

**AN INPUT-OUTPUT ANALYSIS
OF SPORTSMAN EXPENDITURES IN COLORADO**

By

John R. McKean

January 1981

COLORADO WATER RESOURCES



RESEARCH INSTITUTE

**Colorado State University
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By

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Fort Collins, Colorado

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8. Source: Estimated from data collected for the Colorado Hunting and Fishing Expenditures Report and stored on computer tape at Colorado State University.

CHAPTER I
INTRODUCTION

Purpose of the Study

The purpose of this study is to provide estimates of the direct and indirect impacts on the Colorado economy from sportsman exports. Non-resident sportsmen attracted by the bountiful fish or game found in certain regions of Colorado make expenditures in Colorado. Spending in Colorado by non-residential sportsmen is an export for those industries from which sportsmen obtain goods or services. Sport-related industries, in turn, require inputs from supplying industries within Colorado, and the suppliers also expand their purchases in Colorado, and so on. These secondary economic effects constitute the indirect impacts on the Colorado economy due to sportsman exports. Spending in 14 purchase categories by a sample of non-resident hunters and fishermen will be distributed among state planning regions (for each respondent) according to the percentage of trips made to each area. In this manner, export sales from Colorado to non-resident sportsmen in the sample will be calculated for hunters and fishermen attracted to each of the 13 state planning regions. Total sportsman exports attributed to each planning region will be estimated by expanding the sample spending estimates to the non-resident sportsman population.

Colorado business activity multipliers which show the direct plus indirect effects of an added dollar of sportsmen exports on total business activity in Colorado will be estimated for each of the state planning regions. Business multipliers for each industry will be taken from the Colorado State Input-Output

Model. Relevant industry multipliers will be aggregated to reflect the distribution of sportsman spending among industries in each planning region. Total sportsman-induced business activity in Colorado attributed to a given region will depend upon the particular distribution of purchases among industries unique to that region and also, of course, on the magnitude of the non-resident sportsman expenditures.

In addition to the sportsman business activity multipliers, weighted average employment multipliers for sportsman exports will also be estimated for each planning region. The sportsman employment multipliers will show the direct plus indirect impact on Colorado employment per added dollar of sportsman exports from Colorado. Business and employment multipliers will also be shown per added worker hired by industries directly serving sportsmen. This information becomes useful in making projections for the economy when industry employment plans are made known rather than total sales estimates.

The Analytical Method

An input-output model is used to estimate the direct plus indirect impacts on the Colorado economy of sportsman exports. The input-output methodology is simply to divide the industries of the Colorado economy into two groups: (1) Businesses which service and supply inputs mainly to other businesses within the State, and (2) Business firms which sell mainly to customers outside the State. The latter group of firms are often termed "basic" industries. "Basic" industries, along with the government, form the

demands which determine the business activity of the local suppliers of raw materials, labor, and processed goods. The local economy is said to be "driven" by the growth of basic industry, government, and the other "final demands." Thus, in order to project local business activity, it is important to determine the key economic sectors. These driving sectors will be the businesses which sell some of their output outside the region but purchase a significant share of their inputs inside the region.

In order to determine the nature of each industry in the State to see whether the industry is one of the driving sectors and to find the magnitudes involved, a transactions table is constructed. This transactions table is a system of double entry bookkeeping such that sales and purchases by each industry to and from each other industry (as well as labor, government, and exports)¹ are accounted for and measured. The 28 processing sectors for which transactions have been disaggregated are shown by the headings in Table II-1 in the following chapter.

Two features of the input-output technique make it particularly desirable for the analysis of growth and development of an economy. First, the technique provides information on sales and related variables (such as employment and income) on an industry-by-industry basis. This information is much more useful and accurate than more generally aggregated data. Second, the projections of future business activity in the region are consistent. That is, the projected value of production by each sector is the minimum required to meet the needs of other industries in the region and projected

¹Exports are sales to customers outside of Colorado excluding sales to governments.

exports. Inputs and outputs must be in accounting balance at all times. This simultaneous balancing of production to requirements among industries in the region provides much more realistic projections than isolated forecasts for individual industries.

The input-output technique provides two forecasting tools: (1) multipliers and (2) projections. A multiplier indicates how much business activity in dollars of transactions is generated within the Colorado economy for each dollar of sales by a given industry to final demand. Final demand is defined as sales to government, and exports to customers outside of the State. A multiplier will be larger for an industry which purchases a large part of its inputs from within the local economy. This is because the money which it earns from its sales will be spent again in the region. The important "basic" or driving industries will usually be characterized by large multipliers.

Several types of multipliers may be calculated. The business multiplier just discussed shows the total business spending within the State per dollar of additional sales to final demand by a given industry. An employment multiplier shows the total added employment in Colorado per dollar of additional sales to final demand by a given industry. The multipliers derived for Colorado all include direct, indirect, and induced effects. This means that if a "basic" industry expands its sales to, say, exports by \$1,000, it may spend \$600 directly on locally produced goods. The producers of these local goods are then indirectly required to purchase some local goods and services themselves in order to meet this additional demand, and so on. The induced impact refers to the assumption that labor hired directly will respnd a fixed proportion of its added income, stimulating further expansion of the regional economy. Thus, both local producers and local labor are assumed to

respond locally part of their increased incomes which resulted from the increased exports by the "basic" industry. The total effect is reflected in the multiplier.

The second forecasting tool provided by the input-output technique for the Colorado economy is the projection of future business activity by sector. In addition to the projection of dollar sales for each sector, variables which may be assumed to rise proportionately with production may also be estimated. Thus labor employment as well as dollar sales may be projected.

Projections of contributions to future economic activity are derived from the input-output model by focusing on the "basic" or driving industries. Examination of the size of the multipliers and the size and expected growth of the "basic" industries will reveal the key elements in future Colorado economic growth.

Sportsman Exports From Colorado

Sportsman exports from Colorado in 1973 induced by hunting and fishing activity are calculated for each planning region from data which were a result of a study by Ross, Blood, and Nobe entitled, Colorado Hunting and Fishing Expenditures: 1973. This study uses information directly from the computer tapes from the above study. Information not previously published is extracted for use in this report.

Data on Colorado sportsmen expenditures during 1973 were collected by the Department of Economics at Colorado State University under contract with the Colorado Division of Wildlife. The 1973 data provide the most recent comprehensive estimates of Colorado sportsmen expenditures. A similar survey was made in 1968.

The study of sportsmen expenditures, initiated in 1966, was part of a cooperative research agreement between the Department of Economics at Colorado State University and the Colorado Division of Wildlife. The purpose of this cooperative program was to provide data and research findings needed by wildlife managers in meeting current and emerging objectives.

More than 4,100 resident and nonresident Colorado sportsmen responded to the 1973 survey, thus providing the data on which the report was based.

The completion of the survey required the assistance of numerous students who participated in coding over 4,100 questionnaires and keypunching over 60,000 data processing cards. Mr. Alan Johnson was responsible for computer programming and processing the data through the University computer.

Dr. R. A. Wykstra, originally co-project leader for the study was granted leave from the University in 1974 following completion of the mail survey. Therefore, Dr. D. M. Blood, Professor of Economics, assumed primary responsibility for completing the project.

Outline of the Report

The nature of the Colorado Input-Output Model, which is the source of the underlying multiplier estimates, is described in Chapter II. Chapter III is devoted to a discussion of the business activity and employment multiplier concepts. Those familiar with the input-output technique may wish to skip directly to the following chapter. Chapter IV contains a description of the sportsman expenditure survey which provides a means to calculate the weighted average business and employment multipliers associated with the unique export purchase patterns for each of the 13 planning regions in Colorado. These various multiplier estimates are presented in Chapter V.

The chapter concludes with a comparison of 1968 and 1973 export purchases by sportsmen and the trend in license sales. Multipliers based upon employment in primary sportsman serving industries are also included.

CHAPTER II
THE COLORADO INTERINDUSTRY MODEL

Sectoring the State Economy

The input-output model requires the separation of the economy into various economic divisions or "sectors." Total output, by input-output accounting procedures, is the combined value of all sales that take place during a year. Total output must be divided up into sectors in order to study the structural interdependence that prevails. Input-output models structure economic activity into two major components, suppliers or sellers and purchasers or users. Each of these is further subdivided in accordance with the following scheme. Suppliers include: (1) intermediate or processing suppliers who are producers who must purchase inputs to be processed into outputs which they sell to final users or as inputs to other processors, and (2) primary suppliers whose output is not directly dependent on purchased inputs. Purchasers include: (1) intermediate or processing purchasers who buy the outputs of suppliers for use as inputs for further processing, and (2) final purchasers who buy the outputs of suppliers in their final form and for final use. The level of demand by final purchasers and its composition are determined exogenously outside of the input-output system. Production to meet the exogenously determined final demand generates intermediate purchases of inputs. Primary suppliers and final purchasers may or may not be one and the same. However, the activities of primary suppliers and final purchasers are treated in the I-O model as if they were completely independent of each other. This is apparent from the differing sector structuring of the

primary suppliers and the final purchasers. The two major divisions of the suppliers are then the intermediate suppliers which we will label as the processing sector and the primary suppliers which we will designate as the final payments sector. (The suppliers are conventionally shown along the left side of an input-output table.) The two major divisions of the purchasers are the intermediate purchasers which we will label as the processing sector, and the final purchasers which we will designate as final demand. (The purchasers are conventionally shown along the top of an I-0 table.) It is within this general framework that a further sector disaggregation must be accomplished.

A disaggregation within the broad categories delineated above would ideally consist of industries or producer groups which provide a homogeneous good or service. In practice, sector disaggregation is a compromise predicated by the availability of data, funding limitations, and the purposes for which the model was designed. Because the Colorado Input-Output Model was designed with the primary objective of water resource analysis, the sector disaggregation is not optimal for the study of the recreation industry.

The sectors of the study were defined to follow the Standard Industrial Classifications of 1972. Aggregation across SIC numbers was made in order to provide that all sectors are of sufficient size to have a significant impact on the Colorado economy. In some cases data could not be further disaggregated because of disclosure rules. Table II-1 presents the sectors identified in the study and provides a short sector description. Table II-2 shows the related 1972 SIC numbers contained within each sector. It should be noted that some SIC industry divisions do not exist in Colorado or are too small to appear in the Census of Manufacturers. Hence, only the

TABLE II-1: SHORT SECTOR DESCRIPTION

Sector Number	Short Sector Description
Processing Sectors	
1	Natural Gas Distribution
2	Livestock and Livestock Products
3	Irrigated Crops and Pasture
4	Dryland Crops and Pasture
5	Meat, Dairy, Grain and Other Food and Kindred Products
6	Metal Mining
7	Petroleum Production and Natural Gas Processing
8	Industrial Minerals Production, Cement and Concrete
9	Bituminous Coal Mining
10	Services to All Extractive Industries
11	Petroleum and Gas Pipelines
12	Petroleum Refining
13	Metal Smelting and Processing
14	Electric Power Generation and Transmission
15	Fabricated Metal, Metal Fixtures, Machinery, Transportation Equipment, Industrial and Household Wiring and Lighting
16	Electronic Components, Computers, Scientific and Medical Testing and Measuring Devices, Photographic and Optical Goods
17	Transportation, Communication, and Public Utilities (Except Pipeline Transportation)

TABLE II-1: SHORT SECTOR DESCRIPTION (Continued)

Sector Number	Short Sector Description
Processing Sectors	
18	Textiles, Leather, and Apparel
19	Paper and Allied Products
20	Printing and Publishing
21	Chemicals, Explosives, and Rubber Products
22	Lumber and Wood Products, Wood Furniture, and Fixtures
23	All Other Manufacturing, Tobacco, Jewelry, Glass Products, Sporting Goods, Pencils, Etc.
24	Wholesale and Retail Trade
25	Services, Hotels, and Lodging Places, Personal and Business Services, Automotive Repair, Miscellaneous Repair, Motion Pictures, Amusement and Recreation, Health, Legal and Social Services, Membership Organizations
26	Primary and Secondary Level Education
27	University Level Education
28	The Final Individual Consumer
Final Demand Sectors	
29	Local, State, and National Government Purchases
30	Exports from Colorado
31	Other Final Demand
Final Payments Sectors	
29	Local, State, and National Government Receipts
30	Other Final Payments
31	Construction
32	Imports to Colorado

TABLE II-2: SECTOR IDENTIFICATION BY STANDARD INDUSTRIAL CLASSIFICATION

Sector Numbers	Sector Name	1972 SIC Codes
Processing Sectors		
1	Natural Gas Distribution	4924, 4931 (part)
2	Livestock and Livestock Products	02
3	Irrigated Agriculture	01
4	Dryland Agriculture	01
5	Food and Kindred Products	20
6	Metal Mining	1011, 1021, 1031, 1041, 1044, 1061, 1094, 1099
7	Petroleum Production	1311, 1321
8	Industrial Minerals Production	14 (except 148), 324, 325, 327
9	Coal Mining	1211
10	Mining Services	1081, 1213, 1381, 1382, 1389, 1481
11	Pipeline Transportation	4612, 4613, 4922, 4923
12	Petroleum Refining	2911, 295, 299
13	Primary Metal	33
14	Electric Power Generation	4911, 4931 (part)
15	Fabricated Metal, Machinery, and Electrical	2514, 2515, 2522, 2542, 2591, 2599, 34 (except 3482 and 3483), 35 (except 3573 and 3574), 362, 363, 364, 3691, 3692, 3694, 3699, 37
16	Electronic and Scientific Products	3573, 3574, 361, 365, 366, 367, 3693, 38
17	Transportation, Communication, and Utilities	40, 41, 42, 45, 47, 48 49 (except 4922, 4923, 4924, and parts of 491 and 4931)

TABLE II-2: SECTOR IDENTIFICATION BY STANDARD INDUSTRIAL CLASSIFICATION (Cont.)

Sector Numbers	Sector Name	1972 SIC Codes
Processing Sectors		
18	Textiles, Leather, Apparel	22,23, 31
19	Paper and Allied Products	26
20	Printing and Publishing	27
21	Chemicals, Explosives, and Rubber Products	28, 30, 3482, 3483
22	Lumber and Wood Products	24, 2511, 2513, 2519, 2521, 2531, 2541
23	All Other Manufacturing	21, 323, 326, 328, 329, 39
24	Trade	50-59
25	Services	70, 72, 73, 75, 76, 78-81, 84, 86, 89
26	Other Education	821
27	University Education	822
28	Households	-
Final Demand Sectors		
29	Government	91-94
30	Exports	-
31	Other Final Demand	-
Final Payments Sectors		
29	Government	-
30	Other Final Payment	-
31	Construction	15, 16, 17
32	Imports	-

relevant SIC industries are shown in Table II-2. Because of incomplete primary and secondary data for certain sectors and because not all economic activity is allocated to SIC classification by the Census, it was necessary and appropriate to include a miscellaneous sector in both the final demand and the final payments portions of the model. Table II-3 shows the relative size of each of the sectors.

Sector Definitions

NATURAL GAS DISTRIBUTION

Establishments engaged in the distribution of natural gas for sale.

THE AGRICULTURAL SECTORS

The agricultural sector is divided into three components: livestock and livestock products, irrigated agriculture, and dryland agriculture.

THE LIVESTOCK AND LIVESTOCK PRODUCTS SECTOR

This sector consists of all beef cattle and calves, dairy cattle and calves, hogs, sheep, goats, horses, poultry, and all nonprocessed products of livestock.

THE IRRIGATED AGRICULTURAL SECTOR

This sector consists of a number of agricultural crops produced in the state. In 1973, alfalfa, corn, sugar beets, potatoes, vegetables, dry beans, barley, sorghum, fruit, and winter wheat constituted the primary irrigated crops.

THE DRYLAND AGRICULTURAL SECTOR

Dryland agriculture is also of major importance in Colorado. In total, dryland agriculture accounts for about 30 percent of the value of production from crop lands in Colorado in 1970. Winter wheat, wild hay, barley, sorghum, dry beans, millet, oats, and rye were the major dryland crops in 1970.

TABLE II-3: RELATIVE SIZE OF SECTORS IN 1970

Sector Numbers	Sector Name	Gross Output \$ X 1000
1	Natural Gas Distribution	89,623
2	Livestock and Livestock Products	951,256
3	Irrigated Agriculture	320,982
4	Dryland Agriculture	135,271
5	Food and Kindred Products	1,787,260
6	Metal Mining	222,015
7	Petroleum Production	128,925
8	Industrial Minerals Production	195,068
9	Coal Mining	42,308
10	Mining Services	59,412
11	Pipeline Transportation	267,650
12	Petroleum Refining	89,900
13	Primary Metal	239,580
14	Electric Power Generation	112,802
15	Fabricated Metal, Machinery, and Electrical	1,062,756
16	Electronic and Scientific Products	528,697
17	Transportation, Communication, and Utilities	1,081,292
18	Textiles, Leather, and Apparel	108,940
19	Paper and Allied Products	53,240
20	Printing and Publishing	208,600
21	Chemicals, Explosives, and Rubber Products	327,360

TABLE II-3: RELATIVE SIZE OF SECTORS IN 1970
(Cont.)

Sector Numbers	Sector Name	Gross Output \$ X 1000
22	Lumber and Wood Products	117,700
23	All Other Manufacturing	94,615
24	Trade	5,807,247
25	Services	1,975,044
26	Other Education	480,580
27	University Education	317,198
28	Households	8,084,834
29	Government (receipts)	4,527,410
30	Other Final Payments	3,228,268
31	Construction	2,037,522
32	Imports	<u>3,745,223</u>
	TOTAL GROSS OUTPUT	<u><u>38,428,578</u></u>

Source: See Item 1 on the list of references.

THE FOOD AND KINDRED PRODUCTS SECTOR

The food processing sector is one of the largest in Colorado due, in the main, to the well-developed livestock and agricultural crops sectors. The food and kindred products sector includes meat packing plants, prepared meat products, processing of dairy products, prepared animal feed, cereal preparations, fruit and vegetable processing, bakery products, sugar, and beverages.

METAL MINING

Exploration, development, and production from metal mines. Iron, copper, lead and zinc, gold, silver ferroalloy ores, and uranium-radium-vanadium ores are included in this sector.

PETROLEUM PRODUCTION

Exploration, operation, and maintenance of crude oil and gas producing wells and natural gas liquids production are included in this sector.

INDUSTRIAL MINERALS PRODUCTION

Dimension stone, crushed and broken stone, including riprap, sand and gravel, clay, ceramic and refractory minerals, chemical and fertilizer mining, and other miscellaneous nonmetallic minerals except fuels are included in this sector. Also included is the processing of hydraulic cement, structural clay products, concrete, gypsum, and plaster products.

COAL MINING

The coal mining sector includes mining, cleaning, crushing, screening, and sizing of bituminous coal.

MINING SERVICES

Metal mining services, bituminous coal mining services, drilling for oil and gas, oil and gas field exploration services, other oil and gas field services, nonmetallic minerals (except fuels) services are included in this sector.

PIPELINE TRANSPORTATION

Crude and refined petroleum pipelines and the transmission and storage of natural gas are included in this sector. The distribution of natural gas to a few large users is also carried out by the pipeline sector.

PETROLEUM REFINING

This sector includes the production of gasoline, kerosene, distillate fuel oils, residual fuel oils, lubricants, and other products from crude petroleum.

PRIMARY METAL

This sector includes the manufacture of pig iron, silvery pig iron and ferroalloys from iron ore and iron and steel scrap, converting pig iron, scrap iron, and scrap steel into steel, and hot rolling iron and steel into basic shapes.

ELECTRIC POWER GENERATION

The generation and transmission of electric energy.

FABRICATED METAL, MACHINERY, AND ELECTRICAL

This sector includes office and household metal furnishings, fabricated metal products except ammunition, electrical and nonelectrical machines except electronic calculators and accounting machines, lighting and wiring, batteries, other miscellaneous electrical machinery, and transportation equipment.

ELECTRONIC AND SCIENTIFIC PRODUCTS

Electronic calculating and computing equipment; transformers, switches, electric motors, controls, etc.; radio, television, communications electronics and electronic components; x-ray and electromedical apparatus; measuring, analyzing, and controlling instruments; photographic, medical, and optical goods; watches and clocks are included in this sector.

TRANSPORTATION, COMMUNICATION, AND PUBLIC UTILITIES

This sector includes railroad transportation, local and suburban transit and interurban highway passenger transportation, motor freight and warehousing, air transportation, transportation services, communication services, electric energy distribution, sanitary services, and water supply systems except irrigation.

TEXTILES, LEATHER, AND APPAREL

This sector includes the preparation of fiber and the manufacturing of yarn, thread, braids, twine, and cordage; the manufacture of woven fabric, knit fabric, and carpets and rugs from yarn; dyeing and finishing fiber, yarn, fabric and knit apparel; coating, waterproofing or otherwise treating fabric; the manufacture of knit apparel and other finished articles from yarn; the manufacture of felt or lace goods, nonwoven fabrics and miscellaneous textiles; the production of clothing by cutting and sewing woven or knit textiles and related materials such as leather, rubberized fabric, plastics, and furs, tanning currying, and finishing hides and skins and the manufacture of finished leather and artificial leather products and similar products made of other materials.

PAPER AND ALLIED PRODUCTS

The manufacture of pulps from wood and other cellulose fibers, and from rags, the manufacture of paper and paperboard, paper bags, paper boxes and envelopes are included in this sector.

PRINTING AND PUBLISHING

Printing by one or more of the common processes and printing services such as bookbinding, typesetting, engraving, photoengraving and electrotyping, newspaper, book, and periodical publishing are included in this sector.

CHEMICALS, EXPLOSIVES, AND RUBBER PRODUCTS

This sector includes the production of basic chemicals and the manufacturing of products by predominantly chemical processes, the manufacture of natural and synthetic or reclaimed rubber, gutta percha, balata or gutta siak rubber products such as tires, rubber footwear, mechanical rubber goods, heels and soles, flooring and rubber sundries, molding of plastics and the manufacture of finished plastic products. Also included are ammunition for small and large arms, bombs, torpedoes, grenades, depth charges, chemical warfare projectiles and component parts.

LUMBER AND WOOD PRODUCTS

This sector includes logging camps cutting timber and pulpwood, sawmills, lath mills, shingle mills, cooperage stock mills, planing mills, plywood mills, and veneer mills, establishments engaged in producing lumber and wood basic materials, and the manufacture of finished articles made mainly of wood or wood substitutes including wood furniture and fixtures for home, office, and public buildings, wood partitions, shelving, lockers, and store fixtures.

ALL OTHER MANUFACTURING

This sector includes the manufacture of glass products made of purchased glass, pottery, and related products, cut stone and stone products, miscellaneous manufacturing such as jewelry, silverware and plated ware, musical instruments, toys, sporting and athletic goods, pens, pencils, office and artist materials, buttons, costume novelties, notions, brooms and brushes, caskets, and other miscellaneous goods.

TRADE

Wholesale trade includes establishments primarily engaged in selling merchandise to retailers, to industrial, commercial, institutional, farm,

or professional business users, to other wholesalers or acting as agents or brokers in buying merchandise for or selling merchandise to such persons or companies. Retail trade includes establishments engaged in selling merchandise for personal or household consumption, and rendering services incidental to the sale of goods. This sector contains establishments engaged in selling to the general public.

In input-output accounting it is often the practice to attribute to the trade sector only the value of sales that represents gross margin (sales less cost of goods sold). If the goods sold by the trade sector are treated as inputs, other processing sectors will show less sales to final demand. A large share of sales to final demand would be registered in the trade sector because a large part of the sales of many industries reach consumers, and many intermediate users as well, through wholesalers and retailers. We have not followed the practice of measuring trade in terms of gross margins here because of the desire to trace the flows more precisely and in order to show the trade sector linkages. However, in order to reduce the "blow-up" of the trade sector relative to other sectors we have adjusted the sales of trade to trade (sales of wholesale to retail and among wholesalers and retailers) to reflect the gross margin which is estimated to be 13 percent of sales volume.

SERVICES

This sector includes hotels, rooming houses, camps and other lodging places, personal services, business services, automotive repair services and garages, miscellaneous repair services, motion pictures, amusement and recreation services, health services, legal services, private art galleries, botanical and zoological gardens, business and professional membership organizations, private domestic services, and other miscellaneous services.

OTHER EDUCATION

Elementary and secondary schools, both public and private make up this sector.

UNIVERSITY EDUCATION

Junior colleges, technical institutes, colleges, universities and professional schools, both public and private make up this sector.

HOUSEHOLDS

Purchases from households include wages, interest payments, and salaries paid by a firm which accrue to the individual. Purchases by households in general are the revenues accruing to the firm which are not obtained through the sale of goods and services to governments, to foreign (out-of-state) markets, or to other intermediate users. Thus, the household is the final individual consumer.

GOVERNMENT

Local, state, and federal government including executive, legislative, justice, public order and safety, public finance, taxation, monetary regulators, and the administration of human resource programs make up this sector.

OTHER FINAL PAYMENTS

Finance, insurance and real estate, rent, interest and profit (except for agriculture which includes rent, interest, and profit in payments to households) plus unallocable payments. This sector includes banking, credit agencies other than banks, security and commodity brokers, dealers, exchanges, and services, insurance, insurance agents, brokers and services, real estate, combinations of real estate, insurance, loan and law offices, holding and other investment trusts. For the final payments

group rent, interest and profit accruing to business and individuals except agriculture is included in this sector.

CONSTRUCTION (Final payments sector)

This sector contains building construction, general contractors and operative builders, general contractors, special trade contractors, building, highway, bridge, tunnel, pipe and power line construction, interior and exterior building trades, well drilling, and all other construction.

IMPORTS (Final payments sector)

Purchases by Colorado firms or households from firms or households outside Colorado.

EXPORTS (Final demand sector)

Sales by Colorado firms or households to households or firms outside Colorado.

OTHER FINAL DEMAND

(As described in other final payments except that capital formation in Colorado is also included.) Unallocable sales, these numbers reflect residual discrepancies between input and output totals. These are sales or purchases which cannot be distributed among the sectors because of data imperfections or disclosure laws.

Data Sources

Two major types of information are required in order to construct an input-output model. The first is an estimate of sales and purchases among each and every economic sector in the model, and the second is estimates of total sales for each sector.

A selected sample of firms and/or agencies in each sector was interviewed either by mail or in person. The sample survey form is shown in the appendix.

Each firm in the sample was asked to report their transactions with the sector to which they belong and all other sectors with which they trade. This sample provides an estimate of the percentage distribution of sales among the sectors by each sector. Since purchases as well as sales are enumerated, a cross-check for accuracy is achieved. Once a percentage distribution of sales and/or purchases across sectors is established for each sector, the actual flows of payments for the state economy can be calculated if total sales by each sector are known. Total sales for each sector are estimated from secondary data sources appropriate for each sector. A list of these sources is shown in the appendix.

CHAPTER III

PROJECTION TECHNIQUES

Technical Description of An Input-Output Model

The input-output model consists of a double entry system of book-keeping which simultaneously records the distribution of sales and the distribution of purchases for each of a number of economic sectors in a given economy. Components of the model allow identification of key economic indicators such as payments to labor (household income), the total value of production for each economic sector, gross state income, and employment by sector. The model is useful as an aid to planning in that it allows the determination of multipliers which are indicative of the degree of economic interdependence among sectors of an economy and which facilitate projection of the impacts of certain exogenous changes in the economy. Such changes can be used to provide consistent forecasts of alternative futures. This section provides a technical statement of the operation of the analytical framework and incorporates hypothetical examples of each step in reaching the solution to the basic input-output problem. We begin with a discussion of the essential components of the system; the transactions table, the direct coefficients table, and the table of direct plus indirect coefficients. In addition we provide a descriptive discussion of the various multiplier effects and the use of the model as a forecasting tool.

The Basic Model

The essential data requirements for an input-output model are shown by the transactions table which describes the flow of commodities in dollar values,

from each of a number of producing sectors to all consuming sectors for intermediate and final consumption.^{1/} From this table are derived the two other essential components of the system; the direct coefficients table and the direct plus indirect requirements table.

The Transactions Table. Table III-1 presents a highly simplified and hypothetical transactions table. The data are presented in three major portions of the table termed: the processing sector, the final demands sector, and the final payments sector. The column headed "Total Output" is the sum of the respective row entries of the table and the row headed "Total Outlays" is the sum of the respective column entries.

TABLE III-1: HYPOTHETICAL TRANSACTIONS TABLE

Sales →		Processing Sector			Final Demand	Total Output
		X ₁	X ₂	X ₃		
Purchases +	X ₁	1.00	2.25	.20	1.55	5.00
	X ₂	2.00	6.00	1.00	16.00	25.00
	X ₃	.20	3.00	1.80	15.00	20.00
Final Payments		1.80	13.75	17.00	3.00	35.55
Total Outlays		5.00	25.00	20.00	35.55	85.55

^{1/}Intermediate consumers are producers who purchase a commodity and alter this commodity for resale. Final consumption refers to those sectors who consume the final product; i.e., do not subject it to additional processing.

In the table, the sectors denoted X_1 , X_2 , and X_3 are the producing sectors which make up the processing sector of the hypothetical economy. Each of these sectors may sell a portion of its output for intermediate use; e.g., a sale from sector X_1 to sector X_1 , X_2 , or X_3 , and to final demand. Thus, in this example, sector X_1 sells \$1.00 worth of its output to itself,^{2/} \$2.25 of output to sector X_2 and \$.20 of output to sector X_3 . In addition, sector X_1 delivers \$1.55 worth of output to final consumers. A simple sum of these entries yields the total output of sector X_1 which equals \$5.00

Any column of the transactions table describes the purchases made by each of the sectors at the column head. Thus, sector X_2 purchases products valued at \$2.25 from sector X_1 , \$6.00 worth of its own outputs, \$3.00 worth of products from X_3 and \$13.75 worth of primary inputs.^{3/} The entries in the total outlays row are the sum of the payments made. For column X_2 this total outlay is \$25.00. It will be noted that the row and column totals for the processing sectors X_1 , X_2 , and X_3 are equal. This is to be expected since the model accounts for every transaction. In a more disaggregated model, the individual row and column sums for disaggregated final demands and final payments would not be equal. However, aggregate final demands and final payments must be the same, as shown in the example.^{4/}

^{2/}This transaction indicates that several firms, selling to one another, comprise a sector.

^{3/}Primary inputs include labor, taxes, depreciation, imports, and the like.

^{4/}We have, for purposes of simplicity, restricted our example to the aggregate final demand and final payments sectors. Final demand generally contains sales to (purchases by) households, governments, exports, inventory change, and investment. Final payments include payments to households, payments to governments, depreciation, rents, interest, dividends, profits, and imports.

Once the basic set of transactions presented in Table III-1 have been identified, the second essential table of interindustry analysis may be derived.

The Direct Coefficients Table. This table is termed the direct or technical coefficients table and is presented in Table III-2 for the hypothetical example. The entries in Table III-2 are interpreted as the requirements from each of the processing sectors at the left of the table in order for each sector at the top to produce a single dollar's worth of output.

TABLE III-2: HYPOTHETICAL DIRECT COEFFICIENTS TABLE

		Purchasing Sector		
		X_1	X_2	X_3
Selling Sector	X_1	.20	.09	.01
	X_2	.40	.24	.05
	X_3	.04	.12	.09

The entries in Table III-2 are computed by dividing each column entry in each processing sector of Table III-1 by the respective column total. Using sector X_1 for example, the entries in the first column of Table III-2 are: $\$1.00/\$5.00 = \$.20$; $\$2.00/\$5.00 = \$.40$; and $\$.20/\$5.00 = \$.04$. Thus, in order for X_1 to produce one dollar's worth of output, X_1 must purchase \$.20 from itself, \$.40 of output from X_2 , and \$.04 worth of output from X_3 . Each of the other columns of Table III-2 has a like interpretation.

The system as presented thus far may be summarized mathematically in the following manner: let \bar{X}_1 , \bar{X}_2 , and \bar{X}_3 be the total outputs for the respective sectors X_1 , X_2 , and X_3 . Let X_{11} , X_{12} , and X_{13} represent the

distribution of sector X_1 output to the processing sectors and Y_1 be the sales of X_1 output to final demand. Similarly, X_{21} , X_{22} , X_{23} , and Y_2 and X_{31} , X_{32} , X_{33} , and Y_3 represent the respective distribution of the outputs of sectors X_2 and X_3 . The information contained in Table III-1 may be summarized in equation 1.

$$\begin{aligned} \text{Equation 1:} \quad \bar{X}_1 &= X_{11} + X_{12} + X_{13} + Y_1 \\ \bar{X}_2 &= X_{21} + X_{22} + X_{23} + Y_2 \\ \bar{X}_3 &= X_{31} + X_{32} + X_{33} + Y_3 \end{aligned}$$

Further, let a_{ij} be the direct coefficient showing the requirement for the output of sector i necessary in order for sector j to produce one dollar's worth of output, where $a_{ij} = X_{ij} / \bar{X}_j$. As described previously, X_{ij} is the flow of output from sector X_i to sector X_j and \bar{X}_j is the total value of purchases by sector X_j .

Equation 1 may now be rewritten as:

$$\begin{aligned} \text{Equation 2:} \quad \bar{X}_1 &= a_{11} X_1 + a_{12} X_2 + a_{13} X_3 + Y_1 \\ \bar{X}_2 &= a_{21} X_1 + a_{22} X_2 + a_{23} X_3 + Y_2 \\ \bar{X}_3 &= a_{31} X_1 + a_{32} X_2 + a_{33} X_3 + Y_3 \end{aligned}$$

The system in equations (1) and (2) are simply the balance relations of the descriptive model. In terms of the hypothetical example equation (2) expressed numerically is:

$$\begin{aligned} \text{Equation 3:} \quad 5 &= .20 (5) + .09 (25) + .01 (20) + 1.55 \\ 25 &= .40 (5) + .24 (25) + .05 (20) + 16.00 \\ 20 &= .04 (5) + .12 (25) + .09 (20) + 15.00 \end{aligned}$$

In matrix notation, system (2) may be written as:

$$\text{Equation 4: } \begin{bmatrix} X_1 \\ X_2 \\ X_3 \end{bmatrix} = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \\ X_3 \end{bmatrix} + \begin{bmatrix} Y_1 \\ Y_2 \\ Y_3 \end{bmatrix}$$

or more simply as in:

$$\text{Equation 5: } \underline{\bar{X}} = A \underline{\bar{X}} + \underline{\bar{Y}}$$

where $\underline{\bar{X}} = \begin{bmatrix} \bar{X}_1 \\ \bar{X}_2 \\ \bar{X}_3 \end{bmatrix}$ $A = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix}$ and $\underline{\bar{Y}} = \begin{bmatrix} Y_1 \\ Y_2 \\ Y_3 \end{bmatrix}$

Solving for $\underline{\bar{Y}}$ from equation (5) we obtain:

$$\text{Equation 6: } \underline{\bar{Y}} = \underline{\bar{X}} - A \underline{\bar{X}}$$

which may be expanded as:

$$\begin{aligned} \text{Equation 7: } Y_1 &= \bar{X}_1 - a_{11} \bar{X}_1 - a_{12} \bar{X}_2 - a_{13} \bar{X}_3 \\ Y_2 &= -a_{21} \bar{X}_1 + \bar{X}_2 - a_{22} \bar{X}_2 - a_{23} \bar{X}_3 \\ Y_3 &= -a_{31} \bar{X}_1 - a_{32} \bar{X}_2 + \bar{X}_3 - a_{33} \bar{X}_3 \end{aligned}$$

Factoring the appropriate terms in equation (7) yields the matrix system in:

$$\text{Equation 8: } \begin{bmatrix} Y_1 \\ Y_2 \\ Y_3 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} - \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \\ X_3 \end{bmatrix}$$

which reduces to:

$$\text{Equation 9: } \underline{\bar{Y}} = (I-A)\underline{\bar{X}} \text{ in matrix notation.}$$

For the numerical example, Equation 9 is solved in:

Equation 10:

$$\begin{bmatrix} (1 - .20) - .09 - .01 \\ - .40 (1 - .24) - .05 \\ - .04 - .12 (1 - .09) \end{bmatrix} \begin{bmatrix} 5.00 \\ 25.00 \\ 20.00 \end{bmatrix} = \begin{bmatrix} Y_1 \\ Y_2 \\ Y_3 \end{bmatrix}$$

or

$$\begin{bmatrix} .80 - .09 - .01 \\ -.40 - .76 - .05 \\ - .04 - .12 - .91 \end{bmatrix} \begin{bmatrix} 5.00 \\ 25.00 \\ 20.00 \end{bmatrix} = \begin{bmatrix} 1.55 \\ 16.00 \\ 15.00 \end{bmatrix}$$

The Direct Plus Indirect Coefficients Table. All of the information necessary to a solution of the Leontief system is now available. The question addressed in this solution is, "What is the level of output necessary to sustain a given level of final demands?" The solution requires the use of matrix inversion which need not be discussed in mathematical detail here. The mechanical process followed in solving the simultaneous input-output system of equations is first to compute the inverse of the $(I-A)$ matrix of Equation (9). This matrix, denoted $(I-A)^{-1}$, is the table of direct plus indirect coefficients and is presented in Table III-3. It shows the direct plus indirect production generated in each sector of the economy in order for a single sector to deliver one dollar's worth of output to final demand.

TABLE III-3:

HYPOTHETICAL DIRECT PLUS INDIRECT COEFFICIENTS

	X_1	X_2	X_3
X_1	1.3319	.1614	.0235
X_2	.7710	1.4135	.0855
X_3	.1523	.1935	1.1112

Each element in the table represents the total direct and indirect production required in each sector at the left of the table in order for the sectors at the top to deliver a dollar's worth of output to final demand. Suppose that the final demand for the output of sector X_1 increases by one dollar. This will generate a total production of \$1.33 in sector X_1 , a total production valued at \$.71 in sector X_2 and total production valued at \$.15 in sector X_3 .

Using the information contained in Table III-3 in conjunction with Equation (9) the solution for \bar{X} at various levels of final demand \bar{Y} may be obtained. Premultiplying both sides of (9) by the inverse matrix $(I-A)^{-1}$ yields:

$$\text{Equation 11:} \quad (I-A)^{-1} (I-A)\bar{X} = (I-A)^{-1}\bar{Y} \quad \text{or} \quad \bar{X} = (I-A)^{-1}\bar{Y}$$

Expanding (11) yields:

$$\begin{aligned} \text{Equation 12:} \quad \bar{X}_1 &= 1.3319 Y_1 + .1614 Y_2 + .0235 Y_3 \\ \bar{X}_2 &= .7710 Y_1 + 1.4135 Y_2 + .0855 Y_3 \\ \bar{X}_3 &= .1523 Y_1 + .1935 Y_2 + 1.1112 Y_3 \end{aligned}$$

This last result is quite powerful. Table III-3 illustrates the concept of economic interdependence. Alteration in the quantities of any good delivered to final consumption may be expected to stimulate production in other sectors which stimulates production in still other sectors of the economy. Table III-3 shows the magnitude of all direct and indirect effects after the initial stimulation of final demand has worked itself out. These "interdependency coefficients" enable the determination of the output levels which must be reached in order to satisfy new levels of final demands, a result shown explicitly in Equation (12). For example, a \$1 increase in sales to final demand by sector 1 would add \$1.33 to sector 1's direct plus indirect sales, plus \$.77 to sector 2's sales and \$.15 to sector 3's sales. The total business activity generated by the \$1 of increased final demand sales by sector 1 would thus exceed \$2.25.

Business Activity Projection

The input-output model, in addition to its use in describing an economy at a given point in time, also is applicable in making forecasts of economic activity associated with changes in final demand. Its capability in this regard is somewhat limited by the assumptions of constant production coefficients and technical nonsubstitutability among productive inputs. Such assumptions are not likely to be met in the long run but for relatively short-run situations appear to be acceptable. The ideal use of the model in consistent forecasting is to forecast for the short run. The model should be updated periodically to accommodate structural changes in the economy.

The first step in forecasting is to estimate the likely growth in each of the sectors comprising final demand. These projections are aggregated into a single projected final demand vector. For the hypothetical model presented here, assume that the projected final demands are \$3.00, \$19.00, and \$17.00, respectively, for sectors X_1 , X_2 , and X_3 . Each column entry of the direct plus indirect coefficients table (Table III-3) is then multiplied by the projected final demand appropriate to a particular column head. Thus column one of Table III-3 would be multiplied by the projected final demand for the output of sector X_1 which is \$3.00. Similarly, the columns headed by X_2 and X_3 are multiplied by the respective projected final demands for the outputs of X_2 and X_3 . In matrix multiplication we have the following computation:

$$\begin{bmatrix} 1.3319 & .1614 & .0235 \\ .7710 & 1.4135 & .0855 \\ .1523 & .1935 & 1.1112 \end{bmatrix} \begin{bmatrix} 3.00 \\ 19.00 \\ 17.00 \end{bmatrix} = \begin{bmatrix} 7.5 \\ 30.4 \\ 23.0 \end{bmatrix}$$

The right hand side is the vector of projected total outputs associated with the new final demands. What remains is to distribute the new total outputs among the processing sectors of the economy; i.e., to construct a new transactions table. To accomplish this, the total output figures are multiplied by each respective column entry of the direct coefficients table (Table III-2) as follows:

$$\begin{array}{lll}
 .20 \times 7.5 = 1.5 & .09 \times 30.4 = 2.7 & .01 \times 23.0 = .2 \\
 .40 \times 7.5 = 3.0 & .24 \times 30.4 = 7.3 & .05 \times 23.0 = 1.2 \\
 .04 \times 7.5 = .3 & .12 \times 30.4 = 3.6 & .09 \times 23.0 = 2.1
 \end{array}$$

These products are the entries in the projected transactions table. Thus, we form Table III-4.

TABLE III-4: HYPOTHETICAL PROJECTED TRANSACTIONS TABLE

Sales →	Processing Sectors			Final Demand	Total Output	
	X_1	X_2	X_3			
Purchases ↑	X_1	1.5	2.7	.2	3.0	7.4
	X_2	3.0	7.3	1.2	19.0	30.5
	X_3	.3	3.6	2.1	17.0	23.0
Final Payments		2.6	16.9	19.5	3.0	42.0
Total Outlays		7.4	30.5	23.0	42.0	102.9

The forecasting model is consistent. It provides for the interdependence among sectors and estimates the impacts of various projected exogenous changes on all sectors, not just the ones directly effected by such change.

Derivation of Business Multipliers. One useful application of the input-output system is in the derivation of business multipliers. These multipliers provide an estimate of the total business activity generated in an economy as a result of changes in the final demand for the output of any single sector or in all sectors of that economy. These multipliers are very easily derived from the inverse matrix $(I-A)^{-1}$ shown in Table III-3. Each column of that table is summed and the result is the business multiplier. For example, the sum of the entries in column one of Table III-3 is 2.1952. This tells us that as the final demand for the output of sector X_1 increases by, say, \$1,000,000 there will be a total direct plus indirect business activity of \$2,195,200 generated throughout the economy.^{5/}

Employment Multipliers. A second multiplier of importance to this study is the employment multiplier. Regional policy makers have a legitimate primary interest in estimating the employment-generating effects of economic expansion. The basic technique does not differ dramatically from that used in developing the business multipliers. Estimates of total employment by sector on a per dollar output basis are necessary. Once obtained, the employment coefficients may be used in conjunction with the interdependence coefficients to obtain employment multipliers.

The direct plus indirect employment change for sector j is computed as $\sum_{i=1}^h C_{ij}E_i$, where the C_{ij} 's are the column elements of the interdependence matrix and the E_i 's are the rates of workers per dollar of output by sector.^{6/}

^{5/} If households are included in the processing sector, the multiplier is said to contain direct plus indirect plus induced (consumer spending) effects.

^{6/} If households are included in the processing sector, the multiplier is said to contain direct plus indirect plus induced (consumer spending) effects.

1970 Estimates of Multipliers for the Colorado Economy

Business Multipliers. The estimated business activity multipliers are shown in Table III-5. These multipliers measure the direct plus indirect plus induced business activity (total sales receipts) in Colorado for each dollar of exports by the respective sectors listed on the table. Multipliers for the energy-related sectors differ slightly from the original 1970 study because of a revision to reflect changing energy trade patterns made in 1977. Only three of the sectors provide direct sales to sportsmen--these are the trade sector (retail trade), the services sector, and the transport sector. Sportsmen also make purchases from government and other final payments sectors, but since these sectors are not part of the processing component of the model, they are assumed to have no indirect or induced effects and thus their multipliers are unity. To the extent that government or other final payments do expand their local purchases in response to increased demands by nonresident sportsmen, the total economic impact may be somewhat understated by the exclusion of these sectors from the processing component of the model.

Employment Multipliers. Employment data were obtained directly from the Colorado Division of Employment and are based on the standard industrial classification of the sectors in the model. The units in the employment analysis are numbers of workers per \$1,000 of total gross output. The coefficients are presented in Table III-6. The direct employment requirements, by themselves, are of limited usefulness in assessing the impacts of various changes in economic activity. The limitations exist because direct coefficients alone ignore the effects of sectoral interdependence.

To assess the total employment impacts of exogenous changes in final consumption requires the use of the direct plus indirect plus induced production

TABLE III-5: BUSINESS MULTIPLIERS FOR THE COLORADO ECONOMY, BY SECTOR, 1970

(In dollars of business activity generated per dollar delivered to final demand)

Sector	Business Multiplier
1. Natural Gas ^{1/}	2.33
2. Livestock	3.18
3. Irrigated Agriculture	2.71
4. Dryland Agriculture	2.45
5. Food Processing	2.57
6. Metal Mining	2.17
7. Petroleum Production	2.24
8. Industrial Minerals Production	2.13
9. Coal Mining ^{1/}	2.22
10. Mining Services	2.23
11. Pipeline Transportation ^{1/}	2.16
12. Petroleum Refining ^{1/}	2.60
13. Primary Metals	2.12
14. Electric Power Generation ^{1/}	1.88
15. Fabricated Metals	1.69
16. Electronics	1.78
17. Transportation, Communication, and Public Utilities ^{1/}	2.34
18. Textiles	1.82
19. Paper	1.56
20. Printing	1.93
21. Chemicals	1.75
22. Wood Products	1.79
23. Other Manufacturing	2.89
24. Trade	2.65
25. Services	2.45
26. Elementary and Secondary Education	2.62
27. University Education	2.52
28. Households	2.20

^{1/}Energy and energy transport sectors revised March 1977, An Interindustry Analysis of the Impacts of Natural Gas Shortages on Colorado's Economy, Colorado Energy Research Commission. J. McKean, J. Weber, and E. Sparling, Colorado State University.

Source: See Item 1 on the list of references.

requirements per dollar of output delivered to final demand. The process involves premultiplying the interdependency matrix by a diagonal matrix of direct employment coefficients. The results are presented in Table III-7.

The interpretation of the entries in Table III-7 is shown by the following example. As the final demand for the output of the natural gas sector expands by \$1,000 there will be a direct expansion of employment in that sector as well as in those sectors which supply production ingredients to the natural gas sector. Indirect employment increases will also occur in sectors which supply production inputs to those sectors who directly supply the natural gas sector with its inputs. The magnitude of the direct and indirect employment impacts shows the total employment generated in the entire economy as this single sector increases its deliveries to final demand. For the natural gas sector, an increased delivery of \$1,000 to final demand results in a total state employment impact of .036. A \$1 million increase would lead to the employment of an additional 36 persons in the state. All of the remaining entries have the same interpretation for the respective sectors. Table III-7 indicates that the leading sectors in terms of direct and indirect employment generation in the Colorado economy are: livestock, other manufacturing, irrigated agriculture, trade, elementary and secondary education, petroleum refining, food processing, university education, and services.

TABLE III-6: EMPLOYMENT COEFFICIENTS PER \$1,000 OF OUTPUT
AND TOTAL EMPLOYMENT BY SECTOR, COLORADO, 1970

(In workers per \$1,000 output produced and numbers of workers)

Sector	(Workers Per \$1,000 Total Output) Direct Employment Requirement	(Number of Workers) Total Employment*
1. Natural Gas	.022-----	1,972
2. Livestock	.031-----	29,489
3. Irrigated Agriculture	.062-----	19,901
4. Dryland Agriculture	.032-----	4,329
5. Food Processing	.012-----	21,447
6. Metal Mining	.028-----	6,216
7. Petroleum Production	.033-----	4,255
8. Industrial Minerals Production	.025-----	4,877
9. Coal Mining	.027-----	1,142
10. Mining Services	.039-----	2,317
11. Pipeline Transportation	.001-----	268
12. Petroleum Refining	.008-----	719
13. Primary Metals	.032-----	7,667
14. Electric Power Generation	.016-----	1,805
15. Fabricated Metals	.019-----	20,192
16. Electronics	.026-----	13,746
17. Transportation, Communication, and Public Utilities	.042-----	45,414
18. Textiles	.057-----	6,210
19. Paper	.025-----	1,331
20. Printing	.045-----	9,387
21. Chemicals	.027-----	8,839
22. Wood Products	.034-----	4,002
23. Other Manufacturing	.059-----	5,582
24. Trade	.028-----	162,603
25. Services	.049-----	96,777
26. Elementary and Secondary Education	.083-----	39,888
27. University Education	.126-----	39,967
28. Households	.001-----	8,084
	TOTAL, PROCESSING SECTOR EMPLOYMENT	568,426

* Full-time equivalent labor force.

Source: See Item 1 on the list of references.

TABLE III-7: DIRECT PLUS INDIRECT PLUS INDUCED LABOR REQUIREMENTS PER
\$1,000 DELIVERED TO FINAL DEMAND, COLORADO, 1970

(In workers per \$1,000)

Sector	Direct Plus Indirect Plus Induced Employment
1. Natural Gas	.036
2. Livestock	.099
3. Irrigated Agriculture	.107
4. Dryland Agriculture	.070
5. Food Processing	.058
6. Metal Mining	.056
7. Petroleum Production	.060
8. Industrial Minerals Production	.053
9. Coal Mining	.054
10. Mining Services	.066
11. Pipeline Transportation	.033
12. Petroleum Refining	.034
13. Primary Metals	.057
14. Electric Power Generation	.035
15. Fabricated Metals	.035
16. Electronics	.044
17. Transportation, Communication, and Public Utilities	.070
18. Textiles	.073
19. Paper	.037
20. Printing	.065
21. Chemicals	.042
22. Wood Products	.051
23. Other Manufacturing	.105
24. Trade	.070
25. Services	.086
26. Elementary and Secondary Education	.116
27. University Education	.157
28. Households	.040

Source: See Item 1 on the list of references.

CHAPTER IV
ESTIMATES OF HUNTING AND FISHING EXPENDITURES

Source of the Data

Information on which sportsman expenditure estimates are based was obtained by a mail questionnaire sent to a sample of 1973 resident and nonresident Colorado hunting and fishing license purchasers.^{1/} The questionnaire and the accompanying cover letters are shown in the appendix.

Respondents were asked to provide estimates of two general classes of expenditure in Colorado during the year 1973: (1) variable expenditures which ordinarily would be identified with a specific hunting or fishing activity and would vary by length of trip, number of trips, or type of activity and (2) fixed expenditures which could logically be expected to be independent of the number of trips or the variety or number of sportsmen activities engaged in. The expenditures in class (1), collectively called variable costs, include expenditures on licenses and permits; clothing; ammunition; fishing rods, tackle and bait; other related hunting or fishing equipment; private and commercial transportation; lodging; food and drink; boat and equipment rentals; privilege and access fees; services--including packers, guides, and horses; shipping and processing; taxidermy; and related miscellaneous expenses. Fixed costs, class (2), include prorated expenses for vehicles; cabins; land and water areas; camping trailers and other camping equipment; boats and boating equipment; firearms, archery, and other multi-purpose equipment; dogs; and related miscellaneous expenditures.

^{1/}Colorado Hunting and Fishing Expenditures: 1973. LeeAnn Ross, Dwight M. Blood, and Kenneth C. Nobe, Contract Report for the Colorado Division of Wildlife, April 1975. Department of Economics, Colorado State University.

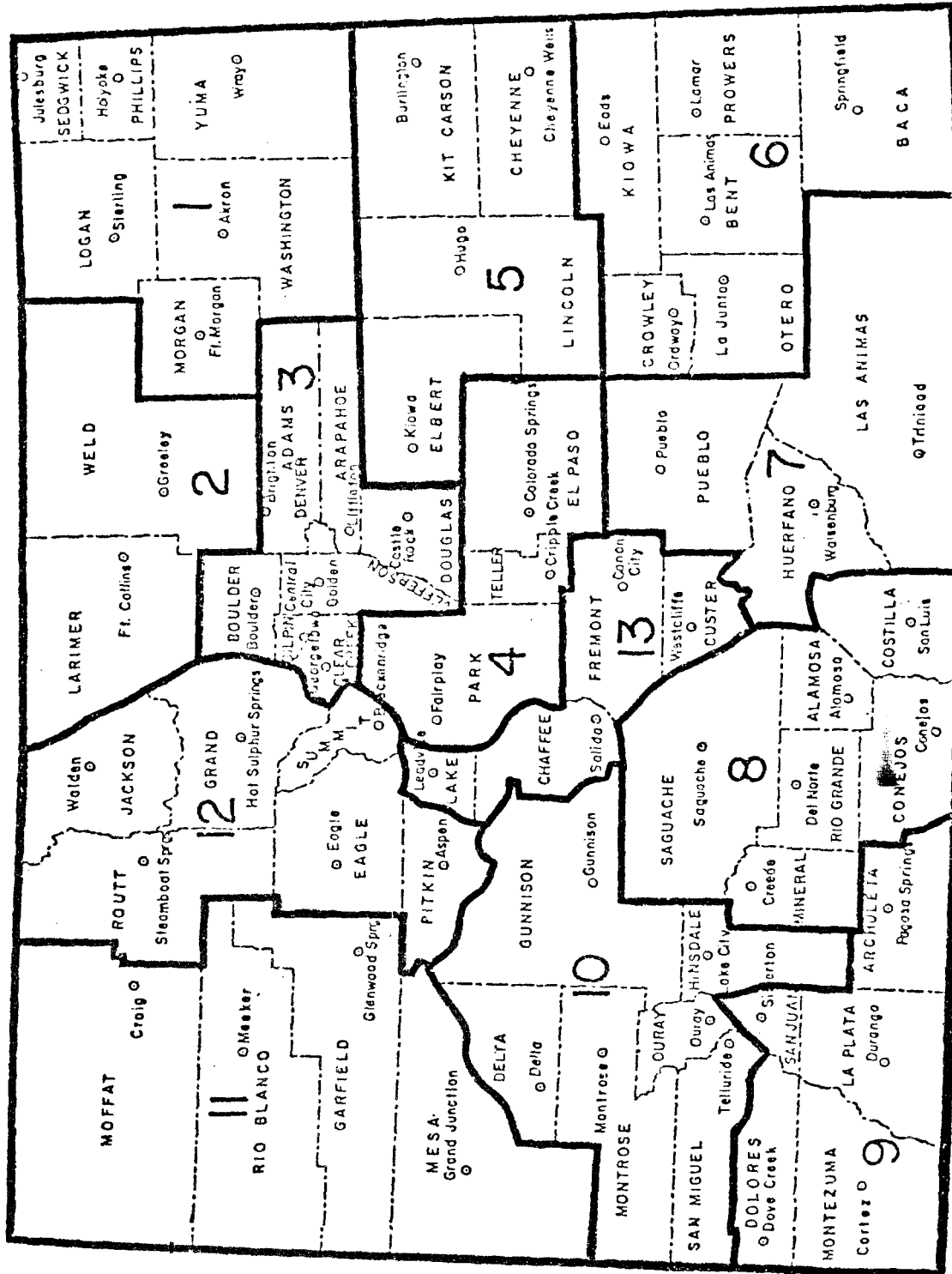
Sampling Procedure

A 1 percent random sample of all 1973 resident and nonresident Colorado hunters was drawn by license type from the master file of license receipts at the Denver office of the Colorado Division of Wildlife.^{2/} Since the master file of fishing receipts was unavailable, a 1 percent random sample of resident and nonresident fisherman was drawn from license receipts in the files of license sales offices throughout the state. A list of these agents was obtained from the Division of Wildlife, and sales agents were divided geographically into the 13 planning areas outlined in Figure 1. The fishing license sales agents were further classified into groups of small, medium, large, and very large sellers on the basis of their total sales within their map areas. A representative of each size class of license sales agents was then selected at random in each map area, and a 1 percent sample of license purchasers was drawn from receipts on file with each of the selected sales agents. This process insured that the sample of fishing license holders was geographically distributed throughout the state and that license purchasers from all size classes of license sales agents were represented in the sample.

A total of 4,871 questionnaires was sent to a sample of hunters in January 1973. A first reminder letter was sent three weeks after the initial mailing, and a second follow-up letter--containing a duplicate questionnaire--was sent two weeks later. A total of 2,405 hunter questionnaires was returned, thus providing a response rate of 49 percent.

Questionnaires were sent to 4,635 fishermen in February 1973. Two follow-up letters were sent at intervals of three, then two weeks following the initial mailing. A total of 1,726 questionnaires was returned by fishing license holders, for a response rate of 37 percent.

^{2/}The resultant usable sample available for the purposes of this study was about $\frac{1}{2}$ of 1 percent of the sportsman population.



JANUARY 1, 1974

Figure 1. State Planning and Management Regions

Division of Planning
524 Social Services Building
Denver, Colorado 80203

Overall, a total of 9,506 questionnaires was mailed to Colorado hunting and fishing license holders, with 4,131 (43 percent) returned. This response rate compares with a response rate of nearly 72 percent for the 1968 survey. The lower response rate for the 1973 survey was attributed primarily to the increased complexity of the 1973 questionnaire, in which respondents were asked to give percentages of fixed and variable expenditures by geographic area within the state. Thus, although a geographic distribution of sportsmen expenditures throughout the state was obtained for the first time, these 1973 survey data were obtained at the sacrifice of a lower overall response rate.

The basic procedure for deriving the estimates of nonresident sportsman spending in Colorado included the following steps:

1. Total Colorado purchases reported by each nonresident sportsman for 24 cost categories were multiplied by the percentage of total trips in 1973 by that sportsman to each county in Colorado.^{3/} The definitions of the cost categories are shown with the sample questionnaire in the appendix.
2. County nonresident sportsmen spending was aggregated to state planning regions.
3. Colorado spending (by 24 cost categories) induced by trips to the 13 state planning regions was divided by the number of sportsmen in the sample and multiplied by the 1973 total sportsmen population.

Data Limitations

Data from surveys such as this one are reasonably reliable for making relative comparisons; they tend to be somewhat less reliable (though how much less is purely conjectural) in making specific dollar estimates. Obviously, the recall by questionnaire respondents about specific dollar amounts for a wide variety of hunting and fishing activities engaged in over an extended period of months is likely to exhibit a range of error.

^{3/} Some inaccuracy exists in this step of the estimation procedure since only the "county visited most" for each type of game or fish was known for each respondent.

But, if the sample is large enough, much of the error will be self-compensating in terms of over-reporting by some and under-reporting by others. County by county expenditure estimates are not reported because the sample size is insufficient at this level of disaggregation.

In addition to recall error, other sources of potential error include coding or editing error and keypunch error. Although stringent safeguards were built into the data processing procedures, some allowance must be made for the possibility of minimal error in the final results in such cases. Thus, data on specific dollar expenditures are likely to be somewhat less valid than data on relative expenditure levels. Nonetheless, the data are as valid as any data obtained by the kind of mail survey technique employed. Moreover, comparisons with the dollar amounts presented in this report with dollar amounts from the original 1968 survey, as adjusted for inflation, are, for the most part, reasonable in terms of expected magnitudes of change. Thus, a higher level of credibility is obtained for these data than would be obtained if no comparative data existed.

Although the direct sportsmen expenditure data have a number of important uses, they are not valid as a measure of total net economic impact. The two measures are not equivalent. Net economic impact in a state or a region can be defined as the total growth in all expenditures in all economic activity sectors resulting from an infusion of new spending in a state or region. Although some Colorado residents might be expected to hunt or fish out-of-state if such opportunities were not available in Colorado, most such existing expenditures would probably be transferred to other kinds of recreation or consumption activities in Colorado if people did not hunt or fish here. Thus, expenditures by residents on hunting and fishing activities in Colorado cannot necessarily

be viewed as having a significant net economic impact on the state although the multiplier effects of dollars spent in various activities do differ.

For resident expenditures on hunting and fishing activities in Colorado, the incremental increase to the state's economy directly due to these activities is equivalent only to the amount of such expenditures that would be diverted to other states in the absence of hunting and fishing opportunities in Colorado.^{4/} The total amount of nonresident hunting and fishing expenditures in Colorado, however, can be viewed as a net economic gain to Colorado since nonresidents were asked to estimate only the portions of their total expenditures that were directly spent in Colorado. These net economic impacts are the focus of the remainder of this report.

A further limitation on the interpretation and use of these data is imposed by the manner in which the questionnaire asked for fixed expenditure data. Each respondent was asked to allocate a percentage of his total 1973 fixed expenditures to the hunting or fishing activities in which he participated. If, for example, a sportsman bought a \$5,000 jeep and allocated 50 percent of that expenditure to deer hunting, the fixed deer hunting expenditure for that individual would have been \$2,500. It is doubtful, however, that the respondent would actually have paid \$5,000 cash for the vehicle. It would be more likely to assume that he actually paid, say, \$1,000 down and financed the balance of the expenditure over a period of years. Thus, the true fixed expenditure assignable to 1973 may well have been only \$500 to \$1,000. Of course, if an amortized share of total cost were assigned to each year for each fixed cost item, it would have been necessary to include an amortized amount for all used fixed equipment and real estate bought before the survey year for all of the sportsmen in the sample; as a result, the

^{4/} An estimate of possible resident sportsman expenditures diverted to other states is not included in this report.

questionnaire would have become much too complex for use in a mail survey. It can be reasonably assumed, however, that--barring significant shifts in spending activities on fixed recreation items over time--including the total fixed costs of sportsmen in the sample, instead of just an amortized rate, was offset by the fixed costs incurred by the other sportsmen in prior years for items still in use. Nonetheless, it is clear that further research is needed on the distribution and estimation procedures used for fixed cost items if the estimates of total hunting and fishing expenditures used for planning are to be improved significantly.

Colorado Sportsman Spending in 1973

The results of the 1973 Colorado sportsmen expenditure survey are reviewed in terms of regional and statewide totals in this section.^{5/} Estimates of Colorado sportsmen expenditures induced by activity in 13 geographic planning areas throughout the state are summarized in the following section. Total sportsmen expenditures are broken down into expenditures on variable and fixed cost categories for both residents and non-residents.

As shown in Table IV-1, an estimated total of \$329.4 million was spent in Colorado by sportsmen in 1973. Residents spent 84 percent of this total, or \$278.2 million, while nonresidents spent 16 percent of the total, or \$51.2 million.

Figure 2 shows that fishing accounted for about two-thirds of resident total sportsmen expenditures in Colorado for 1973. Resident fishing expenditures were followed in order of importance by deer hunting, which accounted for 13 percent of resident sportsmen expenditures; small game

^{5/}This section refers to spending which actually took place in a given planning region. (The discussion and tables are taken directly from the report by Ross, Blood, and Nobe.) The following section discusses spending in Colorado (not necessarily in any specific region of Colorado) induced by sportsman activity in each planning region.

TABLE IV-1

TOTAL SPORTSMEN EXPENDITURES IN COLORADO BY ACTIVITY PARTICIPATION IN 1973

Activity	Resident		Nonresident		Total
	Total	Per Capita	Total	Per Capita	
Antelope	\$ 818,370	\$144.71	\$ 12,777	\$ 56.03	\$ 831,147
Bighorn Sheep	79,754	538.88	-0-	-0-	79,754
Bear	642,991	159.54	224,418	80.53	867,409
Deer	36,002,279	273.31	11,611,329	239.99	47,613,608
Elk	28,345,653	324.85	8,015,565	278.99	36,361,218
Mountain Lion	58,238	93.12	91,484	121.50	149,722
Fishing ^a	184,526,232	447.98	30,917,022	163.23	215,443,254
Lakes	(115,206,487)	(336.41)	(13,394,445)	(107.19)	(128,600,932)
Streams	(68,870,606)	(228.29)	(17,516,558)	(121.87)	(86,387,164)
Small Game ^b	27,691,756	206.29	338,897	113.04	28,030,653
Ducks	(6,520,724)	(137.19)	(55,323)	(114.32)	(6,576,047)
Geese	(3,352,220)	(116.97)	(136,932)	(128.62)	(3,489,152)
Small Game Birds	(9,724,734)	(111.38)	(40,097)	(36.06)	(9,764,831)
Small Game Mammals	(4,450,180)	(85.31)	(65,880)	(75.82)	(4,516,060)
Varmints	(3,789,532)	(100.28)	(40,686)	(56.13)	(3,830,218)
TOTAL	\$278,165,273	--	\$51,211,492	--	\$329,376,765

^aThe sum of Lake and Stream expenditures does not equal the total Fishing expenditure due to rounding.

^bThe sum of Duck, Geese, Small Game Birds, Small Game Mammals, and Varmint expenditures does not equal the total Small Game expenditure due to rounding.

Source: See Item 6 on the list of references.

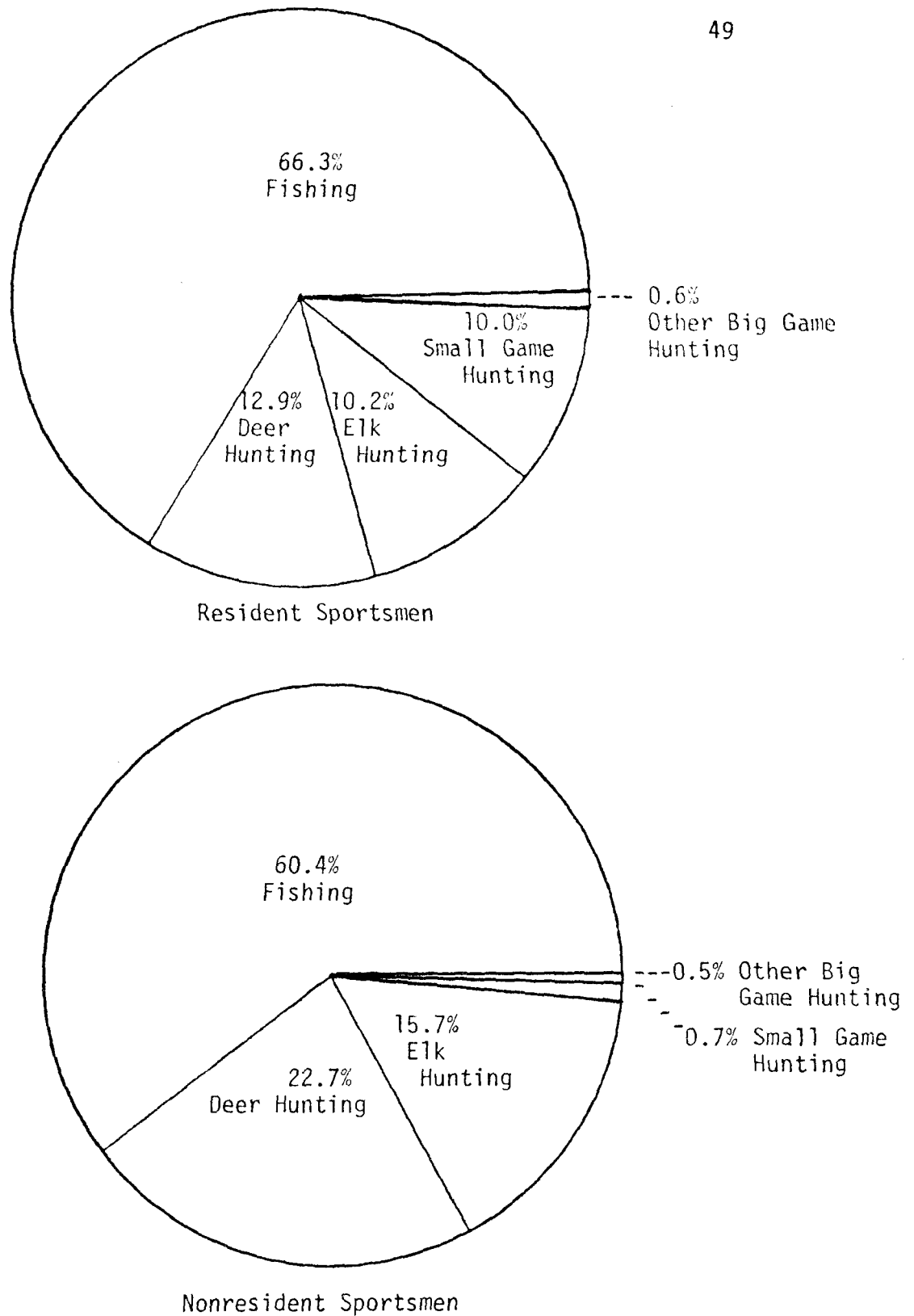


Figure 2. Percentage Distribution of Estimated Gross Expenditures in Colorado by Resident and Nonresident Sportsmen in 1973.

Source: See Item 6 on the list of references.

hunting, 11 percent; elk hunting, 10 percent; and other big game hunting, less than 1 percent. Fishing accounted for 60 percent of the total non-resident expenditures, while deer hunting accounted for 23 percent; elk hunting, 16 percent; and small game hunting and other big game, less than 1 percent each.

Average per capita resident expenditure on fishing for 1973 was \$448, second in terms of average resident expenditures only to the \$539 per capita spent by bighorn sheep hunters. The large average per capita expenditure for fishing is certainly due, in part, to the year-round Colorado fishing season, particularly since ice fishing is becoming increasingly popular. It is also due to the fact that fishing is more likely to be a family sport than are most hunting activities.

Resident elk hunters had the third highest per capita expenditure (\$325), followed by deer hunters (\$273), small game (\$206), bear (\$160), antelope (\$145), and mountain lion (\$93). Elk hunters spent the most per capita (\$280) of any group of nonresident hunters or fishermen. Nonresident elk hunting was followed by deer hunting (\$240), fishing (\$163), mountain lion hunting (\$122), small game hunting (\$113), bear hunting (\$81), and antelope hunting (\$56). For nonresidents, per capita fishing expenditures were less than for elk or deer hunting expenditures. It is likely that many nonresident tourists fish as an incidental part of their summer vacations and that, therefore, they charged only a small portion of their trips to fishing expenditures in Colorado. On the other hand, nonresident elk and deer hunters usually come to Colorado for the sole purpose of shooting big game. Such hunters are more likely to charge a higher percentage of total trip expenditures, if not all trip expenditures, solely to wildlife activities

than are summer tourists who buy fishing licenses only to augment their vacation activities.

Per capita resident lake fishing expenditures were higher than resident stream fishing expenditures, while the reverse expenditure distribution was true for nonresident fishermen. This relationship can be explained by the fact that most nonresidents come to Colorado to see the mountains, where most of the streams are located, while residents are located primarily in urban areas along the Colorado Front Range that are immediately adjacent to many lakes and reservoirs. Further, winter fishing by Colorado residents is concentrated on the lakes and reservoirs.

Resident sportsmen expenditures for both variable and fixed categories of spending are shown in Table IV-2. About 33 percent of total resident expenditures (\$92.9 million) was for variable items, while 67 percent of total resident expenditures (\$185.2 million) was attributable to fixed expenditure items. Thus, fixed expenditures by resident sportsmen are approximately twice the volume of variable expenditures. Although fewer sportsmen make fixed expenditures each year than make variable expenditures, the larger average cost per item for fixed items results in a larger total than that for variable expenditures.

Resident lake fishing fixed expenditures were about 60 percent higher than fixed expenditures for stream fishing because of the relatively higher expense for boating equipment for lake fishing. Fixed expenditures were greater than variable expenditures for all species and wildlife activities, except for the relatively minor activity categories of bear and mountain lion hunting.

TABLE IV-2
VARIABLE AND FIXED RESIDENT SPORTSMEN EXPENDITURES IN COLORADO BY ACTIVITY PARTICIPATION IN 1973

Activity	Variable Costs ^e		Fixed Costs ^e		Total Expenditures
	Total	Per Capita	Total	Per Capita	
Antelope	\$ 309,466	\$ 54.72	\$ 508,904	\$ 89.99	\$ 818,370
Bighorn Sheep	28,361	191.63	51,393	347.25	79,754
Bear	367,535	91.54	275,456	68.00	642,991
Deer	11,360,186	86.24	24,642,093	187.07	36,002,279
Elk	9,883,335	113.27	18,462,268	211.58	28,345,603
Mountain Lion	43,259	68.88	14,979	24.24	58,238
Fishing Lakes	61,152,278	148.46	123,373,954 ^c	299.52	184,526,232
Streams	(36,257,345)	(105.87)	(78,949,142)	(230.54)	(115,206,487)
	(24,894,933)	(82.52)	(43,975,673)	(145.77)	(68,870,606)
Small Game	9,795,218 ^b	72.97	17,856,538 ^d	133.32	27,691,756
Duck	(2,186,138)	(45.99)	(4,334,586)	(91.20)	(6,520,724)
Geese	(1,362,672)	(47.55)	(1,989,548)	(69.42)	(3,352,220)
Small Game Birds	(3,402,977)	(38.98)	(6,321,757)	(72.40)	(9,724,734)
Small Game Mammals	(1,492,060)	(28.60)	(2,958,120)	(56.71)	(4,450,180)
Varmint ^e	(1,351,374)	(35.76)	(2,438,158)	(64.52)	(3,789,532)
TOTAL	\$92,939,688	--	\$185,225,585	--	\$278,165,273

^a The sum of Lake and Stream expenditures does not equal total Fishing expenditure due to rounding.

^b Parenthized sums do not equal the total Small Game expenditure due to rounding.

^c The sum of Lake and Stream expenditures does not equal total Fishing expenditures due to overlap in expenditures by holders of different fishing license types. Difference is 00.36%.

^d Parenthized sums do not equal total Small Game expenditures due to overlap in expenditures by holders of different small game license types. Difference is 00.81%.

^e See appendix for definition.

Source: See Item 6 on the list of references.

Nonresident sportsmen expenditures, subdivided into variable and fixed expenditures, are given in Table IV-3. Variable expenditures accounted for 84 percent (\$42.9 million) of total nonresident expenditures, while fixed expenditures accounted for the remaining 16 percent of total nonresident sportsmen expenditures (\$8.3 million). Variable expenditures were about five times the volume of fixed expenditures by nonresident sportsmen in 1973. This relative expenditure distribution between fixed and variable items is likely due to a combination of factors. The predominant reason, however, is probably that so-called big-ticket items purchased by nonresident fishermen--like cars, campers, trailers, boating equipment, and four-wheel drive vehicles--are probably bought at home and brought into Colorado on vacation trips. In addition, a major decline in purchases of cabins and recreational land and water areas was evident in the data obtained when compared with the 1968 data on nonresident fishermen.

Tables IV-4, IV-5, and IV-6 show the area distribution of variable expenditures, fixed expenditures, and average total expenditures, respectively. The findings in these tables are summarized in Table IV-7 which gives the percentage of total expenditures for both the fixed and variable expenditures accounted for by each geographic map area. Major differences between variable and fixed expenditure patterns can be noted. For example, Map Area 3 (the Denver metropolitan area) received 22 percent of total Colorado sportsmen expenditures, 25 percent of total fixed sportsmen expenditures, but only 17 percent of total variable sportsmen expenditures during the year 1973. One would logically expect the concentration of fixed expenditures to be higher in urban areas where most of the population lives. Also, variable expenditures would logically be less concentrated in major urban areas and

TABLE IV-3

VARIABLE AND FIXED NONRESIDENT SPORTSMEN EXPENDITURES IN COLORADO BY ACTIVITY PARTICIPATION IN 1973

Activity	Variable Costs ^e		Fixed Costs ^e		Total Expenditures
	Total	Per Capita	Total	Per Capita	
Antelope	\$ 11,937	\$ 52.35	\$ 840	\$ 3.68	\$ 12,777
Bighorn Sheep	-0-	-0-	-0-	-0-	-0-
Bear	193,938	69.59	30,400	10.94	224,418
Deer	9,487,221	196.09	2,124,108	43.90	11,611,329
Elk	7,128,481	248.11	887,084	30.88	8,015,565
Mountain Lion	89,698	119.39	1,586	2.11	91,484
Fishing	25,702,355 ^a	135.70	5,214,667 ^c	27.53	30,917,022
Lakes	(10,259,540)	(82.10)	(3,134,805)	(25.09)	(13,394,445)
Streams	(15,442,715)	(107.44)	(2,073,843)	(14.43)	(17,516,558)
Small Game	289,749 ^b	96.65	49,148 ^d	16.39	338,897
Duck	(53,232)	(110.00)	(2,091)	(4.32)	(55,323)
Geese	(121,078)	(113.73)	(15,854)	(14.89)	(136,932)
Small Game Birds	(38,451)	(34.58)	(1,646)	(1.48)	(40,097)
Small Game Mammals	(44,620)	(51.36)	(21,260)	(24.46)	(65,880)
Varmint ^e	(32,368)	(44.66)	(8,318)	(11.47)	(40,686)
TOTAL	\$42,903,579	--	\$8,307,913	--	\$51,211,492

^aThe sum of Lake and Stream expenditures does not equal total Fishing expenditure due to rounding.
^bParenthesized sums do not equal the total Small Game expenditure due to rounding.

^cThe sum of Lake and Stream expenditures does not equal total Fishing expenditures due to overlap in expenditures by holders of different fishing license types. Difference is 00.12%.

^dParenthesized sums do not equal total Small Game expenditures due to overlap in expenditures by holders of different small game license types. Difference is 00.04%.

^e See appendix for definition.

Source: See Item 6 on the list of references.

TABLE IV-4
REGIONAL^a DISTRIBUTION OF VARIABLE SPORTSMEN EXPENDITURES IN COLORADO BY ACTIVITY PARTICIPATION IN 1973

Activity	Map Area													Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	
Antelope	34,060	35,959	80,334	18,164	40,818	12,092	21,383	2,644	0	3,232	63,481	8,404	0	321,371
Big Horn	0	4,899	0	0	0	0	0	2,927	0	8,826	11,709	0	0	28,361
Sheep	168	15,430	69,509	18,828	0	7,210	17,576	62,789	66,665	192,832	34,444	65,822	10,177	511,470
Bear	133,900	960,207	2,974,808	862,304	71,059	58,813	459,239	815,722	1,538,898	3,252,362	6,363,979	2,665,596	686,215	20,847,099
Deer	120,615	763,703	2,273,799	759,282	41,538	60,364	294,554	1,556,753	1,578,517	2,536,700	3,453,836	3,389,699	175,891	17,011,256
Elk	0	0	4,123	1,129	0	0	5,276	26,288	17,672	752	66,511	7,514	3,591	123,156
Mountain Lion	1,536,963	5,457,051	9,623,337	3,862,265	325,010	336,035	916,214	1,858,422	1,887,064	6,694,309	2,744,316	8,908,236	2,297,715	46,517,010
Fishing, Late	393,926	3,530,139	6,325,892	2,482,013	96,994	29,634	538,908	4,325,560	1,876,769	8,333,317	2,426,905	7,061,959	2,113,687	40,335,773
Fishing, Stream	564,742	375,626	584,197	63,549	41,102	176,981	114,062	98,241	20,420	58,038	59,323	64,442	18,536	2,239,359
Duck	109,342	404,885	280,349	42,749	17,678	403,946	165,528	2,276	140	0	39,816	4,417	12,565	1,433,750
Grease	852,908	345,959	895,220	119,842	204,290	141,834	129,151	147,199	29,786	187,761	153,631	199,219	44,604	3,441,412
Birds	106,940	149,557	258,604	180,810	69,556	43,540	91,713	87,999	34,261	143,233	223,645	73,441	73,385	1,536,694
Mammals	167,300	127,929	189,578	107,357	145,103	68,872	67,397	66,032	80,534	63,429	158,111	109,951	32,992	1,333,735
TOTAL ^f	4,020,864	12,171,344	23,555,750	8,518,392	1,053,226	1,340,121	2,891,061	9,053,014	7,130,736	21,474,791	5,799,709	23,362,670	5,468,758	135,840,436

^aRegional distribution refers to the 13 planning districts of the state.

Source: See Item 6 on the list of references.

TABLE IV-5
REGIONAL^a DISTRIBUTION OF FIXED SPORTSMEN EXPENDITURES IN COLORADO BY ACTIVITY PARTICIPATION IN 1973

Activity	Map Area													Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	
Antelope	24,629	37,927	164,713	32,469	56,046	14,312	9,104	0	0	5,073	162,213	3,258	0	509,744
Bighorn	0	10,261	0	0	0	0	0	1,696	0	37,740	1,696	0	0	51,393
Sheep	675	45,676	78,708	22,684	0	27,318	3,109	2,444	27,402	62,771	13,684	12,218	6,222	305,136
Bear	124,791	2,1379,630	6,701,752	2,357,406	226,987	239,494	641,539	1,312,358	773,447	2,775,938	4,785,361	3,342,345	1,044,442	28,756,110
Elk	74,218	1,618,940	4,552,755	814,576	36,656	109,273	667,519	1,112,885	1,147,534	1,947,501	3,025,091	3,674,639	523,518	19,349,315
Mountain Lion	0	0	8,205	3,905	0	0	0	432	595	2,537	991	0	0	16,565
Fishing, Lake	2,083,746	11,017,626	21,374,074	10,878,375	1,118,292	750,666	1,612,151	1,365,501	1,654,478	7,545,590	6,038,105	14,214,718	2,429,549	82,083,851
Fishing, Stream	361,472	5,329,709	10,931,743	4,600,579	77,178	74,869	882,106	2,696,655	827,265	5,076,497	3,698,248	9,171,538	2,321,600	45,049,459
Duck	909,515	699,708	1,443,273	227,819	51,901	156,630	162,231	126,137	261,015	108,591	64,124	107,251	19,347	2,336,672
Beesee	126,869	601,263	541,469	162,064	46,970	289,473	179,280	6,423	0	732	50,434	3,320	2,367	2,655,404
Small Game	1,073,404	543,089	2,165,340	229,137	240,125	286,218	169,293	189,538	54,509	290,932	345,257	583,344	150,609	6,323,395
Birds	208,810	202,118	495,385	386,988	72,984	126,339	203,658	109,049	53,355	191,439	265,763	287,956	373,529	2,979,373
Small Mammals	492,752	287,413	568,101	175,228	65,617	72,128	73,823	117,394	222,194	178,566	119,687	96,271	49,287	2,446,461
TOTAL	5,468,681	22,774,360	49,005,518	19,891,130	1,992,756	2,144,700	4,603,813	7,041,512	5,021,794	18,224,027	18,571,254	31,521,698	6,962,435	193,223,678

^aRegional distribution refers to the 13 planning districts of the state.

Source: See Item 6 on the list of references.

TABLE IV-6
REGIONAL^a DISTRIBUTION OF AVERAGE SPORTSMEN EXPENDITURES IN COLORADO BY ACTIVITY PARTICIPATION IN 1973

Activity	Map Area												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Antelope	167.07	76.21	122.72	163.40	81.96	74.47	53.11	39.60	0	45.58	198.36	47.89	0
Big Horn	0	307.40	0	0	0	0	0	93.78	0	944.10	271.98	0	0
Sheep	12.94	144.22	74.59	48.26	0	82.83	38.23	72.57	86.61	210.24	42.54	66.28	29.01
Bear	127.41	227.03	218.81	227.39	172.48	183.73	120.67	203.14	165.58	188.29	191.13	185.28	140.41
Deer	145.41	247.91	239.70	240.51	204.15	163.67	197.16	198.85	225.13	201.89	242.88	212.87	173.90
Elk	0	0	66.09	23.26	0	0	47.03	63.47	316.95	15.50	234.89	45.82	19.30
Mountain Lion	181.46	239.88	213.94	231.33	324.64	143.54	124.19	110.92	99.11	147.83	218.66	199.05	122.05
Fishing, Lake	79.74	185.10	139.58	125.82	90.57	70.23	91.38	149.97	75.81	142.68	150.65	108.26	110.21
Fishing, Stream	136.31	69.54	125.73	104.83	70.30	64.57	94.66	83.74	269.96	87.00	47.79	71.03	45.11
Duck	66.04	88.85	87.16	123.00	126.74	89.26	136.45	38.87	1.12	3.39	62.23	16.57	44.31
Geese	85.39	63.55	88.64	53.26	64.88	76.35	52.46	71.07	46.52	71.83	58.90	87.58	102.47
Small Game Birds	58.84	51.21	64.13	81.18	63.50	82.99	56.45	52.98	49.10	62.97	63.17	88.14	138.47
Small Game Mammals	139.57	84.20	78.62	70.76	103.37	60.01	43.30	66.57	145.45	73.49	47.28	48.66	47.34
Varmints													

^aRegional distribution refers to the 13 planning districts of the state.

Source: See Item 6 on the list of references.

TABLE IV-7
 REGIONAL DISTRIBUTION OF TOTAL SPORTSMEN EXPENDITURES
 IN MAP AREAS BY PERCENT

Map Area	Expenditures		
	Total	Fixed	Variable
1	2.9%	2.8%	3.0%
2	10.6%	11.8%	9.0%
3	22.1%	25.4%	17.3%
4	8.6%	10.3%	6.3%
5	1.0%	1.0%	.8%
6	1.1%	1.1%	1.0%
7	2.3%	2.4%	2.1%
8	4.9%	3.6%	6.7%
9	3.7%	2.6%	5.2%
10	12.1%	9.4%	15.8%
11	10.4%	9.6%	11.6%
12	16.7%	16.3%	17.2%
13	3.8%	3.6%	4.0%
TOTAL	100.2%	99.9%	100.0%

Source: See Item 6 on the list of references.

distributed more widely over the areas in which hunting and fishing takes place because sportsmen do buy gasoline, food, bait, ammunition, and other supplies in these areas.

Map Area 10 (Gunnison-Montrose) received 12 percent of total sportsmen expenditures, 9 percent of total fixed expenditures, and 16 percent of total variable expenditures. This expenditure pattern follows the logical distribution of sportsmen expenditures in which fixed items are more likely to be purchased in larger urban areas, and variable items are more likely to be bought in the hunting and fishing areas. As expected, the eastern plains area (Map Areas 1, 5, 6, and 7) received only a minor share (7.3 percent) of the total Colorado sportsmen expenditures during 1973.

The regional distribution of 1973 nonresident sportsmen expenditures in Colorado is presented in Tables IV-8, IV-9, and IV-10.^{6/} The findings, summarized in Table IV-11, indicate that nonresident expenditures were concentrated in recreation areas on the Western Slope. Map Area 10 (Gunnison-Montrose) accounted for the largest share (26 percent) of nonresident expenditures. Other areas of major importance in nonresident sportsmen expenditures include Map Area 11 (Meeker-Glenwood Springs) with 16 percent; Map Area 12 (Granby-Steamboat Springs-Aspen) with 12 percent; Map Area 8 (the San Luis Valley) with 11 percent; and Map Area 9 (Durango-Cortez) with 10 percent. These five areas combined accounted for 79 percent of total nonresident sportsmen expenditures in 1973. Variable nonresident sportsmen expenditures were also concentrated in these same areas, while Map Area 4

^{6/} Non-resident expenditures in a particular planning region could be used as an estimate of out-of-state exports which when combined with out-of-region sportsman exports could be used to drive a regional input-output model (if it existed) for a given region. The required information is available on computer tape at Colorado State University.

TABLE IV-8

REGIONAL^a DISTRIBUTION OF TOTAL NONRESIDENT SPORTSMEN EXPENDITURES IN COLORADO BY ACTIVITY PARTICIPATION IN 1973

Activity	Map Area													Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	
Antelope	0	0	6,518	0	0	979	1,746	0	0	0	1,762	1,762	0	12,767
Big Horn	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sheep	0	7,089	0	0	0	34,528	13,704	37,394	60,294	46,652	17,043	5,287	1,622	224,413
Bear	22,819	133,836	871,709	131,255	187,429	46,034	119,410	318,271	1,255,632	2,536,756	4,775,975	1,021,069	155,033	11,611,350
Deer	34,851	88,583	342,744	333,244	9,220	25,343	97,438	678,529	1,033,695	1,585,467	2,181,460	1,547,359	17,417	8,015,930
Mountain	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lion	0	0	0	0	0	0	5,276	0	18,267	0	62,949	2,468	2,525	91,485
Fishing, Lake	49,537	1,535,789	1,156,418	2,576,349	39,454	29,796	210,658	1,069,443	1,447,073	3,246,505	516,469	1,011,198	503,724	13,394,413
Fishing, Stream	80,036	989,082	838,322	517,741	27,954	952	146,021	3,601,990	1,457,952	6,168,723	614,287	2,319,712	718,787	17,516,559
Duck	35,641	5,972	0	0	0	13,710	0	0	0	0	0	0	0	52,323
Grease	0	707	0	0	0	135,223	0	0	0	0	1,001	0	0	137,931
Small Game Birds	12,214	9,102	0	0	8,311	7,298	0	1,468	0	333	0	488	881	40,095
Small Game Mammals	0	27,003	0	0	0	567	0	0	0	0	32,695	1,123	4,492	65,480
Vermin	0	0	0	3,060	12,724	500	14,830	4,346	0	0	1,841	1,532	1,449	40,684
TOTAL	235,108	2,812,163	3,215,711	3,563,649	285,092	294,930	609,083	5,711,443	5,303,343	13,584,438	5,233,257	5,951,338	1,405,930	51,205,485

^aRegional distribution refers to the 13 planning districts of the state.

Source: See Item 6 on the list of references.

TABLE IV-9

REGIONAL^a DISTRIBUTION OF VARIABLE NONRESIDENT SPORTSMEN EXPENDITURES IN COLORADO BY ACTIVITY PARTICIPATION IN 1973

Activity	Map Area													
	1	2	3	4	5	6	7	8	9	10	11	12	13	
Antelope	0	0	5,678	0	0	0	979	1,746	0	0	1,762	1,762	0	11,927
Big Horn	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sheep	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bear	0	7,089	0	0	0	7,210	13,704	37,394	58,650	46,652	16,330	5,287	1,622	193,939
Deer	22,819	135,823	377,415	110,254	25,576	9,918	104,108	313,937	1,193,479	2,017,122	4,058,252	969,566	148,675	9,467,248
Elk	34,861	86,255	312,756	333,244	9,220	24,924	92,265	633,574	970,897	1,419,255	1,729,718	1,473,437	6,093	7,128,439
Mountain Lion	0	0	0	0	0	0	5,276	0	17,672	0	61,958	2,468	2,525	89,639
Fishing, Lake	49,029	1,521,320	999,342	613,255	39,454	17,616	183,823	1,014,601	1,176,346	2,677,501	504,284	972,335	490,719	10,259,619
Fishing, Stream	66,679	931,298	749,744	491,078	27,954	952	116,070	2,920,472	1,363,315	5,562,515	619,264	2,010,087	563,292	15,442,720
Ducks	35,641	5,972	0	0	0	11,619	0	0	0	0	0	0	0	53,252
Geese	0	707	0	0	0	119,480	0	0	0	0	890	0	0	121,077
Small Game	12,214	9,102	0	0	7,827	6,136	0	1,462	0	333	0	488	881	38,449
Birds	0	12,478	0	0	0	480	0	0	0	0	26,047	1,123	4,492	44,620
Mammals	0	0	0	3,060	11,272	413	8,052	4,348	0	0	1,841	1,932	1,449	32,367
License	221,243	2,712,044	2,444,935	1,550,891	121,303	199,727	525,044	4,925,794	4,780,353	1,723,378	7,020,346	5,438,765	1,239,752	42,903,595

^aRegional distribution refers to the 13 planning districts of the state.

Source: See Item 6 on the list of references.

TABLE IV-10

REGIONAL^a DISTRIBUTION OF FIXED NONRESIDENT SPORTSMEN EXPENDITURES IN COLORADO BY ACTIVITY PARTICIPATION IN 1973

Activity	Map Area													Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	
Antelope	0	0	840	0	0	0	0	0	0	0	0	0	0	840
Bighorn	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sheep	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bear	0	0	0	0	0	27,318	0	0	1,644	0	1,278	0	0	30,480
Deer	0	4,013	494,294	21,001	161,853	36,116	15,302	4,334	92,303	519,636	717,673	51,143	6,354	2,124,102
Elk	0	328	25,938	0	0	419	5,173	44,955	62,998	166,212	451,762	113,922	11,324	887,081
Mountain Lion	0	0	0	0	0	0	0	0	595	0	991	0	0	1,596
Fishing, Lake	508	14,469	157,076	1,965,094	0	12,180	26,035	54,842	270,733	569,004	12,185	38,863	13,005	3,134,794
Fishing, Stream	13,357	66,784	88,578	26,663	0	0	29,911	681,518	94,637	606,208	22,023	308,625	135,495	2,073,939
Cuck	0	0	0	0	0	2,091	0	0	0	0	0	0	0	2,091
Geese	0	0	0	0	0	15,743	0	0	0	0	111	0	0	15,854
Small Game	0	0	0	0	484	1,162	0	0	0	0	0	0	0	1,646
Birds	0	14,525	0	0	0	87	0	0	0	0	6,648	0	0	21,260
Mammals	0	0	0	0	1,452	87	6,778	0	0	0	0	0	0	8,317
Trappings	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	13,865	100,119	770,776	2,012,758	163,789	95,203	84,039	785,659	522,990	1,861,060	1,212,911	512,553	166,178	8,301,890

^aRegional distribution refers to the 13 planning districts of the state.

Source: See Item 6 on the list of references.

TABLE IV-11

REGIONAL DISTRIBUTION OF NONRESIDENT SPORTSMEN EXPENDITURES
IN MAP AREAS BY PERCENT

Map Area	Expenditures		
	Total	Fixed	Variable
1	0.5%	0.2%	0.5%
2	5.5%	1.2%	6.3%
3	6.3%	9.3%	5.7%
4	7.0%	24.2%	3.6%
5	0.6%	2.0%	0.3%
6	0.6%	1.1%	0.5%
7	1.2%	1.0%	1.2%
8	11.2%	9.5%	11.5%
9	10.4%	6.3%	11.1%
10	26.5%	22.4%	27.3%
11	16.1%	14.6%	16.4%
12	11.6%	6.2%	12.7%
13	2.7%	2.0%	2.9%
TOTAL	100.2%	100.0%	100.0%

Source: See Item 6 on the list of references.

(Colorado Springs) received the largest share (24 percent of nonresident fixed expenditures.

Sportsman Visits in Colorado

Sportsmen responding to the hunting and fishing survey were asked how many times they went to the county that they "VISITED MOST" for 14 different types of game or fish (up to 14 counties could be designated as "VISITED MOST" by a given respondent if each county provided different types of game or fish). The following tables provide some information which can be distilled from the answers to this survey question. (See question one on the hunting and fishing survey form in the appendix.)

The first table (Table IV 12) shows the number of different counties visited within a planning region when sportsmen were queried as to the counties "VISITED MOST" for each of the 14 species of game and fish. If every county in a given region contained the most attractive source of sports activity, then it is possible that all respondents would list only the counties of that region. Thus, the maximum possible number of visitors to a region is the sample size of nonresident visitors times the number of counties in that region. A total of 1,196 nonresident visitors were surveyed and only 1,056 responses were obtained. Since some of the responses undoubtedly include several counties, a number of those surveyed obviously failed to answer this question. Those not answering Question 1 were excluded from the analysis. It is also noteworthy that whereas a given region has the possibility of dominating with several thousand county "VISITED MOST" votes, in fact, the largest number of visitors was only 267 (out of 1,056) in Region 10. Thus, the sportsman attraction is not dominated by a single region. The Western Slope Regions 10, 9, 11, 12 and 8, ranked in that order, do account for 75 percent of the visitors, however.

TABLE IV-12

ESTIMATED NUMBER OF NONRESIDENT SPORTSMEN VISITORS TO COUNTY THEY
VISITED MOST BY PLANNING REGION: 1973

<u>State Planning Region</u>	<u>Visitors (Upper Bound)</u>	<u>Percentage of Visitors</u>
1	1,400	0.7
2	12,798	6.1
3	8,999	4.3
4	6,599	3.1
5	1,000	0.5
6	1,200	0.7
7	2,000	0.9
8	22,197	10.5
9	32,196	15.2
10	53,393	25.3
11	36,595	17.3
12	24,997	11.8
13	7,799	<u>3.7</u>
	TOTAL	100.1

* Only the first visit to any given county is counted for a given respondent.

Source: See Item 8 on the list of references.

The second table (Table IV-13) shows data similar to the first except that multiple visits by a respondent to a given county are allowed. The previous tabulation allowed more than one county in a region to be visited by a respondent while the second tabulation allows multiple visits to a county as well. Thus, the first tabulation estimates visitors more closely than visits, whereas the latter tabulation more closely estimates visits to a region. The same regions dominate with respect to visits as did with respect to visitors, but their rank order is different. Five regions account for over 80 percent of the visits by nonresidents.

Table IV-14 compares the results presented in the previous tables. Thus, we can say that seven or fewer persons visited Region 1 (since one individual could have visited several counties in Region 1) and a total of 16 visits were made to Region 1. The ratio of visits to visitors can be used to estimate the estimated visits per licensee. Of course, since the denominator of this ratio is an upper-bound estimate, the ratio is a lower bound. Thus, we can say that at least 2.29 trips to Region 1 were made by those nonresidents who visited there most. Extreme variations in the rate of visitation exist for Regions 5 and 6. These regions may attract bird hunters from just across the state border who are able to make many trips. Since the sample size is extremely small for these regions, it is uncertain whether the information is reliable. Examination of the relative sample size by region suggests that only on the Western Slope can the hunting and fishing sample be said to be reliable. (Keep in mind that absolute sample size not the ratio of sample size to the sportsman population is relevant in statistical inference.) Statistical inferences from individual county data would be considered most unreliable given the small sample size, so no county analysis is attempted.

TABLE IV-13

ESTIMATED NUMBER OF NONRESIDENT SPORTSMAN VISITS TO COUNTY THEY
VISITED MOST BY PLANNING REGION: 1973¹

<u>State Planning Region</u>	<u>Visits</u>	<u>Percentage of Visits</u>
1	3,200	0.6
2	27,397	5.4
3	23,397	4.6
4	15,798	3.1
5	29,196	5.8
6	9,799	1.9
7	4,199	0.8
8	48,194	9.6
9	83,989	16.7
10	105,787	21.0
11	75,790	15.1
12	63,592	12.6
13	13,198	<u>2.6</u>
	TOTAL	99.8

¹Multiple visits to the same county by a given respondent are included.

Source: See Item 8 on the list of references.

TABLE IV-14

RATIO OF NONRESIDENT VISITS TO NONRESIDENT VISITORS
BY PLANNING REGION¹

<u>State Planning Region</u>	<u>Average Visits Per Licensee (Lower Bound)</u>
1	2.29
2	2.14
3	2.60
4	2.39
5	29.20
6	8.17
7	2.10
8	2.17
9	2.61
10	1.98
11	2.07
12	2.54
13	1.69

¹ Average visits per licensee is calculated by dividing the number of visits shown in Table IV-13 by the number of visitors shown in Table IV-12 for each planning region.

Source: See Item 8 on the list of references.

Tables IV-15, IV-16, and IV-17 show tabulations corresponding to the Tables IV-12, IV-13, and IV-14, except both resident and nonresident sportsmen are included. Comparison of Tables IV-12 and IV-15 shows that relatively more nonresident sportsmen prefer the western slope than is the case for residents. The percentage who visit regions 1-7 is much less for nonresidents than it is for residents. Likewise, Tables IV-13 and IV-16 shows that total visits to the eastern slope are relatively higher among residents than nonresidents, since the total sportsman population shows a higher preference for the eastern slope than does the nonresident. Comparing Tables IV-14 and IV-17, it is apparent that residents generally make many more hunting and/or fishing trips in Colorado than do nonresidents. Regions 5 and 6 are the exceptions previously discussed.

TABLE IV-15

ESTIMATED NUMBER OF RESIDENT PLUS NONRESIDENT SPORTSMAN
VISITORS TO COUNTY THEY VISITED MOST
BY PLANNING REGION: 1973¹

<u>State Planning Region</u>	<u>Visitors (Upper Bound)</u>	<u>Percentage of Visitors</u>
1	46,427	5.6
2	75,671	9.1
3	70,549	8.5
4	49,401	5.9
5	14,539	1.7
6	18,339	2.2
7	17,513	2.1
8	55,514	6.7
9	47,253	5.7
10	111,028	13.3
11	114,828	13.8
12	161,750	19.4
13	49,566	<u>6.0</u>
		100.0

¹Only the first visit to any given county is counted for a given respondent.

Source: See Item 8 on the list of references.

TABLE IV-16

ESTIMATED NUMBER OF RESIDENT PLUS NONRESIDENT SPORTSMAN VISITS
TO COUNTY THEY VISITED MOST BY PLANNING REGION: 1973¹

<u>State Planning Region</u>	<u>Visits</u>	<u>Percentage of Visits</u>
1	424,615	5.8
2	869,553	11.9
3	773,395	10.6
4	514,660	7.0
5	119,619	1.6
6	193,473	2.6
7	261,874	3.6
8	449,729	6.2
9	367,945	5.0
10	754,560	10.3
11	766,456	10.5
12	1,397,100	19.1
13	409,415	<u>5.6</u>
		99.8

¹Multiple visits to the same county by a given respondent are included.

Source: See Item 8 on the list of references.

TABLE IV-17

RATIO OF RESIDENT PLUS NONRESIDENT VISITS TO
RESIDENT PLUS NONRESIDENT VISITORS BY PLANNING REGION¹

<u>State Planning Region</u>	<u>Average Visits Per Licensee (Lower Bound)</u>
1	9.15
2	11.49
3	10.96
4	10.42
5	8.23
6	10.55
7	14.95
8	8.10
9	7.79
10	6.80
11	6.67
12	8.64
13	8.26

¹Average visits per licensee is calculated by dividing the number of visits shown in Table IV-16 by the number of visitors shown in Table IV-15 for each planning region.

Source: See Item 8 on the list of references.

Sportsman Exports from Colorado

A previous section presented some interesting statistics from the sportsman survey by Blood, et.al. which depicted the regional purchases by resident and nonresident sportsmen.^{7/} While purchases made in each region of Colorado are interesting, they are not the appropriate measure to use if the intent is to indicate the contribution of a region to Colorado sportsman exports. This is because a region may attract sportsmen who spend money in Colorado and yet the attracting region may not actually be the place in Colorado where the nonresident sportsman make their purchases. In order to measure the power to attract nonresident sportsmen who spend money in Colorado, the purchases by each nonresident sportsman in the sample are credited to a certain region according to the relative number of trips made by the sportsman to that region. In this manner, a region which may have a very small services, trade, or transport sector will receive credit for Colorado sportsman exports which occur in other Colorado regions but are due to the hunting and fishing attractiveness of the less commercially developed region.

The data tapes from the hunting and fishing survey have been sorted and the weighted averages for the sample data have been calculated as discussed above. The Fortran computer program is shown in the appendix. Table IV-18 shows the sportsman exports attributed to each planning region in Colorado. This is the basic data which is used in the following chapter to estimate weighted average multipliers appropriate for the mix of sportsman exports in each planning region.

^{7/}The section of this chapter entitled, "Colorado Sportsman Spending in 1973."

The numbers shown in Table IV-18 have been blown up to account for the total nonresident sportsman population in 1973 by multiplying each entry by (226.40), the ratio of the total sportsmen population to the sample size for the nonresident sportsman.^{8/} When this is accomplished, the result is an estimate of the total sportsman exports in 1973 by cost category and by state planning region. (This will be used in the following chapter.) For general information the distribution of nonresident plus resident expenditures attributed to each planning region is shown in Table IV-19. The numbers shown in Table IV-19 have been blown up to account for the resident plus nonresident sportsman population in 1973 by multiplying each entry by (165.22), the ratio of total sportsmen to the survey sample size.

Table IV-20 is simply the ratio of the entries taken from Tables IV-18 and IV-19. This ratio is interesting in that it shows the power of a region to attract nonresident sportsman spending to Colorado relative to its power to attract total sportsman spending.

^{8/}The estimated total spending attributed to each region by nonresident sportsmen is thus:

$$\text{Total Spending}_i = \left(\begin{array}{c} \text{Spending per visitor} \\ \text{in region } i \end{array} \right) \left(\begin{array}{c} \text{Number of visitors} \\ \text{to region } i \text{ in 1973} \end{array} \right) \left(\begin{array}{c} \text{Ratio of sportsman} \\ \text{population in 1973} \\ \text{to total sample size.} \end{array} \right)$$

Where the number of visitors in the sample is blown up and then multiplied by the estimated spending per visitor. This reduces to:

$$\text{Total Spending}_i = \left(\begin{array}{c} \text{Spending by sample} \\ \text{visiting region } i \end{array} \right) \left(\begin{array}{c} \text{Ratio of sportsman population} \\ \text{in 1973 to total sample size.} \end{array} \right)$$

Sample size for this purpose includes hunting and fishing licenses separately purchased by the same respondent. 1,196 nonresident respondents purchased 1,367 licenses while 3,923 resident plus nonresident respondents purchased 6,671 hunting and/or fishing licenses. Twenty-two types of licenses were available for both resident and nonresident sportsman.

TABLE IV-18: COLORADO SPORTSMAN EXPORTS BY COST CATEGORY AND STATE PLANNING REGION PROVIDING FISHING OR HUNTING EXPERIENCE
(Thousands of Dollars)

	AREA 1	AREA 2	AREA 3	AREA 4	AREA 5	AREA 6	AREA 7	AREA 8	AREA 9	AREA 10	AREA 11	AREA 12	AREA 13
LICENSES, PERMITS	40.9	182.2	84.4	79.3	38.1	32.2	60.0	492.1	1255.1	1625.4	2407.6	970.0	113.6
SPECIAL CLOTHING	21.5	54.2	24.0	2.3	5.6	4.8	.6	225.0	407.6	570.0	477.5	214.3	32.2
AMMUNITION	7.0	5.2	.3	11.3	0.0	34.0	0.0	28.5	62.2	117.7	140.1	33.6	11.3
FISHING RODS, ETC	9.3	137.4	116.3	51.7	0.0	.6	5.2	234.7	198.5	444.1	81.8	168.1	62.9
OTHR HNT, FSH EOP	3.5	46.6	10.5	7.9	0.0	.6	5.2	110.7	109.3	247.7	194.9	60.5	19.2
PRIVATE TRANSPRT	60.0	250.8	262.4	144.1	54.3	100.7	38.8	867.5	1270.6	2756.8	1954.3	1207.2	293.0
COMMERCIAL TRANS	0.0	94.0	2.9	20.1	0.0	0.0	0.0	73.6	158.9	274.2	153.5	199.0	5.6
LODGING	28.8	227.8	48.6	90.4	12.5	17.0	45.2	790.8	442.2	2044.2	975.7	1153.9	180.3
FOOD, DRINK	54.9	355.6	245.9	185.5	23.0	41.9	39.7	929.5	1394.0	2470.0	1641.1	1251.6	250.0
BOAT AND EQUIPMT	0.0	690.0	3.4	11.9	0.0	0.0	1.4	6.1	25.6	48.6	24.9	11.6	9.5
PRIVILEGE FEES	1.8	14.8	5.9	22.8	.9	47.5	1.4	35.9	125.8	98.7	377.7	70.3	10.8
SERVICES	0.0	0.0	1.1	0.0	47.2	0.0	226.4	98.1	127.2	307.3	1218.8	426.9	0.0
SHIPPING, LOCKER	5.7	0.0	0.0	0.0	2.8	0.0	59.1	7.2	47.3	142.7	202.2	61.8	.6
TAXIDERMY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	25.8	41.0	109.1	1.1	0.0
MISCELLANEOUS	2.9	30.5	36.4	13.5	4.3	6.0	1.9	130.6	196.5	307.5	208.4	126.4	40.5
FAMILY VEHICLE	17.0	0.0	107.5	0.0	0.0	0.0	0.0	172.8	21.5	2647.0	45.2	34.0	6.8
RECREATIONAL VEH	0.0	11.2	9.0	0.0	0.0	0.0	0.0	157.3	45.3	450.0	430.2	0.0	0.0
CABIN, LAID, ETC	0.0	34.0	23.6	0.0	0.0	0.0	0.0	11.3	54.1	22.6	0.0	0.0	0.0
CAMPING TRAILER	11.3	0.0	11.3	0.0	0.0	0.0	0.0	0.0	141.1	129.5	0.0	45.3	0.0
CAMPING EQUIP	2.8	10.3	13.0	9.0	0.0	0.0	0.0	53.6	117.5	225.9	172.1	225.0	14.7
BOATING EQUIPMT	9.0	0.0	0.0	4.1	0.0	0.0	0.0	1.5	5.7	3.0	0.0	2.2	2.3
FIREARMS, ARCHERY	2.8	25.4	7.4	0.0	3.4	34.0	0.0	48.4	80.1	127.5	325.9	130.7	13.0
DOGS, THEIR CARE	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MISCELLANEOUS-2	4.5	15.4	4.0	5.5	3.4	14.1	0.0	59.2	94.4	284.4	145.3	114.2	11.3
GRAND TOTALS	276.	2288.	1030.	672.	177.	335.	485.	4545.	6555.	19826.	11351.	6540.	1108.

Source: See Item 8 on the list of references.

TABLE IV-19: SPENDING BY COLORADO SPORTSMEN PLUS NONRESIDENT SPORTSMEN BY COST CATEGORY AND STATE PLANNING REGION PROVIDING FISHING OR HUNTING EXPERIENCE (Thousands of Dollars)

	AREA 1	AREA 2	AREA 3	AREA 4	AREA 5	AREA 6	AREA 7	AREA 8	AREA 9	AREA 10	AREA 11	AREA 12	AREA 13
LICENSES, PERMITS	385.0	851.4	666.9	474.1	129.7	146.6	237.3	710.9	1187.2	2067.7	2737.3	2078.2	483.9
SPECIAL CLOTHING	465.6	687.2	640.4	366.0	79.0	117.1	184.1	515.0	479.0	975.2	1190.1	1639.2	385.0
AMMUNITION	359.8	509.1	334.9	251.5	87.0	176.6	174.7	229.8	220.8	448.6	612.4	789.4	203.2
FISHING REELS, ETC	428.3	862.8	919.5	554.0	50.1	108.8	176.1	544.5	327.3	930.0	775.9	1985.5	511.1
OTHR HNT, FISH EOP	220.9	557.2	520.3	260.2	49.7	143.2	93.7	260.5	183.7	441.8	642.1	1165.3	217.3
PRIVATE TRANSPRT	1694.8	3103.5	2789.4	2022.3	385.4	548.1	765.3	2100.1	1791.8	5709.7	4766.5	7939.4	1747.6
COMMERCIAL TRANS	22.0	96.6	71.4	27.2	0.0	27.0	4.2	124.0	120.6	208.5	127.7	291.2	15.0
LODGING	236.5	450.9	432.8	265.1	48.5	61.1	105.2	808.3	393.3	2043.0	909.9	1895.5	275.3
FOOD, DRINK	1013.6	2010.6	1739.4	1276.4	242.8	295.9	533.4	1550.0	1492.3	3641.2	3504.6	5590.6	1409.9
BOAT AND EQUIPMT	11.5	529.4	46.6	27.0	2.6	4.1	10.5	13.6	27.1	103.6	39.5	115.7	11.4
PRIVILEGE FEES	155.8	350.4	153.9	118.1	12.3	51.3	35.4	-92.2	129.0	183.2	550.0	625.4	128.0
SERVICES	38.0	30.4	48.6	73.3	38.6	22.2	175.6	96.5	115.1	376.2	929.9	540.6	19.8
SHIPPING, LOCKER	102.4	125.0	64.0	34.4	14.4	28.5	74.0	74.3	61.6	251.8	400.8	344.4	82.4
TAXIDERY	51.8	102.8	91.5	52.3	28.4	20.6	41.3	18.8	30.0	190.5	305.9	333.0	109.6
MISCELLANECUS	148.9	337.7	298.1	161.3	36.7	33.3	58.9	198.7	159.7	476.2	493.6	741.3	172.3
FAMILY VEHICLE	1240.0	2068.7	2085.1	1529.8	87.9	121.1	438.5	1996.3	451.8	2354.5	3746.9	3601.4	1274.9
RECREATIONAL VEH	3455.8	7331.6	6057.6	6970.1	557.7	1385.5	1571.7	3313.5	1060.7	7864.7	10917.5	16250.6	4517.2
CAMP, LAND, ETC	339.8	2592.4	472.2	2842.4	14.5	1.9	5.8	435.1	842.3	595.5	4558.4	18223.9	351.0
CAMPING TRAILER	1843.5	6847.2	3933.4	2681.2	447.8	318.1	534.2	1401.1	346.5	4176.5	5581.2	8968.3	3291.4
CAMPING EQUIP	379.7	674.0	808.2	489.3	50.5	85.2	121.0	540.2	280.6	851.3	1125.7	2248.0	638.1
BOATING EQUIPMENT	533.9	1441.8	795.4	920.6	122.3	146.9	119.4	179.4	872.7	1219.9	2179.8	2194.7	153.3
FIREARMS, ARCHERY	1071.7	1612.4	1844.6	1127.8	248.3	251.3	450.8	770.3	740.0	1837.9	2498.3	3863.9	990.8
DCGS, THEIR CAPE	281.9	295.7	246.1	241.2	60.3	35.0	90.3	90.0	30.1	231.5	177.0	240.3	91.1
MISCELLANECUS-2	247.1	288.5	437.9	673.4	65.6	84.3	115.1	269.1	195.4	715.7	673.4	1120.3	414.4
GRAND TOTALS	14729.	33758.	25738.	23443.	2654.	4319.	6117.	16272.	11588.	38734.	49474.	84701.	17548.

Source: See Item 8 on the list of references.

TABLE IV-20

COLORADO SPORTSMAN EXPORTS AS A PERCENT OF TOTAL SPORTSMAN
SPENDING BY PLANNING REGION AND REGIONAL SHARE OF TOTAL
STATE SPORTSMAN EXPORTS

	<u>Share of Exports in Area Sportsman Sales</u>	<u>Share of Area Sportsman Exports in Total Sportsman Exports</u>
Area 1	1.9	0.5
Area 2	6.8	4.4
Area 3	4.0	2.0
Area 4	2.9	1.3
Area 5	6.7	0.4
Area 6	7.8	0.7
Area 7	7.9	0.9
Area 8	27.9	8.9
Area 9	56.6	12.8
Area 10	40.9	30.9
Area 11	22.9	22.2
Area 12	7.7	12.8
Area 13	6.3	<u>2.2</u>
		100.0

Source: See Item 8 on the list of references.

CHAPTER V

REGIONAL CONTRIBUTION TO THE COLORADO ECONOMY BY SPORTSMAN EXPORTS

Sportsman Economic Multipliers by State Planning Region

Business activity and employment multipliers have been calculated to show the direct plus indirect plus induced effects on the Colorado economy due to visits by nonresident sportsmen to each of the 13 state planning regions. Spending estimates supplied by the 1973 Colorado Hunting and Fishing Expenditures Study were allocated to the economic sectors of the Colorado Input-Output Model according to the scheme shown in Table V-1. It should be noted that spending under the heading "Government and Other Final Payments" is assumed in the input-output model to have no multiplier effect. A slight understatement of the total economic and employment impacts may occur if the various governmental agencies and other components of Final Payments, such as real estate, do, in fact, expand to meet the demands by nonresident sportsmen. When calculating the total spending and employment due to visits by nonresident sportsmen to Colorado it is appropriate to add in some portion of these payments. It should be noted, however, that the total amounts involved are relatively small since real estate transactions result in only a small margin paid to local firms for their services.

Table V-2 shows the sample sportsman export purchases in Colorado by economic sector and by state planning region. The total spending attributed to each region was based upon a weighting method which attributed each respondents purchases to the region "VISITED MOST," as discussed in Chapter IV. The allocation of this spending among the three processing sectors (sectors

TABLE V-1

ALLOCATION OF SPORTSMAN EXPENDITURES CATEGORIES AMONG
ECONOMIC SECTORS OF THE COLORADO INPUT-OUTPUT MODEL

TRANSPORT, COMMUNICATION, UTILITIES	RETAIL TRADE	SERVICES	GOVT. & OTHER FINAL PAYMENTS
Commercial Transport, ¹ Shipping, Processing	Food, Drink Special Clothing Ammunition Fishing Rod, Etc. Other Fishing Equip. Private Transport. Misc. Var. Exp. Vehicle Share Trailer or Camper Other Fixed Equip. Boat Equip. Firearms Dogs Misc. Fixed Exp.	Lodging Boat Rental Guides, Etc. Taxidermy Privilege Fees	Licenses Cabin Land

¹One-half of the shipping and processing expenditures were arbitrarily allocated to the services sector. This cost component is a small share of total spending.

TABLE V-2-A

SAMPLE SPORTSMEN EXPORTS BY SECTOR AND BY
STATE PLANNING REGION

State Planning Region	Sector 17 Transport, Communication, Public Utilities	Sector 24 Trade	Sector 25 Services	Area Total
Area 1	\$ 12.50	\$ 878.00	\$ 147.50	\$ 1,038.00
Area 2	415.00	7,664.00	1,071.00	9,150.00
Area 3	12.00	3,820.00	246.00	4,078.00
Area 4	89.00	2,032.00	501.00	2,622.00
Area 5	6.50	421.00	273.50	701.00
Area 6	0	1,055.00	285.00	1,340.00
Area 7	130.50	410.00	1,336.50	1,877.00
Area 8	341.00	13,405.00	4,107.00	17,853.00
Area 9	806.50	19,068.00	3,289.50	23,164.00
Area 10	1,526.00	48,895.00	11,319.00	11,749.00
Area 11	1,124.50	26,089.00	12,289.50	39,503.00
Area 12	1,015.50	16,140.00	7,442.50	24,598.00
Area 13	26.50	3,520.00	846.50	4,393.00

TABLE V-2-B

PERCENTAGE DISTRIBUTION OF SPORTSMAN EXPORTS ACROSS
ECONOMIC SECTORS BY PLANNING REGION

State Planning Region	Sector 17 Transport, Communication, Public Utilities	Sector 24 Trade	Sector 25 Services	Area Total
Area 1	.01	.85	.14	1.00
Area 2	.04	.84	.12	1.00
Area 3	.00	.94	.06	1.00
Area 4	.03	.78	.19	1.00
Area 5	.01	.60	.39	1.00
Area 6	.00	.79	.21	1.00
Area 7	.07	.22	.71	1.00
Area 8	.02	.75	.23	1.00
Area 9	.03	.83	.14	1.00
Area 10	.02	.80	.18	1.00
Area 11	.03	.66	.31	1.00
Area 12	.04	.66	.30	1.00
Area 13	.01	.80	.19	1.00

Source for both tables: See Item 8 on the list of references.

17, 24, and 25) of the Colorado Input-Output Model for each planning region is accomplished by aggregating the spending in each purchases category as shown in Table V-1 to achieve the sample totals shown in Table V-2.

These sample totals are converted to percentages shown on the lower half of Table V-2. It is apparent from Table V-2 that, for most regions, the majority of sportsman purchases are made in the retail trade sector.

Planning area 7 is an exception where a large share of spending is for "services," which is defined as "packers, guides, horses, etc., in the survey. Sportsman export business multipliers (Table V-4) are estimated for planning region by simply weighting the multipliers for each industry selling to sportsmen by the share of sportsmen purchases made from that industry.

The percentages shown on the lower part of Table V-2 are applied to the multipliers shown as the column totals on Table V-3. Because sportsmen who visit planning region 7 allocate a larger share of their purchases to the services sector, and the services sector has a smaller multiplier, the average sportsman export multiplier for region 7 is noticeably smaller in region 7. Generally, the multipliers are similar among regions. This would be expected since the multipliers measure the total impact on the state economy rather than on the local economy. The only cause for variation in the multipliers is due to differences in sportsman spending among sectors as discussed above. If multipliers were to be estimated for each region's subeconomy, much greater variation might be expected because of differences in trade patterns and varying degrees of self sufficiency among regions. Nevertheless, relatively small differences in multipliers can cause significant differences in total economic impact estimates when they are applied to the large amounts of spending made by nonresident sportsmen in certain regions of Colorado.

TABLE V-3

DIRECT, PLUS INDIRECT, PLUS INDUCED BUSINESS ACTIVITY
COEFFICIENTS FOR THE ECONOMIC SECTORS SELLING TO SPORTSMEN

<u>Sector Name</u>	Sector 17 Transport, Communication, Public Utilities	Sector 24 Trade	Sector 25 Services
Natural Gas Distribution	.007422	.006047	.009542
Livestock and Livestock Products	.024754	.099203	.031681
Irrigated Agriculture	.008243	.034406	.011715
Dryland Agriculture	.002655	.008283	.002482
Food and Kindred Products	.05479	.184835	.050251
Metal Mining	.000036	.000046	.000127
Petroleum Production	.003656	.004907	.003321
Industrial Minerals Production	.003892	.006709	.015489
Coal Mining	.019512	.002116	.001996
Mining Services	.001720	.001232	.001203
Pipeline Transportation	.005809	.008709	.004579
Petroleum Refining	.005530	.010863	.002489
Primary Metal	.003236	.002788	.008847
Electric Power Generation	.118905	.012279	.009056
Fabricated Metal, Machinery, and Electrical	.015234	.021149	.065248
Electronic and Scientific Products	.031709	.010847	.049047
Transportation, Communication, and Utilities	1.098941	.113489	.083696
Textiles, Leather, and Apparel	.004502	.008062	.028555
Paper and Allied Products	.001856	.005186	.006165
Printing and Publishing	.010788	.016109	.022926
Chemicals, Explosives, and Rubber Products	.010241	.028310	.051947
Lumber and Wood Products	.003013	.005526	.002045
All Other Manufacturing	.004314	.009588	.015742
Trade	.265652	1.507284	.310032
Services	.115443	.152133	1.222680
Other Education	0.0	0.0	0.0
University Education	.006979	.005452	.006449
Households	.512685	.384473	.435739
TOTAL	2.341517	2.650031	2.4509387

Source: Calculated using data from the Colorado Input-Output Model and the 1973 Hunting and Fishing Survey as explained in the text.

The industry detail shown in Table V-3 is included because it could prove useful to the researcher who wishes to trace out the various economic sectors affected by expansion of the industries selling directly to nonresident sportsmen. For instance, in area 1, if \$100 was spent by nonresident sportsmen, from Table V-2 it is shown that \$85 of direct sales can be expected by the trade sector. The total sales resulting from that \$85 purchase from trade will be 2.65 times \$85 = \$225.25. The sector receiving the largest share of the indirect and induced spending from the trade purchase will be sector 28, the household sector, which received .384 times \$85 = \$32.64. In like manner, the effects of the initial \$85 paid to the trade sector by sportsmen could be found for each of the other sectors selling to trade. Similarly, the remainder of the \$100 (\$15), which is spent on either the transportation or the services sectors results in indirect and induced impacts on sectors selling to transportation or services. In this manner, the total impact on any given sector's sales due to an increase of nonresident sportsman purchases can be estimated for a given planning region. For example, it might be desired to estimate the total change in household income due to an added \$100 of sportsman exports attributed to planning region 1. In addition to the \$32.64 estimated above, we would add the impact of \$1 spent on transportation resulting in \$.51 of indirect and induced household income through transportation sector purchases and \$14 purchased from the services sector which results in 14 times .4357 = \$6.10 of indirect and induced household income through service sector purchases. The total increase in household income in Colorado resulting from \$100 of sportsman exports attributed to sector 1 would be $\$32.64 + .51 + 6.10 = \39.25 . Impacts on other sectors could be calculated in a similar fashion.

Table V-5 (Column 1) shows the employment multipliers which indicate the effect on total Colorado employment per \$1,000 of added sportsman exports attributed to hunting and fishing activity in specific planning regions. These multipliers are the result of an aggregation process in which the employment multipliers for the transportation, trade, and services sectors of the Colorado economy have been weighted according to each region's distribution of sportsman spending among sectors. They are estimated in the same manner as were the business multipliers. Thus the table can be used to show that if \$100,000 of added sportsman exports were attracted by hunting and fishing experiences in region 1, a total of 7.16 full time equivalent workers would be required in the Colorado economy. It is noteworthy that planning region 7 shows the greatest employment impact per \$1,000 of exports, adding almost eight workers per \$100,000 of added exports. Planning region 7, it may be recalled, attracts sportmen who make a large share of their purchases from the services sector, a rather labor intensive sector.

Column 2 of Table V-5 shows the ratio of direct plus indirect plus induced employment to direct employment. Thus for planning region 1, if 100 added workers were required by a sport-related activity, a total of 121 workers would be required throughout the Colorado economy.

Table V-6 shows the total spending and employment in Colorado in 1973 which can be attributed to sportsman exports for particular state planning regions. The business or employment multipliers presented previously are applied to the estimate of total exports shown for each planning region in Table IV-18 in the previous chapter.

TABLE V-4

SPORTSMEN EXPORT
BUSINESS MULTIPLIERS BY STATE PLANNING REGION*

(Direct, Plus Indirect, Plus Induced Business Activity
Per Dollar of Sportsman Exports)

Area 1	2.62
Area 2	2.61
Area 3	2.64
Area 4	2.60
Area 5	2.57
Area 6	2.61
Area 7	2.49
Area 8	2.60
Area 9	2.61
Area 10	2.61
Area 11	2.58
Area 12	2.58
Area 13	2.61

* Multipliers measure effect on Colorado economy attributable to sportsman exports attributed to each planning region.

TABLE V-5

SPORTSMEN EXPORT
EMPLOYMENT MULTIPLIERS BY STATE PLANNING REGION*

	(1) Direct, Plus Indirect, Plus Induced Employment Per \$1,000 of Sportsman Exports	(2) Direct, Plus Indirect, Plus Induced Employment Per Added Worker Hired
Area 1	.07160	1.21
Area 2	.07000	1.13
Area 3	.07060	1.22
Area 4	.07171	1.20
Area 5	.07566	1.20
Area 6	.07304	1.28
Area 7	.07890	1.17
Area 8	.07270	1.20
Area 9	.07090	1.20
Area 10	.07190	1.21
Area 11	.07370	1.20
Area 12	.07320	1.19
Area 13	.07240	1.21

* Multipliers in Column 1 measure the employment in Colorado due to sportsman exports attributed to each planning region. Multipliers in Column 2 show the total Colorado employment increase when an additional worker is hired in the sportsman sector.

Source for both tables: Calculated using data from the Colorado Input-Output Model and the 1973 Hunting and Fishing Survey as explained in the text.

TABLE V-6

DIRECT PLUS INDIRECT PLUS INDUCED COLORADO SALES
AND EMPLOYMENT FROM SPORTSMAN EXPORTS BY REGION OF
HUNTING AND FISHING ACTIVITY: 1973

State Planning Region	Colorado Business Sales ¹	Colorado Employment ²
1	\$ 723,120	20
2	5,971,680	160
3	2,719,200	73
4	1,747,200	48
5	506,290	15
6	874,350	25
7	1,207,650	38
8	11,817,000	330
9	17,108,550	465
10	41,305,860	1,138
11	29,285,580	837
12	16,873,200	479
13	2,891,880	80
STATE TOTAL	\$133,031,560	3,708

¹Excluding sales by finance, insurance, real estate, and government.

²Total Colorado employment supported by sportsman exports, excluding employment in finance, insurance, real estate, and government.

Source: Calculated using data from the Colorado Input-Output Model and the 1973 Hunting and Fishing Survey as explained in the text.

Local Sportsman Spending Multipliers

On occasion it may be useful to calculate the effects of changes in local sportsman spending patterns on the state economy. In order to justify and quantify the calculations, some method must be devised to prove that local sportsman spending will be shifted out of the state economy. For instance, a survey of sportsman who frequent a given region might reveal that changes in local conditions (such as might occur due to resource development projects) would induce some sportsmen to travel out of state to obtain certain hunting or fishing experiences. It must be shown that these sportsmen will not simply move to another region in Colorado nor will they substitute other local activities in place of the particular activity which has been degraded. If an estimate can be obtained of both the share of sportsmen who will shift their spending out of state and also the portion of their spending which is moved out of state, then the data included in this report may be utilized to find the direct and indirect impacts of such shifts in local sportsman spending patterns, i.e., multipliers to apply to the lost Colorado sales. The following exposition addresses the methodology and the calculations necessary to estimate local spending multipliers.

The reader may find that a review of Chapter III and particularly a review of the methodology concerning direct plus indirect effects as shown in Table III-3 is useful in conjunction with the following explanation. Each of the columns of the direct plus indirect effects table (Table III-3) shows the total requirements from the sectors listed at the left in order that the sector listed at the column head deliver an added dollar of sales to final demand (the only relevant sector in final demand in this model is exports). The sum of a given column of Table III-3 shows the total business activity (sales) among industries and households in Colorado generated by a dollar of

sales to exports by the sector shown at the column head. Column sums are termed business multipliers. If the direct plus indirect effects of changes in a given industry's sales to local purchasers is desired, then an adjustment must be made to the business multipliers. The desired local sales multiplier will show the direct plus indirect effects on the local economy (sales) when a given industry changes its local sales (i.e., changes occur in resident sportsman purchases).

The theoretical justification for adjusting business multipliers to indicate the direct plus indirect effects of changes in local sales is as follows. Define the business multiplier for a given sector as:

$$B_i = \frac{\Delta (\text{direct plus indirect sales})_{\text{all sectors}}}{\Delta (\text{export sales})_{\text{sector } i}}$$

Define the main diagonal element of the direct plus indirect effects in column i as:

$$MDE_i = \frac{\Delta (\text{direct plus indirect sales})_{\text{sector } i}}{\Delta (\text{export sales})_{\text{sector } i}}$$

and thus dividing B_i by MDE_i and canceling like terms results in:

$$\text{Local Sales Multiplier}_i = \frac{(\text{direct plus indirect sales})_{\text{all sectors}}}{(\text{direct plus indirect sales})_{\text{sector } i}}$$

The above definitions and resultant cancellation of terms is made possible by the fact that, in the input-output model, sales and purchases must always be equal for processing sectors. Thus, some of the elements above might normally be termed purchases rather than sales but changes in sales will always equal changes in purchases for any given processing sector. The effect of changes in local sales by a given sector on total sales in the state can be found by dividing the business multiplier for that sector by the main diagonal element of the direct plus indirect effects table from the column appropriate for the sector. It is clear that a local sales multiplier for a given industry will

always be less than or equal to the business multiplier since the denominator of the local sales multiplier contains both the direct and indirect sales by the given industry while the denominator of the business multiplier contains only a unit of export sales (\$1).

It should be noted at this point that, had we originally structured the input-output model so that households were included as part of final demand rather than part of the processing sectors, then the adjustment described here would be unnecessary. The estimated sportsman business multipliers would then apply equally to exports and to households since both would have been exogenous in the model. Following this approach could have seriously understated the estimated sportsman business multipliers since the effects of induced consumer spending would have been neglected. Only when modeling rather small undeveloped economies (rather than the state economy) would the assumption that household spending is exogenously determined be appropriate. In undeveloped regions consumers may be unable to obtain desired purchases locally.

In order to convert our sportsman business multipliers to local sportsman spending multipliers each element in the relevant columns of the direct plus indirect effects table for Colorado must be divided by their respective main diagonal elements. The main diagonal element is easily identified since it is the only number that equals or exceeds unity.

The division of the entries in sector 17 (or division of the column sum) by the main diagonal element of 1.098941 yields a local sales multiplier of 2.13 as compared to the 2.34 multiplier on export sales by the transport sector. Dividing the sector 24 business multiplier by 1.507284 yields a local sales multiplier for the trade sector of 1.76 while the division of the business

multiplier for sector 25 by 1.222680 yields a local sales multiplier of 2.00. These three local sales multipliers can be aggregated to find the resident sportsman multiplier for each of the 13 planning regions in a manner analogous to that used on the sportsman business multipliers. The three local sales multipliers must be weighted by the share of resident spending in each of the three sectors for a given region.

Resident spending by cost category and by planning region can be obtained by subtracting the data shown in Table IV-18 from corresponding entries shown in Table IV-19. The resulting table can be further aggregated to obtain spending by residents in each of the three processing sectors (transport, trade, and services) by referring to Table V-1 which ascribes cost categories to the appropriate economic sectors. It is then a simple matter to find the percentage distribution of purchases among the three sectors for each of the 13 planning regions. This distribution is used to weight the local sales multipliers calculated above in order to determine local sportsman multipliers for each planning region.

Comparison of 1968 and 1973 Sportsman Exports¹

Variable Expenditures

As estimated in current dollars, without deflating 1973 expenditures for inflation, nonresident Colorado sportsman increased their variable expenditures 49 percent from \$28.6 million in 1968 to \$42.9 million in 1973. On this current-dollar basis, all categories of hunting and fishing showed an increase in total expenditures. Only one category--other big game hunting--registered a decline in per capita expenditures during the period.

In constant 1968 dollars, nonresident Colorado sportsmen increased their variable expenditures on hunting and fishing in the state from \$28.6 million in 1968 to \$33.6 million in 1973, an increase of 17.4 percent. Specifically, increases in constant dollar total expenditures were registered for fishing (up 10.9 percent), elk hunting (up 108.7 percent), and other big game hunting (up 186 percent). Slight percentage decreases were noted for total variable expenditures by nonresidents between the two survey years for deer and small game hunting.

On a per capita basis, declines in constant dollar variable expenditures between 1968 and 1973 occurred for fishing (down 13.2 percent), deer hunting (down 6.2 percent), and other big game hunting (down 37.7 percent). On the other hand, increases in per capita variable expenditures, in constant dollars, were noted for elk hunting (up 7 percent) and small game hunting (up 20.6 percent).

Significant shifts in the number of nonresident licenses sold occurred between 1968 and 1973. Specifically, the fishing population increased by 28 percent, the number of deer hunters was up by 6 percent, elk licenses

¹This comparison is taken directly from the Colorado Hunting and Fishing Expenditures Study by Blood, et.al.

were up by 95 percent, and holders of nonresident licenses for other big game were up by 360 percent. Conversely, the number of small game hunters decreased by 17 percent.

It was possible to hunt both deer and elk during the same season in 1968, while there was a one-week gap between the two seasons in 1973. Since deer can be hunted in about 40 states, while elk hunting is permitted only in a few western states, it is likely that more nonresident sportsmen in 1973 decided to hunt deer in their own states or at least closer to their homes while traveling to Colorado only for the elk season. Such shifts in hunting patterns would account for the increase in elk variable expenditures from \$2.7 million to \$5.6 million (up 100 percent) for the period, while deer hunting expenditures changed very little. The limited number of states in which other big game species including antelope, bear, and mountain lion--can be hunted provides a logical explanation for a sizable jump in numbers of nonresident hunters participating in hunting these species and in the increase in their total variable expenditures from 1968 to 1973.

Total constant nonresident variable fishing expenditures increased by nearly 11 percent for the period from 1968 to 1973, while per capita nonresident variable fishing expenditures declined by 13.1 percent for the same period. Total nonresident variable expenditures also increased for elk and other big game hunting. A modest 7 percent increase on a per capita basis occurred for elk hunting and a 73.7 percent decline in per capita expenditures occurred for other big game hunting. The overall picture of nonresident variable expenditures was that of more sportsmen spending less per capita in 1973 compared with 1968, but there was a sufficient increase in total numbers of sportsmen to generate total increases in variable expenditures.

Fixed Expenditures

Nonresident fixed expenditures fell drastically for all hunting and fishing activities between the years 1968 and 1973, in both current and constant dollars. For example, in constant dollars, the decline in fixed expenditures by nonresident sportsmen was from \$28.7 million in 1968 to \$6.5 million in 1973, a 77.4 percent decline. Unfortunately, the survey did not elicit specific reasons for such a drastic decline in fixed expenditures. One possible reason for the decline in fixed expenditures by nonresidents was likely to have been a decrease in purchase of cabins and recreational lands in Colorado in 1973, compared with 1968, because the recreational land boom had already passed its peak. Another reason might have been linked directly to the upsurge in the use of new four-wheel drive vehicles and pickup-camper vehicles which are fully stocked on leaving home and so reduce the need for making large fixed expenditures in Colorado. Thus, many hunters or fishermen--who in 1968 may have flown or driven an automobile into Colorado, bought a recreational vehicle (often for use during a single hunting or fishing trip), and then either towed it home or sold it at the conclusion of the trip--may in 1973 simply have driven their own recreational vehicles into Colorado for these sportsmen activities.

In general, however, the survey does not offer a clear explanation for the drastic decline in fixed nonresident expenditures. Since the category of fixed expenditures raises several serious conceptual measurement problems, further research is needed to pinpoint sources of change in these categories over time and to validate the general level of expenditures for specific categories.

Summary

In comparing sportsmen expenditure data for the years 1968 and 1973, it is important that comparisons be based on constant dollar figures that are corrected for price inflation between the two years. The constant dollar figures show changes in expenditures due only to changes in quantity of goods and services purchased, with the effect of the changing price level removed.

Also, it is important to consider both total and per capita expenditure data, to take into account shifts in numbers of resident and nonresident sportsmen between the two survey years. A change in the number of sportsmen can exert a dramatic impact on per capita expenditures, particularly if the shift in numbers is large. Where large shifts occur, previous expenditure patterns are not likely to be representative of the new, larger groups of sportsmen for a specific category, as in the case of other big game hunters. For example, in constant dollars, total resident variable expenditures between 1968 and 1973 rose for fishing, deer hunting, and elk hunting, while the corresponding per capita expenditures for these categories declined. Thus, while average expenditures fell, total expenditures increased because of the overriding importance of the significant increase of the number of sportsmen in each of these categories.

Because of the shifts in nonresident spending patterns in fixed expenditures between the survey years, caution should be exercised in reaching conclusions about shifts in these spending patterns until this trend in spending is more directly established in further research. Moreover, the precautions noted earlier in interpreting fixed cost data obtained from surveys such as this one must be taken into account in reaching conclusions about changes in these spending patterns over time.²

²See pages 46 and 47.

Projection of Sportsman Exports: A Need for Further Study

The contribution of sportsman exports to the Colorado economy in 1973 may certainly be taken as indicative of the general magnitudes of the impact on the state economy made by sportsman spending in other years. However, it is often desirable to project the future importance of a sector or activity within the state's economy. The discussion taken from the Hunting and Fishing Expenditures study quoted above makes it clear that sportsman license sales and purchases do not follow a simple time trend. Table V-7, which shows license sales from 1970 to 1978, provides further evidence that projection for this industry would not be a simple matter. Many simultaneous events impinge on total licenses sold in a given year. Different factors may affect per capita spending by those nonresident sportsmen who do continue to purchase licenses to hunt or fish in Colorado. One very significant variable affecting fishing license sales is the price charged by the state. Between 1975 and 1976, as shown in Table V-7, the price of the nonresident license for fishing rose from \$10 to \$25 while the resulting state revenues from license sales rose from \$317,240 to \$403,400. Since revenues increase concurrently with prices, economists would classify the demand for fishing licenses as inelastic (assuming no other variables affecting revenues changed between 1975 and 1976). The state could increase its revenues from license sales by raising the price. Of course, total state revenues may have declined since only about half as many nonresident fishermen visited Colorado and the resulting fall in exports would reduce Colorado personal income and Colorado tax receipts from individuals and businesses.

Many other factors (see footnotes to Table V-7) may affect license sales; some of these are listed below:

1. Change in license fees,
2. Change in options for multiple hunting or fishing seasons;
3. Change in length of season
4. Change in limits on fish or game per day or per season;
5. Change in combination license types available;

TABLE V-7
 NONRESIDENT HUNTING AND FISHING LICENSE
 SALES 1970-1978

<u>Year</u>	<u>Season</u>	<u>Ten Day</u>	<u>Total Nonresident Fishing</u>
1970	24,416	157,937	182,353
1971	28,157	167,639	195,796
1972	28,967	163,754	192,721
1973	29,619	160,526	190,145
1974	32,678	166,700	199,378
1975	31,724	182,765	214,489
1976	16,136 ¹	149,307 ³	165,443
1977	15,193	134,409	149,602
1978	17,438 ²	149,389 ²	166,827

¹One year fishing license price changed from \$10 to \$25 for nonresidents in 1976.

²1978 sales to November 15, 1978.

³Ten day nonresident license changed to five day in 1976. A \$3 one day license will be initiated in 1979.

⁴Source: Computer printouts, Colorado Division of Wildlife.

TABLE V-7
 NONRESIDENT HUNTING AND FISHING LICENSE
 SALES 1970-1978
 (Continued)

<u>Nonresident Hunting Licenses⁷</u>				
<u>Year</u>	<u>Small Game</u>	<u>Elk</u>	<u>Deer</u>	<u>Bear</u>
1970	2,756	16,721	43,828	325
1971	3,425	16,510	20,450	1,385
1972	3,129	17,367	31,048	1,297
1973	3,160	24,366	42,402	1,658
1974	3,242	26,246	37,016	1,938
1975	3,093	23,219	36,051	2,357
1976	2,489	19,511	25,392	1,897
1977	2,872	- ²	- ³	1,952
1978	2,018 ¹	-	-	1,991 ¹

<u>Year</u>	<u>Archery Deer</u>	<u>Additional Deer</u>	<u>Mountain Lion</u>	<u>"Sportsman"⁶</u>
1970	1,800	1,136	25	7,894
1971	1,798	- ⁴	27	881
1972	2,306	-	30	1,517
1973	3,718	-	48	3,482
1974	3,830	-	49	3,020
1975	4,509	-	76	0 ⁵
1976	1,450	-	47	-
1977	2,057	-	17	-
1978	3,088 ¹	-	69	-

¹ 1978 sales to November 15, 1978.

^{2,3} Elk and deer license type changed to split or combined in 1977.

⁴ Additional deer license terminated in 1971.

⁵ Sportsman license terminated in 1975.

⁶ The "sportsman" license permitted hunting deer, elk, bear, mountain lion, and small game, as well as fishing.

⁷ Source: Computer printouts, Colorado Division of Wildlife.

TABLE V-7
 NONRESIDENT HUNTING AND FISHING LICENSE
 SALES 1970-1978
 (Continued)

Nonresident Hunting Licenses (Continued)

<u>Year</u>	<u>Archery Elk</u>	<u>Antelope</u>	<u>Archery Antelope</u>	<u>Turkey</u>	<u>Limited Elk</u>
1970	499	76	8	-	-
1971	591	64	2	13	-
1972	891	52	1	28	-
1973	3,633	77	7	53	-
1974	2,153	41	31	27	-
1975	3,366	32	23	40	10,198 ¹
1976	1,187 ¹	13	9	15	8,138
1977	1,708	29 ⁷	24	16 ⁷	9,591 ⁷
1978	2,312 ⁷	46 ⁷	37	25 ⁷	11,349 ⁷

<u>Year</u>	<u>Limited Deer</u>	<u>Split Season Deer</u>	<u>Combined Season Deer</u>	<u>Split Season Elk</u>
1970	-	-	-	-
1971	-	-	-	-
1972	-	-	-	-
1973	-	-	-	-
1974	-	-	-	-
1975	561 ²	-	-	-
1976	295	-	-	-
1977	1,509 ⁷	21,991 ³	18,939 ⁴	14,785 ⁵
1978	2,110 ⁷	22,333 ⁷	12,981 ⁷	15,407 ⁷

<u>Year</u>	<u>Combined Season Elk</u>	<u>Total Nonresident Hunting</u>	<u>Total Nonresident Hunting or Fishing Licenses</u>
1970	-	75,068	257,421
1971	-	45,146	240,942
1972	-	57,666	250,387
1973	-	82,604	272,749 ⁸
1974	-	77,593	276,971
1975	-	83,525	298,014
1976	-	60,445	225,888
1977	10,196 ⁶	85,686	235,288
1978	6,709 ⁷	80,443	247,270

^{1,2}Limited deer and elk licenses (drawing) initiated in 1975.

^{3,4,5,6}Split season and combined season licenses initiated in 1977.

⁷1978 sales to November 15, 1978.

⁸This estimate for 1973 compares with 273,285 shown in the study by Blood, et.al. (See Table 29, Colorado Hunting and Fishing Expenditures: 1973.)

6. Change in time period for tourist permits;
7. Effects of energy prices or allocation on travel;
8. Effect of inflation and/or changes in real disposable income;
9. Effects of weather on travel, on expected success ratio, or on enjoyability of experience;
10. Effects of hunting pressure, predicted conditions, such as herd size, etc.
11. The prices of substitutes for game such as fish, beef, pork, etc.
12. The amount of free time and incentive for hunting as might be affected by the rate of unemployment.
13. Game management practices and enforcement activities to prevent poaching;
14. Population changes in regions of the country most likely to visit Colorado (including changes in the composition of the population); and
15. Changes in tastes including the effects of previous experience hunting and fishing in Colorado.

Several studies are in progress at Colorado State University which are related to the issue of sportsman demands. One such project has resulted in a Masters' Thesis by Robert Tomlinson, entitled, An Economic Analysis of Colorado Antelope Hunting Experiences (Department of Economics, unpublished, 1978). Another report resulting from the same research effort is by Robert A. Young, et.al, Measuring Preferences and Willingness to Pay for Colorado Elk Hunting Experiences, forthcoming, February 1979, (Contract Report to the Colorado Division of Wildlife, Department of Economics, Colorado State University). The results of these efforts plus statistical analyses of license sales data over time might result in a reliable technique to project license sales. Given the erratic nature of past license sales over time and the uncertain future regarding both energy prices and availability, and the arbitrary nature of license fee and season decisions as well as the multitude of possible variables affecting both visits and per capita spending by sportsmen, it is unlikely that precise projections of sportsman exports are possible.

APPENDIX



State of Colorado

EXECUTIVE CHAMBERS

DENVER

JOHN A. LOVE
Governor

October 1, 1970

TO WHOM IT MAY CONCERN:

The State of Colorado, in cooperation with various federal agencies, is now in the process of preparing a state water plan. It is the purpose of this plan to project the future needs for water usage in Colorado and to recommend methods for satisfying such future needs. The principal state agency charged with the responsibility for this study is the Colorado Water Conservation Board. The principal federal agency concerned is the United States Bureau of Reclamation, with assistance from the Office of Water Research.

Obviously, the present and future structure of Colorado's economy is a basic factor in the preparation of a state water plan. Under a contractual arrangement, the Department of Economics, Colorado State University, is conducting a study involving the structure of Colorado's economy. The major objectives of this study are to determine the economic interrelationships between the many sectors of our state's economy and the water use by these sectors.

It is my sincere hope that you will cooperate with the Colorado State University personnel who may contact you regarding this study.

Sincerely,

A handwritten signature in cursive script that reads "John A. Love".
JOHN A. LOVE
Governor

JAL:lk

INSTRUCTIONS

This questionnaire is designed to help you provide, in as simple a form as possible, detailed information on your sales and purchases. The Sales Analysis asks: How much do you sell to each sector and where are your markets located? The Purchases Analysis asks: How much do you buy from the various sectors of the economy (including your own sector) and where are your supply sources located?

When exact data are not available, please use estimates. Please attempt to answer all questions. If it is not possible to provide information for some questions, please indicate.

1. We are particularly interested in obtaining data for calendar year 1970. However, if it is more convenient, fiscal year data are acceptable. In the event that data are not available for either, please use any consecutive twelve months since 1970.
2. You may indicate your 1970 sales or purchases in dollar amounts or percentages. Our objective is to use the data from many firms in each industry to typify the markets served and the portion of the sales dollar spent on materials and services.
3. Sales are direct sales to the industry which purchases your product.
4. Sales to wholesale and retail trade are sales to establishments which resell your product without any alterations. This is distinguished from sales to other producers who use your products to produce other products.
5. Sales to "Households" consist of sales of your product to final consumers. A sale of your product to a businessman for personal use should be listed as a sale to households.
6. Purchases from "Households" refer to your expenditures on management and labor, i.e., total wages and salaries.
7. Should you have any questions regarding this questionnaire, please call collect:

S. Lee Gray
 Department of Economics
 Colorado State University
 Fort Collins, Colorado 80521
 (303) 491-6948

SALES ANALYSIS QUESTIONNAIRE

This questionnaire is designed to help you provide us, in as simple a form as possible, detailed information on your sales. Your responses will be aggregated with those of other firms in your sector, and thus we assure you that no single firm's responses will be identified.

1. Please list the major products or services you produce: _____

2. Please indicate the 1970 sales of your Colorado establishments:
 TOTAL SALES: \$ _____

3. Allocation of sales among markets:
- (a) In Column 1 please allocate your total sales among the markets listed at left. You may use either dollar values or a percentage of total sales.
 - (b) In Column 2 please indicate the volume of sales made to Colorado markets. You may use either dollar values or a percentage of total sales.
 - (c) If you are uncertain as to the market classification for your sales, please refer to the Major Group Descriptions attached at the end of the questionnaire.

DEMAND SOURCE: SECTORS TO WHICH YOU SELL	(1)	(2)
	TOTAL SALES \$ or %	SALES MADE TO COLORADO MARKETS \$ or %
1 Livestock and Livestock Products		
2 Irrigated Crops and Pasture		
3 Dryland Crops and Pasture		
4 Other Agriculture		

(continued on next page)

APPENDIX A (Cont.)

(1)

(2)

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DEMAND SOURCE: SECTORS TO WHICH YOU SELL	TOTAL SALES \$ or %	SALES MADE TO COLORADO MARKETS \$ or %
5. Processed Meat, Dairy, and Grain Products		
6. Other Food and Kindred Products		
7. Forestry and Fishery Products		
8. Metal Mining and Milling		
9. Petroleum Production and Natural Gas Processing		
10. Industrial Minerals, Mining, and Processing		
11. Coal Mining		
12. Industrial Services — Mineral and Fuels		
13. Metal Smelting and Refining		
14. Petroleum Refining		
15. Industrial Mineral Processing — Brick and Cement		
16. Electric Power Generation		
17. Construction		
18. Fabricated Metal, Metal Fixtures, Machinery, Transportation Equipment, Industrial and Household Lighting and Wiring		
19. Electronic Components, Computers, Scientific and Medical Testing and Measuring Devices, Photographic and Optical Goods		
20. Pipeline Transportation		
21. Other Transportation, Communication, and Public Utilities		
22. Textiles, Leather, and Apparel		
23. Paper and Allied Products		
24. Printing and Publishing		
25. Chemicals, Explosives, and Rubber Products		
26. Lumber and Wood Products, Wood Furniture, and Fixtures		
27. All Other Manufacturing — Tobacco, Jewelry, Sporting Goods, Pencils, etc.		
28. Wholesale and Retail Trade		
29. Finance, Insurance, and Real Estate		
30. Services		
31. Education		
32. Government		
33. Households (Gross Wages and Salaries)		
34. Net Inventory Accumulation ¹		
35. Private Capital Goods Formation ²		

¹Net Inventory Accumulation may be either a positive or negative entry.

²Private Capital Goods Formation refers to sales of buildings, machinery, or equipment which your customers treat as fixed depreciable assets.

PURCHASES ANALYSIS QUESTIONNAIRE

This questionnaire is designed to help you provide us, in as simple a form as possible, detailed information on your purchases. Your responses will be aggregated with those of other firms in your sector, and thus we assure you that no single firm's responses will be identified.

1. What is the total number of **employees** in your firm? _____
2. Please indicate the approximate cost of the materials, parts, supplies, and services you purchased from other sources in 1970. Please include all payments such as those to state, local, and federal governments (taxes); depreciation allowances; wages; salaries; rents; interest; and dividends in this total.

TOTAL PURCHASES: \$ _____

3. Allocation of purchases among markets:
 - (a) In Column 1 please allocate your total purchases among the markets listed at the left. You may use either dollar values or a percentage of total purchases.
 - (b) In Column 2 please indicate the volume of purchases made from Colorado markets. You may use either dollar values or a percentage of total purchases.
 - (c) If you are uncertain as to the market classification for your purchases, please refer to the Major Group Descriptions attached at the end of the questionnaire.

	(1)	(2)
SUPPLY SOURCE: SECTORS FROM WHICH YOU PURCHASE	TOTAL PURCHASES \$ or %	PURCHASES MADE IN COLORADO MARKETS \$ or %
1. Livestock and Livestock Products		
2. Irrigated Crops and Pasture		
3. Dryland Crops and Pasture		
4. Other Agriculture		
5. Processed Meat, Dairy, and Grain Products		
6. Other Food and Kindred Products		
7. Forestry and Fishery Products		
8. Metal Mining and Milling		
9. Petroleum Production and Natural Gas Processing		
10. Industrial Minerals, Mining and Processing		
11. Coal Mining		
12. Industrial Services — Mineral and Fuels		
13. Metal Smelting and Refining		
14. Petroleum Refining		
15. Industrial Mineral Processing — Brick and Cement		
16. Electric Power Generation		
17. Construction		
18. Fabricated Metal, Metal Fixtures, Machinery, Transportation Equipment, Industrial and Household Lighting and Wiring		
19. Electronic Components, Computers, Scientific and Medical Testing and Measuring Devices, Photographic and Optical Goods		
20. Pipeline Transportation		

(continued on next page)

APPENDIX A (Cont.)

(1)

105 (2)

SUPPLY SOURCE: SECTORS FROM WHICH YOUR PURCHASE	TOTAL PURCHASES \$ or %	PURCHASES MADE IN COLORADO MARKETS \$ or %
21. Other Transportation, Communication, and Public Utilities		
22. Textiles, Leather, and Apparel		
23. Paper and Allied Products		
24. Printing and Publishing		
25. Chemicals, Explosives, and Rubber Products		
26. Lumber and Wood Products, Wood Furniture, and Fixtures		
27. All Other Manufacturing — Tobacco, Jewelry, Sporting Goods, Pencils, etc.		
28. Wholesale and Retail Trade		
29. Finance, Insurance, and Real Estate		
30. Services		
31. Education		
32. Government		
33. Households (Gross Wages and Salaries)		
34. Depreciation Allowance		
35. Rents and Dividends		

WATER USE ANALYSIS

1. What is your estimate of your total water intake for all phases of your operation? (NOTE: Please use any unit of measurement which is convenient, such as gallons per day, 1000 gallons per day, acre feet per year, etc.)

Total Water Intake: _____

MAJOR GROUP DESCRIPTIONS

Sector

- 5 This major group includes meat-packing plants, sausage products, small game dressing, and other prepared meat products; manufacture of dairy products, flour, and other grain mill products; prepared animal feed; and cereal preparations.
- 6 This major group includes enterprises engaged in processing and manufacture of fruits, vegetables, and seafoods; bakery products; sugar; beverages; and other food preparations **not** including meat, dairy, and grain products.
- 7 This major group includes enterprises engaged in commercial hunting and trapping; also included are the operation of timber tracts, reforestation services, and the gathering of forest products; and commercial fishing, fisheries, and hatcheries.
- 8 This major group includes establishments primarily engaged in mining, developing mines, or exploring for metallic minerals (ores). These ores are valued chiefly for the metals contained, to be recovered for use as such or as constituents of alloys, chemicals, pigments, etc. This major group also includes all ore dressing and beneficiating operations, whether performed at mills operated in conjunction with the mines served or at mills, such as custom mills, operated separately. These include mills which crush, grind, wash, dry, sinter, or leach ore, or perform gravity separation or flotation operations.
- 9 This major group includes establishments primarily engaged in: (1) producing crude petroleum and natural gas, (2) recovering oil from oil sands and oil shale, and (3) producing natural gasoline and cycle condensate. Types of activities included are exploration, drilling, oil and gas well operation and maintenance, the operation of natural gasoline and cycle plants, and the mining and extraction of oil from oil sands and oil shale. This major group also includes such basic activities as emulsion breaking and desilting of crude petroleum in the preparation of oil and gas customarily done at the field site.
- 10 This major group includes establishments primarily engaged in mining or quarrying, developing mines, or exploring for nonmetallic minerals, except fuels. Also included are certain well and brine operations and primary preparation plants, such as those engaged in crushing, grinding, washing, or other concentration.
- 11 This major group includes establishments primarily engaged in producing bituminous coal or lignite. Included are *mining operations and preparation plants (also known as cleaning plants and washeries)*, whether or not such plants are operated in conjunction with the mines served.
- 12 Establishments primarily engaged in performing oil and gas field services, not elsewhere classified, for others on a contract, fee, or similar basis, such as excavating slush pits and cellars; grading and building of foundations at well locations; well surveying; running, culling, and pulling casings, tubes, and rods; cementing wells; shooting wells; perforating well casing; acidizing and chemically treating wells; and cleaning out, bailing, and swabbing wells.
- Establishments primarily engaged in performing metal mining services for others on a contract, fee, or similar basis, such as the removal of overburden, strip mining for metallic ores, prospect and test drilling, and mine exploration and development. Establishments which have complete responsibility for operating mines for others on a contract, fee, or similar basis are classified according to the product mined, rather than as metal mining services. Establishments primarily performing jobbing services.
- 13 This major group includes enterprises engaged in the smelting and refining of ferrous and nonferrous metals from ore pig or scrap, including the production of pig iron, steel, blooms, billets, slabs, also included in the production of coke.
- 14 Establishments primarily engaged in producing gasoline, kerosene, distillate fuel oils, residual fuel oils, lubricants, and other products from crude petroleum and its fractionation products, through straight distillation of crude oil, redistillation of unfinished petroleum derivatives, cracking, or other processes.
- 15 This major group includes establishments engaged in the processing of raw industrial mineral commodities to produce a higher level of product such as cement, brick, tile pipe, cement blocks, lightweight aggregate, stove products, and other materials, from materials taken principally from the earth in the form of stone, clay, and sand.
- 16 Establishments engaged in the generation, transmission, and/or distribution of electric energy for sale.
- 17 This major group includes enterprises primarily engaged in contract construction. This includes new work, alterations, and repairs done by general contractors or by special trade contractors. (Those who build on their own account for resale or lease are classified in Section 30 under Real Estate.)
- 18 This major group includes enterprises engaged in fabricating ferrous and nonferrous metal products such as metal cans, tinware, hand tools, cutlery, general hardware, nonelectric heating apparatus; manufacture of nails, spikes, and insulated wire and cable; fabricated structural metal products, metal stampings, including guns, howitzers, mortars, small arms, and transportation equipment for the transportation of passengers and cargo by land, air, and water, including tanks and tank components; also included are manufacturers of machines powered by built-in or detachable motors, excluding electronic computing equipment and accounting machines. Included are metal furniture and fixtures; electrical industrial apparatus such as motors, generators, welders, household appliances (major and small), electric lighting and wiring equipment, storage batteries (wet or dry); electrical equipment for internal combustion engines; and other electrical equipment such as gongs, chimes, electric fences, etc.

(continued on back page)

- 19 This major group includes those enterprises primarily engaged in the manufacture of precision electronic and nonelectronic measuring, graphing, and recording instruments, including those which test the electrical characteristics of internal combustion engines; and switch-gear — switchboard apparatus, radio, television, and other audio and communications electronic components and systems; communication equipment such as telephone, telegraph, radio and television transmitting, signaling, and detection equipment; electronic computing equipment, calculation and accounting machines; radiographic, fluoroscopic, and therapeutic X-ray, and other X-ray apparatus and tubes, electromedical and electrotherapeutic apparatus. Also included are the manufacture of guided missiles and space vehicles, sighting, and fire control equipment. Also this major group includes those who manufacture engineering, laboratory, and scientific and research instruments, automatic temperature controls; optical instruments and lenses; surgical, medical, and dental instruments; photographic equipment and supplies; and watches and clocks.
- 20 This major group includes enterprises engaged in petroleum pipeline transportation (crude oil, natural gasoline, refined products) and natural gas transmission.
- 21 This major group includes enterprises engaged in passenger and freight transportation by railway, highway, water, or air, or furnishing services related to transportation; warehousing; telephone and telegraph communication services; radio and television broadcasting; and the supplying of electricity, gas, steam, water, or sanitary services.
- 22 This major group includes enterprises engaged in performing any of the following: manufacturing broad and narrow woven and knit fabric, carpets, and rugs from yarn; manufacture of knit apparel and other finished articles from yarn; apparel and other finished products made from fabrics and similar materials. Also included is the tanning, currying, and finishing of hides and skins, those who manufacture finished leather and artificial leather products, and some similar products made of other material.
- 23 This major group includes the manufacture of pulp from wood and other cellulose fibers, and rags, the manufacture of paper and paperboard, and the manufacture of paperboard into converted products such as paper bags, paper boxes, and envelopes.
- 24 This major group includes enterprises engaged in printing by one or more of the common processes, such as letterpress, lithography, gravure, or screen; and those establishments which perform services for the printing trade, such as bookbinding, typesetting, engraving, photoengraving, and electrotyping.
- 25 Enterprises classified in this major group manufacture these general classes of products: basic chemicals such as acids, alkalis, salts, and organic chemicals; chemical products to be used in further manufacture, such as synthetic fibers, plastic materials (including explosives and ammunition, depth charges, etc.), dry colors, and pigments; finished chemical products to be used for ultimate consumption such as drugs, cosmetics, and soaps; paving and roofing materials; natural, synthetic, or reclaimed rubber; all kinds of rubber products such as tires, rubber footwear, mechanical rubber goods. This group also includes establishments engaged in molding primary plastics for the trade and manufacturing miscellaneous finished plastic products.
- 26 In addition to wood furniture and fixtures, this major group includes logging camps engaged in cutting timber and pulpwood; merchant sawmills, lath mills, shingle mills, cooperage stock mills, planing mills, plywood and veneer mills engaged in producing lumber and wood basic materials; and establishments engaged in manufacturing finished articles made entirely or mainly of wood or wood substitutes.
- 27 This group can be deemed a residual group. Establishments included are those engaged in the manufacture of cigarettes and other tobacco products, stemming and redrying tobacco; sporting goods; musical instruments; silverware and other plated ware, toys, pens, pencils, costume novelties; brooms and brushes; morticians' goods, and other miscellaneous manufacturing industries not listed elsewhere.
- 28 This major group includes establishments or places of business primarily engaged in selling merchandise to retailers; to industrial, commercial, institutional, or professional users; to other wholesalers. Also included are establishments which sell merchandise for personal, household, or farm consumption, and rendering services incidental to the sale of the goods.
- 29 This major group comprises establishments operating primarily in the fields of finance, insurance, and real estate. Finance includes banks and trust companies, credit agencies other than banks, holding companies, other investment companies, brokers and dealers in securities and commodity contracts, and security and commodity exchanges. Insurance covers carriers of all types of insurance, insurance agents, and brokers. Real estate includes owners, lessors, lessees, buyers, sellers, agents, and developers of real estate.
- 30 Services include establishments primarily engaged in rendering a wide variety of services to individuals and business establishments. Hotels and other lodging places; establishments providing personal, business, repair, and amusement services; medical, legal, engineering, and other professional services; *nonprofit membership organization*, and other miscellaneous services are included. Also included are enterprises engaged in performing agricultural, animal husbandry, and horticultural services on a fee or contract basis.
- 31 Educational services include public and private institutions furnishing formal academic or technical courses, correspondence schools, commercial and trade schools, and libraries. *Schools for the instruction of beauty, beauty shops, and barber colleges are included under 30.*
- 32 This division includes all federal, state, local, and international government activities, such as the legislative, judicial, and administrative functions, as well as government owned and operated business enterprises.
- 33 A purchase from households would include all wages, interest payments, and salaries which are paid by the firm which accrue to the individual. Expenditure by households includes all revenues to the firm not attained by the sale of goods and services to government from exports or to other firms. The household, in this respect, is the final individual consumer.

APPENDIX B

SOURCES OF COLORADO INPUT-OUTPUT
TOTAL SALES BY SECTOR IN 1970

All SIC definitions are based on the 1972 description as identified in Office of Management and Budget, Executive Office of the President, Standard Industrial Classification Manual 1972, U.S. Government Printing Office, Washington, D.C.

Sector Number

- 1 4924, 4931 (part) NATURAL GAS DISTRIBUTION.
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- 2 02 LIVESTOCK AND LIVESTOCK PRODUCTS.
Colorado Crop and Livestock Reporting Service, Colorado Agricultural Statistics. (various years)

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- 3, 4 01 AGRICULTURE.
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Op. cit., ASCS, Colorado Annual Report.
- 5 20 FOOD AND KINDRED PRODUCTS.
U.S. Bureau of the Census, Census of Manufacturers, 1972, Area Series, Colorado, MC 72(3)-6. U.S. Government Printing Office, Washington, D.C., 1975. (also 1967)
- 6 1011, 1021, 1031, 1041, 1044, 1061, 1094, 1099 METAL MINING.
Colorado Bureau of Mines, A Summary of Mineral Industry Activities in Colorado. (various years)

Bureau of Mines, U.S. Department of the Interior, Minerals Yearbook, Vol. III, Area Reports: Domestic. U.S. Government Printing Office, Washington, D.C. (various years)
- 7 1311, 1321 PETROLEUM PRODUCTION.
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Op. cit., Minerals Yearbook.

- 8 14 (except 148), 324, 325, 327 INDUSTRIAL MINERALS PRODUCTION.
 Op. cit., A Summary of Mineral Industry Activities in Colorado.
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- 9 1211 COAL MINING.
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- 10 1081, 1213, 1381, 1382, 1389, 1481 MINING SERVICES.
 U.S. Bureau of the Census, County Business Patterns. U.S. Government Printing Office, Washington, D.C. (various years)
 U.S. Bureau of the Census, Census of Mineral Industries, 1972, Industry Series: Metal Mining Services and Miscellaneous Metal Ores, MIC 72(1)-10D. U.S. Government Printing Office, Washington, D.C., 1975. (also 1967)
 U.S. Bureau of the Census, Census of Mineral Industries, 1967, Industry Series: Bituminous Coal and Lignite Mining, MIC 67(1)-12A. U.S. Government Printing Office, Washington, D.C., 1970.
 U.S. Bureau of the Census, Census of Mineral Industries, 1967, Area Series: Colorado, MIC 67(2)-6. U.S. Government Printing Office, Washington, D.C., 1970.
- 11 4612, 4613, 4922, 4923 PIPE LINE TRANSPORTATION.
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 Moody's Investors Service, Inc., Moody's Public Utility Manual. (various years)
 Public Utilities Commission, State of Colorado, Annual Report. (various years)
 Public Service Company of Colorado, Statistical Review, 1964-1974.
 Various Companies' Annual Reports to the Colorado Public Utilities Commission.
- 12 2911, 295, 299 PETROLEUM REFINING.
 Op. cit., Census of Manufacturers, 1972, Area Series: Colorado.

Sector Number

- 13 33 PRIMARY METAL.
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- 14 4911 (part), 4931 (part) ELECTRIC POWER GENERATION.
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Office, Washington, D.C., 1973. (also 1967)
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1972 Annual Statistical Report: Rural Electric Borrowers. U.S.
Government Printing Office, Washington, D.C., 1973. (also 1967)
- 15 2514, 2515, 2522, 2542, 2591, 2599, 34 (except 3482 and 3483), 35
(except 3573 and 3574), 362, 363, 364, 3691, 3692, 3694, 3699, 37
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Moody's Investors Service, Moody's Industrial Manual. (various years)
- Op. cit., Census of Manufacturers, 1972, Area Series: Colorado.
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- Op. Cit., County Business Patterns.
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Series: Electrical Measurement and Distribution Equipment, MC
72(2)-36A. U.S. Government Printing Office, Washington, D.C., 1975.
- U.S. Bureau of the Census, Census of Manufacturers, 1972, Industry
Series: Engineering, Measuring and Controlling and Optical Instru-
ments, MC 72(2)-38A. U.S. Government Printing Office, Washington,
D.C., 1975.
- U.S. Bureau of the Census, Census of Manufacturers, 1972, Industry
Series: Household Appliances, MC 72(2)-36B. U.S. Government
Printing Office, Washington, D.C., 1975.
- U.S. Bureau of the Census, Census of Manufacturers, 1972, Industry
Series: Ordinance and Accessories, NEC, MC 72(2)-34E. U.S.
Government Printing Office, Washington, D.C., 1975.
- 16 3573, 3574, 361, 365, 366, 367, 3693, 38 ELECTRONIC AND SCIENTIFIC PRODUCTS
Op. cit., Census of Manufacturers, 1972, Area Series: Colorado.
- Op. cit., County Business Patterns.
- 17 40, 41, 42, 45, 47, 48, 49 [except 491 (part), 4922, 4923, 4924, 4931
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- Division of Property Taxation, State of Colorado, Annual Report to
the Governor and the Legislature. (various years)
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tistics in the United States for the Year Ended December 31, 1972,
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Sector Number

Bureau of Accounts, Interstate Commerce Commission, Transport Statistics in the United States for the Year Ended December 31, 1972, Part 1: Railroads.

Moody's Investors Service, Inc., Moody's Transportation Manual 1973.

Civil Aeronautics Board and Federal Aviation Administration, Airport Activity Statistics of Certificated Route Air Carriers, 12 Months Ended December 31, 1972.

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| 18 | 22, 23, 31 TEXTILES, LEATHER, APPAREL.
Op. cit., Census of Manufacturers, Area Series: Colorado.

Op. cit., County Business Patterns. |
| 19 | 26 PAPER AND ALLIED PRODUCTS.
Op. cit., Census of Manufacturers, Area Series: Colorado. |
| 20 | 27 PRINTING AND PUBLISHING.
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Sector Number

- 21 28, 30, 3482, 3483 CHEMICALS, EXPLOSIVES AND RUBBER PRODUCTS.
Op. cit., Census of Manufacturers, Area Series: Colorado.
Op. cit., County Business Patterns.
- 22 24, 2511, 2512, 2519, 2521, 2531, 2541 LUMBER AND WOOD PRODUCTS.
Op. cit., Census of Manufacturers, Area Series: Colorado.
Op. cit., County Business Patterns.
- 23 21, 323, 326, 328, 329, 39 ALL OTHER MANUFACTURING.
Op. cit., Census of Manufacturers, Area Series: Colorado.
- 24 50-59 TRADE
Colorado Department of Revenue, Annual Report. (various years)
U.S. Bureau of the Census, Census of Retail Trade, 1972, Area Series, Colorado, RC 72-A-6, U.S. Government Printing Office, Washington, D.C., 1974.
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- 25 70, 72, 73, 75, 76, 78, 79, 80, 81, 84, 86, 89 SERVICES.
U.S. Bureau of the Census, Census of Selected Service Industries, 1972, Area Series, Colorado, SC 72-A-6. U.S. Government Printing Office, Washington, D.C., 1974.
Internal Revenue Service, Department of the Treasury, Statistics of Income: Business Income Tax Returns. U.S. Government Printing Office, Washington, D.C. (various years)
- 26 821 PUBLIC SCHOOLS.
Colorado Department of Education, Revenue and Expenditures, Colorado School Districts. (various years)
- 27 822 HIGHER EDUCATION.
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Bureau of Land Management, U.S. Department of the Interior, Public Land Statistics. U.S. Government Printing Office, Washington, D.C. (various years)

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United States Post Office Department, Annual Report of the Postmaster General. U.S. Government Printing Office, Washington, D.C. (various years)

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Op. cit., County Business Patterns.

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- 31 15, 16, 17 CONSTRUCTION.
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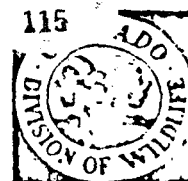
DIVISION OF WILDLIFE

Jack R. Grieb, Director

6060 Broadway

Denver, Colorado 80216 (825-1192)

APPENDIX C

SURVEY FORM FOR THE
1973 COLORADO HUNTING
AND FISHING EXPENDITURES
SURVEY

Dear Hunter or Fisherman:

The Colorado Division of Wildlife needs your help! We are making a survey to find out more about all sportsmen who hunt and fish in Colorado. Because the hunting and fishing population is decreasing in relation to the total population and in light of the current energy crisis, the information you can provide us is very important to the future of your sport. We will use it to help us progressively develop the fish and wildlife resources of our state.

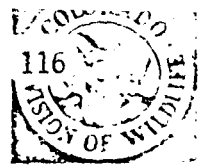
You are one of a carefully selected sample, representative of all persons who purchased hunting and fishing licenses in Colorado during 1973. In order to ensure that the information we obtain from this sample is meaningful, we need your expenditure information. Your expenditure information is important regardless of how little or how much you hunted and/or fished in Colorado in 1973.

Please read the entire questionnaire before filling it out in order that you may acquaint yourself with the information we are seeking. Estimations are satisfactory when filling it out. Record only your own expenditures, or your share, for 1973. In other words, if you purchased items which were used by friends or family other than yourself, list only that amount of the total expenditure you would attribute to your own hunting and/or fishing use. Return the completed questionnaire in the enclosed envelope addressed to the Department of Economics, Colorado State University, Fort Collins, Colorado 80521, which is cooperating with us by collecting and analyzing the results of this survey for us.

If you participated in more than one activity, you could receive more than one copy of this questionnaire. If you do, please return only one copy. Your cooperation will be very much appreciated.

Sincerely,

Jack R. Grieb
Director



DIVISION OF WILDLIFE

Jack R. Grieb, Director

6060 Broadway

Denver, Colorado 80216 (825-1192)

Dear Hunter or Fisherman:

A few weeks ago a questionnaire was mailed to you which requested information concerning your hunting and/or fishing expenditures in 1973. As yet, we have not received your questionnaire.

Because we are surveying only a very carefully selected sample, the information you can provide us is extremely important, regardless of how much your expenditures were. This information is necessary in order for us to evaluate the economic significance of hunting and fishing in Colorado. Also, this information will assist us in making decisions regarding the development of hunting and fishing resources.

Please help us by mailing your completed questionnaire at your earliest convenience. If you have just recently mailed your questionnaire, please disregard this letter. Thank you for your cooperation.

Sincerely,



Jack R. Grieb
Director

STATE OF COLORADO

John D. Vanderhoof, Governor

DEPARTMENT OF NATURAL RESOURCES

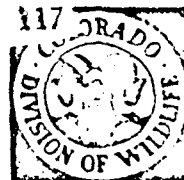
DIVISION OF WILDLIFE

Jack R. Grieb, Director

6060 Broadway

Denver, Colorado 80216 (825-1192)

APPENDIX C (Cont.)



Dear Hunter or Fisherman:

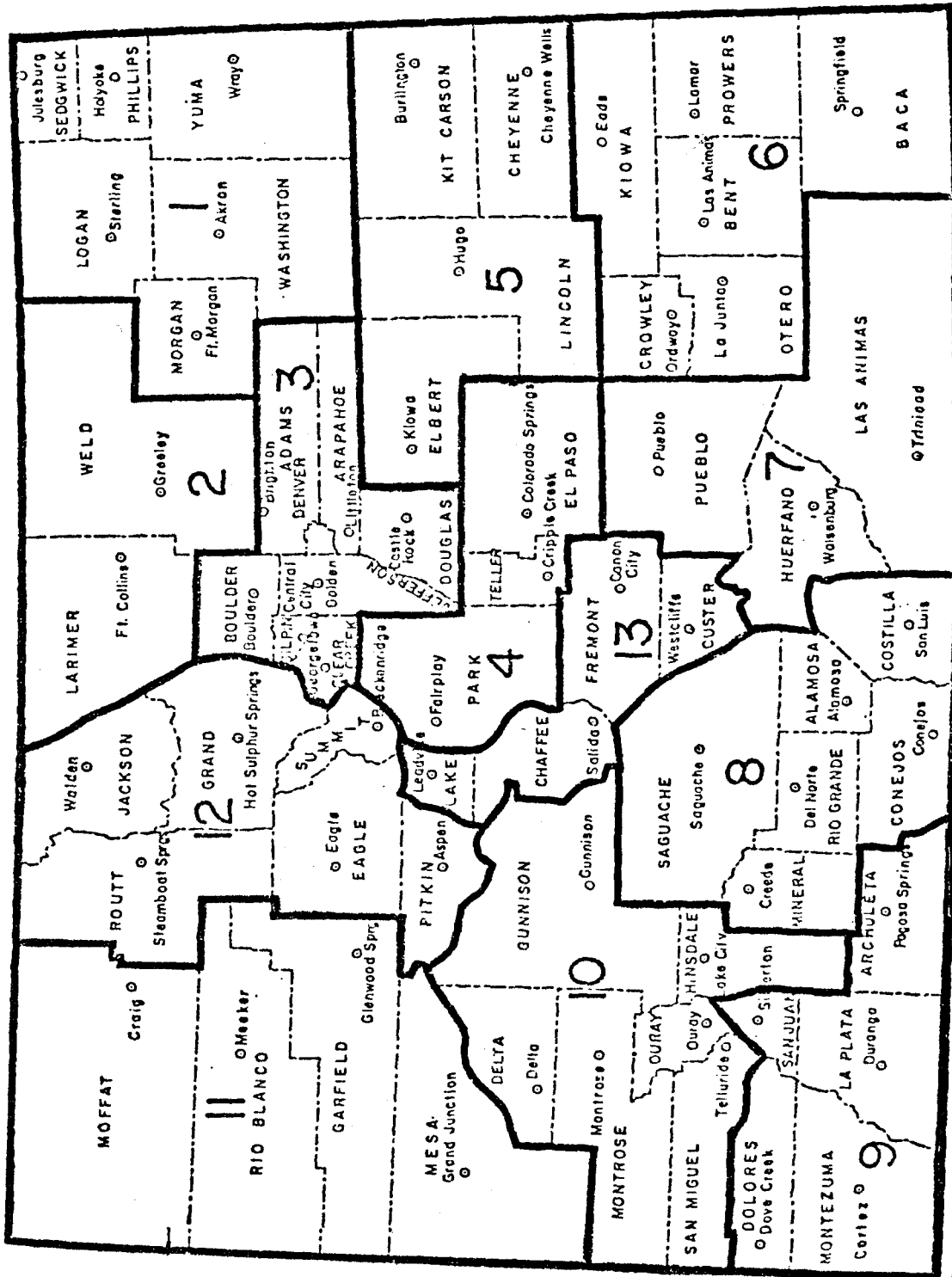
In response to our second letter requesting hunting and/or fishing expenditure data, numerous sportsmen reported that they had lost or misplaced their questionnaire. Since our records indicate that you have not returned your questionnaire, we have enclosed an additional questionnaire and return envelope.

Since we are surveying a carefully selected random sample of the sportsmen population and must meet budget limitations, it is hoped that each sportsman fill out the questionnaire regardless of his expenditure. These data will be used to indicate the importance of hunting and fishing to the State's economy and thereby enhance the development of hunting and fishing resources. Because the hunting and fishing population is decreasing in relation to the total population, the information you can provide us is very important to the future of your sport.

Please help us by mailing your completed questionnaire at your earliest convenience. If you have just recently mailed your questionnaire, please disregard this letter. Thank you for your cooperation.

Sincerely,


Jack R. Grieb
Director



JANUARY 1, 1974

State Planning and Management Regions

Division of Planning
524 Social Services Building
Denver, Colorado 80203

1. Location of Previous Fishing and Hunting Activity:

For each of the categories in which you have participated in Colorado, fill in Columns A through C. For Column A, refer to the enclosed Colorado map.

	Name of County Most Frequently Visited	Number of Years Visited	Number of Trips in 1973
Fishing and Hunting Categories	A	B	C
Antelope			
Bighorn Sheep			
Bear			
Deer			
Elk			
Mountain Goat			
Mountain Lion			
Fishing - Lake			
Fishing - Stream			
Duck			
Geese			
^a Small Game Birds			
^b Small Game Mammals			
^c Varmints			

^aIncludes: Grouse, Partridge, Pheasant, Pigeon, Dove, Quail and Turkey.

^bIncludes: Cottontails, Snowshoe Hares and Tree Squirrels.

^cIncludes: Jack Rabbit, Bobcat, Coyote, Prairie Dog, Fox and Ground Squirrels.

2. Did you pay an access or trespass fee to fish and/or hunt on private land in Colorado during 1973? Yes _____ No _____.

(a) If yes, for what activity? _____.

(b) Rate per day? _____ or Rate per season? _____.

3. Please circle the cost of each Colorado license purchased by you in 1973.

	Resident	Non-Resident		Resident	Non-Resident
Sportsman	\$ 30.00	\$135.00	Mountain Goat	\$ 40.00	None
10-day Fishing	None	5.00	Mountain Lion	25.00	\$ 50.00
Season Fishing	6.00	10.00	Turkey	5.00	10.00
Extra Rod Stamp	2.00	2.00	Archery Antelope	10.00	25.00
Lifetime Fishing	20.00	None	Archery Deer	7.50	25.00
Fishing/Small Game Comb.	7.50	None	Archery Elk	10.00	25.00
Antelope	10.00	50.00	Trapper	4.00	25.00
Bear	5.00	25.00	Small Game	4.00	15.00
Bighorn Sheep	40.00	None	Duck Stamp (Federal)	5.00	5.00
Deer	10.00	50.00	Goose Permit - \$2.00	2.00	2.00
Elk	12.50	75.00	Goose Permit - \$1.00	1.00	1.00

4.(a) Group I - Specific Use Items

Please indicate the dollar amounts of items purchased 1973 which were used ONLY for hunting and/or fishing:

	Column 1 Total 1973 Expenses IN Colorado	Column 2 Total 1973 Expenses OUTSIDE Colorado
1. Licenses, duck stamp, special goose permit, etc (total from question #3).....	_____	_____
2. Special clothing for hunting and/or fishing.....	_____	_____
3. Ammunition.....	_____	_____
4. Fishing rods, tackle and bait.....	_____	_____
5. Other hunting and/or fishing equipment (game bags, waders, etc.).....	_____	_____
6. Private transportation (gas, oil, tires, repairs)..	_____	_____
7. Commercial transportation (fares, <u>vehicle rentals</u> , charter).....	_____	_____
8. Lodging (motel, cabin, seasonal rental).....	_____	_____
9. Food and drink	_____	_____
10. Boat and equipment rentals (not including <u>vehicles</u>)	_____	_____
11. Privilege fees (access, camping, memberships, boat or state park sticker).....	_____	_____
12. Services (packers, guides, horses, etc.).....	_____	_____
13. Shipping, locker, and/or meat processing costs....	_____	_____
14. Taxidermy work.....	_____	_____
15. Miscellaneous (film, boot grease, etc.).....	_____	_____
16. Total - Column 1.....	=====	=====

4.(b) Please list the percentage of Line 16, Column One, Question 4(a), (Total 1973 Expenses in Colorado) chargeable to the following activities:

<u>ACTIVITY</u>	<u>% of 1973 COLORADO EXPENSES</u>
Antelope	_____%
Bighorn Sheep	_____%
Bear	_____%
Deer	_____%
Elk	_____%
Mountain Goat	_____%
Mountain Lion	_____%
Fishing - Lakes	_____%
Fishing - Streams	_____%
Duck	_____%
Geese	_____%
^a Small Game Birds	_____%
^b Small Game Mammals	_____%
^c Varmints	_____%
TOTAL =	100

^aIncludes: Grouse, Partridge, Pheasant, Pigeon, Dove, Quail and Turkey.

^bIncludes: Cottonail, Snowshoe Hares and, Tree Squirrels.

^cIncludes: Jack Rabbit, Bobcat, Coyote, Prairie Dog, Fox and, Ground Squirrels.

5.(a) Group II - Multi-Purpose Use Items Purchased in 1973

Instructions: Because these items may be used for purposes other than hunting and/or fishing, please list the amount chargeable to hunting and/or fishing in addition to total cost. Example: You bought a \$3000 recreational vehicle in 1973 and you feel only 25% of the cost is chargeable to hunting and/or fishing because you also drive it to work. Then you would list \$3000 for item no. 2, column 1 and \$750 in the blank to the right if you bought the vehicle in Colorado or just list \$3000 in item 2, column 2 if you bought the vehicle outside Colorado.

	<u>Column 1</u> Total 1973 Expenses IN Colorado	Colorado Expenses Chargeable to Hunting and/or Fishing <u>ONLY</u>	<u>Column 2</u> Total 1973 Expenses <u>OUTSIDE</u> Colorado
1. Family vehicle.....	_____	_____	_____
2. Recreational vehicle (4-wheel drive, pick-up, etc., other than the above).....	_____	_____	_____
3. Cabin, land and/or water area (other than permanent residence).....	_____	_____	_____
4. Camping trailer or camper for pick-up.....	_____	_____	_____
5. Camping equipment (tent, sleeping bag, accessories)_____	_____	_____	_____
6. Boating equipment (boat, canoe, motor, accessories)_____	_____	_____	_____
7. Firearms, archery, and other multi-purpose equipment (binoculars, boots, etc.).....	_____	_____	_____
8. Dogs and their care.....	_____	_____	_____
9. Miscellaneous.....	_____	_____	_____
10. Total <u>Colorado</u> expenses for multi-purpose items chargeable to hunting and/or fishing.....	_____	_____	_____

5.(b) Please list the percentage of Line Ten, Question 5(a), (Total Colorado expenses for multi-purpose use items chargeable to hunting and/or fishing ONLY) chargeable to the following activities:

<u>ACTIVITY</u>	<u>% of 1973 COLORADO EXPENSES</u>
Antelope	_____%
Bighorn Sheep	_____%
Bear	_____%
Deer	_____%
Elk	_____%
Mountain Goat	_____%
Mountain Lion	_____%
Fishing - Lakes	_____%
Fishing - Streams	_____%
Duck	_____%
Geese	_____%
^a Small Game Birds	_____%
^b Small Game Mammals	_____%
^c Varmints	_____%
TOTAL =	100%

^aIncludes: Grouse, Partridge, Pheasant, Pigeon, Dove, Quail and Turkey.
^bIncludes: Cottontail, Snowshoe Hares and Tree Squirrel.
^cIncludes: Jack Rabbit, Bobcat, Coyote, Prairie Dog, Fox and Ground Squirrels.

- 5.(c) For each of the activities you charged expenses to in Question 5(b), please indicate what percentage of your expenditures for that activity was spent in each of the 12 map areas. See the Colorado map on page two. (For example, if you hunted deer and if 40% of your deer hunting expenditures were spent in Denver and 60% of your deer hunting expenditures were spent in Craig, you would indicate 40% for area 2 and 60% for area 11 in the deer hunting column. Complete the table for each activity you charged expenses to in Question 5(b).

ACTIVITY	MAP AREA												TOTAL	
	1	2	3	4	5	6	7	8	9	10	11	12		
ANTELOPE														100%
BIGHORN SHEEP														100%
BEAR														100%
DEER														100%
ELK														100%
MOUNTAIN GOAT														100%
MOUNTAIN LION														100%
FISHING/LAKES														100%
FISHING/STREAM														100%
DUCK														100%
GEESE														100%
SM GAME BIRDS														100%
SM GAME MAMMALS														100%
VARMINTS														100%

Thank you for your cooperation and please return in the enclosed envelope.

SPORTSMAN EXPENDITURE DEFINITIONS

Variable Cost Items Include:

- Licenses, duck stamp, special goose permit, etc.
- Special clothing for hunting and/or fishing
- Ammunition
- Fishing rods, tackle, and bait
- Other hunting and/or fishing equipment (game bags, waders, etc.)
- Private transportation (gas, oil, tires, and repairs)
- Commercial transportation (fares, vehicle rentals, and charters)
- Lodging (motel, cabin, and seasonal rental)
- Food and drink
- Boat and equipment rentals (not including vehicle rentals)
- Privilege fees (access, camping, memberships, boat or state park sticker)
- Services (packers, guides, horses, etc.)
- Shipping, locker, and/or meat processing costs
- Taxidermy work
- Miscellaneous (film, boot grease, etc.).

Fixed Cost Items Include:

- Recreational vehicle (four-wheel drive, pick-up, etc., other than above)
- Cabin, land and/or water area (other than permanent residence)
- Camping trailer or camper for pick-up
- Camping equipment (tent, sleeping bag, and accessories)
- Boating equipment (boat, canoe, motor, and accessories)
- Firearms, archery, and other multi-purpose equipment (binoculars, boots, etc.)
- Dogs and their care
- Miscellaneous

Small Game Birds Include:

Grouse, partridge, pheasant, pigeon, dove, quail, and turkey

Small Game Mammals Include:

Cottontails, snowshoe hares, and tree squirrels.

Varmints Include:

Jack rabbit, bobcat, coyote, prairie dog, fox, and ground squirrels.

APPENDIX E

COMPUTER PROGRAM USED TO SORT THE HUNTING AND FISHING DATA TAPE

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1  PROGRAM TABLE2 (INPUT, OUTPUT, TAPE5=INPUT, TAPE6=OUTPUT, TAPE2)
   DIMENSION TOTAL1(24,63),GTOT(13) ,NTRIPS(14),WEIGHT(63),
   WTOT1(63),WTOT2(63),COEND4(15),SPENDE5(9),FINAL(24,13),PTOT(24)
   * KLIC(44),STOT1(63),TORS(13)
   DIMENSION TOTS(63),LORS(63)
   INTEGER COUNTY(14) , REP(63) , CATEG1(24) , CATEG2(24)
   INTEGER FOPS(63)
   C DATA STATEMENT SPTS UP CATEGORIES TO ALLOCATE COUNTIES TO REGIONS
   DATA (REP(I),I=1,63) /5*1,2,2,8*2,3*4,4*5,6*6,3*7,5*8,5*9,
   * 6*10,4*11,6*12,4*13/
   READ(5,210) ((CATEG1(I),CATEG2(I),I=1,24)
   210 FORMAT(2A10)
   DO 172 I=1,63
   STOT1(I)=0.0
   FOPS(I)=0
   ITEST=0
15  172 CONTINUE
   C
   C READ IN 1 DATA CARD AND DETERMINE THE COUNTY WIGHTING FACTOR
   C
   KHUNT=0
   KOUNTER = 0
10 KOUNTER = KOUNTER + 1
   C THESE HUNTERS ARE SKIPPED DUE TO DATA ERRORS ON TAPE
   IF(KOUNTER .EQ.5564) GO TO 98
   IF(KOUNTER .EQ.9586) GO TO 98
   C QUESTION ONE I INDEX BY ANIMAL TYPE
   C NUMBER OF TRIPS IN 1973 TO COUNTY MOST VISITED
   READ(2,100) (COUNTY(I),NTRIPS(I),I=1,14)
   100 FORMAT(8Y,14I2,1Y,I2)
   IF (EOF(5LTAPE2) .NE. C.0) GO TO 10000
   C READ IN LICENSE TYPE AND RESIDENT NON RESIDENT DUMMIES FROM CARD TWO
160 READ(2,141) (KLIC(I),I=1,44)
   141 FORMAT(21X,44(I1))
   IF (EOF(5LTAPE2) .NE. C.0) GO TO 10000
   KOUNTER=KOUNTER+1
   C
   C SKIP TO 164 IF BOTH RESIDENT AND NON-RESIDENT SAMPLE REQUIRED
   C OTHERWISE ONLY NON-RESIDENT SAMPLE SORTED
   C KLIC=0 FOR NON-RESIDENT, KLIC=0 FOR RESIDENT AND SKIP FOR BOTH
40  C
   KLIC=0
   DO 162 I=1,22
   162 KLIC=KLIC+KLIC(I)
   IF(KLIC.NE.0) GO TO 163
   GO TO 164
   163 READ(2,165)
   165 FORMAT(//////,A1)
   KOUNTER=KOUNTER+1
   GO TO 10
   164 CONTINUE
   KHUNT=KHUNT+1
   WTOT3=C.0
   ITEST=ITEST+1 $ WTEST=C.0 $ ITEST2=0
   C TRIPS FOR EACH COUNTY
   DO 30 I=1,14
   IF (COUNTY(I) .LT. 1) GO TO 30
   IF (COUNTY(I) .GT. 63) GO TO 30
   WTOT1(COUNTY(I)) = WTOT1(COUNTY(I)) +IARS(NTRIPS(I))
   22 IF (NTRIPS(I) .EQ. 0) GO TO 20
   WTOT3=WTOT3+IARS(NTRIPS(I))
   30 CONTINUE

```

APPENDIX E (Cont.)

C WTOT3 MADE INTEGER...TEST FOR NUMBER OF TRIPS BY HUNTER

ITEST2=INT(WTOT3)
 IF (WTOT3 .EQ. 0.0) GO TO 45
 C PERCENT OF HUNTING IN EACH COUNTY
 DO 40 I=1,63

STOT1(I)=WTOT1(I)
 WTOT2(I) = (WTOT1(I))/(WTOT3)
 WTEST=WTEST+WTOT2(I)
 40 CONTINUE
 45 CONTINUE

C READ IN THE SPENDING CATEGORIES FROM QUES 4(A)
 C QUESTION 4A I IS SPENDING CATEGORY

50 READ(2,200) (SPEND4(I),I=1,15)
 200 FORMAT(15(F4.0))
 IF (EOF(5LTAPE?) .NE. 0.0) GO TO 10000
 KOUNTER=KOUNTER+1

C READ IN THE SPENDING CATEGORIES FROM QUESTION 5(B).

60 READ(2,300) (SPEND5(I),I=1,9)
 300 FORMAT(9(F5.0),//)//
 IF (EOF(5LTAPE?) .NE. 0.0) GO TO 10000
 KOUNTER = KOUNTER +12

C ADD THE 63 WEIGHTED TOTALS TO THE TABLE
 C SUM OF SPENDING BY COUNTY

70 DO 95 I=1,63
 80 DO 85 J=1,15
 TOTAL1(J,I) = TOTAL1(J,I) + (WTOT2(I)*ABS(SPEND4(J)))
 85 CONTINUE
 DO 90 J=1,9

K=15 + J
 TOTAL1(K,I) =TOTAL1(K,I) + (WTOT2(I)*ABS(SPEND5(J)))
 90 CONTINUE
 95 CONTINUE

C IF(ITEST .LT.500) WRITE(6,106) ITEST,ITEST2,WTEST
 C 106 FORMAT(10X,'HUNTER NO.',I3,' TOOK',I3,' TRIPS. WEIGHTED AVF.S TCT
 C CALLED TO*,FR.3)

DO 96 I=1,14
 NTRIPS(I) = 0
 COUNTY(I) = 0

96 CONTINUE
 DO 168 I=1,63
 IF(WTOT2(I).GT.0.0) GO TO 167
 GO TO 168

167 LORS(I)=LORS(I)+1
 168 CONTINUE
 M=REF(I)
 DO 169 I=1,63

FORS(M)=FORS(M)+LORS(I)
 TORS(M)=TORS(M)+STOT1(I)

169 CONTINUE
 C INITIALIZE BEFORE READING SECOND NUMBER DATA
 DO 97 I=1,63
 WEIGHT(I) = 0.0
 WTOT1(I) = 0.0
 WTOT2(I) = 0.0
 SPEND4(I) = 0.0
 SPEND5(I) = 0.0

120

```

125      TOTSI(I)=0.0
        LORS(I)=0
        C 97 CONTINUE
        C   END OF DATA READ LOOP
        GO TO 10
130      C USED TO SKIP BAD RECORDS
        C RAD DATA LOOP --- SKIP THIS HUNTER
        98 READ(2,99) X
        99 FORMAT(//////////,A1)
        KOUNTER = KOUNTER + 14
        GO TO 10
135      C ACCUMULATE TOTALS FOR THE 13 MAP AREAS
        C
        C 15 + 9 SPENDING CATEGORIES TOTALED
        10000 DO 105 J=1,24
        C 63 COUNTIFS
        C FIND TOTAL BY MAP AREA REGIONS
        DO 110 I=1,63
        P=REF(I)
        FINAL(J,M) = FINAL(I,M) + TOTAL1(J,I)
        GTOT(M)=GTOT(M) + TOTAL1(J,I)
        110 CONTINUE
        105 CONTINUE
        C WRITE OUT THE REPORT HEADING
        C LABELS ARE INPUT ON CARD DECK
150      C
        C WRITE(6,10500)
        10500 FORMAT(1H1,/,/,15X,*,WEIGHTED SPENDING TOTALS IN EACH OF THE 13 MAP
        *-AREAS FOR THE 24 SPENDING CATEGORIES*)
        C WRITE OUT THE COLUMN HEADERS
155      C
        C WRITE(6,10510)
        10510 FORMAT(1H0,13Y,*,AREA 1 AREA 2 AREA 3 AREA 4 AREA 5 AREA
        *- 6 AREA 7 AREA 8 AREA 9 AREA 10 AREA 11 AREA 12 AREA 13
        *-*)
160      C
        C 165 IS THE PLOWUP FACTOR FOR RES PLUS NON RES DATA
        C AND 226 IS PLOWUP FACTOR FOR NON RES DATA...WITH DECIMAL
        C ALL OUTPUT IS IN THOUSANDS OF DOLLARS
        PLOW=.2264
        DO 173 I=1,24
        DO 173 J=1,13
        173 FINAL(I,J)=FINAL(I,J)*PLOW
        DO 174 I=1,13
        174 GTOT(I)=GTOT(I)*PLOW
        DO 175 I=1,24
        175 PRINT(I)=PRINT(I)*PLOW
        C WRITE OUT THE DETAIL LINE
        C
175      DO 160 I=1,24
        WRITE(6,10520) (CATEG1(I),CATEG2(I),FINAL(I,J),J=1,13)
        10520 FORMAT(1H0,10,A6,13(F9.1))
        150 CONTINUE
        WRITE(6,10521)(GTOT(I),I=1,13)
        10521 FORMAT(1H0,*, GRAND TOTALS *,13(F9.0))
        C
        C WRITE OUT THE LEGEND
        C

```