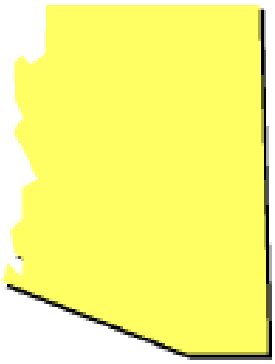
# The 2001 Economic Benefits of Watchable Wildlife Recreation in

# Arizona



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# Executive Summary

This project was conducted by Southwick Associates for the Arizona Game and Fish Department. The purpose of this project was to quantify the 2001 economic benefits of watchable wildlife recreation in Arizona. The data used in this project were obtained from the 2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (Survey). The Survey is conducted by the U.S. Fish and Wildlife Service and the U.S. Bureau of the Census. The Survey consists of a wide range of hunting, fishing, and watchable wildlife recreation participation, economic, and demographic information. The data were analyzed using the RIMS-II economic model (U.S. Bureau of Economic Analysis) to generate economic impact estimates for each activity.

In 2001, there were 638,000 watchable wildlife recreationists (residents and non-residents) participating in non-residential activities in Arizona. In addition, there were nearly 1.1 million residents participating in residential activities in Arizona. Non-residential activities are those performed at least one mile from an individual's home. Conversely, residential activities are those performed within one mile of an individual's home. The non-residential activity cited most often by recreationists was observing wildlife, whereas the primary residential activity was feeding wildlife.

The total economic effect from 2001 watchable wildlife recreation in Arizona was estimated at $1.5 billion ($1.1 billion by residents and $434.7 million by non-residents). In the last ten years, expenditures in Arizona for watchable wildlife recreation have than doubled ($410.9 million in 1991). The economic impact of watchable wildlife recreation in Arizona is summarized below.

***Table E-1.*** *2001 Economic Impacts of Watchable Wildlife Recreation in Arizona*

| | **Resident** | **Non-Resident** | **Total** |
|---|---|---|---|
| Retail sales | $594.5 million | $226.2 million | $820.7 million |
| Salaries & wages | $312.1 million | $117.3 million | $429.4 million |
| Full & part-time jobs | 10,235 | 4,823 | 15,058 |
| Tax revenues: | | | |
| State sales tax | $33.6 million | $13.1 million | $46.8 million |
| State income tax | $8.1 million | $2.7 million | $10.8 million |
| Federal income tax | $56.9 million | $18.6 million | $75.5 million |
| Total economic effect | $1.1 billion | $434.7 million | $1.5 billion |

## Introduction

Watchable wildlife recreational activities, popular among residents and non-residents alike, produce significant economic benefits for many individuals and businesses in Arizona. Unlike steel or textile industries which are easily identified by large factories, the watchable wildlife industry is comprised of widely scattered retailers, manufacturers, and wholesalers and support services that, when considered together, form an important industry. Given that watchable wildlife dollars are often spent in rural or lightly populated areas, the economic contributions of watchable wildlife recreation can be especially important to the rural economic base.

This project assesses the 2001 economic contributions of watchable wildlife recreation in Arizona. The project was designed to provide resource managers with the economic information necessary to better conserve and manage wildlife and other natural resources. Only the economic effects of watchable wildlife activities occurring within Arizona are considered. This report measures the impact of watchable wildlife recreation expenditures on Arizona industries and individuals (in dollar terms) to produce estimates of the total economic benefits created in 2001.

This report is divided into several sections to provide the reader with a better understanding of the activities undertaken by watchable wildlife recreationists, and the economic effects of their activities. The first section, participation, is divided into two subsections. The first subsection explores non-residential participation by residents and non-residents. Non-residential activities are those that occur more than one mile from home. The second subsection examines residential participation. Given the definitions, non-residential recreation is enjoyed by both Arizona residents and non-residents visiting the state, while residential recreation only includes residents. The next section presents the economic impacts of watchable wildlife recreation in Arizona. Definitions of several terms used in this report are provided in Appendix A. Appendix B provides methodological descriptions. Appendix C presents tables detailing the economic impacts of watchable wildlife recreation. Appendix D is a list of "factoids" comparing watchable wildlife recreation to well-known activities.

# I. Data Sources & Methods

Data on recreationists' demographics, participation and expenditures were obtained from the 2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (Survey), which is conducted approximately every five years by the U.S. Fish and Wildlife Service and the U.S. Bureau of the Census. The Survey provides data required by natural resource management agencies, industry and private organizations at the state and national levels to assist in optimally managing natural resources. The Survey is funded through excise taxes on hunting and fishing equipment through the Federal Aid in Sport Fish and Wildlife Restoration Acts. The expenditure data was analyzed using economic models to quantify the economic impacts. A more detailed description of the methods used to generate the economic estimates is presented in Appendix B.

## II. Demographics & Participation Characteristics of Recreationists

## Demographics

Only a small percentage of watchable wildlife recreationists in Arizona, both non-residential and residential, report they are non-white (Table 1). Participants are in their forties, are split almost evenly between male and female, and are likely to be married.

**Table 1.** Demographic background of watchable wildlife recreationists in Arizona in 2001 (Participants 16 years old and older)

| | Nonresidential Activity | | Residential Activity |
|---|---|---|---|
| | Resident | Nonresident | |
| Race (non-white) | 8% | 8% | 9% |
| Average age | 45 years | 48 years | 50 years |
| Gender (male) | 51% | 46% | 45% |
| Marital Status (married) | 70% | 68% | 71% |
| Average household income | $54,500 | $66,600 | $48,900 |
| Education | | | |
| 8 years or less | 1% | 1% | 3% |
| 9-11 years | 6% | 7% | 7% |
| 12 years | 17% | 5% | 23% |
| 1-3 years college | 39% | 36% | 31% |
| 4 years college or more | 37% | 51% | 36% |
| Sample size | 91 | 68 | 319 |

The average household income for residents participating in non-residential and residential activities is approximately the same. Non-residents have, on average, a household income higher than resident participants. Both have incomes higher than the state average ($42,704). As with income levels, the education levels of residents who participate in residential and non-residential activities are similar same, however non-residents have, on average, a higher level of education.

## Participation

Watchable wildlife recreation includes a broad category of activities. To help describe the types of activities undertaken by residents and non-residents, and to better understand the types of wildlife they enjoy and the surroundings preferred, we present the following participation information. Participation information is divided into two subsections. The first subsection explores non-residential activities by residents and non-residents. The second subsection examines residential activities.

*Non-residential Participation*

In 2001, there were 638,000 million watchable wildlife recreationists (residents and non-residents) participating in non-residential activities in Arizona (Table 2). Of the total recreationists in Arizona, 271,000 were state residents and 367,000 were non-residents. Arizona is one of the few "destination" states were non-resident participants outnumber residents bringing in significant new dollars to the state economy. The total number of watchable wildlife recreation days in Arizona was 4.6 million.

**Table 2.** Participation in Non-residential Watchable Wildlife Recreation in Arizona in 2001 (Participants 16 years old and older)

| | Resident | Nonresident | Total |
|---|---|---|---|
| **Number of participants** | **270,715** | **367,173** | **637,888** |
| observing wildlife | 240,320 | 321,604 | 561,924 |
| photographing wildlife | 116,407 | 236,118 | 352,525 |
| feeding wildlife | 53,180 | 41,442 | 94,622 |
| **Number of days** | 2,463,588 | 2,120,425 | 4,584,013 |
| observing wildlife | 2,324,380 | 1,917,729 | 4,242,109 |
| photographing wildlife | 726,689 | 970,762 | 1,697,451 |
| feeding wildlife * | 683,821 | 342,120 | 1,025,941 |
| **Number of trips** | 1,786,466 | 550,426 | 2,336,891 |

** Estimate based on small sample size*

The primary watchable wildlife activity, measured in terms of number of participants and number of activity days, was observing wildlife, with photographing wildlife the second preferred activity. Please note one participant may engage in two or more activities per trip as these activities are not exclusive of one another.

Participation by resident and non-resident recreationists in terms of sites visited and wildlife observed, fed, or photographed is presented in Table 3. Note that the results presented in Table 3 do not necessarily imply that recreationists prefer a certain site type or prefer to observe a certain wildlife type. This is because the results in Table 3 reflects participants' preferences *and* the availability of sites and wildlife.

**Table 3.** Participation in Non-residential Watchable Wildlife Recreation by Site Visited and Wildlife Observed, Fed, or Photographed in Arizona in 2001 (Participants 16 years old and older)

| | Resident | Non-Resident | Total |
|---|---|---|---|
| **Number of participants** | 270,715 | 367,173 | 637,888 |
| **Number of recreationists visiting:** | | | |
| lakes and/or streams | 166,651 | 115,126* | 281,777 |
| wetlands | 14,364 | 24,945* | 39,309 |
| woodlands | 166,979 | 224,058* | 391,037 |
| brush-covered areas | 166,708 | 303,072* | 469,780 |
| open fields | 149,018 | 240,170* | 389,188 |
| man-made areas | 59,895 | 76,254* | 136,149 |
| other sites | 36,217 | 72,459* | 108,676 |
| private land | 47,867 | 147,602* | 195,469 |
| public land | 265,566 | 321,611* | 587,177 |
| **Number of recreationists observing, feeding, or photographing:** | | | |
| birds | 242,598 | 345,462 | 588,059 |
| birds of prey | 221,942 | 295,457 | 517,399 |
| waterfowl | 128,118 | 64,949 | 193,066 |
| shorebirds | 88,823 | 28,536* | 117,359 |
| songbirds | 175,574 | 247,523* | 423,096 |
| other birds | 144,177 | 186,774 | 330,951 |
| mammals | 190,374 | 295,203* | 485,577 |
| large land mammals | 159,222 | 190,845* | 350,068 |
| small land mammals | 166,694 | 270,785* | 437,479 |
| fish | 66,170 | 22,764* | 88,933 |
| other wildlife | 107,792 | 102,195* | 209,988 |

** Estimate based on small sample size*

*Residential Participation*

In 2001, there were 1.1 million residential watchable wildlife participants in Arizona (Table 4). This number represents Arizona residents participating in watchable wildlife recreation within one mile of their home. Compared to non-residential activity, there are nearly 4 times more residents who participate within one mile of their homes than those who travel away from home.

**Table 4.** Participation in Residential Watchable Wildlife Recreation in Arizona in 2001 (Participants 16 years old and older)

| | |
|---|---|
| **Number of participants** | 1,062,657 |
| observing wildlife | 790,571 |
| photographing wildlife | 232,367 |
| feeding birds & wildlife | 860,299 |
| birds | 845,821 |
| other wildlife | 195,299 |
| visiting parks near home | 199,990 |
| maintaining natural areas around home | 122,559 |
| maintaining plantings around home | 174,300 |
| **Number of days** | |
| observing wildlife | 110,828,427 |
| photographing wildlife | 2,193,529 |

The primary residential watchable wildlife activity, measured in terms of number of participants, was feeding wildlife. Observing wildlife was the second most popular residential watchable wildlife activity. This is in contrast to the ranking of the non-residential activities, where observing wildlife was the most popular activity. Of those who participate in feeding birds and wildlife, most feed wild birds.

Given the manner in which the survey questions were asked, we cannot determine the number of days spent feeding wildlife. However, we can determine the number of days spent observing and photographing wildlife around the home. In terms of days spent in watchable wildlife activities, observing wildlife again was the most popular activity. Residents spent approximately 111 million man-days observing wildlife around their home compared with only 2.5 million days spent observing wildlife on trips away from home.

The number one type of wildlife observed by residential recreationists in Arizona was birds (Table 5). The second most prominent category to be observed by residents was mammals. As with the results presented in Table 3, the Table 5 results do not necessarily imply that recreationists prefer to observe a certain wildlife type because the results reflect participants' preferences and the availability of wildlife types.

**Table 5.** Participation in Residential Watchable Wildlife Recreation by Wildlife Observed in Arizona in 2001 (Participants 16 years old and older)

| | |
|---|---|
| **Number of recreationists** | |
| birds | 771,450 |
| mammals | 496,294 |
| large mammals | 179,602 |
| small mammals | 483,469 |
| amphibians or reptiles | 319,036 |
| insects or spiders | 288,542 |
| fish & other wildlife | 105,336 |

# III. Economic Impacts

*Retail Sales*

The expenditure figures in Table 6 describe the total retail sales generated from 2001 watchable wildlife recreation by specific categories of goods and services. In terms of trip expenditures, residents spent the largest amount on food, drink and refreshments ($33.2 million) followed by private transportation (mostly gasoline, $28.2 million). Similarly, non-residents spent the largest amount of their trip expenditures on food, drink and refreshments ($76.5 million), but lodging was second ($68.5 million).

The largest equipment expenditures by Arizona residents were for off-road and four wheel drive vehicles ($225.0 million), followed by boats of all types ($111 million) and cameras ($49 million). Note that equipment expenditures are comprised of expenditures that may have been made for residential and/or non-residential activities.

Total resident expenditures for watchable wildlife recreation equal $594.5 million. Total nonresident expenditures equal $226.2 million and may be more important to some as these dollars represent new dollars brought into the state economy by out-of-state visitors.

Table 7 shows figures for an average amount spent per day by recreationists on residential activities and on non-residential activities, as well as an average amount spent annually per participant. Since the Survey does not collect total days of residential participation, the residential per day figure is estimated based on the number of days spent observing wildlife. The non-residential per day figure is estimated by totaling the travel expenses plus several equipment items that would be used away from home: binoculars, clothing, camping gear, backpacks and daypacks, vehicles and one-half of cameras, film and developing. The residential per day figure is estimated by totaling the remaining equipment items. Also, since purchased land may be used to go visit or build a home on, 50 percent of its value was assigned to both the residential and non-residential estimates.

**Table 6.** Expenditures made by Residents and Non-Residents Participating in Watchable Wildlife Recreation in Arizona in 2001 (Participants 16 years old and older)

| | Residents | Non-Residents | Total |
|---|---|---|---|
| **Trip Expenditures** | | | |
| Food | $33,158,867 | $76,523,656 | $109,682,523 |
| Lodging | $15,317,068 | $68,511,041 | $83,828,109 |
| Public transportation | $905,018 | $27,780,815 | $28,685,834 |
| Private transportation | $28,246,411 | $41,284,636 | $69,531,047 |
| Guide fees | $1,108,307 | $1,193,379 | $2,301,686 |
| Public land access fees | $1,910,195 | $3,193,743 | $5,103,938 |
| Private land access fees | $19,844 | $338,794 | $358,638 |
| Equipment rental | $278,148 | $340,400 | $618,548 |
| Boat fuel | $59,518 | $436,625 | $496,143 |
| Other boat costs | $28,383 | $2,944,163 | $2,972,546 |
| Heating and cooking fuel | $473,839 | $624,385 | $1,098,224 |
| **Equipment Expenditures** | | | |
| Binoculars, scopes | $8,824,125 | $0 | $8,824,125 |
| Film and developing | $16,119,378 | $1,284,450 | $17,403,827 |
| Cameras | $48,989,431 | $0 | $48,989,431 |
| Day packs, special clothing | $4,472,909 | $25,205 | $4,498,114 |
| Commercially prepared bird food | $27,098,836 | $139,480 | $27,238,317 |
| Other bird food | $8,886,351 | $266,029 | $9,152,381 |
| Food for other wildlife | $1,536,726 | $0 | $1,536,726 |
| Nest boxes, feeders | $8,385,498 | $319,095 | $8,704,592 |
| Other special equipment | $1,434,335 | $419,717 | $1,854,052 |
| Tents, tarps | $6,299,700 | $42,356 | $56,342,056 |
| Backpacking equipment | $910,151 | $0 | $910,151 |
| Other camping equipment | $11,544,625 | $0 | $11,544,625 |
| Magazines and books | $3,790,471 | $151,146 | $3,941,617 |
| Membership dues, contributions | $12,360,127 | $368,306 | $12,728,433 |
| Other equipment | $1,673,472 | $0 | $1,673,472 |
| Off-road & 4WD vehicles, campers, motor homes | $224,853,208 | $0 | $224,853,208 |
| Boats | $111,004,758 | $0 | $111,004,758 |
| Trailer, boat accessories | $0 | $0 | $0 |
| Cabin | $0 | $0 | $0 |
| Other equipment | $0 | $0 | $0 |
| Land purchases | $0 | $0 | $0 |
| Land leases | $0 | $0 | $0 |
| Plantings | $14,840,573 | $0 | $14,840,573 |
| **Total Trip & Equipment Expenditures** | **$594,530,274** | **$226,187,421** | **$820,717,695** |

**Table 7. Average Expenditures for Watchable Wildlife Recreationists in Arizona in 2001** (Participants 16 years old and older)

| | Resident | Non-resident | Total |
|---|---|---|---|
| **Avg. by participant** | | | |
| on residential activities, annually | $75.29 | ---- | ---- |
| on non-residential activities, annually | $1,900.61* | $616.02 | $1,158.59** |
| **Avg. per day, per participant** for non-residential activities | $208.85*** | $105.89 | $161.22**** |
| **Total spent by recreationists** | | | |
| on residential activities | $80.0 million | $1.7 million***** | $81.7 million |
| on non-residential activities | $514.5 million | $224.5 million | $739.0 million |
| TOTAL: | $594.5 million | $226.2 million | $820.7 million |

***** 56 percent of non-residential expenditures made by state residents was for vehicles or boats. If these items were moved from the equation, the average annual expense would be $659.98 per resident annually.

****** If boats and vehicles were removed from the equation, the average expense would be $632.07 per participant annually.

******* If boats and vehicles were removed from the equation, the average per-day expense would be $72.52 per resident.

******** If boats and vehicles were removed from the equation, the average per-day expense would be $87.96 per participant.

***** Includes bird seed, other wildlife feed, nest boxes, membership dues and other items typically purchased in one's state of residence, but reported purchased in AZ by out-of-state residents.

Note: numbers above may not add perfectly due to rounding error.

Once boats and vehicles are removed from the equation, residents on average spend less for a day of activity than non-residents when they travel away from home to view, feed or photograph wildlife. Residents spend more annually, but that most likely reflects a higher proporation of their overall annual activities occurring in Arizona compared to non-residents. More detail on economic impacts for this data is listed in the tables located in Appendix C.

*Total Economic Effect (Output)*

Original expenditures made by watchable wildlife recreationists generate rounds of additional spending through the economy. This results in numerous direct, indirect, and induced impacts. The sum of these impacts is the total economic impact resulting from the original expenditures. The economic figures in Table 8 show the total economic effect from 2001 watchable wildlife activities in Arizonato be $1.5 billion ($1.1 billion by residents and $434.7 million by non-residents). Tables detailing the economic impacts of watchable wildlife recreation for each specific category of goods and services are provided in Appendix C.

*Earnings*

Total household income (salaries and wages) generated during 2001 from wildlife watchable recreation in Arizona was estimated at $429.4 million ($312.1 million by residents and $117.3 million by non-residents).

*Employment*

During 2001, watchable wildlife recreation supported 15,000 full and part-time jobs in Arizona (10,200 generated by resident spending and 4,800 generated by non-resident spending). These are jobs that are directly associated with watchable wildlife use, in addition to jobs in industries that indirectly support these activities.

**Table 8.** Economic Impacts of Watchable Wildlife Recreation in Arizona in 2001 (Population 16 years old and older)

| | **Resident** | **Non-resident** | **Total** |
|---|---|---|---|
| Retail sales | $594.5 million | $226.2 million | $820.7 million |
| Salaries & wages | $312.1 million | $117.3 million | $429.4 million |
| Full & part-time jobs | 10,235 | 4,823 | 15,058 |
| Tax revenues: | | | |
| State sales tax | $33.6 million | $13.1 million | $46.8 million |
| State income tax | $8.1 million | $2.7 million | $10.8 million |
| Federal income tax | $56.9 million | $18.6 million | $75.5 million |
| Total economic effect | $1.1 billion | $434.7 million | $1.5 billion |

*Tax Revenues*

Expenditures by residents and non-residents generate sales tax revenues for the State. Likewise, the jobs generated by wildlife watching activities creates additional income tax revenues. Total state tax revenues generated by watchable wildlife recreation is estimated at $41.7 million for residents and $15.8 million for nonresidents. Total federal income tax revenues generated by watchable wildlife recreation is estimated at $5.0 million.

# APPENDIX A
# DEFINITIONS

**Economic benefits** can be estimated by two types of economic measures: economic impacts and economic values. An **economic impact** addresses the business and financial activity resulting from the use of a resource. **Economic value**, on the other hand, is a non-business measure that estimates the value people receive from an activity after subtracting for their costs and expenditures. This concept is also known as consumer surplus.

There are three types of economic impact: direct, indirect and induced. A **direct impact** is defined as the economic impact of the initial purchase made by the consumer. **Indirect impacts** are the secondary effects generated from a direct impact. Indirect impacts indicate that sales in one industry affect not only that industry, but also the industries that supply the first industry. An **induced impact** results from the salaries and wages paid by the directly and indirectly impacted industries. The employees of these industries spend their income on various goods and services. These expenditures are induced impacts, which, in turn, create a continual cycle of indirect and induced effects.

The sum of the direct, indirect and induced impact effects is the **total economic impact** of the activity under study. As the original retail purchase (direct impact) goes through round after round of indirect and induced effects, the economic impact of the original purchase is multiplied, benefiting many industries and individuals. Likewise, the reverse is true. If a particular item or industry is removed from the economy, the economic loss is greater than the original lost retail sale. Once the original retail purchase is made, each successive round of spending is smaller than the previous round. When the economic benefits are no longer measurable, the economic examination ends.

**Watchable wildlife recreation** is defined here as the primary purpose of observing, photographing or feeding of fish or other wildlife. **Wildlife** are defined as animals that are living in natural or wild environments. Animals in museums, zoos and aquariums are not included. Domestic and farm animals also are not included as wildlife. Watchable wildlife recreation is divided into two types of activity: residential and non-residential. According to the 2001 USFWS Survey, **residential activities** are those activities that occur within one mile of one's home for the primary purpose of observing, photographing or feeding wildlife. In contrast, according to the Survey, **non-residential activities** are trips or outings that occur at least one mile from home for the primary purpose of observing, photographing or feeding wildlife. Given the definitions, residential activities are made by Arizona residents, whereas, non-residential activities are made by both Arizona residents and non-residents.

# APPENDIX B
# METHODS

The methods used to generate the economic impact estimates of watchable wildlife recreation activities in Arizona are separated into three stages:

1) tabulate the expenditures made by watchable wildlife recreationists (age 16 and older) from the 2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (Survey),

2) disaggregate the expenditures into retail, wholesale, and manufacturer portions,

3) generate the economic impact estimates by applying the multipliers from the RIMS model to the adjusted expenditures,

4) calculate state sales tax, state income tax, and federal income tax revenues.

*Source of Expenditure Data*

Recreationists' expenditures were obtained from the Survey (which is conducted approximately every five years by the U.S. Fish and Wildlife Service and U.S. Bureau of the Census). The Survey provides data required by natural resource management agencies, industry and private organizations at the local, state, and national levels to assist in optimally managing natural resources. The Survey is funded through excise taxes on hunting and fishing equipment through the Federal Aid in Sport Fish and Wildlife Restoration Acts.

Recreationists' expenditures were categorized into resident and non-resident files. Both included information on travel-related categories such as food and lodging, and equipment expenditures such as guidebooks and binoculars. Together, the resident and non-resident files represent all expenditures made in Arizona in 2001.

*Margins*

Retail sales were separated into manufacturing, wholesale and retail sub-categories because economic impact analyses treats each segment as separate industries. The amount of each retail sale attributed to each segment is known as a margin.

A margin is the percentage, or mark-up, of a sale attributable to either the retail, wholesale or manufacturing sector. For example, 70 percent of the final retail dollar value of a spotting scope sale may be attributed to the manufacturer, five percent to the wholesaler and 25 percent to the retailer. This means that the manufacturing industry has earned 70 percent of the final retail price, the wholesaler accrued five percent of the sale, and the retailer received 25 percent. Since there are no wholesale or manufacturing activities in the service sector, services are not subjected to the above process.

Data used to calculate trade margins are from the U.S. Department of Commerce Census of Trade series surveys (1999). These data sources contain national sales figures for most retail and wholesale industry sectors as well as gross margins. A gross margin is the revenue remaining after the cost of the goods sold is subtracted. To derive margins, each wholesale and retail industry's gross margin was divided by its total sales. This produces the typical price mark-up for that industry. Next, two formulas are applied to estimate the value added (price mark-up) for each sector:

R/(1+R) = retail margin, where R = retail mark-up.

W/{(1+W)(1+R)} = wholesale margin, where W = wholesale mark-up.

These formulas estimate the percentage of a product's final selling price that accrues to each sector. The manufacturing margin is derived by summing the retail and wholesale margins and subtracting the total from 100 percent.

*The Input-Output Model*

To estimate the economic impacts the data were analyzed with the Regional Input-Output model (RIMS-II). RIMS-II was developed by the U.S. Dept. of Commerce, Bureau of Economic Analysis for primary use by the Federal government.

Input-output models, such as RIMS-II, describe how sales in one industry impact other industries. For example, once a recreationist makes a purchase, the retailer buys more merchandise from wholesalers, who buy more from manufacturers, who, in turn, purchase new inputs and supplies. In addition, the salaries and wages paid by these businesses stimulate more benefits. Simply, the first purchase creates numerous rounds of purchasing. Input-output analysis tracks how the various rounds of purchasing benefits other industries and generates economic benefits.

The relationships between industries are explained through multipliers. For example, an income multiplier of .09 for industry *X* would indicate that for every dollar received by the industry under study, nine cents would be paid to industry *X* for its products or services. The RIMS-II model provides multipliers for all major industries in the U.S. The multipliers include direct, indirect and induced effects.

The RIMS-II model includes output, earnings and employment multipliers. The **output** multiplier measures the total economic effect from economic activity created by the original retail sale. The **earnings multiplier** measures the total salaries and wages generated from the economic activity created by the original retail sale. The **employment** multiplier estimates the number of jobs supported by the economic activity resulting from the original retail sale.

To apply the RIMS-II model, expenditures are each matched to the appropriate output, earnings and employment multipliers. For example, dollars attributed to gasoline refining are multiplied separately by the earnings, output and employment multipliers specific to gasoline refinement. The resulting estimates describe the salaries and wages, total economic effects, and jobs

supported by the refining industry as a result of fuel purchases made during watchable wildlife recreational activities. This same process is repeated for all reported expenditures. After all expenditures and multipliers have been applied together, the retail, wholesale and manufacturing results for each category are summed together.

*Calculation of Tax Revenues*

State sales tax estimates are based on state general and fuel sales tax rates. Sales tax revenues are calculated by multiplying all retail purchases, except fuel, by the 2001 state tax rate (excluding local and city taxes). Sales taxes were not calculated for excluded items (guide fees, public land access fees, memberships and dues to organizations). This was added to fuel tax revenues which were determined by multiplying total fuel purchases by the 2001 state fuel tax rate. Since the Survey does not include detailed information on food purchases, it was assumed that residents purchased food from both restaurants and grocery stores with one-third assigned to restaurants, whereas nonresidents purchased most of their food at restaurants within the state. As groceries are exempt from sales taxes, sales taxes were not applied to grocery sales estimated in this report.

State income tax revenues were calculated by dividing the total income generated by recreationists' expenditures by the total number of jobs supported by recreationists' expenditures. The result was the average income per job. Next, the state standard deduction was subtracted and the remaining amount was multiplied by the appropriate 2001 state income tax rate. The results were then multiplied by the total jobs to derive the final income tax estimate.

Federal income tax revenues were calculated by dividing the total income generated by recreationists' expenditures by the total number of jobs supported by recreationists' expenditures. The result was the average income per job. From this, a standard deduction of $3,980 was subtracted. The applicable tax rate was then applied according to the 2001 IRS tax schedule for single filers to determine the average tax paid per job. Finally, the average tax paid per job was multiplied by the total number of jobs to determine the total Federal income tax revenue generated by recreationalists during 2001.

# APPENDIX C
# Economic Impact Tables

**2001 Economic Impacts:** **RESIDENTS:** **Arizona Watchable Wildlife**

| Category: | Retail Sales | Total Multiplier Effect | Salaries and Wages | Full & Part-Time Jobs | State Sales Taxes | State Income Taxes | Federal Income Taxes |
|---|---|---|---|---|---|---|---|
| Food | $33,158,867 | $66,839,136 | $17,073,856 | 717 | $618,959 | $568,268 | $3,986,672 |
| Lodging | $15,317,068 | $31,280,516 | $9,804,455 | 441 | $857,756 | $349,311 | $2,450,585 |
| Public transportation | $905,018 | $1,815,648 | $538,395 | 18 | $50,681 | $14,067 | $98,683 |
| Private transportation | $28,246,411 | $42,177,612 | $7,639,617 | 266 | $3,972,152 | $210,585 | $1,477,356 |
| Guide fees | $1,108,307 | $2,086,610 | $602,698 | 32 | n/a | $25,021 | $175,536 |
| Public land access fees | $1,910,195 | $3,989,251 | $1,011,257 | 30 | n/a | $23,866 | $167,434 |
| Private land access fees | $19,844 | $37,361 | $11,039 | 1 | $1,111 | $448 | $3,143 |
| Equipment rental | $278,148 | $504,394 | $147,001 | 5 | $15,576 | $3,734 | $26,198 |
| Boat fuel | $59,518 | $88,873 | $16,097 | 1 | $8,370 | $444 | $3,113 |
| Other boat costs | $28,383 | $53,437 | $15,435 | 1 | $1,589 | $641 | $4,495 |
| Heating & cooking fuel | $473,839 | $707,538 | $128,156 | 4 | $66,634 | $3,533 | $24,783 |
| Cameras | $48,989,431 | $88,234,119 | $24,177,433 | 869 | $2,743,408 | $689,001 | $4,833,664 |
| Film & developing | $16,119,378 | $31,133,207 | $9,786,299 | 364 | $902,685 | $288,560 | $2,024,383 |
| Commercial bird food | $27,098,836 | $51,216,150 | $12,628,115 | 478 | $1,517,535 | $378,846 | $2,657,781 |
| Other bird food | $8,886,351 | $16,794,991 | $4,141,058 | 157 | $497,636 | $124,232 | $871,549 |
| Food for other wildlife | $1,536,726 | $2,904,376 | $716,118 | 27 | $86,057 | $21,484 | $150,718 |
| Nest boxes, feeders | $8,385,498 | $15,626,774 | $4,469,714 | 165 | $469,588 | $130,517 | $915,640 |
| Other special equipment | $1,434,335 | $2,672,952 | $764,542 | 28 | $80,323 | $22,325 | $156,620 |
| Tents, tarps | $6,299,700 | $12,291,169 | $3,653,799 | 140 | $352,783 | $111,342 | $781,115 |
| Backpacking equipment | $910,151 | $1,775,771 | $527,884 | 20 | $50,968 | $16,086 | $112,852 |
| Other camping equipment | $11,544,625 | $22,524,395 | $6,695,833 | 257 | $646,499 | $204,041 | $1,431,446 |
| Day packs | $4,472,909 | $8,726,968 | $2,594,268 | 100 | $250,483 | $79,055 | $554,607 |
| Magazines & books | $3,790,471 | $7,056,827 | $1,958,371 | 69 | $212,266 | $54,683 | $383,624 |
| Binoculars, spotting scopes | $8,824,125 | $17,716,617 | $5,544,634 | 194 | $494,151 | $153,727 | $1,078,466 |
| Membership dues, contributions | $12,360,127 | $26,323,363 | $8,589,052 | 525 | n/a | $416,304 | $2,920,570 |
| Other auxiliary equipment | $1,673,472 | $3,265,065 | $970,607 | 37 | $93,714 | $29,577 | $207,498 |
| Off-road vehicles | $203,211,500 | $380,164,119 | $109,720,086 | 2,464 | $11,379,844 | $1,953,063 | $13,701,658 |
| Pickup, camper, motor home | $21,641,708 | $40,486,886 | $7,948,956 | 262 | $1,211,936 | $207,998 | $1,459,205 |
| Boat | $111,004,758 | $202,978,459 | $62,143,376 | 2,238 | $6,216,266 | $1,773,695 | $12,443,305 |
| Trailer, boat accessories | $0 | $0 | $0 | 0 | $0 | $0 | $0 |
| Cabin | $0 | $0 | $0 | 0 | $0 | $0 | $0 |
| Other special equipment | $0 | $0 | $0 | 0 | $0 | $0 | $0 |
| Plantings, gardening | $14,840,573 | $26,809,336 | $8,091,452 | 326 | $831,072 | $258,498 | $1,813,484 |
| Land purchases, 2001 payments | $0 | $0 | $0 | 0 | $0 | $0 | $0 |
| Land leases, 2001 payments | $0 | $0 | $0 | 0 | $0 | $0 | $0 |
| *TOTALS:* | $594,530,275 | $1,108,281,918 | $312,109,604 | 10,235 | $33,630,043 | $8,112,952 | $56,916,185 |

**2001 Economic Impacts:** **NON-RESIDENTS** **Arizona Watchable Wildlife**

| Category: | Retail Sales | Total Multiplier Effect | Salaries and Wages | Full & Part-Time Jobs | State Sales Taxes | State Income Taxes | Federal Income Taxes |
|---|---|---|---|---|---|---|---|
| Food | $76,523,656 | $154,250,596 | $39,402,851 | 1,654 | $1,428,427 | $929,296 | $6,390,486 |
| Lodging | $68,511,041 | $139,913,248 | $43,853,917 | 1,971 | $3,836,618 | $1,107,139 | $7,613,460 |
| Public transportation | $27,780,815 | $55,733,872 | $16,526,807 | 545 | $1,555,726 | $305,970 | $2,104,064 |
| Private transportation | $41,284,636 | $61,646,324 | $11,165,978 | 388 | $5,805,652 | $218,101 | $1,499,815 |
| Guide fees | $1,193,379 | $2,246,775 | $648,960 | 34 | n/a | $19,091 | $131,284 |
| Public land access fees | $3,193,743 | $6,669,813 | $1,690,768 | 50 | n/a | $28,276 | $194,444 |
| Private land access fees | $338,794 | $637,847 | $188,471 | 10 | $18,972 | $5,420 | $37,271 |
| Equipment rental | $340,400 | $617,282 | $179,902 | 6 | $19,062 | $3,238 | $22,270 |
| Boat fuel | $436,625 | $651,969 | $118,091 | 4 | $61,400 | $2,307 | $15,862 |
| Other boat costs | $2,944,163 | $5,542,976 | $1,601,036 | 84 | $164,873 | $47,099 | $323,889 |
| Heating & cooking fuel | $624,385 | $932,333 | $168,873 | 6 | $87,804 | $3,299 | $22,683 |
| Cameras | $0 | $0 | $0 | 0 | $0 | $0 | $0 |
| Film & developing | $1,284,450 | $2,480,805 | $779,807 | 29 | $71,929 | $16,293 | $112,044 |
| Commercial bird food | $139,480 | $263,615 | $64,998 | 2 | $7,811 | $1,382 | $9,502 |
| Other bird food | $266,029 | $502,789 | $123,970 | 5 | $14,898 | $2,635 | $18,123 |
| Food for other wildlife | $0 | $0 | $0 | 0 | $0 | $0 | $0 |
| Nest boxes, feeders | $319,095 | $594,648 | $170,087 | 6 | $17,869 | $3,519 | $24,202 |
| Other special equipment | $419,717 | $782,162 | $223,721 | 8 | $23,504 | $4,629 | $31,833 |
| Tents, tarps | $42,356 | $82,639 | $24,566 | 1 | $2,372 | $530 | $3,648 |
| Backpacking equipment | $0 | $0 | $0 | 0 | $0 | $0 | $0 |
| Other camping equipment | $0 | $0 | $0 | 0 | $0 | $0 | $0 |
| Day packs | $25,205 | $49,177 | $14,619 | 1 | $1,411 | $316 | $2,171 |
| Magazines & books | $151,146 | $281,393 | $78,091 | 3 | $8,464 | $1,545 | $10,625 |
| Binoculars, spotting scopes | $0 | $0 | $0 | 0 | $0 | $0 | $0 |
| Membership dues, contributions | $368,306 | $784,382 | $255,936 | 16 | n/a | $8,790 | $60,448 |
| Other auxiliary equipment | $0 | $0 | $0 | 0 | $0 | $0 | $0 |
| Off-road vehicles | $0 | $0 | $0 | 0 | $0 | $0 | $0 |
| Pickup, camper, motor home | $0 | $0 | $0 | 0 | $0 | $0 | $0 |
| Boat | $0 | $0 | $0 | 0 | $0 | $0 | $0 |
| Trailer, boat accessories | $0 | $0 | $0 | 0 | $0 | $0 | $0 |
| Cabin | $0 | $0 | $0 | 0 | $0 | $0 | $0 |
| Other special equipment | $0 | $0 | $0 | 0 | $0 | $0 | $0 |
| Plantings, gardening | $0 | $0 | $0 | 0 | $0 | $0 | $0 |
| Land purchases, 2001 payments | $0 | $0 | $0 | 0 | $0 | $0 | $0 |
| Land leases, 2001 payments | $0 | $0 | $0 | 0 | $0 | $0 | $0 |
| ***TOTALS:*** | $226,187,421 | $434,664,643 | $117,281,448 | 4,823 | $13,126,794 | $2,708,876 | $18,628,122 |

**2001 Economic Impacts: RESIDENTS + NON-RESIDENTS Arizona Watchable Wildlife**

| Category: | Retail Sales | Total Multiplier Effect | Salaries and Wages | Full & Part-Time Jobs | State Sales Taxes | State Income Taxes | Federal Income Taxes |
|---|---|---|---|---|---|---|---|
| Food | $109,682,523 | $221,089,732 | $56,476,707 | 2,371 | $2,047,387 | $1,704,281 | $11,897,131 |
| Lodging | $83,828,109 | $171,193,764 | $53,658,373 | 2,412 | $4,694,374 | $1,733,312 | $12,099,790 |
| Public transportation | $28,685,834 | $57,549,520 | $17,065,203 | 562 | $1,606,407 | $404,247 | $2,821,943 |
| Private transportation | $69,531,047 | $103,823,936 | $18,805,594 | 654 | $9,777,803 | $469,995 | $3,280,913 |
| Guide fees | $2,301,686 | $4,333,385 | $1,251,657 | 66 | n/a | $47,114 | $328,887 |
| Public land access fees | $5,103,938 | $10,659,064 | $2,702,025 | 80 | n/a | $57,818 | $403,614 |
| Private land access fees | $358,638 | $675,208 | $199,510 | 10 | $20,084 | $7,341 | $51,246 |
| Equipment rental | $618,548 | $1,121,675 | $326,903 | 10 | $34,639 | $7,529 | $52,561 |
| Boat fuel | $496,143 | $740,842 | $134,188 | 5 | $69,770 | $3,354 | $23,411 |
| Other boat costs | $2,972,546 | $5,596,413 | $1,616,471 | 85 | $166,463 | $60,845 | $424,746 |
| Heating & cooking fuel | $1,098,224 | $1,639,871 | $297,029 | 10 | $154,438 | $7,423 | $51,821 |
| Cameras | $48,989,431 | $88,234,119 | $24,177,433 | 869 | $2,743,408 | $624,697 | $4,360,844 |
| Film & developing | $17,403,827 | $33,614,012 | $10,566,106 | 393 | $974,614 | $282,476 | $1,971,892 |
| Commercial bird food | $27,238,317 | $51,479,764 | $12,693,113 | 480 | $1,525,346 | $345,256 | $2,410,143 |
| Other bird food | $9,152,381 | $17,297,780 | $4,265,029 | 161 | $512,533 | $116,010 | $809,835 |
| Food for other wildlife | $1,536,726 | $2,904,376 | $716,118 | 27 | $86,057 | $19,479 | $135,975 |
| Nest boxes, feeders | $8,704,592 | $16,221,422 | $4,639,800 | 171 | $487,457 | $122,839 | $857,509 |
| Other special equipment | $1,854,052 | $3,455,114 | $988,263 | 36 | $103,827 | $26,164 | $182,647 |
| Tents, tarps | $6,342,056 | $12,373,808 | $3,678,365 | 141 | $355,155 | $101,629 | $709,446 |
| Backpacking equipment | $910,151 | $1,775,771 | $527,884 | 20 | $50,968 | $14,585 | $101,813 |
| Other camping equipment | $11,544,625 | $22,524,395 | $6,695,833 | 257 | $646,499 | $184,998 | $1,291,425 |
| Day packs | $4,498,114 | $8,776,144 | $2,608,887 | 100 | $251,894 | $72,081 | $503,176 |
| Magazines & books | $3,941,617 | $7,338,220 | $2,036,462 | 72 | $220,731 | $51,556 | $359,899 |
| Binoculars, spotting scopes | $8,824,125 | $17,716,617 | $5,544,634 | 194 | $494,151 | $139,380 | $972,973 |
| Membership dues, contributions | $12,728,433 | $27,107,745 | $8,844,988 | 541 | n/a | $388,698 | $2,713,399 |
| Other auxiliary equipment | $1,673,472 | $3,265,065 | $970,607 | 37 | $93,714 | $26,817 | $187,201 |
| Off-road vehicles | $203,211,500 | $380,164,119 | $109,720,086 | 2,464 | $11,379,844 | $1,770,786 | $12,361,385 |
| Pickup, camper, motor home | $21,641,708 | $40,486,886 | $7,948,956 | 262 | $1,211,936 | $188,586 | $1,316,468 |
| Boat | $111,004,758 | $202,978,459 | $62,143,376 | 2,238 | $6,216,266 | $1,608,158 | $11,226,123 |
| Trailer, boat accessories | $0 | $0 | $0 | 0 | $0 | $0 | $0 |
| Cabin | $0 | $0 | $0 | 0 | $0 | $0 | $0 |
| Other special equipment | $0 | $0 | $0 | 0 | $0 | $0 | $0 |
| Plantings, gardening | $14,840,573 | $26,809,336 | $8,091,452 | 326 | $831,072 | $234,372 | $1,636,092 |
| Land purchases, 2001 payments | $0 | $0 | $0 | 0 | $0 | $0 | $0 |
| Land leases, 2001 payments | $0 | $0 | $0 | 0 | $0 | $0 | $0 |
| ***TOTALS:*** | $820,717,696 | $1,542,946,561 | $429,391,051 | 15,058 | $46,756,837 | $10,821,828 | $75,544,307 |

# APPENDIX D
# Arizona Watchable Wildlife Recreation Facts

1. Wildlife watching, photography and feeding in Arizona is enjoyed by 1,465,000 people (both residential and non-residential activities) – more than population of the Tucson metropolitan area (803,618 residents per U.S. Census Bureau, 1999).
2. One in every five Arizona residents participates in some form of wildlife watching activities (5.3 million state residents per U.S. Census Bureau (2001), and 1.063 million residental wildlife watching participants in AZ).
3. Wildlife viewing-related expenditures in Arizona alone are twice as great as tennis equipment sales *nationally* (source: National Sporting Goods Association; $382 million for bowling equipment in 2001 and $820 million for watchable wildlife in Arizona).
4. The annual state tax revenues generated from wildlife watching activities in Arizona could pay the yearly tuition for 25,352 state residents to Arizona State University in Tempe ($57.6 million state tax revenues, annual tuition to ASU reported by The Princeton Review's Complete Book of Accredited Colleges, 2000 Edition to be $2,272).
5. If the jobs supported by wildlife watching expenditures were to disappear, the state average unemployment rate for 2001 would have jumped from 4.7 percent to 5.3 percent (data source: U.S. Bureau of Labor Statistics).
6. The total jobs supported by Arizona wildlife watchers nearly equals the unemployed workforce in the Tucson metropolitan area (17,100 unemployed as of December, 2001, 15,058 employed in state by wildlife watchers' dollars. Data source: U.S. Bureau of Labor Statistics).
7. In 2001, all state residents who participated in watchable wildlife recreation could fill Sun Devil Stadium twenty times (source: ballparks.com, stadium capacity = 73,500).
8. In 2001, the number out-of-state visitors to Arizona nearly equaled the population of Mesa, bringing in $226 million into the state economy (source: U.S. Census Bureau via the InfoPlease Almanac; and the U.S. Fish and Wildlife Service's 2001 National Survey of Fishing, Hunting and Wildlife-Associated Recreation).
9. Watchable wildlife participants in Arizona outnumber the combined populations of Montana and Wyoming (data source: U.S. Census Bureau (2001), 1,465,000 residents and non-residents participating in Arizona compared to 1,362,381 residents of Montana and Wyoming).
10. In 2001, watchable wildlife recreationists in Arizona spent an amount 2.5 times greater than the *national* box office revenues for "Harry Potter and the Sorcerer's Stone" –the top grossing film in the U.S. in 2001 ($820 million v. $317 million total box office receipts; data source: The Movie Times).