	0.0	775.00	0	0	0	0	0	1	0	0	1.0	1.0
122	1993	LTR	12	DU	44.00	0.0	44.00	0	0	0	0	0	1	0	0	3.0	1.0
123	1993	LTR	13	DU	52.00	0.0	52.00	0	0	0	0	0	1	0	0	3.0	1.0
124	1993	LTR	14	DU	0.50	0.0	0.50	0	0	0	0	0	1	0	0	2.0	1.0
125	1993	LTR	15	DU	70.00	0.0	70.00	0	0	0	0	0	1	0	0	3.0	1.0
126	1993	LTR	16	DU	21.50	0.0	21.50	0	0	0	0	0	1	0	0	4.0	1.0
127	1993	LTR	17	DU	28.50	0.0	28.50	0	0	0	0	0	1	0	0	2.0	5.0
128	1993	LTR	18	DU	182.00	0.0	182.00	0	0	0	0	0	1	0	0	6.0	10.0
129	1993	LTR	19	DU	22.00	0.0	22.00	0	0	0	0	0	1	0	0	3.0	2.0
130	1993	LTR	20	DU	14.00	0.0	14.00	0	0	0	0	0	1	0	0	4.0	2.0
131	1993	LTR	21	DU	21.50	0.0	21.50	0	0	0	0	0	1	0	0	6.0	1.0
132	1993	LTR	22	DU	73.00	0.0	73.00	0	0	0	0	0	1	0	0	3.0	2.0
133	1993	LTR	23	DU	23.00	0.0	23.00	0	0	0	0	0	1	0	0	5.0	2.0
134	1993	LTR	24	DU	42.00	0.0	42.00	0	0	0	0	0	1	0	0	6.0	2.0
135	1993	PL	1	CP	320.00	4.0	80.00	0	0	0	0	0	0	1	1	1.0	2.0
136	1993	PL	2	CP	75.00	3.0	25.00	0	0	0	0	0	0	1	1	7.0	5.0
137	1993	PL	3	CP	170.00	2.0	85.00	0	0	0	0	0	0	1	1	7.0	2.0
138	1993	PL	4	CP	41.00	1.0	41.00	0	0	0	0	0	0	1	1	4.0	2.0
139	1993	PL	5	CP	87.00	1.0	87.00	0	0	0	0	0	0	1	1	12.0	2.0
140	1993	PL	6	CP	162.00	4.0	40.50	0	0	0	0	0	0	1	1	10.0	3.0
141	1993	PL	7	CP	140.00	2.0	70.00	0	0	0	0	0	0	1	1	6.0	5.0
142	1993	PL	8	CP	75.00	3.0	25.00	0	0	0	0	0	0	1	1	8.0	1.0
143	1993	PL	9	CP	195.00	6.0	32.50	0	0	0	0	0	0	1	1	3.0	4.0
144	1993	PL	10	CP	180.00	4.0	45.00	0	0	0	0	0	0	1	1	1.0	6.0
145	1993	PL	1	DU	70.00	0.0	70.00	0	0	0	0	0	0	1	0	5.0	2.0
146	1993	PL	2	DU	20.00	0.0	20.00	0	0	0	0	0	0	1	0	7.0	3.0
147	1993	PL	3	DU	61.00	0.0	61.00	0	0	0	0	0	0	1	0	8.0	5.0
148	1993	PL	4	DU	45.00	0.0	45.00	0	0	0	0	0	0	1	0	5.0	3.0
149	1993	PL	5	DU	45.00	0.0	45.00	0	0	0	0	0	0	1	0	7.0	10.0
150	1993	PL	6	DU	42.00	0.0	42.00	0	0	0	0	0	0	1	0	5.0	5.0
151	1993	PL	7	DU	220.00	0.0	220.00	0	0	0	0	0	0	1	0	6.0	7.0
152	1994	DL	1	CP	68.00	4.0	17.00	0	1	0	0	0	0	0	1	4.0	4.0
153	1994	DL	2	CP	343.00	5.0	68.60	0	1	0	0	0	0	0	1	9.0	6.0
154	1994	DL	3	CP	108.00	3.0	36.00	0	1	0	0	0	0	0	1	6.0	2.0
155	1994	DL	4	CP	335.00	6.0	55.83	0	1	0	0	0	0	0	1	8.0	2.0
156	1994	DL	5	CP	210.00	3.0	70.00	0	1	0	0	0	0	0	1	12.0	4.0
157	1994	DL	6	CP	56.25	2.0	28.13	0	1	0	0	0	0	0	1	12.0	9.0
158	1994	DL	7	CP	160.00	5.0	32.00	0	1	0	0	0	0	0	1	10.0	6.0
159	1994	DL	8	CP	135.00	2.0	67.50	0	1	0	0	0	0	0	1	12.0	2.0
160	1994	DL	9	CP	163.00	1.0	163.00	0	1	0	0	0	0	0	1	6.0	2.0
161	1994	DL	10	CP	48.00	2.0	24.00	0	1	0	0	0	0	0	1	5.0	2.0
162	1994	DL	11	CP	181.00	4.0	45.25	0	1	0	0	0	0	0	1	5.0	14.0
163	1994	DL	12	CP	490.60	4.0	122.65	0	1	0	0	0	0	0	1	10.0	3.0
164	1994	DL	13	CP	980.00	8.0	122.50	0	1	0	0	0	0	0	1	7.0	8.0
165	1994	DL	14	CP	111.00	5.0	22.20	0	1	0	0	0	0	0	1	7.0	2.0
166	1994	DL	15	CP	385.00	8.0	48.13	0	1	0	0	0	0	0	1	11.0	7.0
167	1994	DL	16	CP	10.00	6.0	1.67	0	1	0	0	0	0	0	1	6.0	7.0
168	1994	DL	17	CP	130.00	2.0	65.00	0	1	0	0	0	0	0	1	8.0	3.0
169	1994	DL	18	CP	68.00	2.0	34.00	0	1	0	0	0	0	0	1	10.0	10.0
170	1994	DL	19	CP	150.00	3.0	50.00	0	1	0	0	0	0	0	1	11.0	2.0
171	1994	DL	20	CP	87.00	2.0	43.50	0	1	0	0	0	0	0	1	3.0	2.0
172	1994	DL	21	CP	162.00	2.0	81.00	0	1	0	0	0	0	0	1	10.0	9.0
173	1994	DL	22	CP	165.00	4.0	41.25	0	1	0	0	0	0	0	1	8.0	4.0
174	1994	DL	23	CP	200.00	3.0	66.67	0	1	0	0	0	0	0	1	11.0	7.0
175	1994	DL	24	CP	271.25	6.0	45.21	0	1	0	0	0	0	0	1	10.0	7.0
176	1994	DL	25	CP	47.00	3.0	15.67	0	1	0	0	0	0	0	1	12.0	10.0
177	1994	DL	26	CP	190.00	2.0	95.00	0	1	0	0	0	0	0	1	12.0	7.0

Table 7.5-1. Camping and Day Use Visitor Expenditure Function Observations (continue).

Observation Number	Year	Site	Questionnaire Number	Visitor Type	Expenditures	Number of Days	Expenditures per Day	Upper Truckee River UTR	Donner Lake DL	Prosser Reservoir PR	Stampede Reservoir SR	Boca Reservoir BR	Lower Truckee River LTR	Pyramid Lake PL	Camping Visitor	Activity Hours	Group Size
178	1994	DL	27	CP	121.25	2.0	60.63	0	1	0	0	0	0	0	1	7.0	14.0
179	1994	DL	28	CP	354.00	7.0	50.57	0	1	0	0	0	0	0	1	2.0	2.0
180	1994	DL	29	CP	51.00	2.5	20.40	0	1	0	0	0	0	0	1	9.0	6.0
181	1994	DL	30	CP	140.00	2.0	70.00	0	1	0	0	0	0	0	1	12.0	2.0
182	1994	DL	31	CP	144.25	2.0	72.13	0	1	0	0	0	0	0	1	12.0	1.0
183	1994	DL	32	CP	830.00	7.0	118.57	0	1	0	0	0	0	0	1	8.0	8.0
184	1994	DL	33	CP	64.75	2.0	32.38	0	1	0	0	0	0	0	1	12.0	4.0
185	1994	DL	34	CP	38.00	2.0	19.00	0	1	0	0	0	0	0	1	5.0	4.0
186	1994	DL	35	CP	25.00	2.0	12.50	0	1	0	0	0	0	0	1	7.0	6.0
187	1994	DL	36	CP	14.00	5.0	2.80	0	1	0	0	0	0	0	1	8.0	3.0
188	1994	DL	37	CP	30.00	3.0	10.00	0	1	0	0	0	0	0	1	1.0	2.0
189	1994	DL	38	CP	121.00	4.0	30.25	0	1	0	0	0	0	0	1	5.0	8.0
190	1994	DL	39	CP	73.00	3.0	24.33	0	1	0	0	0	0	0	1	6.0	6.0
191	1994	DL	40	CP	110.50	5.0	22.10	0	1	0	0	0	0	0	1	10.0	4.0
192	1994	DL	41	CP	140.00	3.0	46.67	0	1	0	0	0	0	0	1	7.0	7.0
193	1994	DL	42	CP	74.00	4.0	18.50	0	1	0	0	0	0	0	1	12.0	2.0
194	1994	DL	1	DU	25.00	0.0	25.00	0	1	0	0	0	0	0	0	3.0	2.0
195	1994	DL	2	DU	63.00	0.0	63.00	0	1	0	0	0	0	0	0	4.0	4.0
196	1994	DL	3	DU	19.00	0.0	19.00	0	1	0	0	0	0	0	0	4.0	3.0
197	1994	DL	4	DU	53.00	0.0	53.00	0	1	0	0	0	0	0	0	2.0	4.0
198	1994	DL	5	DU	34.00	0.0	34.00	0	1	0	0	0	0	0	0	5.0	6.0
199	1994	DL	6	DU	95.00	0.0	95.00	0	1	0	0	0	0	0	0	6.0	11.0
200	1994	DL	7	DU	27.00	0.0	27.00	0	1	0	0	0	0	0	0	3.0	10.0
201	1994	DL	8	DU	3.00	0.0	3.00	0	1	0	0	0	0	0	0	4.0	4.0
202	1994	DL	9	DU	5.00	0.0	5.00	0	1	0	0	0	0	0	0	6.0	3.0
203	1994	DL	10	DU	7.00	0.0	7.00	0	1	0	0	0	0	0	0	10.0	4.0
204	1994	DL	11	DU	60.50	0.0	60.50	0	1	0	0	0	0	0	0	9.0	7.0
205	1994	DL	12	DU	125.00	0.0	125.00	0	1	0	0	0	0	0	0	7.0	5.0
206	1994	DL	13	DU	22.50	0.0	22.50	0	1	0	0	0	0	0	0	3.0	6.0
207	1994	DL	14	DU	85.00	0.0	85.00	0	1	0	0	0	0	0	0	3.5	5.0
208	1994	DL	15	DU	43.00	0.0	43.00	0	1	0	0	0	0	0	0	4.0	4.0
209	1994	DL	16	DU	20.00	0.0	20.00	0	1	0	0	0	0	0	0	1.5	2.0
210	1994	DL	17	DU	140.00	0.0	140.00	0	1	0	0	0	0	0	0	6.0	9.0
211	1994	DL	18	DU	25.00	0.0	25.00	0	1	0	0	0	0	0	0	10.0	2.0
212	1994	DL	19	DU	35.00	0.0	35.00	0	1	0	0	0	0	0	0	5.0	2.0
213	1994	DL	20	DU	5.00	0.0	5.00	0	1	0	0	0	0	0	0	7.0	16.0
214	1994	DL	21	DU	60.00	0.0	60.00	0	1	0	0	0	0	0	0	8.0	7.0
215	1994	DL	22	DU	11.00	0.0	11.00	0	1	0	0	0	0	0	0	4.0	9.0
216	1994	DL	23	DU	31.00	0.0	31.00	0	1	0	0	0	0	0	0	3.0	6.0
217	1994	DL	24	DU	10.00	0.0	10.00	0	1	0	0	0	0	0	0	4.0	9.0
218	1994	DL	25	DU	81.65	0.0	81.65	0	1	0	0	0	0	0	0	2.5	4.0
219	1994	DL	26	DU	5.00	0.0	5.00	0	1	0	0	0	0	0	0	8.0	4.0
220	1994	DL	27	DU	177.99	0.0	177.99	0	1	0	0	0	0	0	0	8.0	8.0
221	1994	DL	28	DU	46.00	0.0	46.00	0	1	0	0	0	0	0	0	6.0	5.0
222	1994	DL	29	DU	149.51	0.0	149.51	0	1	0	0	0	0	0	0	5.0	5.0
223	1994	DL	30	DU	12.00	0.0	12.00	0	1	0	0	0	0	0	0	3.0	2.0
224	1994	DL	31	DU	156.06	0.0	156.06	0	1	0	0	0	0	0	0	4.0	8.0
225	1994	DL	32	DU	92.50	0.0	92.50	0	1	0	0	0	0	0	0	2.0	1.0
226	1994	DL	33	DU	21.00	0.0	21.00	0	1	0	0	0	0	0	0	6.0	4.0
227	1994	DL	34	DU	5.00	0.0	5.00	0	1	0	0	0	0	0	0	5.0	2.0
228	1994	DL	35	DU	50.00	0.0	50.00	0	1	0	0	0	0	0	0	5.0	3.0
229	1994	DL	36	DU	11.00	0.0	11.00	0	1	0	0	0	0	0	0	4.0	2.0
230	1994	DL	37	DU	15.00	0.0	15.00	0	1	0	0	0	0	0	0	8.0	2.0
231	1994	DL	38	DU	4.50	0.0	4.50	0	1	0	0	0	0	0	0	3.0	1.0
232	1994	DL	39	DU	137.00	0.0	137.00	0	1	0	0	0	0	0	0	2.0	4.0
233	1994	DL	40	DU	2.00	0.0	2.00	0	1	0	0	0	0	0	0	6.0	7.0
234	1994	DL	41	DU	5.00	0.0	5.00	0	1	0	0	0	0	0	0	2.0	2.0
235	1994	PR	1	CP	177.70	4.0	44.43	0	0	1	0	0	0	0	1	9.0	2.0
236	1994	PR	2	CP	10.00	3.0	3.33	0	0	1	0	0	0	0	1	2.0	2.0

Table 7.5-1. Camping and Day Use Visitor Expenditure Function Observations (continue).

Observation Number	Year	Site	Questionnaire Number	Visitor Type	Expenditures	Number of Days	Expenditures per Day	Upper Truckee River UTR	Donner Lake DL	Prosser Reservoir PR	Stampede Reservoir SR	Boca Reservoir BR	Lower Truckee River LTR	Pyramid Lake PL	Camping Visitor	Activity Hours	Group Size
237	1994	PR	3	CP	193.00	2.0	96.50	0	0	1	0	0	0	0	1	10.0	9.0
238	1994	PR	4	CP	114.00	14.0	8.14	0	0	1	0	0	0	0	1	12.0	3.0
239	1994	PR	5	CP	125.00	7.0	17.86	0	0	1	0	0	0	0	1	1.0	2.0
240	1994	PR	6	CP	185.00	2.0	92.50	0	0	1	0	0	0	0	1	7.0	3.0
241	1994	PR	7	CP	245.00	3.0	81.67	0	0	1	0	0	0	0	1	4.0	7.0
242	1994	PR	8	CP	6.00	1.0	6.00	0	0	1	0	0	0	0	1	5.0	6.0
243	1994	PR	9	CP	279.00	3.0	93.00	0	0	1	0	0	0	0	1	3.0	1.0
244	1994	PR	10	CP	8.00	2.0	4.00	0	0	1	0	0	0	0	1	12.0	2.0
245	1994	PR	11	CP	8.00	3.0	2.67	0	0	1	0	0	0	0	1	9.0	4.0
246	1994	PR	12	CP	31.00	4.0	7.75	0	0	1	0	0	0	0	1	6.0	2.0
247	1994	PR	13	CP	63.00	1.0	63.00	0	0	1	0	0	0	0	1	6.0	2.0
248	1994	PR	14	CP	87.50	4.0	21.88	0	0	1	0	0	0	0	1	8.0	1.0
249	1994	PR	15	CP	522.00	4.0	130.50	0	0	1	0	0	0	0	1	12.0	2.0
250	1994	PR	16	CP	64.00	9.0	7.11	0	0	1	0	0	0	0	1	12.0	6.0
251	1994	PR	17	CP	244.00	3.0	81.33	0	0	1	0	0	0	0	1	10.0	8.0
252	1994	PR	18	CP	76.00	2.0	38.00	0	0	1	0	0	0	0	1	8.0	2.0
253	1994	PR	19	CP	16.00	2.0	8.00	0	0	1	0	0	0	0	1	12.0	3.0
254	1994	PR	20	CP	120.00	7.0	17.14	0	0	1	0	0	0	0	1	12.0	1.0
255	1994	PR	21	CP	426.00	12.0	35.50	0	0	1	0	0	0	0	1	8.0	4.0
256	1994	PR	22	CP	30.00	5.0	6.00	0	0	1	0	0	0	0	1	8.0	4.0
257	1994	PR	23	CP	24.00	2.0	12.00	0	0	1	0	0	0	0	1	7.0	8.0
258	1994	PR	24	CP	96.00	3.0	32.00	0	0	1	0	0	0	0	1	9.0	7.0
259	1994	PR	25	CP	59.25	4.0	14.81	0	0	1	0	0	0	0	1	5.0	5.0
260	1994	PR	26	CP	24.00	2.0	12.00	0	0	1	0	0	0	0	1	2.0	4.0
261	1994	PR	27	CP	136.00	2.0	68.00	0	0	1	0	0	0	0	1	5.0	2.0
262	1994	PR	28	CP	16.00	2.0	8.00	0	0	1	0	0	0	0	1	10.0	5.0
263	1994	PR	29	CP	74.00	3.0	24.67	0	0	1	0	0	0	0	1	10.0	2.0
264	1994	PR	30	CP	66.00	2.0	33.00	0	0	1	0	0	0	0	1	6.0	3.0
265	1994	PR	1	DU	1.00	0.0	1.00	0	0	1	0	0	0	0	0	4.0	1.0
266	1994	PR	2	DU	80.00	0.0	80.00	0	0	1	0	0	0	0	0	3.0	4.0
267	1994	SR	1	CP	11.00	2.0	5.50	0	0	0	1	0	0	0	1	11.0	2.0
268	1994	SR	2	CP	232.00	3.0	77.33	0	0	0	1	0	0	0	1	8.5	2.0
269	1994	SR	3	CP	11.00	1.0	11.00	0	0	0	1	0	0	0	1	8.0	2.0
270	1994	SR	4	CP	72.00	4.0	18.00	0	0	0	1	0	0	0	1	9.0	2.0
271	1994	SR	5	CP	22.88	2.0	11.44	0	0	0	1	0	0	0	1	6.0	2.0
272	1994	SR	6	CP	300.00	3.0	100.00	0	0	0	1	0	0	0	1	10.0	4.0
273	1994	SR	7	CP	242.00	2.0	121.00	0	0	0	1	0	0	0	1	8.0	5.0
274	1994	SR	8	CP	237.00	7.0	33.86	0	0	0	1	0	0	0	1	8.0	2.0
275	1994	SR	9	CP	11.00	1.0	11.00	0	0	0	1	0	0	0	1	10.0	3.0
276	1994	SR	10	CP	16.00	4.0	4.00	0	0	0	1	0	0	0	1	4.0	6.0
277	1994	SR	11	CP	227.00	14.0	16.21	0	0	0	1	0	0	0	1	5.0	2.0
278	1994	SR	12	CP	135.00	4.0	33.75	0	0	0	1	0	0	0	1	4.0	4.0
279	1994	SR	13	CP	40.00	4.0	10.00	0	0	0	1	0	0	0	1	10.0	6.0
280	1994	SR	14	CP	43.00	6.0	7.17	0	0	0	1	0	0	0	1	7.0	4.0
281	1994	SR	15	CP	16.50	3.0	5.50	0	0	0	1	0	0	0	1	7.0	3.0
282	1994	SR	16	CP	95.00	5.0	19.00	0	0	0	1	0	0	0	1	5.0	2.0
283	1994	SR	17	CP	132.00	2.0	66.00	0	0	0	1	0	0	0	1	12.0	8.0
284	1994	SR	18	CP	142.50	8.0	17.81	0	0	0	1	0	0	0	1	8.0	3.0
285	1994	SR	19	CP	3108.00	14.0	222.00	0	0	0	1	0	0	0	1	4.0	4.0
286	1994	SR	20	CP	165.00	5.0	33.00	0	0	0	1	0	0	0	1	8.0	16.0
287	1994	SR	21	CP	170.00	3.0	56.67	0	0	0	1	0	0	0	1	12.0	4.0
288	1994	SR	22	CP	44.00	5.0	8.80	0	0	0	1	0	0	0	1	7.0	2.0
289	1994	SR	23	CP	322.00	14.0	23.00	0	0	0	1	0	0	0	1	8.0	2.0
290	1994	SR	24	CP	48.00	3.0	16.00	0	0	0	1	0	0	0	1	9.0	4.0
291	1994	SR	25	CP	149.00	4.0	37.25	0	0	0	1	0	0	0	1	9.0	2.0
292	1994	SR	26	CP	142.00	2.0	71.00	0	0	0	1	0	0	0	1	11.0	3.0
293	1994	SR	27	CP	190.00	3.0	63.33	0	0	0	1	0	0	0	1	10.0	4.0
294	1994	SR	28	CP	152.00	3.0	50.67	0	0	0	1	0	0	0	1	12.0	8.0
295	1994	SR	29	CP	92.00	2.0	46.00	0	0	0	1	0	0	0	1	7.0	2.0

Table 7.5-1. Camping and Day Use Visitor Expenditure Function Observations (continue).

Observation Number	Year	Site	Questionnaire Number	Visitor Type	Expenditures	Number of Days	Expenditures per Day	Upper Truckee River UTR	Donner Lake DL	Prosser Reservoir PR	Stampede Reservoir SR	Boca Reservoir BR	Lower Truckee River LTR	Pyramid Lake PL	Camping Visitor	Activity Hours	Group Size
296	1994	SR	30	CP	163.00	4.0	40.75	0	0	0	1	0	0	0	1	7.0	6.0
297	1994	SR	31	CP	78.00	6.0	13.00	0	0	0	1	0	0	0	1	8.0	2.0
298	1994	SR	32	CP	106.50	4.0	26.63	0	0	0	1	0	0	0	1	10.0	4.0
299	1994	SR	33	CP	30.00	2.0	15.00	0	0	0	1	0	0	0	1	8.0	5.0
300	1994	SR	34	CP	22.00	4.0	5.50	0	0	0	1	0	0	0	1	8.0	2.0
301	1994	SR	35	CP	68.00	2.0	34.00	0	0	0	1	0	0	0	1	11.0	4.0
302	1994	SR	36	CP	153.00	4.0	38.25	0	0	0	1	0	0	0	1	12.0	20.0
303	1994	SR	37	CP	11.00	1.0	11.00	0	0	0	1	0	0	0	1	2.0	2.0
304	1994	SR	38	CP	19.00	2.0	9.50	0	0	0	1	0	0	0	1	8.0	3.0
305	1994	SR	39	CP	481.00	20.0	24.05	0	0	0	1	0	0	0	1	7.0	5.0
306	1994	SR	40	CP	330.00	4.0	82.50	0	0	0	1	0	0	0	1	12.0	9.0
307	1994	SR	41	CP	206.00	2.0	103.00	0	0	0	1	0	0	0	1	12.0	6.0
308	1994	SR	42	CP	72.00	2.0	36.00	0	0	0	1	0	0	0	1	12.0	7.0
309	1994	SR	43	CP	163.00	8.0	20.38	0	0	0	1	0	0	0	1	5.0	2.0
310	1994	SR	44	CP	253.00	3.0	84.33	0	0	0	1	0	0	0	1	8.0	4.0
311	1994	SR	45	CP	183.00	3.0	61.00	0	0	0	1	0	0	0	1	12.0	2.0
312	1994	SR	46	CP	57.00	3.0	19.00	0	0	0	1	0	0	0	1	7.0	2.0
313	1994	SR	47	CP	78.50	7.0	11.21	0	0	0	1	0	0	0	1	6.0	2.0
314	1994	SR	48	CP	33.00	4.0	8.25	0	0	0	1	0	0	0	1	7.0	9.0
315	1994	SR	49	CP	103.00	3.0	34.33	0	0	0	1	0	0	0	1	12.0	4.0
316	1994	SR	50	CP	267.50	4.0	66.88	0	0	0	1	0	0	0	1	8.0	4.0
317	1994	SR	51	CP	180.00	6.0	30.00	0	0	0	1	0	0	0	1	8.0	11.0
318	1994	SR	52	CP	47.00	2.0	23.50	0	0	0	1	0	0	0	1	5.0	2.0
319	1994	SR	53	CP	88.00	3.0	29.33	0	0	0	1	0	0	0	1	11.0	4.0
320	1994	SR	54	CP	242.00	8.0	30.25	0	0	0	1	0	0	0	1	12.0	2.0
321	1994	SR	55	CP	114.00	2.0	57.00	0	0	0	1	0	0	0	1	10.0	2.0
322	1994	SR	56	CP	483.00	10.0	48.30	0	0	0	1	0	0	0	1	11.0	2.0
323	1994	SR	57	CP	64.00	2.0	32.00	0	0	0	1	0	0	0	1	12.0	4.0
324	1994	SR	58	CP	226.50	4.0	56.63	0	0	0	1	0	0	0	1	12.0	22.0
325	1994	SR	59	CP	134.00	3.0	44.67	0	0	0	1	0	0	0	1	12.0	4.0
326	1994	SR	60	CP	142.50	4.0	35.63	0	0	0	1	0	0	0	1	12.0	5.0
327	1994	SR	61	CP	440.00	3.0	146.67	0	0	0	1	0	0	0	1	12.0	25.0
328	1994	SR	62	CP	343.50	7.0	49.07	0	0	0	1	0	0	0	1	7.0	2.0
329	1994	SR	63	CP	3.50	2.0	1.75	0	0	0	1	0	0	0	1	4.0	10.0
330	1994	SR	64	CP	98.00	3.0	32.67	0	0	0	1	0	0	0	1	8.0	5.0
331	1994	BR	1	CP	960.00	7.0	137.14	0	0	0	0	1	0	0	1	12.0	10.0
332	1994	BR	2	CP	250.00	1.0	250.00	0	0	0	0	1	0	0	1	12.0	2.0
333	1994	BR	3	CP	237.00	2.0	118.50	0	0	0	0	1	0	0	1	10.0	6.0
334	1994	BR	4	CP	6.00	2.0	3.00	0	0	0	0	1	0	0	1	11.9	3.0
335	1994	BR	5	CP	89.00	3.0	29.67	0	0	0	0	1	0	0	1	5.5	3.0
336	1994	BR	6	CP	66.00	2.0	33.00	0	0	0	0	1	0	0	1	7.0	3.0
337	1994	BR	7	CP	66.00	1.0	66.00	0	0	0	0	1	0	0	1	4.0	20.0
338	1994	BR	8	CP	12.00	2.0	6.00	0	0	0	0	1	0	0	1	9.0	4.0
339	1994	BR	9	CP	86.00	2.0	43.00	0	0	0	0	1	0	0	1	12.0	3.0
340	1994	BR	10	CP	58.00	3.0	19.33	0	0	0	0	1	0	0	1	5.0	1.0
341	1994	BR	11	CP	122.00	1.0	122.00	0	0	0	0	1	0	0	1	8.0	4.0
342	1994	BR	12	CP	206.00	14.0	14.71	0	0	0	0	1	0	0	1	8.0	9.0
343	1994	BR	13	CP	52.00	1.0	52.00	0	0	0	0	1	0	0	1	4.0	2.0
344	1994	BR	14	CP	207.00	14.0	14.79	0	0	0	0	1	0	0	1	1.0	3.0
345	1994	BR	15	CP	458.00	2.0	229.00	0	0	0	0	1	0	0	1	12.0	2.0
346	1994	BR	16	CP	353.00	2.0	176.50	0	0	0	0	1	0	0	1	12.0	14.0
347	1994	BR	17	CP	12.00	3.0	4.00	0	0	0	0	1	0	0	1	10.0	4.0
348	1994	BR	1	DU	10.00	0.0	10.00	0	0	0	0	1	0	0	0	3.0	3.0
349	1994	BR	2	DU	15.00	0.0	15.00	0	0	0	0	1	0	0	0	5.0	2.0
350	1994	BR	3	DU	100.00	0.0	100.00	0	0	0	0	1	0	0	0	8.0	25.0
351	1994	BR	4	DU	100.00	0.0	100.00	0	0	0	0	1	0	0	0	8.0	6.0
352	1994	BR	5	DU	20.00	0.0	20.00	0	0	0	0	1	0	0	0	4.0	2.0
353	1994	BR	6	DU	50.00	0.0	50.00	0	0	0	0	1	0	0	0	4.0	9.0
354	1994	BR	7	DU	60.00	0.0	60.00	0	0	0	0	1	0	0	0	4.0	3.0

Table 7.5-1. Camping and Day Use Visitor Expenditure Function Observations (continue).

Observation Number	Year	Site	Questionnaire Number	Visitor Type	Expenditures	Number of Days	Expenditures per Day	Upper Truckee River UTR	Donner Lake DL	Prosser Reservoir PR	Stampede Reservoir SR	Boca Reservoir BR	Lower Truckee River LTR	Pyramid Lake PL	Camping Visitor	Activity Hours	Group Size
355	1994	BR	8	DU	20.00	0.0	20.00	0	0	0	0	1	0	0	0	4.0	5.0
356	1994	BR	9	DU	25.00	0.0	25.00	0	0	0	0	1	0	0	0	5.0	5.0
357	1994	BR	10	DU	22.00	0.0	22.00	0	0	0	0	1	0	0	0	12.0	2.0
358	1994	BR	11	DU	70.00	0.0	70.00	0	0	0	0	1	0	0	0	10.0	1.0
359	1994	BR	12	DU	95.00	0.0	95.00	0	0	0	0	1	0	0	0	6.0	13.0
360	1994	BR	13	DU	8.00	0.0	8.00	0	0	0	0	1	0	0	0	4.0	2.0
361	1994	BR	14	DU	45.00	0.0	45.00	0	0	0	0	1	0	0	0	3.0	6.0
362	1994	PL	1	CP	120.00	3.0	40.00	0	0	0	0	0	0	1	1	11.9	2.0
363	1994	PL	2	CP	500.00	4.0	125.00	0	0	0	0	0	0	1	1	12.0	9.0
364	1994	PL	3	CP	10.00	3.0	3.33	0	0	0	0	0	0	1	1	10.0	15.0
365	1994	PL	4	CP	150.00	2.0	75.00	0	0	0	0	0	0	1	1	9.0	4.0
366	1994	PL	5	CP	83.75	2.0	41.88	0	0	0	0	0	0	1	1	7.0	8.0
367	1994	PL	6	CP	86.00	2.0	43.00	0	0	0	0	0	0	1	1	9.0	3.0
368	1994	PL	7	CP	125.00	2.0	62.50	0	0	0	0	0	0	1	1	5.0	4.0
369	1994	PL	8	CP	56.00	3.0	18.67	0	0	0	0	0	0	1	1	7.0	2.0
370	1994	PL	9	CP	15.00	3.0	5.00	0	0	0	0	0	0	1	1	6.0	4.0
371	1994	PL	10	CP	130.00	3.0	43.33	0	0	0	0	0	0	1	1	12.0	5.0
372	1994	PL	11	CP	100.00	2.0	50.00	0	0	0	0	0	0	1	1	12.0	14.0
373	1994	PL	12	CP	105.00	2.0	52.50	0	0	0	0	0	0	1	1	12.0	4.0
374	1994	PL	13	CP	150.00	2.0	75.00	0	0	0	0	0	0	1	1	2.0	4.0
375	1994	PL	14	CP	445.00	4.0	111.25	0	0	0	0	0	0	1	1	12.0	5.0
376	1994	PL	15	CP	314.00	2.0	157.00	0	0	0	0	0	0	1	1	11.0	6.0
377	1994	PL	16	CP	253.00	3.0	84.33	0	0	0	0	0	0	1	1	12.0	4.0
378	1994	PL	17	CP	155.00	10.0	15.50	0	0	0	0	0	0	1	1	6.0	3.0
379	1994	PL	18	CP	300.00	4.0	75.00	0	0	0	0	0	0	1	1	11.0	5.0
380	1994	PL	19	CP	152.00	2.0	76.00	0	0	0	0	0	0	1	1	12.0	4.0
381	1994	PL	1	DU	20.00	0.0	20.00	0	0	0	0	0	0	1	0	4.0	6.0
382	1994	PL	2	DU	240.00	0.0	240.00	0	0	0	0	0	0	1	0	7.0	26.0
383	1994	PL	3	DU	50.00	0.0	50.00	0	0	0	0	0	0	1	0	5.0	3.0
384	1994	PL	4	DU	6.00	0.0	6.00	0	0	0	0	0	0	1	0	6.0	4.0
385	1994	PL	5	DU	65.00	0.0	65.00	0	0	0	0	0	0	1	0	6.0	9.0
386	1994	PL	6	DU	72.00	0.0	72.00	0	0	0	0	0	0	1	0	4.0	3.0
387	1994	PL	7	DU	60.00	0.0	60.00	0	0	0	0	0	0	1	0	8.0	2.0
388	1994	PL	8	DU	36.00	0.0	36.00	0	0	0	0	0	0	1	0	2.0	4.0
389	1994	PL	9	DU	70.00	0.0	70.00	0	0	0	0	0	0	1	0	5.0	5.0
390	1994	PL	10	DU	116.00	0.0	116.00	0	0	0	0	0	0	1	0	2.0	5.0
391	1994	PL	11	DU	45.00	0.0	45.00	0	0	0	0	0	0	1	0	8.0	4.0
392	1994	PL	12	DU	70.00	0.0	70.00	0	0	0	0	0	0	1	0	8.0	2.0
393	1994	PL	13	DU	41.00	0.0	41.00	0	0	0	0	0	0	1	0	8.0	2.0
394	1994	PL	14	DU	25.00	0.0	25.00	0	0	0	0	0	0	1	0	3.0	3.0
395	1994	PL	15	DU	40.00	0.0	40.00	0	0	0	0	0	0	1	0	7.0	4.0
396	1994	PL	16	DU	25.00	0.0	25.00	0	0	0	0	0	0	1	0	2.0	3.0
397	1994	PL	17	DU	50.00	0.0	50.00	0	0	0	0	0	0	1	0	6.0	4.0
398	1994	PL	18	DU	20.00	0.0	20.00	0	0	0	0	0	0	1	0	2.0	2.0
399	1994	PL	19	DU	75.00	0.0	75.00	0	0	0	0	0	0	1	0	7.0	5.0
400	1994	PL	20	DU	15.00	0.0	15.00	0	0	0	0	0	0	1	0	10.0	4.0
401	1994	PL	21	DU	51.00	0.0	51.00	0	0	0	0	0	0	1	0	6.0	4.0
402	1994	PL	22	DU	121.00	0.0	121.00	0	0	0	0	0	0	1	0	6.0	13.0
403	1994	PL	23	DU	76.00	0.0	76.00	0	0	0	0	0	0	1	0	6.0	14.0
404	1994	PL	24	DU	35.00	0.0	35.00	0	0	0	0	0	0	1	0	2.0	3.0
405	1994	PL	25	DU	95.00	0.0	95.00	0	0	0	0	0	0	1	0	8.0	15.0
406	1994	PL	26	DU	25.00	0.0	25.00	0	0	0	0	0	0	1	0	5.0	3.0
407	1994	PL	27	DU	12.00	0.0	12.00	0	0	0	0	0	0	1	0	7.0	6.0
408	1994	PL	28	DU	55.00	0.0	55.00	0	0	0	0	0	0	1	0	6.0	4.0
409	1994	PL	29	DU	36.00	0.0	36.00	0	0	0	0	0	0	1	0	8.0	15.0
410	1994	PL	30	DU	36.00	0.0	36.00	0	0	0	0	0	0	1	0	6.0	4.0
411	1994	PL	31	DU	25.00	0.0	25.00	0	0	0	0	0	0	1	0	6.0	6.0
412	1994	PL	32	DU	15.00	0.0	15.00	0	0	0	0	0	0	1	0	5.0	2.0
413	1994	PL	33	DU	90.00	0.0	90.00	0	0	0	0	0	0	1	0	6.0	6.0

Table 7.5-1. Camping and Day Use Visitor Expenditure Function Observations (continue).

Observation Number	Year	Site	Questionnaire Number	Visitor Type	Expenditures	Number of Days	Expenditures per Day	Upper Truckee River UTR	Donner Lake DL	Prosser Reservoir PR	Stampede Reservoir SR	Boca Reservoir BR	Lower Truckee River LTR	Pyramid Lake PL	Camping Visitor	Activity Hours	Group Size
414	1994	PL	34	DU	67.00	0.0	67.00	0	0	0	0	0	0	1	0	3.0	8.0
415	1994	PL	35	DU	19.00	0.0	19.00	0	0	0	0	0	0	1	0	5.0	2.0
416	1994	PL	36	DU	55.00	0.0	55.00	0	0	0	0	0	0	1	0	10.0	6.0
417	1994	PL	37	DU	130.00	0.0	130.00	0	0	0	0	0	0	1	0	3.0	5.0
418	1994	PL	38	DU	31.00	0.0	31.00	0	0	0	0	0	0	1	0	5.0	5.0
419	1994	PL	39	DU	35.00	0.0	35.00	0	0	0	0	0	0	1	0	4.0	5.0
420	1994	PL	40	DU	65.00	0.0	65.00	0	0	0	0	0	0	1	0	8.0	10.0
421	1994	PL	41	DU	195.00	0.0	195.00	0	0	0	0	0	0	1	0	8.0	13.0
422	1994	PL	42	DU	70.00	0.0	70.00	0	0	0	0	0	0	1	0	5.0	6.0
423	1994	PL	43	DU	25.00	0.0	25.00	0	0	0	0	0	0	1	0	2.0	2.0
424	1994	PL	44	DU	55.00	0.0	55.00	0	0	0	0	0	0	1	0	5.0	11.0
425	1994	PL	45	DU	57.00	0.0	57.00	0	0	0	0	0	0	1	0	6.0	7.0
426	1994	PL	46	DU	50.00	0.0	50.00	0	0	0	0	0	0	1	0	12.0	2.0
427	1994	PL	47	DU	7.00	0.0	7.00	0	0	0	0	0	0	1	0	3.5	5.0
428	1994	PL	48	DU	190.00	0.0	190.00	0	0	0	0	0	0	1	0	5.0	15.0
429	1994	PL	49	DU	17.00	0.0	17.00	0	0	0	0	0	0	1	0	4.0	3.0
430	1994	PL	50	DU	30.00	0.0	30.00	0	0	0	0	0	0	1	0	5.0	2.0
431	1994	PL	51	DU	28.00	0.0	28.00	0	0	0	0	0	0	1	0	5.0	2.0
432	1994	PL	52	DU	36.00	0.0	36.00	0	0	0	0	0	0	1	0	10.0	10.0
433	1995	DL	1	SHO-DU	10.59	0.0	10.59	0	1	0	0	0	0	0	0	4.0	10.0
434	1995	DL	2	SHO-DU	73.33	0.0	73.33	0	1	0	0	0	0	0	0	2.0	4.0
435	1995	DL	3	SHO-DU	40.43	0.0	40.43	0	1	0	0	0	0	0	0	6.0	2.0
436	1995	DL	4	SHO-DU	137.50	0.0	137.50	0	1	0	0	0	0	0	0	12.0	4.0
437	1995	DL	5	SHO-DU	44.29	0.0	44.29	0	1	0	0	0	0	0	0	1.0	3.0
438	1995	DL	6	SHO-DU	90.94	0.0	90.94	0	1	0	0	0	0	0	0	4.0	3.0
439	1995	DL	7	SHO-DU	115.00	0.0	115.00	0	1	0	0	0	0	0	0	5.0	4.0
440	1995	DL	8	SHO-DU	105.00	0.0	105.00	0	1	0	0	0	0	0	0	6.0	4.0
441	1995	DL	9	SHO-DU	164.44	0.0	164.44	0	1	0	0	0	0	0	0	12.0	4.0
442	1995	DL	10	SHO-DU	42.86	0.0	42.86	0	1	0	0	0	0	0	0	6.0	12.0
443	1995	DL	11	SHO-DU	137.14	0.0	137.14	0	1	0	0	0	0	0	0	9.0	4.0
444	1995	DL	12	SHO-DU	76.67	0.0	76.67	0	1	0	0	0	0	0	0	1.0	3.0
445	1995	DL	13	SHO-DU	85.00	0.0	85.00	0	1	0	0	0	0	0	0	6.0	10.0
446	1995	DL	14	SHO-DU	262.50	0.0	262.50	0	1	0	0	0	0	0	0	7.0	4.0
447	1995	DL	15	SHO-DU	40.59	0.0	40.59	0	1	0	0	0	0	0	0	4.0	4.0
448	1995	DL	16	SHO-DU	116.84	0.0	116.84	0	1	0	0	0	0	0	0	9.0	5.0
449	1995	DL	17	SHO-DU	70.00	0.0	70.00	0	1	0	0	0	0	0	0	12.0	4.0
450	1995	DL	18	SHO-DU	96.00	0.0	96.00	0	1	0	0	0	0	0	0	4.0	8.0
451	1995	DL	19	SHO-DU	125.00	0.0	125.00	0	1	0	0	0	0	0	0	7.0	2.0
452	1995	DL	20	SHO-DU	24.67	0.0	24.67	0	1	0	0	0	0	0	0	3.0	6.0
453	1995	DL	21	SHO-DU	67.50	0.0	67.50	0	1	0	0	0	0	0	0	5.0	4.0
454	1995	DL	22	SHO-DU	106.67	0.0	106.67	0	1	0	0	0	0	0	0	6.0	5.5
455	1995	DL	23	SHO-DU	153.33	0.0	153.33	0	1	0	0	0	0	0	0	7.0	4.0
456	1995	DL	24	SHO-DU	53.08	0.0	53.08	0	1	0	0	0	0	0	0	12.0	9.0
457	1995	DL	1	VHR-DU	423.33	0.0	423.33	0	1	0	0	0	0	0	0	6.0	4.0
458	1995	DL	2	VHR-DU	141.25	0.0	141.25	0	1	0	0	0	0	0	0	7.0	4.0
459	1995	DL	3	VHR-DU	359.37	0.0	359.37	0	1	0	0	0	0	0	0	12.0	5.0
460	1995	DL	4	VHR-DU	296.43	0.0	296.43	0	1	0	0	0	0	0	0	8.0	7.0
461	1995	DL	5	VHR-DU	375.00	0.0	375.00	0	1	0	0	0	0	0	0	5.0	6.0
462	1995	DL	6	VHR-DU	178.57	0.0	178.57	0	1	0	0	0	0	0	0	12.0	4.0

Table 7.5-2. Camping and Day Use Visitor Expenditure Function Values.

	Upper Truckee River	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir	Lower Truckee River	Pyramid Lake
Camping Visitor Group Expenditures per Day	$53.63	$36.97	$27.90	$39.61	$34.40	$16.55	$36.32
Day Use Visitor Group Expenditures per Day	$84.55	$52.00	$34.07	$52.78	$48.85	$28.89	$56.38

7.6. Formulation of the Model Equations

Model formulation incorporates the above descriptive statistics and expenditure function values. The variable that drives the model is the end of the month reservoir storage levels at Donner Lake and Prosser, Stampede, and Boca Reservoirs. Relative to the storage levels at Donner Lake and Prosser, Stampede, and Boca Reservoirs the model calculates the annual number of camping and day use visitors and the annual expenditures of the camping and day use visitors.

There are eleven functions within the model. Using only end of the month reservoir storage levels as the input into the model, the functions then generate the following data.

Visitation Relative to End of the Month Reservoir Storage Levels
Annual Visitation Relative to End of the Month Reservoir Storage Levels
Annual Number of Camping Visitors
Annual Number of Day Use Visitors
Annual Number of Camping Visitor Groups
Annual Number of Day Use Visitor Groups
Annual Camping Visitor Expenditures
Annual Day Use Visitor Expenditures
Annual Number of Camping and Day Use Visitors
Annual Camping and Day Use Visitor Expenditures
Annual Camping and Day Use Visitor Expenditures by Category

Each of the functions calculate data either by use of a single equation or multiple equations. Simultaneously, data is generated by one function and inputted into another function and so on. Throughout the model, there are twenty-seven equations with thirty-eight variables.

Visitation Relative to End of the Month Reservoir Storage Levels

The visitation relative to end of the month reservoir storage levels is derived by assigning a scale value to the end of the month reservoir storage level and then calculating a percentage of visitation corresponding to the assigned scale value. Each of these functions are based on data taken from the survey.

The scale values for reservoir storage levels are shown in Table 7.6-1. Scale values for Donner Lake range from high to low or 5 to 1. These scale values correspond to reservoir storage levels at Donner Lake from 9,660 acre-feet to 5,796 acre-feet. Scale values for Prosser, Stampede, and Boca Reservoirs range from high to low or 11 to 1. These scale values correspond to reservoir storage levels at Prosser Reservoir from 29,840 acre-feet to 0 acre-feet, at Stampede Reservoir from 226,500 acre-feet to 0 acre-feet, and at Boca Reservoir from 40,870 acre-feet to 0 acre-feet. These reservoir storage levels are stated in the survey questionnaire.

The end of the month reservoir storage level is assigned a scale value through the following equation.

If $A_i \geq B_{it} \geq C_i$ storage level, then scale value $D_{it} = \alpha_i + \beta_i (B_{it})$ (7.6-1)

where:
- A_i is the high storage level for reservoir i
- B_{it} is the end of the month storage level for reservoir i in month t
- C_i is the low storage level for reservoir i
- D_{it} is the scale value for the end of the month storage level for reservoir i in month t
- α_i is the scale value constant term for reservoir i
- β_i is the scale value slope coefficient term for reservoir i

This equation is formulated to linearly interpolate an end of the month storage level for a reservoir during any month to a scale value.

Separate equations for reservoir storage levels are formulated for Donner Lake and Prosser, Stampede, and Boca Reservoirs. These equations are provided below by reservoir.

Donner Lake

If $9,660 \geq B_{it} \geq 5,796$ storage level, then scale value $D_{it} = -5.000000 + .001035 (B_{it})$
If $5,796 > B_{it} \geq 0$ storage level, then scale value $D_{it} = 1.000000$

Prosser Reservoir

If $29,840 \geq B_{it} \geq 0$ storage level, then scale value $D_{it} = 1.000000 + .000335 (B_{it})$

Stampede Reservoir

If $226,500 \geq B_{it} \geq 0$ storage level, then scale value $D_{it} = 1.000000 + .000044 (B_{it})$

Boca Reservoir

If $40,870 \geq B_{it} \geq 0$ storage level, then scale value $D_{it} = 1.000000 + .000245 (B_{it})$

End of the month reservoir storage levels at Donner Lake and Prosser, Stampede, and Boca Reservoirs for April through October and Other Months are given in Table 7.6-2. April through October is considered to be the recreation season in a given year. Other Months are January, February, March, November, and December of the given year. The reservoir storage levels are taken in total for April through October and as an average for the Other Months. The scale values for these end of the month reservoir storage levels are calculated using the above equations and shown by reservoir in Table 7.6-3.

The percentage of visitation corresponding to the scale value of an end of the month reservoir storage level is based on the indicated number of visits per respondent for reservoir storage levels taken from the survey.

The indicated number of visits per respondent for reservoir storage levels are provided in Table 7.6-4. Also provided for reservoir storage levels are percentages of visitation.

Given that the percentage of visitation for reservoir storage level 1 is 100% at Donner Lake and Prosser, Stampede, and Boca Reservoirs. The visitation declines from 100% for reservoir storage level 1 to 82.64% for reservoir storage level 5 at Donner Lake, to 8.25% for reservoir storage level 11 at Prosser Reservoir, to 15.58% for reservoir storage level 11 at Stampede Reservoir, and to 4.68% for reservoir storage level 11 at Boca Reservoir.

The percentage of visitation corresponding to the scale value is then calculated through the following equation.

If $E_i \geq D_{it} > F_i$ scale value, then visitation $G_{it} = \alpha_i + \beta_i (D_{it})$ (7.6-2)

where:
- E_i is the high scale value for reservoir i
- D_{it} is the scale value for the end of the month storage level for reservoir i in month t
- F_i is the low scale value for reservoir i
- G_{it} is the percentage of visitation corresponding to the scale value for the end of the month storage level for reservoir i in month t
- α_i is the percentage of visitation constant term for reservoir i
- β_i is the percentage of visitation slope coefficient term for reservoir i

This equation is formulated to linearly interpolate a scale value for an end of the month storage level for a reservoir during any month to a percentage of visitation.

Separate equations for scale value and reservoir storage levels are formulated for Donner Lake and Prosser, Stampede, and Boca Reservoirs. These equations are provided below by reservoir.

Donner Lake

If $5 \geq D_{it} > 4$ scale value, then visitation $G_{it} = .935691 + .012862 (D_{it})$
If $4 \geq D_{it} > 3$ scale value, then visitation $G_{it} = .819936 + .041801 (D_{it})$
If $3 \geq D_{it} > 2$ scale value, then visitation $G_{it} = .733119 + .070740 (D_{it})$
If $2 \geq D_{it} > 1$ scale value, then visitation $G_{it} = .778135 + .048232 (D_{it})$
If $1 = D_{it}$ scale value, then visitation $G_{it} = .826367$

Prosser Reservoir

If $11 \geq D_{it} > 10$ scale value, then visitation $G_{it} = 1.000000 + .000000 (D_{it})$
If $10 \geq D_{it} > 9$ scale value, then visitation $G_{it} = .702970 + .029703 (D_{it})$
If $9 \geq D_{it} > 8$ scale value, then visitation $G_{it} = .495050 + .052805 (D_{it})$
If $8 \geq D_{it} > 7$ scale value, then visitation $G_{it} = .415842 + .062706 (D_{it})$
If $7 \geq D_{it} > 6$ scale value, then visitation $G_{it} = .646865 + .029703 (D_{it})$
If $6 \geq D_{it} > 5$ scale value, then visitation $G_{it} = .151815 + .112211 (D_{it})$
If $5 \geq D_{it} > 4$ scale value, then visitation $G_{it} = .547855 + .033003 (D_{it})$
If $4 \geq D_{it} > 3$ scale value, then visitation $G_{it} = - 1.419142 + .524752 (D_{it})$
If $3 \geq D_{it} > 2$ scale value, then visitation $G_{it} = - .062706 + .072607 (D_{it})$
If $2 \geq D_{it} > 1$ scale value, then visitation $G_{it} = .082508 + .000000 (D_{it})$
If $1 = D_{it}$ scale value, then visitation $G_{it} = .082508$

Stampede Reservoir

If $11 \geq D_{it} > 10$ scale value, then visitation $G_{it} = .785714 + .019481 (D_{it})$
If $10 \geq D_{it} > 9$ scale value, then visitation $G_{it} = .720779 + .025974 (D_{it})$
If $9 \geq D_{it} > 8$ scale value, then visitation $G_{it} = .457792 + .055195 (D_{it})$
If $8 \geq D_{it} > 7$ scale value, then visitation $G_{it} = .483766 + .051948 (D_{it})$
If $7 \geq D_{it} > 6$ scale value, then visitation $G_{it} = .529221 + .045455 (D_{it})$
If $6 \geq D_{it} > 5$ scale value, then visitation $G_{it} = - .347403 + .191558 (D_{it})$
If $5 \geq D_{it} > 4$ scale value, then visitation $G_{it} = .545455 + .012987 (D_{it})$
If $4 \geq D_{it} > 3$ scale value, then visitation $G_{it} = - .974026 + .392857 (D_{it})$
If $3 \geq D_{it} > 2$ scale value, then visitation $G_{it} = .126623 + .025974 (D_{it})$
If $2 \geq D_{it} > 1$ scale value, then visitation $G_{it} = .133117 + .022727 (D_{it})$
If $1 = D_{it}$ scale value, then visitation $G_{it} = .155844$

Boca Reservoir

If $11 \geq D_{it} > 10$ scale value, then visitation $G_{it} = 1.000000 + .000000 (D_{it})$
If $10 \geq D_{it} > 9$ scale value, then visitation $G_{it} = .117117 + .088288 (D_{it})$
If $9 \geq D_{it} > 8$ scale value, then visitation $G_{it} = .295495 + .068468 (D_{it})$
If $8 \geq D_{it} > 7$ scale value, then visitation $G_{it} = - .093694 + .117117 (D_{it})$
If $7 \geq D_{it} > 6$ scale value, then visitation $G_{it} = .284685 + .063063 (D_{it})$
If $6 \geq D_{it} > 5$ scale value, then visitation $G_{it} = - .180180 + .140541 (D_{it})$
If $5 \geq D_{it} > 4$ scale value, then visitation $G_{it} = .441441 + .016216 (D_{it})$
If $4 \geq D_{it} > 3$ scale value, then visitation $G_{it} = - .192793 + .174775 (D_{it})$
If $3 \geq D_{it} > 2$ scale value, then visitation $G_{it} = .034234 + .099099 (D_{it})$
If $2 \geq D_{it} > 1$ scale value, then visitation $G_{it} = - .138739 + .185586 (D_{it})$
If $1 = D_{it}$ scale value, then visitation $G_{it} = .046847$

Visitation relative to end of the month reservoir storage levels for Donner Lake and Prosser, Stampede, and Boca Reservoirs for April through October and Other months are shown in Table 7.6-5. The percentages of visitation for the end of the month reservoir storage levels are calculated using the above equations. Again, percentages of visitation correspond to scale values which in turn correspond to end of the month reservoir storage levels.

Survey year visitation relative to end of the month reservoir storage levels are the same because of end of the month reservoir storage levels. The percentages of visitation are shown in Table 7.6-6. Visitation would differ under alternative reservoir storage levels.

Visitation and end of the month reservoir storage level relationships for Donner Lake and Prosser, Stampede, and Boca Reservoirs are also shown in Figures 7.6-1, 7.6-2, 7.6-3, and 7.6-4.

Table 7.6-1. Scale Values for Reservoir Storage Levels.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Reservoir Storage Level 1 in Acre-feet	9,660	29,840	226,500	40,870
Reservoir Storage Level 2 in Acre-feet	8,694	26,856	203,850	36,783
Reservoir Storage Level 3 in Acre-feet	7,728	23,872	181,200	32,696
Reservoir Storage Level 4 in Acre-feet	6,762	20,888	158,550	28,609
Reservoir Storage Level 5 in Acre-feet	5,796	17,904	135,900	24,522
Reservoir Storage Level 6 in Acre-feet		14,920	113,250	20,435
Reservoir Storage Level 7 in Acre-feet		11,936	90,600	16,348
Reservoir Storage Level 8 in Acre-feet		8,952	67,950	12,261
Reservoir Storage Level 9 in Acre-feet		5,968	45,300	8,174
Reservoir Storage Level 10 in Acre-feet		2,984	22,650	4,087
Reservoir Storage Level 11 in Acre-feet		0	0	0
Scale Value for Reservoir Storage Level 1	5.00	11.00	11.00	11.00
Scale Value for Reservoir Storage Level 2	4.00	10.00	10.00	10.00
Scale Value for Reservoir Storage Level 3	3.00	9.00	9.00	9.00
Scale Value for Reservoir Storage Level 4	2.00	8.00	8.00	8.00
Scale Value for Reservoir Storage Level 5	1.00	7.00	7.00	7.00
Scale Value for Reservoir Storage Level 6		6.00	6.00	6.00
Scale Value for Reservoir Storage Level 7		5.00	5.00	5.00
Scale Value for Reservoir Storage Level 8		4.00	4.00	4.00
Scale Value for Reservoir Storage Level 9		3.00	3.00	3.00
Scale Value for Reservoir Storage Level 10		2.00	2.00	2.00
Scale Value for Reservoir Storage Level 11		1.00	1.00	1.00

Table 7.6-2. End of the Month Reservoir Storage Levels.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
April End of the Month Reservoir Storage Level in Acre-Feet	4,930	9,767	80,186	26,763
May End of the Month Reservoir Storage Level in Acre-Feet	9,300	16,414	113,577	37,473
June End of the Month Reservoir Storage Level in Acre-Feet	9,600	20,957	166,955	38,557
July End of the Month Reservoir Storage Level in Acre-Feet	9,420	22,110	177,424	38,084
August End of the Month Reservoir Storage Level in Acre-Feet	8,880	21,691	174,288	34,582
September End of the Month Reservoir Storage Level in Acre-Feet	5,300	14,394	172,442	23,927
October End of the Month Reservoir Storage Level in Acre-Feet	3,150	10,050	170,696	16,419
Other Months Average End of the Month Reservoir Storage Level in Acre-Feet	3,366	9,854	113,263	9,561
January End of the Month Reservoir Storage Level in Acre-Feet	3,290	9,827	73,944	5,247
February End of the Month Reservoir Storage Level in Acre-Feet	3,320	9,723	75,751	4,396
March End of the Month Reservoir Storage Level in Acre-Feet	4,290	9,642	76,677	2,955
November End of the Month Reservoir Storage Level in Acre-Feet	2,980	9,981	170,433	17,042
December End of the Month Reservoir Storage Level in Acre-Feet	2,950	10,098	169,510	18,163

Table 7.6-3. Scale Values for End of the Month Reservoir Storage Levels.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Scale Value for April End of the Month Reservoir Storage Level	1.00	4.27	4.54	7.55
Scale Value for May End of the Month Reservoir Storage Level	4.63	6.50	6.01	10.17
Scale Value for June End of the Month Reservoir Storage Level	4.94	8.02	8.37	10.49
Scale Value for July End of the Month Reservoir Storage Level	4.75	8.41	8.83	10.32
Scale Value for August End of the Month Reservoir Storage Level	4.19	8.27	8.69	9.46
Scale Value for September End of the Month Reservoir Storage Level	1.00	5.82	8.61	6.85
Scale Value for October End of the Month Reservoir Storage Level	1.00	4.37	8.54	5.02
Scale Value for Other Months End of the Month Reservoir Storage Level	1.00	4.30	6.00	3.34

Table 7.6-4. Indicated Number of Visits per Respondent for Reservoir Storage Levels.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Number of Visits per Respondent for Reservoir Storage Level 1	3.11	3.03	3.08	5.55
Number of Visits per Respondent for Reservoir Storage Level 2	3.07	3.03	3.02	5.55
Number of Visits per Respondent for Reservoir Storage Level 3	2.94	2.94	2.94	5.06
Number of Visits per Respondent for Reservoir Storage Level 4	2.72	2.78	2.77	4.68
Number of Visits per Respondent for Reservoir Storage Level 5	2.57	2.59	2.61	4.03
Number of Visits per Respondent for Reservoir Storage Level 6		2.50	2.47	3.68
Number of Visits per Respondent for Reservoir Storage Level 7		2.16	1.88	2.90
Number of Visits per Respondent for Reservoir Storage Level 8		2.06	1.84	2.81
Number of Visits per Respondent for Reservoir Storage Level 9		0.47	0.63	1.84
Number of Visits per Respondent for Reservoir Storage Level 10		0.25	0.55	1.29
Number of Visits per Respondent for Reservoir Storage Level 11		0.25	0.48	0.26
Percentage of Visitation for Reservoir Storage Level 1	100.00%	100.00%	100.00%	100.00%
Percentage of Visitation for Reservoir Storage Level 2	98.71%	100.00%	98.05%	100.00%
Percentage of Visitation for Reservoir Storage Level 3	94.53%	97.03%	95.45%	91.17%
Percentage of Visitation for Reservoir Storage Level 4	87.46%	91.75%	89.94%	84.32%
Percentage of Visitation for Reservoir Storage Level 5	82.64%	85.48%	84.74%	72.61%
Percentage of Visitation for Reservoir Storage Level 6		82.51%	80.19%	66.31%
Percentage of Visitation for Reservoir Storage Level 7		71.29%	61.04%	52.25%
Percentage of Visitation for Reservoir Storage Level 8		67.99%	59.74%	50.63%
Percentage of Visitation for Reservoir Storage Level 9		15.51%	20.45%	33.15%
Percentage of Visitation for Reservoir Storage Level 10		8.25%	17.86%	23.24%
Percentage of Visitation for Reservoir Storage Level 11		8.25%	15.58%	4.68%

Table 7.6-5. Visitation Relative to End of the Month Reservoir Storage Levels.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Visitation Relative to April End of the Month Reservoir Storage Level	82.64%	68.88%	60.44%	79.01%
Visitation Relative to May End of the Month Reservoir Storage Level	99.52%	83.99%	80.26%	100.00%
Visitation Relative to June End of the Month Reservoir Storage Level	99.92%	91.86%	91.98%	100.00%
Visitation Relative to July End of the Month Reservoir Storage Level	99.68%	93.90%	94.53%	100.00%
Visitation Relative to August End of the Month Reservoir Storage Level	98.96%	93.16%	93.77%	95.22%
Visitation Relative to September End of the Month Reservoir Storage Level	82.64%	80.51%	93.32%	71.68%
Visitation Relative to October End of the Month Reservoir Storage Level	82.64%	69.20%	92.89%	52.48%
Visitation Relative to Other Months End of the Month Reservoir Storage Level	82.64%	68.98%	80.20%	39.07%

Table 7.6-6. Survey Year Visitation Relative to End of the Month Reservoir Storage Levels.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Visitation Relative to April End of the Month Reservoir Storage Level	82.64%	68.88%	60.44%	79.01%
Visitation Relative to May End of the Month Reservoir Storage Level	99.52%	83.99%	80.26%	100.00%
Visitation Relative to June End of the Month Reservoir Storage Level	99.92%	91.86%	91.98%	100.00%
Visitation Relative to July End of the Month Reservoir Storage Level	99.68%	93.90%	94.53%	100.00%
Visitation Relative to August End of the Month Reservoir Storage Level	98.96%	93.16%	93.77%	95.22%
Visitation Relative to September End of the Month Reservoir Storage Level	82.64%	80.51%	93.32%	71.68%
Visitation Relative to October End of the Month Reservoir Storage Level	82.64%	69.20%	92.89%	52.48%
Visitation Relative to Other Months End of the Month Reservoir Storage Level	82.64%	68.98%	80.20%	39.07%

Figure 7.6-1. Donner Lake Visitation and End of the Month Reservoir Storage Level Relationship.

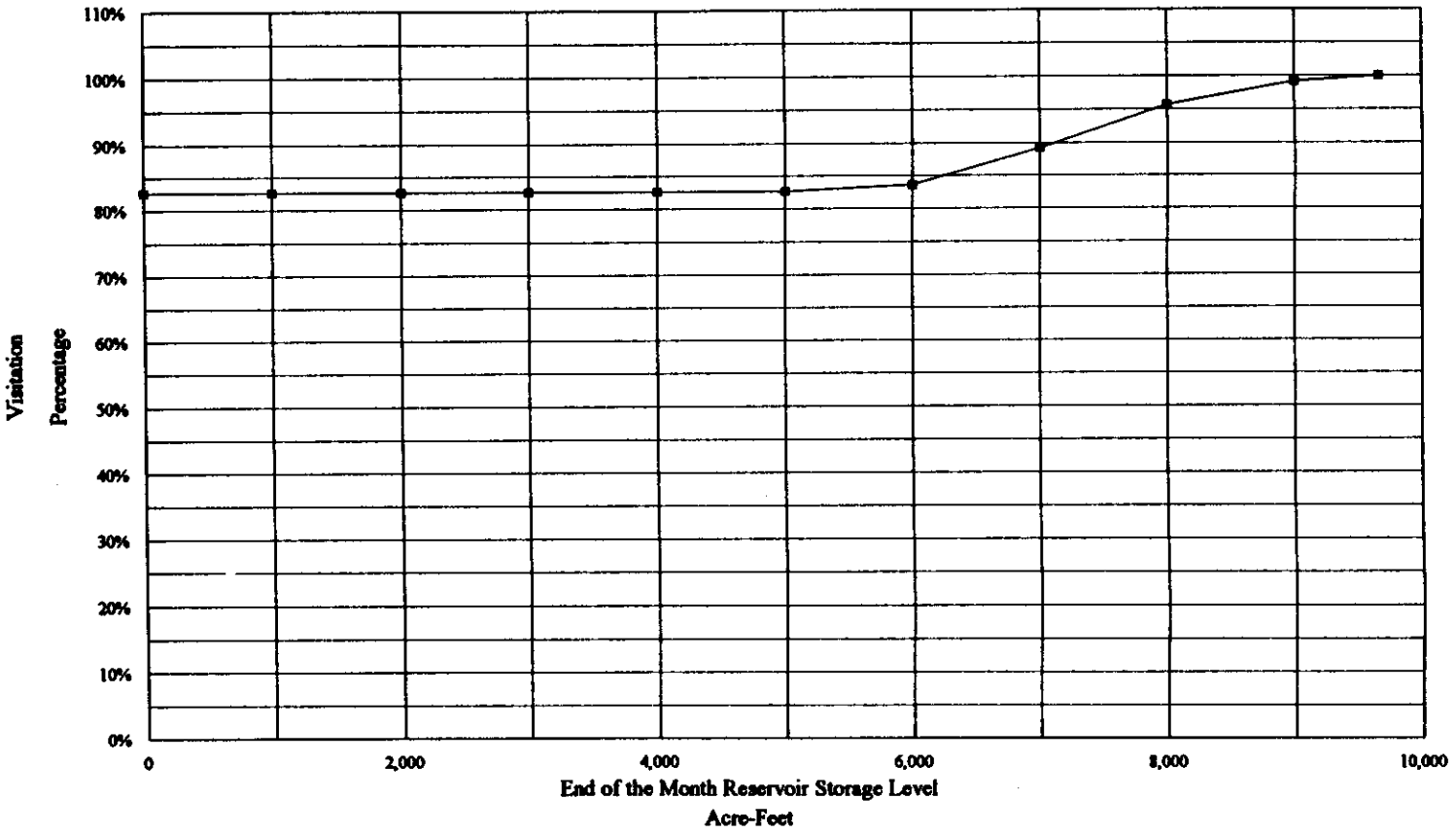


Figure 7.6-2. Prosser Reservoir Visitation and End of the Month Reservoir Storage Level Relationship.

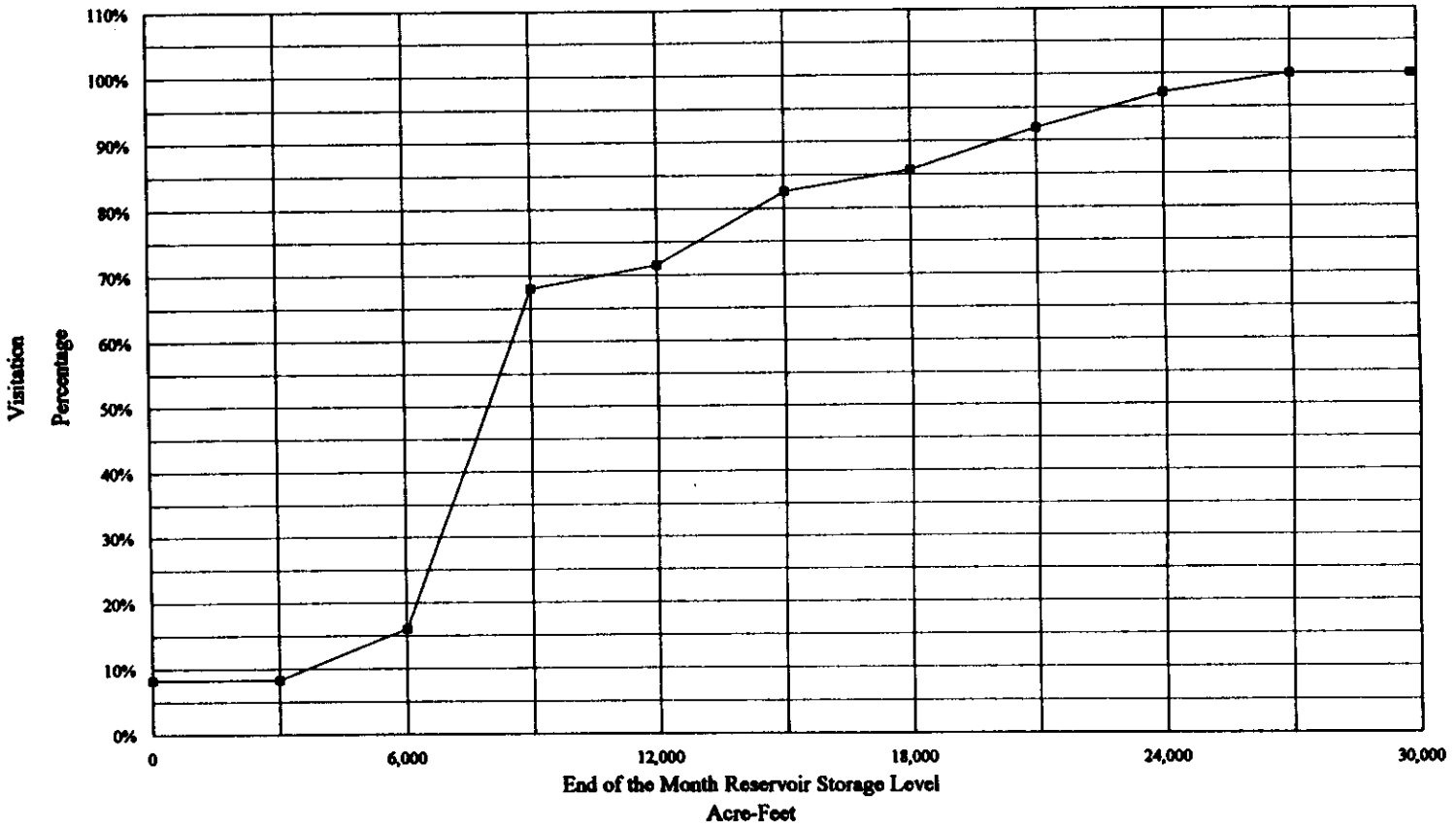


Figure 7.6-3. Stampede Reservoir Visitation and End of the Month Reservoir Storage Level Relationship.

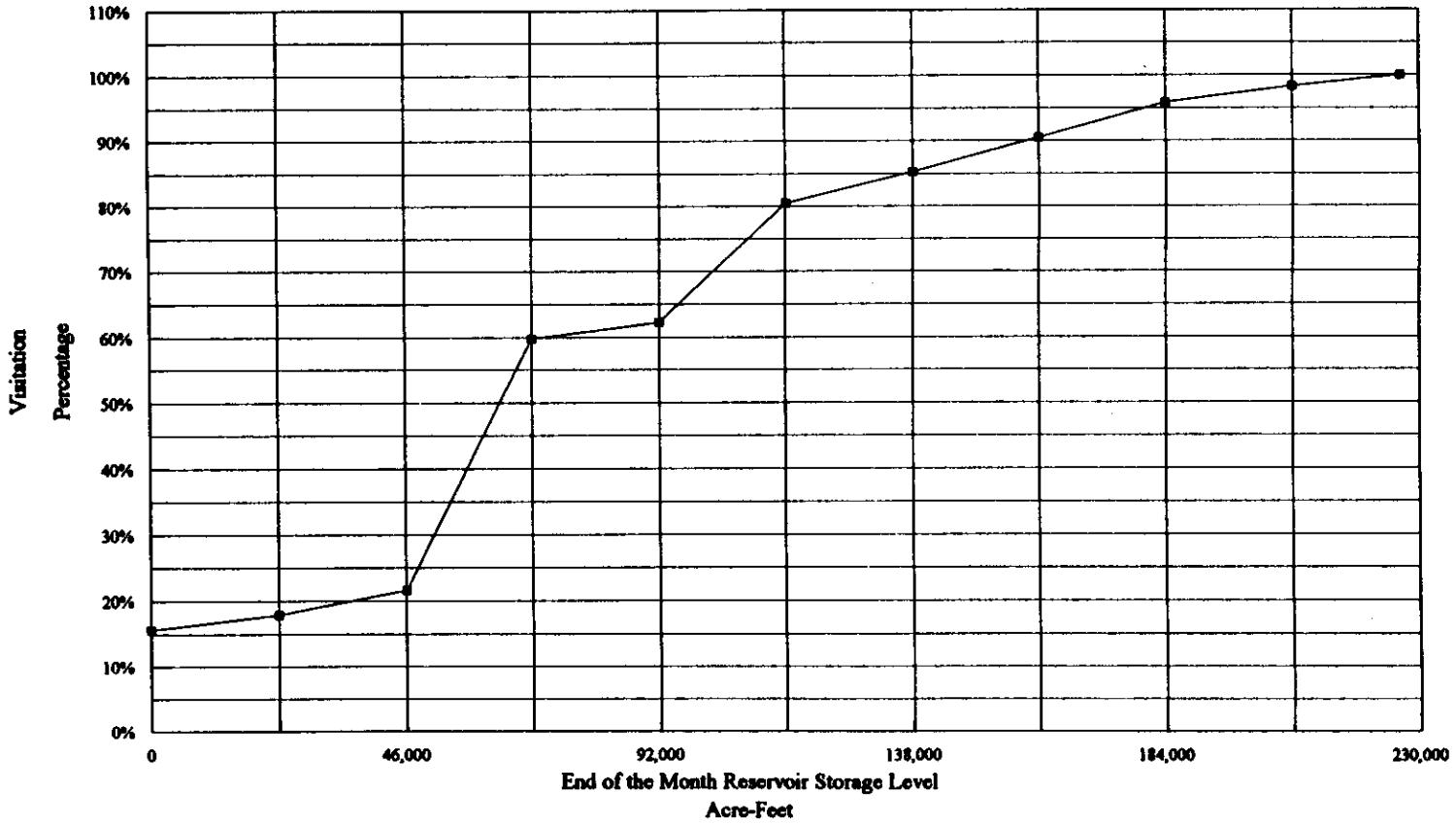
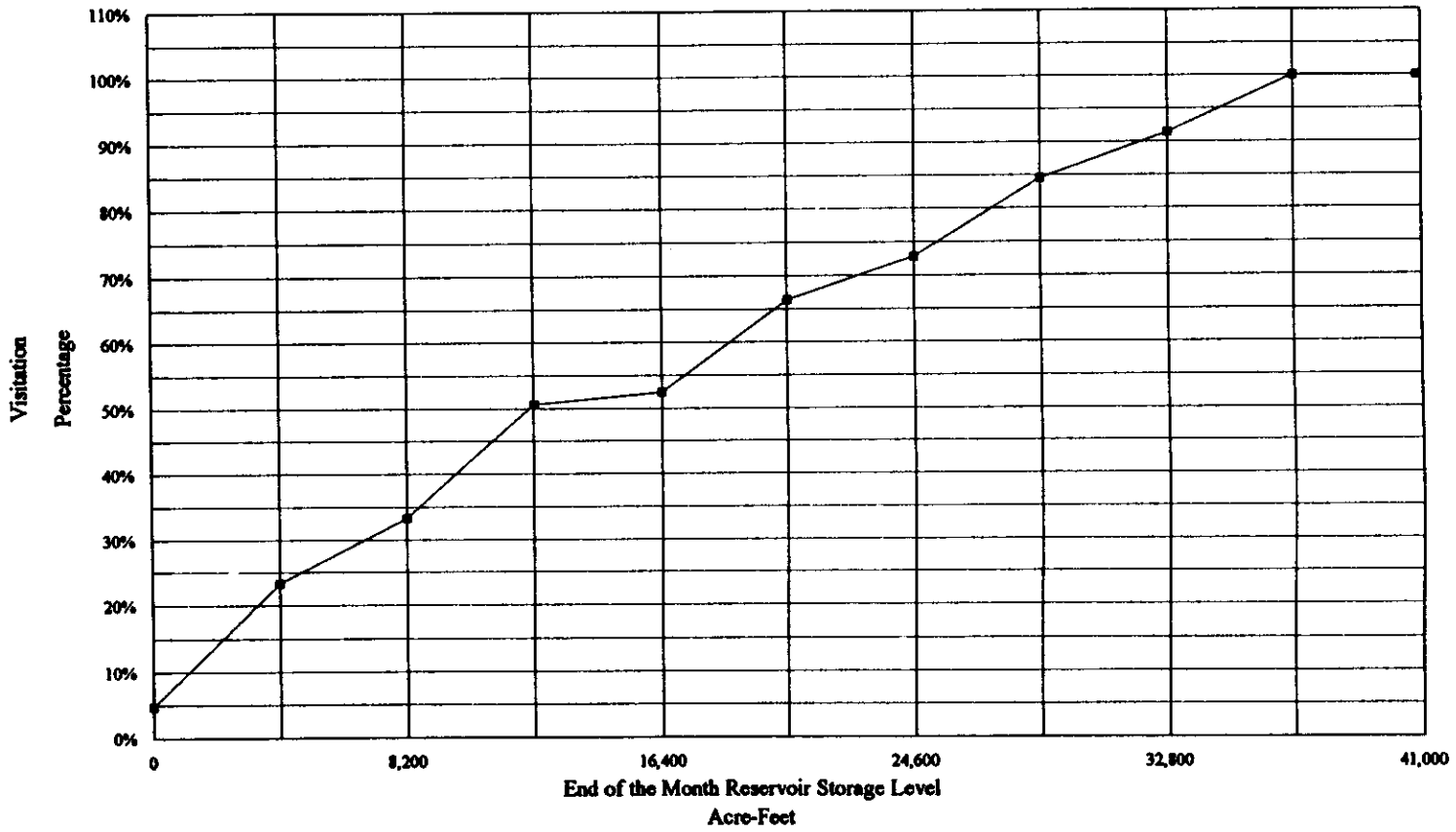


Figure 7.6-4. Boca Reservoir Visitation and End of the Month Reservoir Storage Level Relationship.



Annual Visitation Relative to End of the Month Reservoir Storage Levels

The annual visitation relative to end of the month reservoir storage levels is derived by weighting the scale values for the end of the month reservoir storage levels for the reservoir by the expected annual visitation to the reservoir for the year and then calculating an annual percentage of visitation.

The scale values are weighted by survey year annual visitation by respondents to reservoirs and expected annual visitation to the reservoirs for the year.

The survey year annual visitation by respondents to the reservoirs is shown in Table 7.6-7. The expected annual visitation is calculated through the following equation.

$$H_{it} = \frac{G_{it}\,(H_{it}^{o})}{G_{it}^{o}} \qquad (7.6\text{-}3)$$

where:

- H_{it} is the expected annual visitation to reservoir i in month t
- G_{it} is the percentage of visitation corresponding to the scale value for the end of the month storage level for reservoir i in month t
- $H_{it}o$ is the survey year annual visitation by respondents to reservoir i in month t
- $G_{it}o$ is the survey year percentage of visitation corresponding to the scale value for the end of the month storage level for reservoir i in month t

The expected annual visitation is shown in Table 7.6-8. These values are the same as the values for the survey year since the end of the month reservoir storage levels are the same. The expected annual visitation would differ under alternative reservoir storage levels.

The weights for the expected annual visitation are then calculated through the following equation.

$$I_{it} = \frac{H_{it}}{\sum H_{it}} \qquad (7.6\text{-}4)$$

where: I_{it} is the weight of the expected annual visitation to reservoir i in month t
H_{it} is the expected annual visitation to reservoir i in month t

These weights are shown in Table 7.6-9. These weights show the annual pattern of visitation to the reservoirs.

The annual scale values for the reservoirs are then calculated through the following equation.

$$D_i = \sum_t D_{it} (I_{it}) \qquad (7.6\text{-}5)$$

where: D_i is the annual scale value for reservoir i
D_{it} is the scale value for the end of the month storage level for reservoir i in month t
I_{it} is the weight of the expected annual visitation to reservoir i in month t

The weighted scale values are shown by month and by reservoir in Table 7.6-10. The summation of these weighted scale values is the annual scale value. Corresponding to an annual scale value is an annual percentage of visitation.

The annual percentage of visitation corresponding to the annual scale value is then calculated through the following equation.

If $E_i \geq D_i \geq F_i$ scale value, then visitation $G_i = \alpha_i + \beta_i (D_i)$ (7.6-6)

where:
- E_i is the high scale value for reservoir i
- D_i is the annual scale value for reservoir i
- F_i is the low scale value for reservoir i
- G_i is the annual percentage of visitation corresponding to the annual scale value for reservoir i
- α_i is the annual percentage of visitation constant term for reservoir i
- β_i is the annual percentage of visitation slope coefficient term for reservoir i

This equation is formulated to linearly interpolate an annual scale value to an annual percentage of visitation.

Separate equations for annual scale value and reservoir storage levels are formulated for Donner Lake and Prosser, Stampede, and Boca Reservoirs. These equations are provided below by reservoir.

Donner Lake

If $5 \geq D_{it} > 4$ scale value, then visitation $G_{it} = .935691 + .012862 (D_{it})$
If $4 \geq D_{it} > 3$ scale value, then visitation $G_{it} = .819936 + .041801 (D_{it})$
If $3 \geq D_{it} > 2$ scale value, then visitation $G_{it} = .733119 + .070740 (D_{it})$
If $2 \geq D_{it} > 1$ scale value, then visitation $G_{it} = .778135 + .048232 (D_{it})$
If $1 = D_{it}$ scale value, then visitation $G_{it} = .826367$

Prosser Reservoir

If $11 \geq D_{it} > 10$ scale value, then visitation $G_{it} = 1.000000 + .000000 (D_{it})$
If $10 \geq D_{it} > 9$ scale value, then visitation $G_{it} = .702970 + .029703 (D_{it})$
If $9 \geq D_{it} > 8$ scale value, then visitation $G_{it} = .495050 + .052805 (D_{it})$
If $8 \geq D_{it} > 7$ scale value, then visitation $G_{it} = .415842 + .062706 (D_{it})$
If $7 \geq D_{it} > 6$ scale value, then visitation $G_{it} = .646865 + .029703 (D_{it})$
If $6 \geq D_{it} > 5$ scale value, then visitation $G_{it} = .151815 + .112211 (D_{it})$
If $5 \geq D_{it} > 4$ scale value, then visitation $G_{it} = .547855 + .033003 (D_{it})$
If $4 \geq D_{it} > 3$ scale value, then visitation $G_{it} = - 1.419142 + .524752 (D_{it})$
If $3 \geq D_{it} > 2$ scale value, then visitation $G_{it} = - .062706 + .072607 (D_{it})$
If $2 \geq D_{it} > 1$ scale value, then visitation $G_{it} = .082508 + .000000 (D_{it})$
If $1 = D_{it}$ scale value, then visitation $G_{it} = .082508$

Stampede Reservoir

If $11 \geq D_{it} > 10$ scale value, then visitation $G_{it} = .785714 + .019481 (D_{it})$
If $10 \geq D_{it} > 9$ scale value, then visitation $G_{it} = .720779 + .025974 (D_{it})$
If $9 \geq D_{it} > 8$ scale value, then visitation $G_{it} = .457792 + .055195 (D_{it})$
If $8 \geq D_{it} > 7$ scale value, then visitation $G_{it} = .483766 + .051948 (D_{it})$
If $7 \geq D_{it} > 6$ scale value, then visitation $G_{it} = .529221 + .045455 (D_{it})$
If $6 \geq D_{it} > 5$ scale value, then visitation $G_{it} = - .347403 + .191558 (D_{it})$
If $5 \geq D_{it} > 4$ scale value, then visitation $G_{it} = .545455 + .012987 (D_{it})$
If $4 \geq D_{it} > 3$ scale value, then visitation $G_{it} = - .974026 + .392857 (D_{it})$
If $3 \geq D_{it} > 2$ scale value, then visitation $G_{it} = .126623 + .025974 (D_{it})$
If $2 \geq D_{it} > 1$ scale value, then visitation $G_{it} = .133117 + .022727 (D_{it})$
If $1 = D_{it}$ scale value, then visitation $G_{it} = .155844$

Boca Reservoir

If $11 \geq D_{it} > 10$ scale value, then visitation $G_{it} = 1.000000 + .000000 (D_{it})$
If $10 \geq D_{it} > 9$ scale value, then visitation $G_{it} = .117117 + .088288 (D_{it})$
If $9 \geq D_{it} > 8$ scale value, then visitation $G_{it} = .295495 + .068468 (D_{it})$
If $8 \geq D_{it} > 7$ scale value, then visitation $G_{it} = - .093694 + .117117 (D_{it})$
If $7 \geq D_{it} > 6$ scale value, then visitation $G_{it} = .284685 + .063063 (D_{it})$
If $6 \geq D_{it} > 5$ scale value, then visitation $G_{it} = - .180180 + .140541 (D_{it})$
If $5 \geq D_{it} > 4$ scale value, then visitation $G_{it} = .441441 + .016216 (D_{it})$
If $4 \geq D_{it} > 3$ scale value, then visitation $G_{it} = - .192793 + .174775 (D_{it})$
If $3 \geq D_{it} > 2$ scale value, then visitation $G_{it} = .034234 + .099099 (D_{it})$
If $2 \geq D_{it} > 1$ scale value, then visitation $G_{it} = - .138739 + .185586 (D_{it})$
If $1 = D_{it}$ scale value, then visitation $G_{it} = .046847$

Annual visitation relative to end of the month reservoir storage levels for Donner Lake and Prosser, Stampede, and Boca Reservoirs are given in Table 7.6-11. An annual percentage of visitation corresponds to an annual scale value which in turn corresponds to end of the month reservoir storage levels.

Survey year annual visitation relative to end of the month reservoir storage levels are the same because of end of the month reservoir storage levels being the same. The annual percentages of visitation are shown in Table 7.6-12. Annual visitation would differ under alternative reservoir storage levels.

Annual patterns of visitation for Donner Lake and Prosser, Stampede, and Boca Reservoirs are also shown in Figures 7.6-5, 7.6-6, 7.6-7, and 7.6-8.

Table 7.6-7. Survey Year Annual Visitation by Respondents by Month by Reservoir.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Number of Respondents that Visit during April	20	8	19	24
Number of Respondents that Visit during May	35	15	41	53
Number of Respondents that Visit during June	71	26	86	69
Number of Respondents that Visit during July	103	35	83	75
Number of Respondents that Visit during August	96	33	97	78
Number of Respondents that Visit during September	44	17	43	51
Number of Respondents that Visit during October	16	11	21	29
Number of Respondents that Visit during Other Months	21	3	2	11
Total	406	148	392	390

Table 7.6-8. Expected Annual Visitation by Month by Reservoir.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Expected Visitation during April	20	8	19	24
Expected Visitation during May	35	15	41	53
Expected Visitation during June	71	26	86	69
Expected Visitation during July	103	35	83	75
Expected Visitation during August	96	33	97	78
Expected Visitation during September	44	17	43	51
Expected Visitation during October	16	11	21	29
Expected Visitation during Other Months	21	3	2	11
Total	406	148	392	390

Table 7.6-9. Weights for Expected Annual Visitation by Month by Reservoir.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Weight for expected Visitation during April	4.93%	5.41%	4.85%	6.15%
Weight for expected Visitation during May	8.62%	10.14%	10.46%	13.59%
Weight for expected Visitation during June	17.49%	17.57%	21.94%	17.69%
Weight for expected Visitation during July	25.37%	23.65%	21.17%	19.23%
Weight for expected Visitation during August	23.65%	22.30%	24.74%	20.00%
Weight for expected Visitation during September	10.84%	11.49%	10.97%	13.08%
Weight for expected Visitation during October	3.94%	7.43%	5.36%	7.44%
Weight for expected Visitation during Other Months	5.17%	2.03%	0.51%	2.82%

Table 7.6-10. Annual Scale Values by Reservoir.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Weighted Scale Value for April End of the Month Reservoir Storage Level	0.05	0.23	0.22	0.46
Weighted Scale Value for May End of the Month Reservoir Storage Level	0.40	0.66	0.63	1.38
Weighted Scale Value for June End of the Month Reservoir Storage Level	0.86	1.41	1.84	1.85
Weighted Scale Value for July End of the Month Reservoir Storage Level	1.20	1.99	1.87	1.98
Weighted Scale Value for August End of the Month Reservoir Storage Level	0.99	1.84	2.15	1.89
Weighted Scale Value for September End of the Month Reservoir Storage Level	0.11	0.67	0.94	0.90
Weighted Scale Value for October End of the Month Reservoir Storage Level	0.04	0.32	0.46	0.37
Weighted Scale Value for Other Months End of the Month Reservoir Storage Level	0.05	0.09	0.03	0.09
Annual Scale Value	3.71	7.21	8.14	8.93

Table 7.6-11. Annual Visitation Relative to End of the Month Reservoir Storage Levels.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Annual Visitation Relative to the End of the Month Reservoir Storage Levels	97.49%	86.80%	90.71%	90.69%

Table 7.6-12. Survey Year Annual Visitation Relative to End of the Month Reservoir Storage Levels.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Annual Visitation Relative to the End of the Month Reservoir Storage Levels	97.49%	86.80%	90.71%	90.69%

Figure 7.6-5. Donner Lake Annual Pattern of Visitation.

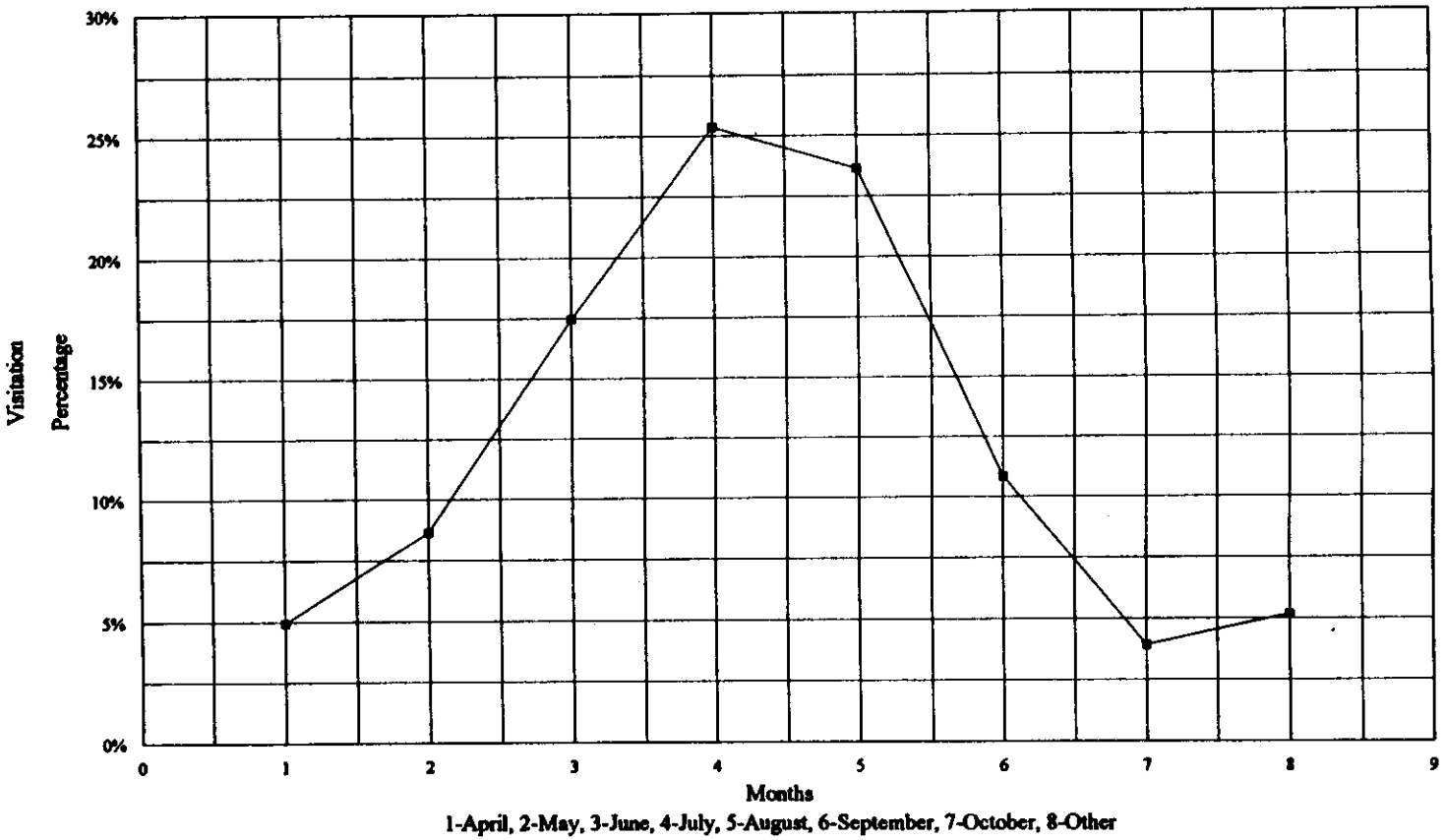


Figure 7.6-6. Prosser Reservoir Annual Pattern of Visitation.

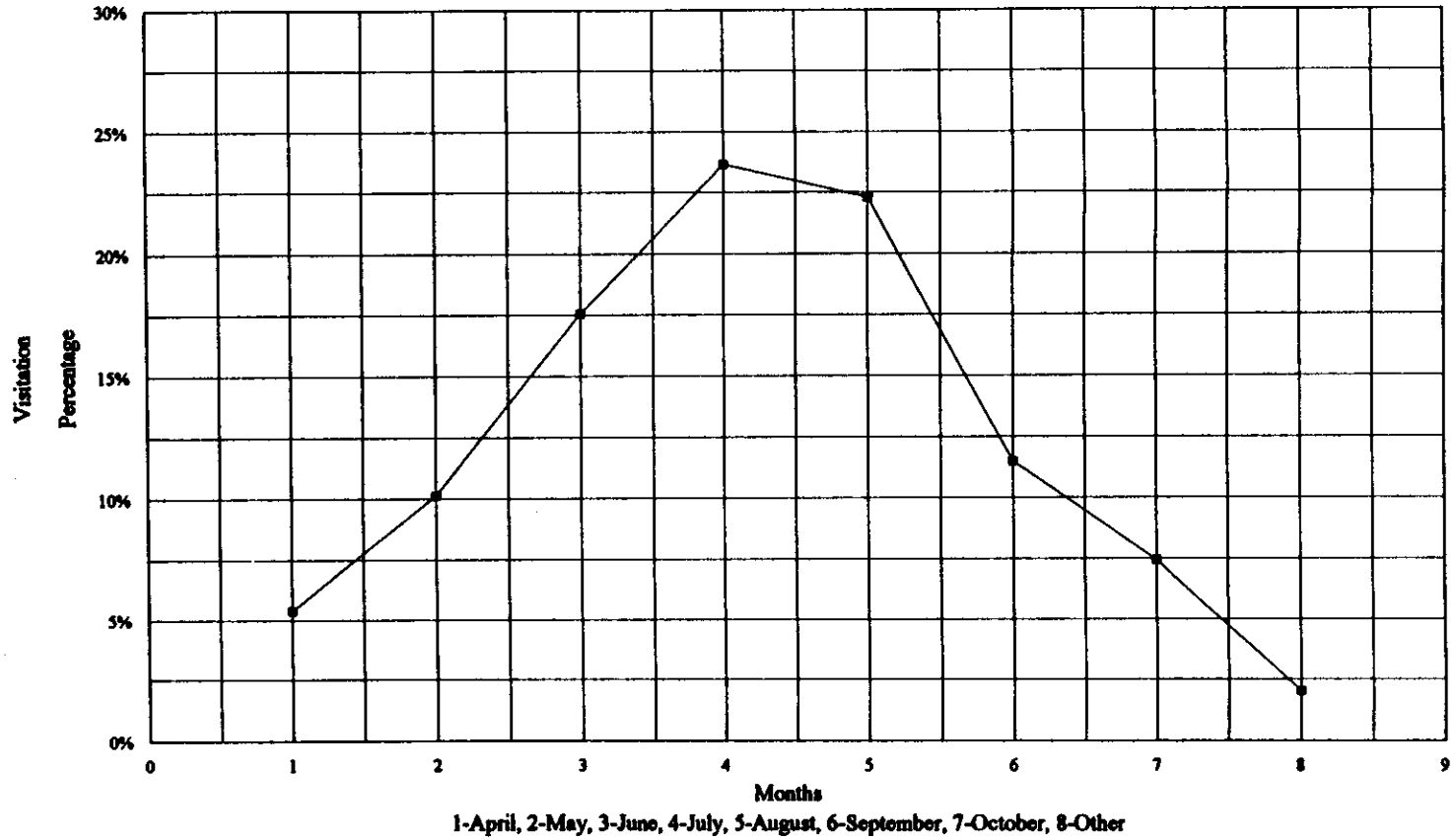


Figure 7.6-7. Stampede Reservoir Annual Pattern of Visitation.

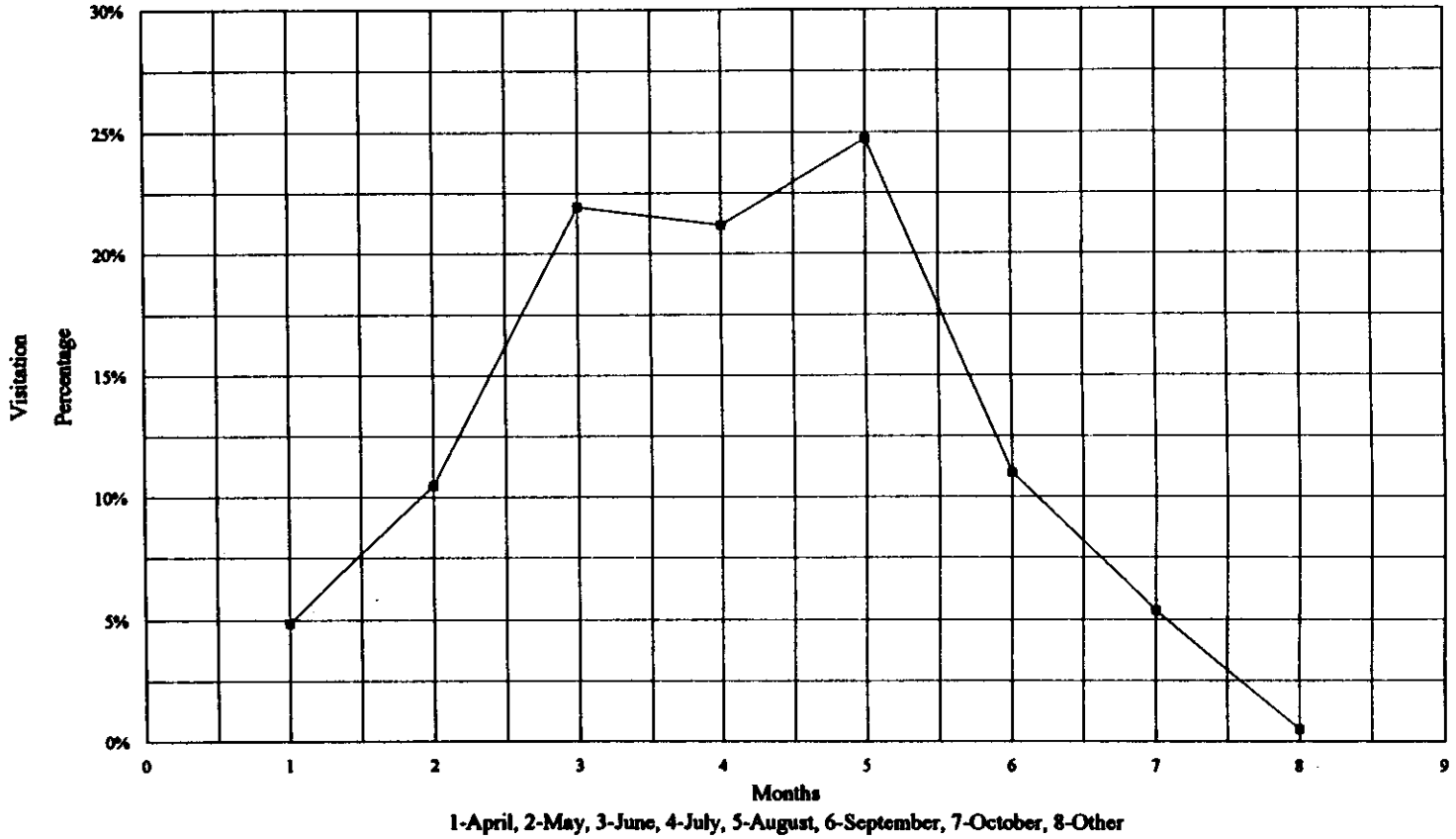
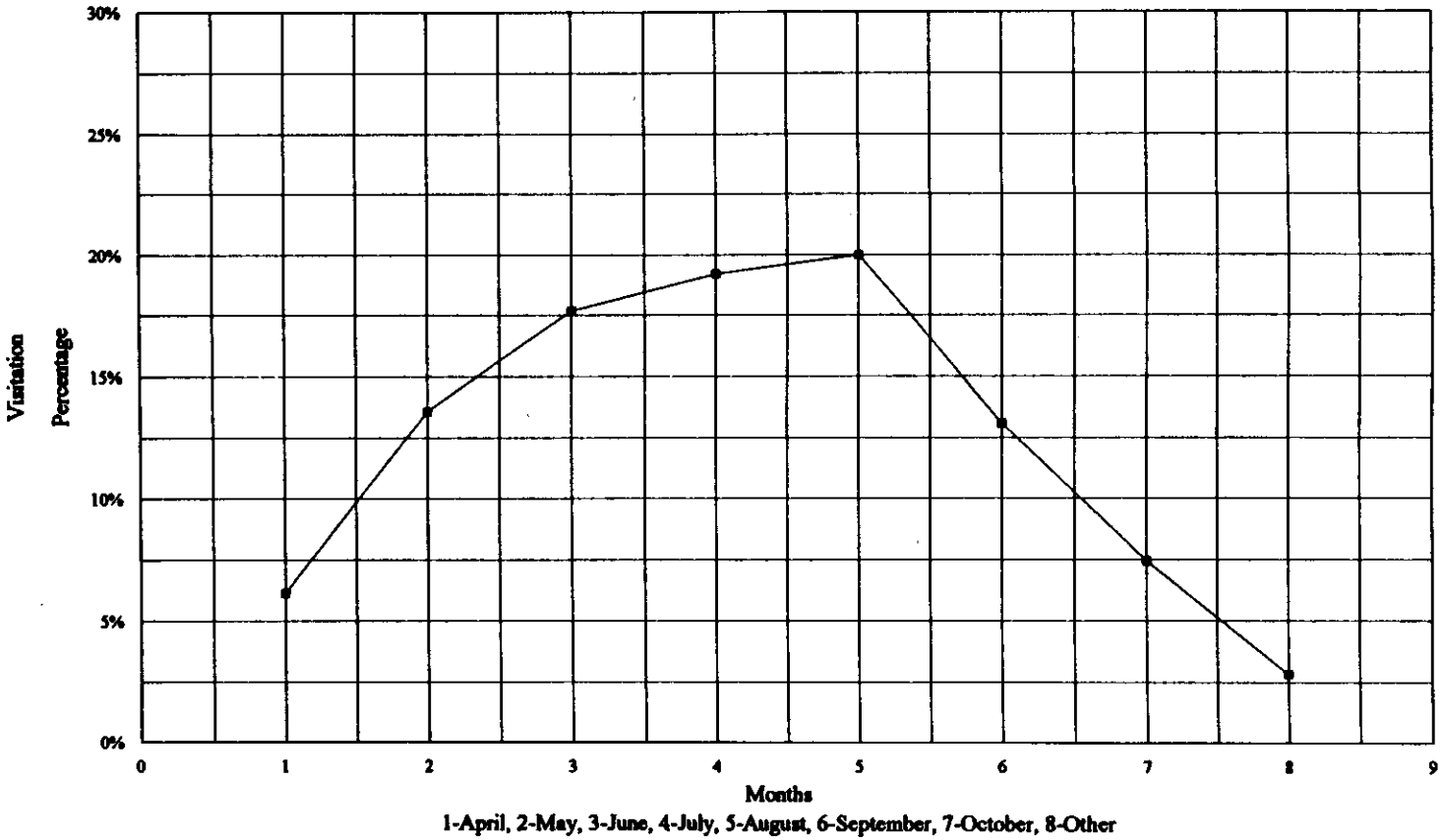


Figure 7.6-8. Boca Reservoir Annual Pattern of Visitation.



Annual Number of Camping Visitors

The annual number of camping visitors to the reservoirs is derived by taking the survey year number of camping visitors for the campgrounds at the reservoirs and multiplying by the ratio of annual visitation for the given year to the annual visitation for survey year. The annual number of camping visitors is distributed monthly by the weights of the expected annual visitation to show the annual pattern of visitation.

The survey year number of camping visitors for the campgrounds at the reservoirs are taken from California State Park and U.S. Forest Service data. This data is shown in Table 7.6-13. There are twelve campgrounds in the area. One campground is near Donner Lake. Four campgrounds are near Prosser Reservoir. Another three campgrounds are near Stampede Reservoir. And the remaining four campgrounds are near Boca Reservoir. The annual number of camping visitors is provided for each campground.

The annual number of camping visitors for the given year is calculated through the following equation.

$$J_i = J_i^o \frac{G_i}{G_i^o} \qquad (7.6\text{-}7)$$

where:

J_i	is the annual number of camping visitors for reservoir i
J_i^o	is the survey year annual number of camping visitors for reservoir i
G_i	is the annual percentage of visitation corresponding to the annual scale value for reservoir i
G_i^o	is the survey year annual percentage of visitation corresponding to the annual scale value for reservoir i

The equation is formulated so that if the annual percentage of visitation for the given year is greater than the survey year annual percentage of visitation then the annual number of camping visitors for the given year is also greater. Likewise if the annual percentage of visitation for the given year is less than the survey year annual percentage of visitation then the annual number of camping visitors for the given year is also less.

The annual number of camping visitors by reservoir are shown in Table 7.6-14.

The annual number of camping visitors are then distributed by the weights for expected annual visitation to show the annual number of camping visitors by month. This is done through the following equation.

$$K_{it} = J_i (I_{it}) \qquad (7.6\text{-}8)$$

where:
- K_{it} is the number of annual camping visitors to reservoir i in month t
- J_i is the annual number of camping visitors for reservoir i
- I_{it} is the weight of the expected annual visitation to reservoir i in month t

The annual number of camping visitors by month to the reservoirs are shown in Table 7.6-15. Together the annual number of camping visitors by month show the annual pattern of visitation to the reservoir by camping visitors.

Table 7.6-13. Annual Number of Camping Visitors by Campground by Reservoir.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Number of Camping Visitors for Donner State Park	56,715			
Number of Camping Visitors for Lakeside Campground		0		
Number of Camping Visitors for Prosser Family Campground		15,031		
Number of Camping Visitors for Prosser Ranch Campground		3,877		
Number of Camping Visitors for Annie McCloud Campground		0		
Number of Camping Visitors for Davies Creek Campground			1,111	
Number of Camping Visitors for Emigrant Campground			20,679	
Number of Camping Visitors for Logger Campground			97,132	
Number of Camping Visitors for Boca Campground				0
Number of Camping Visitors for Boca Rest Campground				29,427
Number of Camping Visitors for Boca Spring Campground				0
Number of Camping Visitors for Boyington Mill Campground				3,480
Total Number of Camping Visitors for Campgrounds	56,715	18,908	118,921	32,907

Note: There are 152 open campsites at Donner Lake, 46 open campsites at Prosser Reservoir, 216 to 256 open campsites at Stampede Reservoir, and 59 open campsites at Boca Reservoir.

Table 7.6-14. Annual Number of Camping Visitors by Reservoir.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Annual Number of Camping Visitors	56,715	18,908	118,921	32,907

Table 7.6-15. Annual Number of Camping Visitors by Month by Reservoir.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Number of Camping Visitors during April	2,794	1,022	5,764	2,025
Number of Camping Visitors during May	4,889	1,916	12,438	4,472
Number of Camping Visitors during June	9,918	3,322	26,090	5,822
Number of Camping Visitors during July	14,388	4,471	25,180	6,328
Number of Camping Visitors during August	13,410	4,216	29,427	6,581
Number of Camping Visitors during September	6,146	2,172	13,045	4,303
Number of Camping Visitors during October	2,235	1,405	6,371	2,447
Number of Camping Visitors during Other Months	2,934	383	607	928
Annual Number of Camping Visitors	56,715	18,908	118,921	32,907

Annual Number of Day Use Visitors

The annual number of day use visitors to the reservoirs is derived by multiplying the annual number of camping visitors to the reservoirs by the ratio of day use visitors to camping visitors taken from the survey vehicle count data.

The ratio of day use visitors to camping visitors is calculated through the following equations.

$$L_i = M_i (N_i) \qquad (7.6\text{-}9)$$

$$O_i = P_i (Q_i) \qquad (7.6\text{-}10)$$

$$R_i = \frac{O_i}{L_i} \qquad (7.6\text{-}11)$$

where:
- L_i is the number of camping visitors to reservoir i
- M_i is the number of camping visitor vehicles at reservoir i
- N_i is the average group size of camping respondents at reservoir i
- O_i is the number of day use visitors to reservoir i
- P_i is the number of day use visitor vehicles at reservoir i
- Q_i is the average group size of day use respondents at reservoir i
- R_i is the ratio of day use visitors to camping visitors to reservoir i

The ratios of day use visitors to camping visitors by reservoir are given in Table 7.6-16.

The annual number of day use visitors is then calculated through the following equation.

$$S_i = J_i (R_i) \qquad (7.6\text{-}12)$$

where:
- S_i is the annual number of day use visitors for reservoir i
- J_i is the annual number of camping visitors for reservoir i
- R_i is the ratio of day use visitors to camping visitors to reservoir i

The annual number of day use visitors by reservoir are shown in Table 7.6-17.

The annual number of day use visitors are then distributed by the weights for expected annual visitation to show the annual number of day use visitors by month. This is done through the following equation.

$$T_{it} = S_i (I_{it}) \qquad (7.6\text{-}13)$$

where:
- T_{it} is the number of annual day use visitors to reservoir i in month t
- S_i is the annual number of day use visitors for reservoir i
- I_{it} is the weight of the expected annual visitation to reservoir i in month t

The annual number of day use visitors by month to the reservoirs are shown in Table 7.6-18. Together the annual number of day use visitors by month show the annual pattern of visitation to the reservoir by day use visitors.

Table 7.6-16. Ratio of Day Use Visitors to Camping Visitors by Reservoir.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Average Group Size of Camping Respondents	5.24	3.73	5.12	5.10
Average Group Size of Day Use Respondents	5.02	3.13	3.89	5.02
Number of Camping Visitor Vehicles counted on May 28, 1994		26	227	98
Number of Camping Visitor Vehicles counted on June 11, 1994		44	136	16
Number of Camping Visitor Vehicles counted on June 17, 1994		11	86	9
Number of Camping Visitor Vehicles counted on June 24, 1994				
Number of Camping Visitor Vehicles counted on June 25, 1994		37	107	9
Number of Camping Visitor Vehicles counted on July 2, 1994		30	208	38
Number of Camping Visitor Vehicles counted on July 8, 1994		13	63	12
Number of Camping Visitor Vehicles counted on July 16, 1994		28	131	16
Number of Camping Visitor Vehicles counted on July 22, 1994		24	90	8
Number of Camping Visitor Vehicles counted on July 23, 1994				
Number of Camping Visitor Vehicles counted on August 6, 1994		32	86	12
Number of Camping Visitor Vehicles counted on August 12, 1994				
Number of Camping Visitor Vehicles counted on August 20, 1994		21	93	10
Number of Camping Visitor Vehicles counted on September 3, 1994		23	70	11
Total Number of Camping Visitor Vehicles	N.A.	289	1,297	239
Number of Day Use Visitor Vehicles counted on May 28, 1994		33	36	43
Number of Day Use Visitor Vehicles counted on June 11, 1994		4	39	62
Number of Day Use Visitor Vehicles counted on June 17, 1994		3	12	22
Number of Day Use Visitor Vehicles counted on June 24, 1994				
Number of Day Use Visitor Vehicles counted on June 25, 1994		16	18	28
Number of Day Use Visitor Vehicles counted on July 2, 1994		35	65	50
Number of Day Use Visitor Vehicles counted on July 8, 1994		9	14	18
Number of Day Use Visitor Vehicles counted on July 16, 1994		10	49	19
Number of Day Use Visitor Vehicles counted on July 22, 1994		4	15	9
Number of Day Use Visitor Vehicles counted on July 23, 1994				
Number of Day Use Visitor Vehicles counted on August 6, 1994		2	21	12
Number of Day Use Visitor Vehicles counted on August 12, 1994				
Number of Day Use Visitor Vehicles counted on August 20, 1994		9	40	20
Number of Day Use Visitor Vehicles counted on September 3, 1994		6	26	23
Total Number of Day Use Visitor Vehicles	N.A.	131	335	306
Number of Camping Visitors	N.A.	1,078	6,641	1,219
Number of Day Use Visitors	N.A.	410	1,303	1,536
Ratio of Day Use Visitors to Camping Visitors /1	3.72	0.38	0.20	1.26

1. Ratio of day use visitors to camping visitors for Donner Lake is based on estimates of recreation visits for 1993. Estimates are 195,099 camping visits and 138,246 day use visits.

Table 7.6-17. Annual Number of Day Use Visitors by Reservoir.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Annual Number of Day Use Visitors	211,037	7,192	23,337	41,470

Table 7.6-18. Annual Number of Day Use Visitors by Month by Reservoir.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Number of Day Use Visitors during April	10,396	389	1,131	2,552
Number of Day Use Visitors during May	18,193	729	2,441	5,636
Number of Day Use Visitors during June	36,905	1,263	5,120	7,337
Number of Day Use Visitors during July	53,539	1,701	4,941	7,975
Number of Day Use Visitors during August	49,900	1,604	5,775	8,294
Number of Day Use Visitors during September	22,871	826	2,560	5,423
Number of Day Use Visitors during October	8,317	535	1,250	3,084
Number of Day Use Visitors during Other Months	10,916	146	119	1,170
Annual Number of Day Use Visitors	211,037	7,192	23,337	41,470

Annual Number of Camping Visitor Groups

The annual number of camping visitor groups to the reservoirs is derived by dividing the annual number of camping visitors by month by the group size. This is done through the following equation.

$$U_{it} = \frac{K_{it}}{N_i} \qquad (7.6\text{-}14)$$

where:
- U_{it} is the annual number of camping visitor groups to reservoir i in month t
- K_{it} is the number of annual camping visitors to reservoir i in month t
- N_i is the average group size of camping respondents at reservoir i

The annual number of camping visitor groups by month to the reservoirs are shown in Table 7.6-19.

Table 7.6-19. Annual Number of Camping Visitor Groups by Month by Reservoir.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Number of Camping Visitor Groups during April	1,834	548	2,252	794
Number of Camping Visitor Groups during May	3,210	1,028	4,859	1,754
Number of Camping Visitor Groups during June	6,511	1,781	10,191	2,283
Number of Camping Visitor Groups during July	9,446	2,398	9,836	2,482
Number of Camping Visitor Groups during August	8,804	2,261	11,495	2,581
Number of Camping Visitor Groups during September	4,035	1,165	5,096	1,688
Number of Camping Visitor Groups during October	1,467	754	2,489	960
Number of Camping Visitor Groups during Other Months	1,926	206	237	364
Annual Number of Camping Visitor Groups	37,233	10,138	46,453	12,905

Annual Number of Day Use Visitor Groups

The annual number of day use visitor groups to the reservoirs is derived by dividing the annual number of day use visitors by month by the group size. This is done through the following equation.

$$V_{it} = \frac{T_{it}}{Q_i} \qquad (7.6\text{-}15)$$

where:
- V_{it} is the annual number of day use visitor groups to reservoir i in month t
- T_{it} is the number of annual day use visitors to reservoir i in month t
- Q_i is the average group size of day use respondents at reservoir i

The annual number of day use visitor groups by month to the reservoirs are shown in Table 7.6-20.

Table 7.6-20. Annual Number of Day Use Visitor Groups by Month by Reservoir.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Number of Day Use Visitor Groups during April	1,357	248	582	1,017
Number of Day Use Visitor Groups during May	2,374	466	1,255	2,245
Number of Day Use Visitor Groups during June	4,816	807	2,632	2,923
Number of Day Use Visitor Groups during July	6,987	1,087	2,540	3,177
Number of Day Use Visitor Groups during August	6,512	1,025	2,969	3,304
Number of Day Use Visitor Groups during September	2,985	528	1,316	2,161
Number of Day Use Visitor Groups during October	1,085	342	643	1,229
Number of Day Use Visitor Groups during Other Months	1,424	93	61	466
Annual Number of Day Use Visitor Groups	27,539	4,596	11,998	16,522

Annual Camping Visitor Expenditures

The annual camping visitor expenditures by reservoir are the summation of the annual number of camping visitor groups per month multiplied by the camping visitor group expenditure function value. This is done through the following equations.

$$W_{it} = U_{it} (X_i) \quad (7.6\text{-}16)$$

$$Y_i = \Sigma W_{it} \quad (7.6\text{-}17)$$

where:
- W_{it} is the annual camping visitor expenditures for reservoir i in month t
- U_{it} is the annual number of camping visitor groups to reservoir i in month t
- X_i is the camping visitor group expenditure function value for reservoir i
- Y_i is the annual camping visitor expenditures for reservoir i

The camping visitor group expenditure function values for each reservoir are shown in Table 7.6-21. The annual camping visitor expenditures by month by reservoir are shown in Table 7.6-22.

The annual camping visitor expenditures are proportioned by the percentage of expenditure per category indicated by camping respondents for the reservoir. This is done through the following equation.

$$Z_{ci} = Y_i (AA_{ci}) \quad (7.6\text{-}18)$$

where:
- Z_{ci} is the annual camping visitor expenditures by category c for reservoir i
- Y_i is the annual camping visitor expenditures for reservoir i
- AA_{ci} is the percentage of expenditure per category c for reservoir i by camping respondents

The annual camping visitor expenditures by category by reservoir are shown in Table 7.6-23.

Table 7.6-21. Camping Visitor Group Expenditure Function Values by Reservoir.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Camping Visitor Group Expenditure per Day	$36.97	$27.90	$39.61	$34.40

Table 7.6-22. Annual Camping Visitor Expenditures by Month by Reservoir.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Camping Visitor Expenditures during April	67,807	15,290	89,184	27,318
Camping Visitor Expenditures during May	118,663	28,668	192,451	60,327
Camping Visitor Expenditures during June	240,716	49,692	403,677	78,539
Camping Visitor Expenditures during July	349,208	66,892	389,595	85,368
Camping Visitor Expenditures during August	325,476	63,070	455,310	88,783
Camping Visitor Expenditures during September	149,176	32,491	201,838	58,050
Camping Visitor Expenditures during October	54,246	21,023	98,572	33,009
Camping Visitor Expenditures during Other Months	71,198	5,734	9,388	12,521
Annual Camping Visitor Expenditures	$1,376,490	$282,860	$1,840,016	$443,915

Table 7.6-23. Annual Camping Visitor Expenditures by Category by Reservoir.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Number of Camping Respondents	42	30	97	21
Expenditures on Licenses by Camping Respondents	0.00	0.00	533.94	69.60
Expenditures on Camping Fees by Camping Respondents	2045.82	623.10	4231.19	434.01
Expenditures on Hotel or Motel by Camping Respondents	235.20	0.00	0.00	219.98
Expenditures on Restaurant by Camping Respondents	1189.86	246.90	1081.22	120.02
Expenditures on Groceries by Camping Respondents	2392.32	1840.80	5872.95	2030.03
Expenditures on Equipment and Supplies by Camping Respondents	0.00	0.00	497.64	1.60
Expenditures on Rental by Camping Respondents	25.20	0.00	0.00	3.06
Expenditures on Fuel by Camping Respondents	654.36	365.70	2666.98	439.38
Expenditures on Other by Camping Respondents	1065.12	418.50	3766.40	688.05
Total Expenditures by Camping Respondents	$7,607.88	$3,495.00	$18,650.32	$4,005.73
Expenditures on Licenses by Camping Respondents	0.00%	0.00%	2.86%	1.74%
Expenditures on Camping Fees by Camping Respondents	26.89%	17.83%	22.69%	10.83%
Expenditures on Hotel or Motel by Camping Respondents	3.09%	0.00%	0.00%	5.49%
Expenditures on Restaurant by Camping Respondents	15.64%	7.06%	5.80%	3.00%
Expenditures on Groceries by Camping Respondents	31.45%	52.67%	31.49%	50.68%
Expenditures on Equipment and Supplies by Camping Respondents	0.00%	0.00%	2.67%	0.04%
Expenditures on Rental by Camping Respondents	0.33%	0.00%	0.00%	0.08%
Expenditures on Fuel by Camping Respondents	8.60%	10.46%	14.30%	10.97%
Expenditures on Other by Camping Respondents	14.00%	11.97%	20.19%	17.18%
Total Expenditures by Camping Respondents	100.00%	100.00%	100.00%	100.00%
Annual Camping Visitor Expenditures on Licenses	0	0	52,678	7,713
Annual Camping Visitor Expenditures on Camping Fees	370,149	50,429	417,444	48,097
Annual Camping Visitor Expenditures on Hotel or Motel	42,555	0	0	24,378
Annual Camping Visitor Expenditures on Restaurant	215,281	19,982	106,672	13,301
Annual Camping Visitor Expenditures on Groceries	432,841	148,981	579,418	224,968
Annual Camping Visitor Expenditures on Equipment and Supplies	0	0	49,097	177
Annual Camping Visitor Expenditures on Rental	4,559	0	0	339
Annual Camping Visitor Expenditures on Fuel	118,393	29,597	263,121	48,692
Annual Camping Visitor Expenditures on Other	192,712	33,870	371,588	76,250
Annual Camping Visitor Expenditures	$1,376,490	$282,860	$1,840,016	$443,915

Annual Day Use Visitor Expenditures

The annual day use visitor expenditures by reservoir are the summation of the annual number of day use visitor groups per month multiplied by the day use visitor group expenditure function value. This is done through the following equations.

$$AB_{it} = V_{it} (AC_i) \quad (7.6\text{-}19)$$

$$AD_i = \Sigma AB_{it} \quad (7.6\text{-}20)$$

where:
- AB_{it} is the annual day use visitor expenditures for reservoir i in month t
- V_{it} is the number of annual day use visitor groups to reservoir i in month t
- AC_i is the day use visitor group expenditure function value for reservoir i
- AD_i is the annual day use visitor expenditures for reservoir i

The day use visitor group expenditure function values for each reservoir are shown in Table 7.6-24. The annual day use visitor expenditures by month by reservoir are shown in Table 7.6-25.

The annual day use visitor expenditures are proportioned by the percentage of expenditure per category indicated by day use respondents for the reservoir. This is done through the following equation.

$$AE_{ci} = AD_i (AF_{ci}) \quad (7.6\text{-}21)$$

where:
- AE_{ci} is the annual day use visitor expenditures by category c for reservoir i
- AD_i is the annual day use visitor expenditures for reservoir i
- AF_{ci} is the percentage of expenditure per category c for reservoir i by day use respondents

The annual day use visitor expenditures by category by reservoir are shown in Table 7.6-26.

Table 7.6-24. Day Use Visitor Group Expenditure Function Values by Reservoir.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Day Use Visitor Group Expenditure per Day	$52.00	$34.07	$52.78	$48.85

Table 7.6-25. Annual Day Use Visitor Expenditures by Month by Reservoir.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Day Use Visitor Expenditures during April	70,543	8,463	30,694	49,668
Day Use Visitor Expenditures during May	123,451	15,869	66,235	109,683
Day Use Visitor Expenditures during June	250,429	27,506	138,932	142,795
Day Use Visitor Expenditures during July	363,298	37,027	134,086	155,212
Day Use Visitor Expenditures during August	338,608	34,911	156,703	161,421
Day Use Visitor Expenditures during September	155,195	17,985	69,466	105,544
Day Use Visitor Expenditures during October	56,435	11,637	33,925	60,015
Day Use Visitor Expenditures during Other Months	74,071	3,174	3,231	22,764
Annual Day Use Visitor Expenditures	$1,432,030	$156,571	$633,273	$807,104

Table 7.6-26. Annual Day Use Visitor Expenditures by Category by Reservoir.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Number of Day Use Respondents	71	8	9	54
Expenditures on Licenses by Day Use Respondents	0.00	142.38	347.40	376.00
Expenditures on Camping Fees by Day Use Respondents	165.64	0.00	0.00	292.80
Expenditures on Hotel or Motel by Day Use Respondents /1	1101.01	6.00	144.00	1317.14
Expenditures on Restaurant by Day Use Respondents	1169.56	250.02	135.00	537.16
Expenditures on Groceries by Day Use Respondents	1510.37	250.02	201.60	1408.56
Expenditures on Equipment and Supplies by Day Use Respondents	351.30	27.00	33.84	230.40
Expenditures on Rental by Day Use Respondents	956.38	975.00	0.00	0.00
Expenditures on Fuel by Day Use Respondents	449.02	119.98	181.80	886.20
Expenditures on Other by Day Use Respondents	323.15	50.00	13.50	292.80
Total Expenditures by Day Use Respondents	$6,026.43	$1,820.40	$1,057.14	$5,341.06
Expenditures on Licenses by Day Use Respondents	0.00%	7.82%	32.86%	7.04%
Expenditures on Camping Fees by Day Use Respondents	2.75%	0.00%	0.00%	5.48%
Expenditures on Hotel or Motel by Day Use Respondents /1	18.27%	0.33%	13.62%	24.66%
Expenditures on Restaurant by Day Use Respondents	19.41%	13.73%	12.77%	10.06%
Expenditures on Groceries by Day Use Respondents	25.06%	13.73%	19.07%	26.37%
Expenditures on Equipment and Supplies by Day Use Respondents	5.83%	1.48%	3.20%	4.31%
Expenditures on Rental by Day Use Respondents	15.87%	53.56%	0.00%	0.00%
Expenditures on Fuel by Day Use Respondents	7.45%	6.59%	17.20%	16.59%
Expenditures on Other by Day Use Respondents	5.36%	2.75%	1.28%	5.48%
Total Expenditures by Day Use Respondents	100.00%	100.00%	100.00%	100.00%
Annual Day Use Visitor Expenditures on Licenses	0	12,246	208,108	56,819
Annual Day Use Visitor Expenditures on Camping Fees	39,360	0	0	44,246
Annual Day Use Visitor Expenditures on Hotel or Motel /1	261,627	516	86,262	199,037
Annual Day Use Visitor Expenditures on Restaurant	277,917	21,504	80,871	81,172
Annual Day Use Visitor Expenditures on Groceries	358,902	21,504	120,767	212,852
Annual Day Use Visitor Expenditures on Equipment and Supplies	83,478	2,322	20,272	34,816
Annual Day Use Visitor Expenditures on Rental	227,260	83,859	0	0
Annual Day Use Visitor Expenditures on Fuel	106,698	10,319	108,906	133,916
Annual Day Use Visitor Expenditures on Other	76,789	4,300	8,087	44,246
Annual Day Use Visitor Expenditures	$1,432,030	$156,571	$633,273	$807,104

1. Expenditures on hotel or motel include vacation-home rent expenditures.

Annual Number of Camping and Day Use Visitors

The annual number of camping and day use visitors by reservoir is the summation of the annual number of camping visitors and the annual number of day use visitors. This is done through the following equations.

$$AG_{it} = K_{it} + T_{it} \quad (7.6\text{-}22)$$

$$AH_i = \Sigma AG_{it} \quad (7.6\text{-}23)$$

where:
- AG_{it} is the annual number of camping and day use visitors for reservoir i in month t
- K_{it} is the number of annual camping visitors to reservoir i in month t
- T_{it} is the number of annual day use visitors to reservoir i in month t
- AH_i is the annual number of camping and day use visitors for reservoir i

The annual number of camping and day use visitors by month by reservoir are shown in Table 7.6-27.

Table 7.6-27. Annual Number of Camping and Day Use Visitors by Month by Reservoir.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Number of Camping and Day Use Visitors during April	16,421	2,822	13,790	9,154
Number of Camping and Day Use Visitors during May	28,737	5,291	29,758	20,215
Number of Camping and Day Use Visitors during June	58,294	9,170	62,419	26,318
Number of Camping and Day Use Visitors during July	84,568	12,345	60,242	28,607
Number of Camping and Day Use Visitors during August	78,820	11,639	70,403	29,751
Number of Camping and Day Use Visitors during September	36,126	5,996	31,210	19,452
Number of Camping and Day Use Visitors during October	13,137	3,880	15,242	11,061
Number of Camping and Day Use Visitors during Other months	17,242	1,058	1,452	4,196
Annual Number of Camping and Day Use Visitors	333,345	52,200	284,515	148,754

Annual Camping and Day Use Visitor Expenditures

The annual camping and day use visitor expenditures by reservoir is the summation of the annual camping visitor expenditures and the annual day use visitor expenditures. This is done through the following equations.

$$AI_{it} = W_{it} + AB_{it} \quad (7.6\text{-}24)$$

$$AJ_i = \Sigma AI_{it} \quad (7.6\text{-}25)$$

where:
- AI_{it} is the annual camping and day use visitor expenditures for reservoir i in month t
- W_{it} is the annual camping visitor expenditures for reservoir i in month t
- AB_{it} is the annual day use visitor expenditures for reservoir i in month t
- AJ_i is the annual camping and day use visitor expenditures for reservoir i

The annual camping and day use visitor expenditures by month by reservoir are shown in Table 7.6-28.

Table 7.6-28. Annual Camping and Day Use Visitor Expenditures by Month by Reservoir.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Camping and Day Use Visitor Expenditures during April	138,351	23,753	119,879	76,986
Camping and Day Use Visitor Expenditures during May	242,114	44,537	258,686	170,010
Camping and Day Use Visitor Expenditures during June	491,145	77,197	542,609	221,334
Camping and Day Use Visitor Expenditures during July	712,506	103,919	523,681	240,581
Camping and Day Use Visitor Expenditures during August	664,084	97,981	612,013	250,204
Camping and Day Use Visitor Expenditures during September	304,372	50,475	271,305	163,595
Camping and Day Use Visitor Expenditures during October	110,681	32,660	132,498	93,025
Camping and Day Use Visitor Expenditures during Other months	145,268	8,907	12,619	35,285
Annual Camping and Day Use Visitor Expenditures	$2,808,521	$439,431	$2,473,289	$1,251,019

Annual Camping and Day Use Visitor Expenditures by Category

The annual camping and day use visitor expenditures by category by reservoir is the summation of the annual camping visitor expenditures by category and the annual day use visitor expenditures by category. This is done through the following equations.

$$AK_{ci} = Z_{ci} + AE_{ci} \quad (7.6\text{-}26)$$

$$AL_i = \Sigma AK_{ci} \quad (7.6\text{-}27)$$

where:
- AK_{ci} is the annual camping and day use visitor expenditures by category c for reservoir i
- Z_{ci} is the annual camping visitor expenditures by category c for reservoir i
- AE_{ci} is the annual day use visitor expenditures by category c for reservoir i
- AL_i is the annual camping and day use visitor expenditures for reservoir i

The annual camping and day use visitor expenditures by category by reservoir are shown in Table 7.6-29.

Table 7.6-29. Annual Camping and Day Use Visitor Expenditures by Category by Reservoir.

	Donner Lake	Prosser Reservoir	Stampede Reservoir	Boca Reservoir
Annual Camping and Day Use Visitor Expenditures on Licenses	0	12,246	260,786	64,532
Annual Camping and Day Use Visitor Expenditures on Camping Fees	409,510	50,429	417,444	92,343
Annual Camping and Day Use Visitor Expenditures on Hotel or Motel	304,182	516	86,262	223,415
Annual Camping and Day Use Visitor Expenditures on Restaurant	493,198	41,486	187,543	94,473
Annual Camping and Day Use Visitor Expenditures on Groceries	791,743	170,485	700,185	437,820
Annual Camping and Day Use Visitor Expenditures on Equipment and Supplies	83,478	2,322	69,368	34,994
Annual Camping and Day Use Visitor Expenditures on Rental	231,819	83,859	0	339
Annual Camping and Day Use Visitor Expenditures on Fuel	225,091	39,916	372,027	182,609
Annual Camping and Day Use Visitor Expenditures on Other	269,500	38,171	379,675	120,496
Annual Camping and Day Use Visitor Expenditures	$2,808,521	$439,431	$2,473,289	$1,251,019

8. Model Application Improvement

Model application improvement includes estimation of the economic impacts for alternative reservoir storage levels.

8.1. Estimation of the Economic Impacts for Alternative Reservoir Storage Levels

Estimation of the economic impacts for alternative reservoir storage levels at Donner Lake and at Prosser, Stampede, and Boca Reservoirs is done by integrating the recreation model component with the input-output model component. A direct economic impact is calculated first using the recreation model component. Then second, the total economic impact is calculated using the input-output model component. Third, the response economic impact is also calculated using the input-output model component.

Direct Economic Impact

The direct economic impact is the expenditures that camping and day use visitors at Donner Lake and at Prosser, Stampede, and Boca Reservoirs make in the regional economy during the year. Expenditures are on licenses, camping fees, hotel or motel, restaurant, groceries, equipment and supplies, rental, fuel, and other items.

Estimation of the direct economic impact is done through the following process. Using the recreation model component, the end of the month reservoir storage levels at Donner Lake and at Prosser, Stampede, and Boca Reservoirs is the input data. In turn, annual number of camping and day use visitors, annual camping and day use visitor expenditures, and, annual camping and day use visitor expenditures by category are calculated for each of the reservoirs. The total expenditures by category for all the reservoirs are then placed into economic sectors to become the direct economic impact. Underlying details of the recreation model component and equations used to calculate annual visitors, annual visitor expenditures, and annual visitor expenditures by category are given in Chapter 7.

End of the Month Reservoir Storage Levels

End of the month reservoir storage levels at Donner Lake and at Prosser, Stampede, and Boca Reservoirs are provided in Table 8.1-1.

End of the month reservoir storage levels for Donner Lake and Prosser, Stampede, and Boca Reservoirs are given for April through October and Other Months. April through October is considered to be the recreation season in a given year. Other Months are January, February, March, November and December of the given year. The reservoir storage levels are taken in total for April through October and as an average for the Other Months.

End of the month reservoir storage levels for Donner Lake and Prosser, Stampede, and Boca Reservoirs also have a set range of storage level. Reservoir storage levels at Donner Lake can range between 5,796 acre-feet and 9,660 acre-feet. Reservoir storage levels at Prosser Reservoir can range between 0 acre-feet and 29,840 acre-feet. Reservoir storage levels at Stampede Reservoir can range between 0 acre-feet and 226,500 acre-feet. Reservoir storage levels at Boca Reservoir can range between 0 acre-feet to 40,870 acre-feet.

Annual Number of Camping and Day Use Visitors

Annual number of camping and day use visitors by month by reservoir are provided in Table 8.1-2.

Annual Camping and Day Use Visitor Expenditures

Annual camping and day use visitor expenditures by month by reservoir are provided in Table 8.1-3.

Annual Camping and Day Use Visitor Expenditures by Category

Annual camping and day use visitor expenditures by category by reservoir are provided in Table 8.1-4.

Direct Economic Impact

The direct economic impact by economic sector is provided in Table 8.1-5. The total expenditures by category for the reservoirs are placed into economic sectors. The direct impact is presented as total direct expenditures.

There are twenty economic sectors within the regional economy. These sectors include livestock production, dairy production, alfalfa hay production, other hay production, barley production, agricultural services, gold mining, other mining, construction, manufacturing, transportation and communications, utilities, trade, eating, drinking, and lodging, finance, insurance, and real estate, services, hotels, gaming, and recreation, health, local government, and households. In addition to these sectors, there is also other final payments and imports.

The trade sector accounts for expenditure categories of groceries, equipment and supplies, fuel, and other. The eating, drinking, and lodging sector accounts for the expenditure categories of hotel or motel, restaurant, and rental. Other final payments account for expenditure categories of camping fees and license fees.

The total direct expenditures are trade, eating, drinking, and lodging sector expenditures, other final payments, and imports. Other final payments and imports are leakage's out of the regional economy. Other final payments are expenditures to the federal and state government. Imports make-up the balance of the marginalized trade sector expenditures. The trade sector expenditures are marginalized to 25% to reflect that only the mark-up value on goods sold remains in the regional economy.

Table 8.1-1. End of the Month Reservoir Storage Levels.

Month	Donner Lake *acre-feet*	Prosser Reservoir *acre-feet*	Stampede Reservoir *acre-feet*	Boca Reservoir *acre-feet*
April	4,930	9,767	80,186	26,763
May	9,300	16,414	113,577	37,473
June	9,600	20,957	166,955	38,557
July	9,420	22,110	177,424	38,084
August	8,880	21,691	174,288	34,582
September	5,300	14,394	172,442	23,927
October	3,150	10,050	170,696	16,419
Other Months Average	3,366	9,854	113,263	9,561
January	3,290	9,827	73,944	5,247
February	3,320	9,723	75,751	4,396
March	4,290	9,642	76,677	2,955
November	2,980	9,981	170,433	17,042
December	2,950	10,098	169,510	18,163

Table 8.1-2. Annual Number of Camping and Day Use Visitors by Month by Reservoir.

Month	Donner Lake *visitors*	Prosser Reservoir *visitors*	Stampede Reservoir *visitors*	Boca Reservoir *visitors*	Total *visitors*
April	16,421	2,822	13,790	9,154	42,187
May	28,737	5,291	29,758	20,215	84,000
June	58,294	9,170	62,419	26,318	156,202
July	84,568	12,345	60,242	28,607	185,761
August	78,820	11,639	70,403	29,751	190,613
September	36,126	5,996	31,210	19,452	92,784
October	13,137	3,880	15,242	11,061	43,320
Other Months	17,242	1,058	1,452	4,196	23,947
Total	333,345	52,200	284,515	148,754	818,814

Table 8.1-3. Annual Camping and Day Use Visitor Expenditures by Month by Reservoir.

Month	Donner Lake $	Prosser Reservoir $	Stampede Reservoir $	Boca Reservoir $	Total $
April	138,351	23,753	119,879	76,986	358,968
May	242,114	44,537	258,686	170,010	715,347
June	491,145	77,197	542,609	221,334	1,332,286
July	712,506	103,919	523,681	240,581	1,580,688
August	664,084	97,981	612,013	250,204	1,624,282
September	304,372	50,475	271,305	163,595	789,746
October	110,681	32,660	132,498	93,025	368,863
Other Months	145,268	8,907	12,619	35,285	202,080
Total	2,808,521	439,431	2,473,289	1,251,019	6,972,260

Table 8.1-4. Annual Camping and Day Use Visitor Expenditures by Category by Reservoir.

Category	Donner Lake $	Prosser Reservoir $	Stampede Reservoir $	Boca Reservoir $	Total $
Licenses	0	12,246	260,786	64,532	337,563
Camping Fees	409,510	50,429	417,444	92,343	969,725
Hotel or Motel	304,182	516	86,262	223,415	614,376
Restaurant	493,198	41,486	187,543	94,473	816,699
Groceries	791,743	170,485	700,185	437,820	2,100,233
Equipment and Supplies	83,478	2,322	69,368	34,994	190,162
Rental	231,819	83,859	0	339	316,017
Fuel	225,091	39,916	372,027	182,609	819,643
Other	269,500	38,171	379,675	120,496	807,842
Total	2,808,521	439,431	2,473,289	1,251,019	6,972,260

Table 8.1-5. Direct Economic Impact by Economic Sector.

Economic Sector	Total Direct Expenditures $
1 Livestock Production	0
2 Dairy Production	0
3 Alfalfa Hay Production	0
4 Other Hay Production	0
5 Barley Production	0
6 Agricultural Services	0
7 Gold Mining	0
8 Other Mining	0
9 Construction	0
10 Manufacturing	0
11 Transportation and Communications	0
12 Utilities	0
13 Trade	999,059
14 Eating, Drinking, and Lodging	1,747,092
15 Finance, Insurance, and Real Estate	0
16 Services	0
17 Hotels, Gaming, and Recreation	0
18 Health	0
19 Local Government	0
20 Households	0
Other Final Payments	1,307,288
Imports	2,918,820
Total	6,972,260

Total Economic Impact

The total economic impact is the total amount of economic activity in terms of output generated from the direct economic impact.

The total economic impact includes the direct economic impact plus indirect and induced economic impacts. The direct economic impact is the expenditures accounted for in the trade, and, eating, drinking, and lodging sectors. The indirect economic impact is the additional impact that occurs due to linkages that the trade, and, eating, drinking, and lodging sectors have with each other and with the other economic sectors in the regional economy, except for local government and households sectors. The induced economic impact is the additional impact that occurs due to linkages that the trade, and, eating, drinking, and lodging sectors have with the local government and households sectors.

Estimation of the total economic impact is done through the following process. The direct economic impact by economic sector is the input data. In turn, using the input-output model component, the direct economic impact by economic sector is post-multiplied by the output requirements to become the total economic impact. Underlying details of the input-output model component and output requirements are given in Chapter 4.

Total Economic Impact

The total economic impact by economic sector is provided in Table 8.1-6. The total economic impact is presented as total output and adjusted output. The adjusted output is net of agriculture production and mining sectors. The reason for this is because the agriculture production and mining sectors have a fixed resource base.

Table 8.1-6. Total Economic Impact by Economic Sector.

Economic Sector	Total Output $	Adjusted /1 Output $
1 Livestock Production	246	0
2 Dairy Production	66	0
3 Alfalfa Hay Production	39	0
4 Other Hay Production	63	0
5 Barley Production	4	0
6 Agricultural Services	1,497	1,497
7 Gold Mining	165	0
8 Other Mining	219	0
9 Construction	63,777	63,777
10 Manufacturing	97,302	97,302
11 Transportation and Communications	85,042	85,042
12 Utilities	157,939	157,939
13 Trade	1,171,681	1,171,681
14 Eating, Drinking, and Lodging	1,776,923	1,776,923
15 Finance, Insurance, and Real Estate	283,643	283,643
16 Services	293,234	293,234
17 Hotels, Gaming, and Recreation	46,661	46,661
18 Health	98,173	98,173
19 Local Government	77,282	77,282
20 Households	1,504,461	1,502,805
Other Final Payments	1,307,288	1,307,288
Imports	2,918,820	2,918,820
Total	9,884,525	9,882,066

1. Adjusted output is net of agriculture production and mining sectors.

Response Economic Impact

The response economic impact includes the employment response, income response, population response, housing response, agriculture water use response, commercial water use response, and residential water use response to the total economic impact.

Estimation of the response economic impact is done through the following process. The total economic impact by economic sector is the input data. In turn, using the input-output model component, the total economic impact by economic sector is multiplied by the output response coefficients by economic sector to become the response economic impact. Output response coefficients are given for employment, income, population, housing, agriculture water use, commercial water use, and residential water use. Underlying details of the input-output model component and output response coefficients are given in Chapter 4.

Employment Response

Employment response by economic sector is provided in Table 8.1-7. Employment is measured as jobs.

Income Response

Income response by economic sector is provided in Table 8.1-8. Income is measured in dollars.

Population Response

Population response by economic sector is provided in Table 8.1-9. Population is measured as all persons.

Housing Response

Housing response by economic sector is provided in Table 8.1-10. Housing is measured as dwellings.

Agriculture Water Use Response

Agriculture water use response by economic sector is provided in Table 8.1-11. Agriculture water use is measured in acre-feet.

Commercial Water Use Response

Commercial water use response by economic sector is provided in Table 8.1-12. Commercial water use is measured in acre-feet and in gallons.

Residential Water Use Response

Residential water use response by economic sector is provided in Table 8.1-13. Residential water use is measured in acre-feet and in gallons.

Table 8.1-7. Employment Response by Economic Sector.

Economic Sector	Employment *jobs*
1 Livestock Production	0
2 Dairy Production	0
3 Alfalfa Hay Production	0
4 Other Hay Production	0
5 Barley Production	0
6 Agricultural Services	0
7 Gold Mining	0
8 Other Mining	0
9 Construction	1
10 Manufacturing	1
11 Transportation and Communications	1
12 Utilities	1
13 Trade	30
14 Eating, Drinking, and Lodging	33
15 Finance, Insurance, and Real Estate	3
16 Services	8
17 Hotels, Gaming, and Recreation	1
18 Health	3
19 Local Government	1
20 Households	0
Total	83

Table 8.1-8. Income Response by Economic Sector.

Economic Sector	Income $
1 Livestock Production	0
2 Dairy Production	0
3 Alfalfa Hay Production	0
4 Other Hay Production	0
5 Barley Production	0
6 Agricultural Services	633
7 Gold Mining	0
8 Other Mining	0
9 Construction	18,403
10 Manufacturing	25,658
11 Transportation and Communications	34,105
12 Utilities	19,812
13 Trade	570,492
14 Eating, Drinking, and Lodging	592,885
15 Finance, Insurance, and Real Estate	39,346
16 Services	116,271
17 Hotels, Gaming, and Recreation	15,062
18 Health	41,460
19 Local Government	28,678
20 Households	0
Total	1,502,805

Table 8.1-9. Population Response by Economic Sector.

Economic Sector	Population *all persons*
1 Livestock Production	0
2 Dairy Production	0
3 Alfalfa Hay Production	0
4 Other Hay Production	0
5 Barley Production	0
6 Agricultural Services	0
7 Gold Mining	0
8 Other Mining	0
9 Construction	1
10 Manufacturing	1
11 Transportation and Communications	2
12 Utilities	2
13 Trade	48
14 Eating, Drinking, and Lodging	60
15 Finance, Insurance, and Real Estate	5
16 Services	14
17 Hotels, Gaming, and Recreation	1
18 Health	5
19 Local Government	2
20 Households	0
Total	141

Table 8.1-10. Housing Response by Economic Sector.

Economic Sector	Housing *dwellings*
1 Livestock Production	0
2 Dairy Production	0
3 Alfalfa Hay Production	0
4 Other Hay Production	0
5 Barley Production	0
6 Agricultural Services	0
7 Gold Mining	0
8 Other Mining	0
9 Construction	0
10 Manufacturing	1
11 Transportation and Communications	1
12 Utilities	1
13 Trade	19
14 Eating, Drinking, and Lodging	24
15 Finance, Insurance, and Real Estate	2
16 Services	5
17 Hotels, Gaming, and Recreation	1
18 Health	2
19 Local Government	1
20 Households	0
Total	56

Table 8.1-11. Agriculture Water Use Response by Economic Sector.

Economic Sector	Agriculture Water Use *acre-feet*
1 Livestock Production	0
2 Dairy Production	0
3 Alfalfa Hay Production	0
4 Other Hay Production	0
5 Barley Production	0
6 Agricultural Services	0
7 Gold Mining	0
8 Other Mining	0
9 Construction	0
10 Manufacturing	0
11 Transportation and Communications	0
12 Utilities	0
13 Trade	0
14 Eating, Drinking, and Lodging	0
15 Finance, Insurance, and Real Estate	0
16 Services	0
17 Hotels, Gaming, and Recreation	0
18 Health	0
19 Local Government	0
20 Households	0
Total	0

Table 8.1-12. Commercial Water Use Response by Economic Sector.

Economic Sector	Commercial Water Use *acre-feet*	Commercial Water Use *gallons*
1 Livestock Production	0	0
2 Dairy Production	0	0
3 Alfalfa Hay Production	0	0
4 Other Hay Production	0	0
5 Barley Production	0	0
6 Agricultural Services	0	597
7 Gold Mining	0	0
8 Other Mining	0	0
9 Construction	0	3,451
10 Manufacturing	0	10,510
11 Transportation and Communications	0	10,475
12 Utilities	0	73,685
13 Trade	1	356,700
14 Eating, Drinking, and Lodging	4	1,175,906
15 Finance, Insurance, and Real Estate	0	22,834
16 Services	0	155,328
17 Hotels, Gaming, and Recreation	0	51,227
18 Health	0	78,985
19 Local Government	0	10,833
20 Households	0	0
Total	6	1,950,531

Table 8.1-13. Residential Water Use Response by Economic Sector.

Economic Sector	Residential /1 Water Use *acre-feet*	Residential /1 Water Use *gallons*
1 Livestock Production	0	0
2 Dairy Production	0	0
3 Alfalfa Hay Production	0	0
4 Other Hay Production	0	0
5 Barley Production	0	0
6 Agricultural Services	0	4,845
7 Gold Mining	0	0
8 Other Mining	0	0
9 Construction	0	73,740
10 Manufacturing	0	101,904
11 Transportation and Communications	0	123,089
12 Utilities	0	120,173
13 Trade	11	3,669,959
14 Eating, Drinking, and Lodging	14	4,552,507
15 Finance, Insurance, and Real Estate	1	408,338
16 Services	3	1,055,622
17 Hotels, Gaming, and Recreation	0	107,290
18 Health	1	359,600
19 Local Government	1	175,482
20 Households	0	0
Total	33	10,752,548

1. Residential water use is non-metered residential water use.

Summary

A summary is provided in Table 8.1-14. This summary includes average end of the month reservoir storage for the reservoirs, camping and day use visitors for the reservoirs, direct economic impact, total economic impact, employment response, income response, population response, housing response, agriculture water use response, commercial water use response, residential water use response, and a recreation expenditure multiplier.

Table 8.1-14. Summary.

Donner Lake Average End of the Month Reservoir Storage	6,743	*acre-feet*
Prosser Reservoir Average End of the Month Reservoir Storage	15,655	*acre-feet*
Stampede Reservoir Average End of the Month Reservoir Storage	146,104	*acre-feet*
Boca Reservoir Average End of the Month Reservoir Storage	28,171	*acre-feet*
Donner Lake Camping and Day Use Visitors	333,345	*visitors*
Prosser Reservoir Camping and Day Use Visitors	52,200	*visitors*
Stampede Reservoir Camping and Day Use Visitors	284,515	*visitors*
Boca Reservoir Camping and Day Use Visitors	148,754	*visitors*
Direct Economic Impact	6,972,260	*$s of expenditure*
Total Economic Impact	9,882,066	*$s of output*
Employment Response	83	*jobs*
Income Response	1,502,805	*$s of income*
Population Response	141	*all persons*
Housing Response	56	*dwellings*
Agriculture Water Use Response	0	*acre-feet*
Commercial Water Use Response	6	*acre-feet*
Residential Water Use Response /1	33	*acre-feet*
Recreation Expenditure Multiplier /2	1.41734047	

1. Residential water use is non-metered residential water use.
2. Recreation expenditure multiplier is a ratio multiplier. The recreation expenditure multiplier is the total economic impact to direct economic impact. Multiplier interpretation: a $1 expenditure creates an additional $.42 in economic activity.

References

Barton, A. P., and V. Bohm. *Handbook of Mathematical Economics.* Volume II. North Holland Publishing. Amsterdam, Netherlands. 1982.

Church, D.C. *Livestock Feeds and Feeding.* Third Edition. Prentice Hall. Englewood Cliffs, New Jersey. 1991.

Counties of Plumas and Sierra. *Annual Crop and Livestock Report* Plumas-Sierra Counties Department of Agriculture. Quincy, California. 1990.

County of Nevada. *Annual Crop and Livestock Report* Nevada County Department of Agriculture. Grass Valley, California. 1992.

Deaton, A., and J. Muelbauer. *Economics and Consumer Behavior.* Cambridge: Cambridge University Press. Cambridge, England. 1980.

Donner Lake Home Owners Association. *Donner Lake Recreation Use.* Donner Lake Home Owners Association. Truckee, California. 1993.

Executive Office of the President. *Standard Industrial Classification Manual 1987.* Office of Management and Budget. National Technical Information Service. Springfield, Virginia. 1987.

Fletcher, Robert R., and George W. Borden. *Economic Impact: New Reno Casino.* Department of Agricultural Economics. University of Wyoming. Laramie, Wyoming. 1994.

Hicks, John R. *Value and Capital.* Clarendon Press. Oxford, England. 1946.

Miller, Ronald E., and Peter D. Blair. *Input-Output Analysis Foundations and Extensions* Prentice Hall. Englewood Cliffs, New Jersey. 1985.

Narayanan, Rangesan, Thomas R. Harris, and Thomas R. MacDiarmid. *Economic Cost of Leasing Agricultural Water During Drought: An Application to Sierra Valley and the Truckee Meadows.* Department of Agricultural Economics. University of Nevada, Reno. Reno, Nevada. 1989.

One Hundred First Congress of the United States of America. *Public Law 101-618: Title I-Fallon Paiute Shoshone Tribal Settlement Act and Title II-The Truckee-Carson-Pyramid Lake Water Rights Settlement Act.* Washington D.C. 1990.

Otto, Daniel M., and Thomas G. Johnson. *Microcomputer-Based Input-Output Modeling: Applications to Economic Development.* Westview Press. Boulder, Colorado. 1993.

Samuelson, Paul A. *Foundations of Economic Analysis.* Harvard University Press. Cambridge, Massachusetts. 1947.

Silberberg, Eugene. *The Structure of Economics: A Mathematical Analysis.* McGraw-Hill. New York City, New York. 1978.

Stanley R. Hoffman Associates. *Town of Truckee General Plan: Economic and Demographic Analysis.* Planning and Development Services. Hayward, California. 1994.

State of California. *Donner Memorial State Park Visitation.* Department of Parks and Recreation. Sierra District Donner Memorial State Park. Truckee, California. 1993.

State of California. *Measuring Economic Impacts: The Application of Input-Output Analysis to California Water Resources Problems.* Bulletin 210. Department of Water Resources. Sacramento, California. 1980.

State of California. *Truckee River Atlas.* Department of Water Resources. Sacamento, California. 1991.

State of Nevada. *Input-Output (I-O) Economic Impact Models.* Department of Conservation and Natural Resources. Division of Water Planning. Carson City, Nevada. 1994.

State of Nevada. *Net Proceeds of Mines.* Department of Taxation. Division of Assessment Standards. Carson City, Nevada. 1988.

State of Nevada. *Nevada Water Facts.* Department of Conservation and Natural Resources. Division of Water Resources. Carson City, Nevada. 1992.

State of Nevada. *Water for Nevada: Input-Output Economic Models.* Department of Conservation and Natural Resource. Division of Water Resources. Carson City, Nevada. 1974.

State of Nevada. *Water Words Dictionary.* Department of Conservation and Natural Resources. Division of Water Planning. Carson City, Nevada. 1993.

Tahoe Donner Association. *Demographic Survey Results.* Tahoe Donner Association. Truckee, California. 1994.

Tahoe Donner Association. *Donner Lake Recreation Use.* Tahoe Donner Association. Truckee, California. 1993.

Theil, Henri. *Theory and Measurement of Consumer Demand.* Volume I. North Holland Publishing. Amsterdam, Netherlands. 1975.

Truckee Donner Recreation and Park District. *Donner Lake Recreation Use.* Truckee Donner Recreation and Park District. Truckee, California. 1993.

U.S. Department of Agriculture. *1990 IMPLAN Database Documentation.* Forest Service. Minnesota IMPLAN Group. Department Agricultural and Applied Economics. University of Minnesota. St. Paul, Minnesota. 1993.

U.S. Department of Agriculture. *Boca Reservoir Campground Visitation.* Forest Service. Truckee, California. 1993.

U.S. Department of Agriculture. *IMPLAN (IMpact analysis for PLANning).* Forest Service. Minnesota IMPLAN Group. Department Agricultural and Applied Economics. University of Minnesota. St. Paul, Minnesota. 1993.

U.S. Department of Agriculture. *IMPLAN Companion Guide.* Forest Service. Minnesota IMPLAN Group. Department Agricultural and Applied Economics. University of Minnesota. St. Paul, Minnesota. 1993.

U.S. Department of Agriculture. *Lake Tahoe and Vicinity, National Forest Campgrounds.* Forest Service. California Land Management. Truckee, California. 1993.

U.S. Department of Agriculture. *Nevada Agricultural Statistics 1992-93.* National Agricultural Statistics Service. Reno, Nevada. 1993.

U.S. Department of Agriculture. *Nevada Agricultural Statistics for 1988-89.* National Agricultural Statistics Service. Reno, Nevada. 1989.

U.S. Department of Agriculture. *Prosser Reservoir Campground Visitation.* Forest Service. Truckee, California. 1993.

U.S. Department of Agriculture. *Regional Development and Plan Evaluation: The Use of Input-Output Analysis.* Agriculture Handbook No. 530. Economics, Statistics, and Cooperatives Service. Washington D.C. 1978.

U.S. Department of Agriculture. *Stampede Reservoir Campground Visitation.* Forest Service. Truckee, California. 1993.

U.S. Department of Commerce. *1987 Personal Income, Industry Earnings, and Industry Employment for Nevada Counties.* Bureau of Economic Analysis. Regional Economic Information System. Washington D.C. 1992.

U.S. Department of Commerce. *1990 Census of Housing, General Housing Characteristics.* Bureau of the Census. Washington, D.C. 1990.

U.S. Department of Commerce. *1990 Census of Housing, Detailed Housing Characteristics, Nevada.* Bureau of the Census. Washington D.C. 1990.

U.S. Department of Commerce. *1990 Census of Population, General Population Characteristics, Nevada.* Bureau of the Census. Washington D.C. 1990.

U.S. Department of Commerce. *1990 Census of Population, Social and Economic Characteristics, Nevada.* Bureau of the Census. Washington D.C. 1990.

U.S. Department of Commerce. *1990 Census of Population and Housing Summary, Population and Housing Characteristics, Nevada.* Bureau of the Census. Washington D.C. 1990.

U.S. Department of Commerce. *1990 Census of Population. and Housing Summary, Social, Economic, and Housing Characteristics, Nevada.* Bureau of the Census. Washington D.C. 1990.

U.S. Department of Commerce. *Census of Construction Industries for 1987, Mountain States.* Bureau of the Census. Washington, D.C. 1990.

U.S. Department of Commerce. *Census of Governments, Government Finances.* Bureau of the Census. Washington, D.C. 1990.

U.S. Department of Commerce. *Census of Manufacturers 1987, Nevada.* Bureau of the Census. Washington, D.C. 1990.

U.S. Department of Commerce. *Census of Retail Trade for 1987, Nevada.* Bureau of the Census. Washington, D.C. 1989.

U.S. Department of Commerce. *Census of Service Industries for 1987, Nevada.* Bureau of the Census. Washington, D.C. 1989.

U.S. Department of Commerce. *Census of Wholesale Trade for 1987, Nevada.* Bureau of the Census. Washington, D.C. 1989.

U.S. Department of the Interior. *Boca Reservoir End of Month Storage.* Bureau of Reclamation. Carson City, Nevada. 1993.

U.S. Department of the Interior. *Donner Lake End of Month Storage.* Bureau of Reclamation. Carson City, Nevada. 1993.

U.S. Department of the Interior. *Draft Environmental Impact Statement for the Newlands Project Proposed Operating Criteria and Procedures.* Bureau of Reclamation. URS Corporation. Sacramento, California. 1986.

U.S. Department of the Interior. *Prosser Reservoir End of Month Storage.* Bureau of Reclamation. Carson City, Nevada. 1993.

U.S. Department of the Interior. *Stampede Reservoir End of Month Storage.* Bureau of Reclamation. Carson City, Nevada. 1993.

U.S. Department of the Interior. *Unofficial Draft: Truckee River Operating Agreement.* Bureau of Reclamation. Carson City, Nevada. 1993.

U.S. Department of the Interior. *Donner Lake Operation.* Bureau of Reclamation. Carson City, Nevada. 1995.

U.S. Department of the Interior. *Estimated Use of Water in the United States in 1990.* U.S. Geological Circular 1081. U.S. Government Printing Office. Washington D.C. 1993.

Varian, Hal R. *Microeconomic Analysis.* W. W. Norton. New York City, New York. 1978.

Westpac Utilities. *Commercial Water Use.* Westpac Utilities. Reno, Nevada. 1993.

Westpac Utilities. *Residential Water Use.* Westpac Utilities. Reno, Nevada. 1993.