THE ECONOMIC IMPACT OF CHEYENNE BOTTOMS
ON KANSAS AND ON BARTON COUNTY


prepared by

Shirley Sicilian and Carolyn Coleman
Research Associates


Institute for Public Policy and Business Research
The University of Kansas
Lawrence, Kansas 66045
(913) 864-3701

prepared for
Kansas Biological Survey

Anthony L. Redwood, Executive Director
Institute for Public Policy and Business Research

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EXECUTIVE SUMMARY


ECONOMIC IMPACT OF CHEYENNE BOTTOMS

The Institute for Public Policy and Business Research (IPPBR) has conducted a study to determine the usage of Cheyenne Bottoms Wetlands and the economic impact of the Bottoms on Kansas and Barton County. The type and extent of activities taking place at Cheyenne Bottoms during 1986 were estimated using traffic counters at each of the four entrances to Cheyenne Bottoms, four IPPBR on-site surveys, and data collected by Cheyenne Bottoms personnel and by Kansas Fish and Game.

The primary economic impact of the Bottoms on Kansas and Barton County was estimated with user expenditure data gathered by IPPBR on-site and mail-in surveys, and records of state expenditures for maintenance of the Bottoms. The secondary impacts of these expenditures were estimated using the static input-output model which was developed at IPPBR and adapted specifically for this project.

It is clear that the presence of Cheyenne Bottoms Wetlands has a quantifiable and significant impact on all sectors of the Kansas and Barton County economies. Results are summarized in the accompanying tables.

TABLE 1--Usage Estimates by User Group. Birdwatching, environmental study, fishing and teal hunting estimates are based on traffic counter data collected in 1986. Other hunting is based on user data from the Kansas Fish and Game Commission. Usage was not estimated for the period between January 11 and April 17.

| Activity | Total Users |
| --- | --- |
| Birdwatching | 15,567 |
| Deer Hunting | 89 |
| Duck & Goose Hunting | 3,833 |
| Environmental Study | 428 |
| Fishing | 787 |
| Pheasant Hunting | 1,246 |
| Teal Hunting | 1,911 |

TABLE 2--Economic Impacts on Kansas: User Groups, State Expenditures, and Total. Discrepancies between this table and Table 10 are due to rounding.

| | IMPACTS | | | MULTIPLIER |
| SOURCE | Primary | Secondary | Total | |
|---|---|---|---|---|
| Birdwatching | 916,430 | 985,455 | 1,901,885 | 2.08 |
| Environmental Study | 23,790 | 25,927 | 49,717 | 2.09 |
| Total Non-Consumptive Use | 940,220 | 1,011,382 | 1,951,602 | |
| | | | | |
| Deer Hunting | 4,468 | 3,934 | 8,402 | 1.88 |
| Duck and Goose Hunting | 148,270 | 154,681 | 302,951 | 2.04 |
| Pheasant Hunting | 50,332 | 54,757 | 105,089 | 2.09 |
| Teal Hunting | 75,402 | 79,756 | 155,158 | 2.06 |
| Fishing | 25,822 | 26,324 | 52,146 | 2.02 |
| Total Consumptive Use | 304,294 | 319,452 | 623,746 | |
| | | | | |
| All User Groups | 1,244,514 | 1,330,834 | 2,575,348 | 2.07 |
| | | | | |
| State Expenditures | 109,538 | 123,904 | 233,442 | 2.13 |
| | | | | |
| TOTAL | 1,354,052 | 1,454,738 | 2,808,790 | 2.07 |

TABLE 3--Economic Impacts on Barton County: User Groups, State Expenditures, and Total. Discrepancies are due to rounding.

| | IMPACTS | | | MULTIPLIER |
| SOURCE | Primary | Secondary | Total | |
|---|---|---|---|---|
| Birdwatching | 606,195 | 465,784 | 1,071,980 | 1.77 |
| Environmental Study | 19,024 | 14,156 | 33,180 | 1.74 |
| Total Non-Consumptive Use | 625,219 | 479,940 | 1,105,160 | |
| | | | | |
| Deer Hunting | 1,609 | 1,017 | 2,626 | 1.63 |
| Duck and Goose Hunting | 84,324 | 63,850 | 148,174 | 1.76 |
| Pheasant Hunting | 33,716 | 26,301 | 60,017 | 1.78 |
| Teal Hunting | 43,864 | 33,490 | 77,355 | 1.76 |
| Fishing | 23,147 | 15,759 | 38,906 | 1.68 |
| Total Consumptive Use | 186,660 | 140,417 | 327,078 | |
| | | | | |
| All User Groups | 811,879 | 620,357 | 1,432,238 | 1.76 |
| | | | | |
| State Expenditures | 109,538 | 85,369 | 194,907 | 1.78 |
| | | | | |
| TOTAL | 921,417 | 705,726 | 1,627,145 | 1.77 |

# THE ECONOMIC IMPACT OF CHEYENNE
## BOTTOMS ON KANSAS AND ON BARTON COUNTY

## INTRODUCTION

This chapter contains the results of a study conducted by the Institute for Public Policy and Business Research (IPPBR) to determine the usage of the Cheyenne Bottoms Wetlands Management Area and the economic impact on Kansas and Barton County of this usage and of state expenditures for managing and maintaining the Bottoms. The chapter is divided into two parts. Part one contains an estimation of the type and extent of Cheyenne Bottoms uses during 1986 and their resulting primary economic impacts to the county and state along with the primary impact of fiscal 1986 state expenditures on the Bottoms. Part two reports the secondary economic impacts that accrue as the primary impact diffuses through the county and state economies. The secondary impacts are estimated using the static input-output model developed at IPPBR and adapted specifically for this project. It is clear that the presence of Cheyenne Bottoms Wetlands has a significant and quantifiable impact on state and regional economic vitality. Expenditures made by Cheyenne Bottoms users generate income for all sectors of the Kansas and Barton County economies.

## DETERMINING THE PRIMARY IMPACT
### PRIMARY IMPACT OF BOTTOMS USERS
#### Estimating Usage.

The type and extent of activities engaged in by Cheyenne

Bottoms users were determined by first separating the year into the specific wildlife seasons shown in Table 4. Total daytime usage during spring shorebird season, an off-season, fall shore-bird season, and teal season was determined using traffic counters, which were installed at each of the four entrances to the Bottoms. The traffic counters recorded the hourly total of

Table 4--Cheyenne Bottoms Wildlife Seasons.

| Season | Duration |
|---|---|
| 1) Spring Shore bird Migration | April 17 - May 18 |
| 2) Off-seasons | May 19 - July 31, |
| | Sept. 21 - Oct 1, |
| | Jan. 11 - April 17 |
| 3) Fall Shore Bird Migration | Aug. 1 - Sept 12 |
| 4) Teal Hunting | Sept. 13 - Sept. 21 |
| 5) Duck Hunting | Oct. 25 - Nov. 2 |
| | Nov. 8 - Dec. 7 |
| | Dec. 24 - Jan. 1 |
| 6) Goose Hunting | Nov. 1 - Jan. 11 |
| 7) Pheasant Hunting | Nov. 8 - Jan. 31 |
| 8) Deer Hunting | |
| (fire arm and archery) | Oct. 1 - Dec. 14 |

vehicles entering and leaving the Bottoms during the four seasons. The summation of these totals for the season, divided by two, gives the total number of vehicles entering the premises for that season. We used this number to approximate the total number of Cheyenne Bottoms users, or person/days, for the season. We believe this is a good compromise number because of two off-setting factors: there was likely to be more than one person per vehicle, which would raise the usage from the traffic counter

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totals, but the same vehicle was also likely to make more than one visit to the Bottoms per day, which would lower the usage from the traffic counter totals.

During fall shorebird season and teal season there were traffic counter malfunctions on two of the four roads leading to Cheyenne Bottoms. Usage data for the two roads during these seasons was extrapolated using contemporary data for the other two roads and past data for all four roads.

Given the total number of users, or persons/days, for a season, it was also desirable to know how people were using the Bottoms and the number of person/days spent on each type of activity. For this purpose, IPPBR performed four two-day on-site surveys, one during each of the first four seasons. Two researchers attempted to hand out written surveys to everyone at the site over the survey period. The surveys asked respondents to identify the purpose of their trip by checking one (or more) of ten possible activities listed or by writing in their activity if it was not on the list. Using these responses, we found what percent of those surveyed were engaged in each of the activities. This proportion determined how we allocated the total seasonal use, as estimated from the traffic-counter data, among the possible activities.

Since we did not survey at night, we were not able to estimate the types of activities taking place between 22:00 and 5:00. Therefore, we do not include the usage for these time periods in the total seasonal usage figures.

In the case of Cheyenne Bottoms fishing use, modifications were required in order to reduce bias in the on-site survey. Fishing use was reduced by half because fishers tend to enter the Bottoms and settle into one place where they are easily spotted and approached by the surveyors. By contrast, bird watchers and environmentalist are much more mobile within the area and are therefore harder to find and approach.

Due to the limited duration of this study, it was not possible to operate traffic counters during duck and goose, pheasant, and deer seasons or the remaining off-seasons. Therefore, Kansas Fish and Game data were used to determine use of the Bottoms during the hunting seasons. We assumed that no bird-watching, fishing, or environmental study took place during hunting seasons. This assumption is supported by our on-site surveys during the 1986 teal season, which turned up only teal hunters. Usage for the September 21 to October 1 off-season was extrapolated from the traffic-counter data for the May 15 to July 31 off-season. The composition of activities is assumed to follow the pattern established during the earlier off-season period. Usage for the January 11 to April 1 off-season was not estimated. We felt that the level and composition of use among these winter and early spring months could be sufficiently different from the summer off-season usage that projection would not be appropriate.

Total use of the Bottoms during duck and goose season was extrapolated from the 1985-1986 records of permits issued at the hunter check-station for use of hunting blinds. According to the

area managers, total waterfowl hunting at Cheyenne Bottoms is roughly divided such that 40 percent of hunters use the blinds and 60 percent use the perimeter areas of pools 2, 3, and 4. There is considerable overlap between duck and goose seasons, and the 1985-86 blind-use records do not distinguish between duck hunter days and goose hunter days during the overlapping periods (Kansas Fish and Game, 1986). However, the 1980 Waterfowl Harvest Summary indicates that hunters generally obtain both duck and and goose permits when the seasons overlap (Kansas Fish and Game, 1980). Therefore, use of the Bottoms for duck and goose season was estimated as an aggregate waterfowl hunting season usage.

Pheasant hunting season usage was estimated to be the same as that determined by the Public Lands Use Survey (Kansas Fish and Game, 1985). This survey contains the most recent estimates available for pheasant hunter use of Cheyenne Bottoms.

1985 Cheyenne Bottoms deer hunter (firearm and archery) usage statistics from the Kansas Fish and Game Commission were employed as our estimate of deer season use (Kansas Fish and Game, 1985).

With the combination of Kansas Fish and Game data from 1985 and 1986 and our own data, collected during the study period, we have estimated current usage of Cheyenne Bottoms.

The data necessary to determine general past usage of the Bottoms do not exist. However, our survey results suggest that a substantial core of current users have been coming to the Bottoms for many years (Figure 1).

Figure 1--Number of Years Respondent has Visited Cheyenne Bottoms.
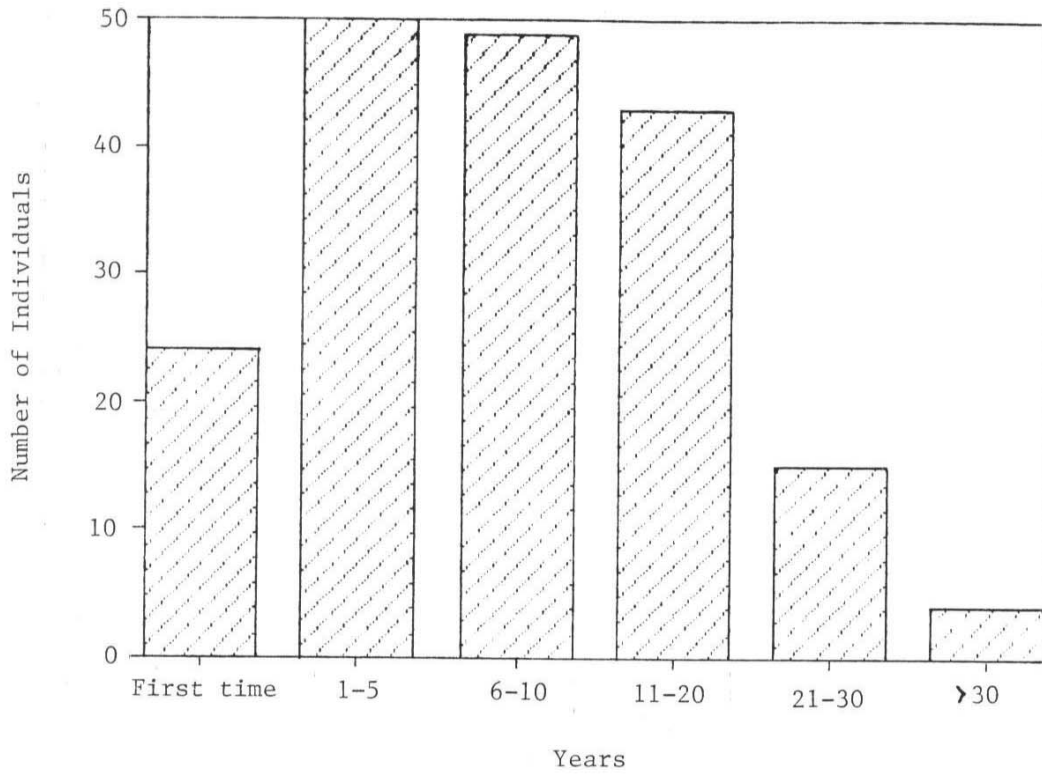
Concerning expected future use, only one survey respondent answered that he did not intend to return to Cheyenne Bottoms in future years. Certainly future use depends on management of the Bottoms and environmental conditions; several respondents wrote that they intended to return to the Bottoms as long as there was water.

Table 5 sets out the current Cheyenne Bottoms usage data for each season. Table 6 shows the number of cars entering the Bottoms between 22:00 and 5:00; this usage is not included in the total seasonal usage estimates in Table 5.

Table 5--Seasonal Usage of Cheyenne Bottoms. Seasonal use after September 21 was estimated using existing data; other use was determined using IPPBR on-site surveys and traffic-counter data. * indicates adjusted total.

| | number of on-site survey respondents participating in activity | percent of total participation | estimated total season participation |
|---|---|---|---|
| Spring Shorebird Season: April 17-May 18 | | | |
| birdwatching | 20 | 76% | 1,628 |
| environmental study | 5 | 20% | 428 |
| fishing | 1 | 4% | 86* |
| Totals | 26 | 100% | 2,142 |
| Off-Season: May 19-July 31, Sept. 21-Oct. 1 | | | |
| birdwatching | 3.5 | 88% | 5,144 |
| fishing | 0.5 | 12% | 701* |
| Totals | 4.0 | 100% | 5,845 |
| Fall Shorebird Season: Aug. 1-Sept. 12 | | | |
| birdwatching | 5 | 100% | 8,796 |

Table 5--(Continued)

| | number of on-site survey respondents participating in activity | percent of total participation | estimated total season participation |
|---|---|---|---|
| Teal Hunting Season: Sept. 13-Sept. 21 | | | |
| teal hunting | 20 | 100% | 1,911 |
| Duck and Goose Hunting Season: Oct. 25-Jan.11 | | | |
| duck and goose hunting | n.a. | n.a. | 3,833 |
| Pheasant Hunting Season: Nov. 8-Jan.31 | | | |
| pheasant hunting | n.a. | n.a. | 1,246 |
| Deer Hunting Season: Oct. 1-Dec. 14 | | | |
| deer hunting | n.a. | n.a. | 89 |

Table 6--Seasonal Nighttime Usage of Cheyenne Bottoms (22:00-5:00). Nighttime traffic is not included in total seasonal usage.

| Season | Dates | Nighttime Usage |
|---|---|---|
| Spring shorebird | April 17-May 18 | 463 |
| Off-season | May 19-July 31 Sept. 21-Oct. 1 | 992 |
| Fall shorebird | Aug. 1-Sept. 12 | 44 |
| Teal | Sept. 13-Sept. 21 | 70 |

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Estimating Expenditures.

A second objective of the four on-site surveys was to estimate average daily expenditures in Kansas and in Barton County for each type of Cheyenne Bottoms use. For this purpose, further surveys were administered at a shell-shot ballistics seminar in Great Bend, sponsored by the Kansas Fish and Game Commission, and mailed in from the Kansas Ornithological Society newsletter. Visitors to the Cheyenne Bottoms hunter check-station also completed surveys during the seasons. The surveys listed possible expenditure categories and requested respondents to write in the amount spent in each category. An "other" category was also available. The categories were formed so that expenditures would be reported in a manner compatible with the industry sectors of the IPPBR static input-output model. In tabulating the data, we divided the numerous expenditure categories into 1) travel expenditures for the trip, like food, lodging, and gasoline, and 2) equipment expenditures for long-term use, like camper-shells, guns, and cameras. For the sake of accuracy, respondents were asked to report their travel expenses for their entire trip since it was believed the total would be easier to recall than average daily expenditures.

In order to differentiate between impacts to Kansas and impacts to Barton County, we considered the origin of the Cheyenne Bottoms user when we calculated daily travel expenditure. The assumption was that users filled their gas tanks once before they left on their trips and once before they returned, so

if they were not from Kansas, half of their gasoline would have been purchased outside of the state and would not be a primary impact on the Kansas economy. Likewise, when users were not from Barton County, we assumed they bought half their gas outside the county. Since over 95 percent of the trips to the Bottoms were for four days or less, we assumed that other travel expenditures were made in the Bottoms area. We divided the total of respondents' modified per-trip travel expenditures by their reported number of days per trip to get the average daily travel expenditure in Kansas and the average daily travel expenditure in Barton County.

Long-term equipment expenditures were handled differently. We allocated only a portion of the long-term expense to Cheyenne Bottoms usage, since a person might not buy equipment solely for use at the Bottoms. We determined the proportion of the expenditures to be charged to Cheyenne Bottoms usage by asking respondents to estimate what percent of their sport activity takes place at Cheyenne Bottoms. By asking only for long-term expenses made during the past year, we avoided having to amortize a wide variety of purchases in order to determine annual expenditure. The assumption is that the sampling process would yield a valid average. Further, to put these long-term expenses on an average daily basis, we divided them by the number of days respondents reported that they spend at Cheyenne Bottoms per year.

Given an average equipment expenditure, it is still

necessary to determine how much of the spending will have a primary impact on the Kansas economy and how much will have a primary impact on the Barton County economy.

Recognizing that most equipment is purchased near the user's home, we used survey results to determine the percent of each user group who were from Kansas and the percent who were from Barton County and allocated the primary impact of equipment purchases to Barton County and Kansas proportionately.

Table 7 sets out the average daily equipment and travel expenditures for all survey respondents in each user group as estimated based on IPPBR on- and off-site surveys. Table 7 also presents estimates of average daily expenditures for U.S. sportsmen in each user group (U.S. Department of the Interior, 1982).

Table 7--Average Daily Expenditures by Type by Activity Group. National survey figures are adjusted for inflation using GNP implicit price deflators. National categories are somewhat broader than IPPBR's, e.g., national figures are for all migratory bird hunters.

| | Average Daily Expenditures | | | |
| | IPPBR Survey | | 1980 National Survey | |
| Activity | Travel | Equipment | Travel | Equipment |
| Birdwatching | $34.79 | $24.92 | $11.86 | $ 2.05 |
| Duck and Geese Hunting | 20.10 | 20.11 | 10.43 | 7.03 |
| Fishing | 14.62 | 18.19 | 9.61 | 13.11 |
| Teal Hunting | 23.64 | 18.98 | 10.43 | 7.03 |
| Deer Hunting | 4.68 | 47.66 | 17.25 | 13.70 |
| Pheasant Hunting | 27.13 | 16.17 | 11.20 | 9.28 |
| Environmental Study | 35.09 | 34.90 | 11.86 | 2.05 |
| Other | 30.51 | 12.53 | -- | -- |

Table 7 shows a pattern of higher travel expenditures from the IPPBR survey than from the national survey. This is probably because across the nation many people can make afternoon outings to participate in nearby outdoor activities, but Cheyenne Bottoms is far from any major population center. Because of this fact, a higher percentage of the users must travel a good distance and perhaps stay overnight.

An exception to this pattern is the average daily expenditure for deer hunting. The deer hunters average expenditures at the Bottoms were probably less than the national average because all deer hunters surveyed were from Barton County.

Our expenditure information, along with the traffic-counter data collected during the three wildlife seasons and the off-season allow us to estimate the total annual expenditures for each of these different Cheyenne Bottoms user groups. The primary economic impact of each type of activity in 1986 is the product of that activity group's total annual usage and the activity group's average daily expenditures. The primary impact for each activity group is shown in Table 8.

Table 8--Primary Impacts by Activity Group in Kansas and Barton County

| Activity Group | Primary Impact | |
| --- | --- | --- |
| | Travel | Equipment |
| KANSAS | | |
| Birdwatching | $538,618 | $377,812 |
| Duck and Goose Hunting | 75,050 | 73,220 |
| Fishing | 11,506 | 14,316 |
| Teal Hunting | 40,953 | 34,449 |
| Deer Hunting | 417 | 4,051 |
| Pheasant Hunting | 31,187 | 19,145 |
| Environmental Study | 14,856 | 8,934 |
| Total Activity Group Primary Impact | $712,587 | $531,927 |
| BARTON COUNTY | | |
| Birdwatching | $477,284 | $128,911 |
| Duck and Goose Hunting | 62,746 | 21,578 |
| Fishing | 10,396 | 12,751 |
| Teal Hunting | 33,710 | 10,154 |
| Deer Hunting | 417 | 1,192 |
| Pheasant Hunting | 28,072 | 5,643 |
| Environmental Study | 13,195 | 5,829 |
| Total Activity Group Primary Impact | $625,820 | $186,058 |

PRIMARY IMPACT OF STATE EXPENDITURES

Determining the primary impact of the state expenditures is a relatively straightforward matter since the Fish and Game Commission provided the relevant data in sufficient detail to categorize each type of expenditure as a wage and salary expenditure or as an expenditure made in one of the eleven sectors of the model. The wages and salary expenses are in turn allocated

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among the eleven sectors on the basis of the average propensity of wage and salary earners to consume of each sector. The average propensity to consume for each sector is derived from actual data on income and consumption patterns by dividing consumption for the sector by total personal income. The resulting average propensities to consume are listed in Table 9.

Table 9--Average Propensities to Consume by Sector.

| Sector | Average Propensity to Consume |
|---|---|
| 1) Agriculture | 0.007655 |
| 2) Mining | 0.0 |
| 3) Construction | 0.0 |
| 4) Durable Goods Manufacturing | 0.078594 |
| 5) Non-Durable Goods Manufacturing | 0.178675 |
| 6) Transportation and Utilities | 0.050132 |
| 7) Wholesale | 0.000308 |
| 8) General Merchandise Stores and Other Retail | 0.055689 |
| 9) Travel | 0.088967 |
| 10) Finance, Insurance and Real Estate | 0.136506 |
| 11) Services | 0.125455 |
| Total Average Propensity to Consume | 0.7220 |

DETERMINING THE SECONDARY IMPACT

THE INPUT-OUTPUT MODEL FOR KANSAS

The secondary effects of each user group's Cheyenne Bottoms related expenditures were determined using an Input-Output (I-O) model. IPPBR is in the second year of a three-year grant to develop a dynamic I-O model of Kansas. Although the model is not yet complete, enough data have been gathered to provide the basic

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static model necessary for this study. The I-O model is a structural description of the intricate flow of goods and services among sectors of the Kansas economy. Fundamentally, the demand for any good or service can be broken down into two parts: final demand (consumers, government, and exports) and intermediate demand, which is the use of a good or service in the production of another good or service. While the primary impact, discussed above, is the change in final demand, it is through the complex flows of intermediate demand that the secondary impacts are created. An increase in final demand for a product increases the demand for all of the intermediate products used in its production. In the I-O model the intermediate flows are captured by using a coefficient matrix which reflects the proportion of all other goods used in the production of one good. By multiplying this coefficient matrix by total output in each sector, one gets total intermediate demand in the Kansas economy. Then by adding intermediate demand to final demand one gets total Kansas output. This basic relationship can be compactly written in matrix form. Let A be the coefficient matrix for intermediate demand, X be a column vector for total output, and D be a final demand vector. Then

$$A X + D = X$$

using elementary matrix alegbra, one can show that

$$D = X - AX = (I-A)X$$

where I is the identity matrix. Then

$$(I-A)^{-1} D = X$$

where the minus one indicates the inverse operation. What the final equation shows is that some matrix, $(I-A)^{-1}$, multiplied by final demand gives total output. Thus a change in final demand multiplied by the same matrix will give the change in total output. The matrix $(I-A)^{-1}$ is then the matrix by which we can determine the changes in intermediate demand due to the change in final demand.

For our purposes, we need the coefficient matrix in order to develop the $(I-A)^{-1}$ matrix. A special coefficient matrix was created for this project to reflect the sectors relevant to Cheyenne Bottoms. The data used to construct IPPBR's I-O model classified the Kansas economy into 125 sectors. However, certain assumptions inherent in the model allow us to aggregate those 125 sectors into a more manageable 11 sectors. Most of the 125 sectors were grouped together to create major fields of endeavor: agriculture; mining; construction; durable goods manufacturing; non-durable goods manufacturing; transportation and utilities; wholesale; finance, insurance, and real estate; and services. A travel sector was formed by grouping the individual sectors of hotels, restaurants, gas stations and car dealerships. The general merchandise and other retail sector was kept separate to best reflect the economic effects of equipment and other retail purchases by Cheyenne Bottoms users.

Our estimate of secondary effects of Cheyenne Bottoms users' expenditures was found in a simple two-step procedure. In the first step, the $(I-A)^{-1}$ matrix was multiplied by the change in

final demand estimated in Part One of this chapter. The result of this operation is the total change in output in each sector of the Kansas economy due to the change in final demand. The second step is to subtract the primary effect from the total effect in each sector to give the secondary effect. The primary, secondary and total effects are listed in Table 10.

Table 10--Primary, Secondary, and Total Impacts on the Kansas Economy of User and State Expenditures by Sector. Discrepancies are due to rounding.

USER EXPENDITURES

Bird Watching

| Sector | Primary Impact | Secondary Impact | Total Impact |
|---|---|---|---|
| 1. Agriculture | $        0 | $132,642 | $   132,642 |
| 2. Mining | 0 | 80,066 | 80,066 |
| 3. Construction | 0 | 25,596 | 25,596 |
| 4. Durable goods manufacturing | 0 | 106,400 | 106,400 |
| 5. Non-durable goods manu-facturing | 0 | 288,628 | 288,628 |
| 6. Transportation and utilities | 0 | 78,215 | 78,215 |
| 7. Wholesale | 0 | 8,089 | 8,089 |
| 8. General merchandise stores and other retail | 377,812 | 2,895 | 380,707 |
| 9. Travel | 538,618 | 24,696 | 563,314 |
| 10. Finance, Insurance and Real Estate | 0 | 150,437 | 150,437 |
| 11. Services | 0 | 87,791 | 87,791 |
| Totals | 916,430 | 985,455 | 1,901,885 |

The birdwatching multiplier for the Kansas economy is 2.08.

Table 10--(Continued)

Deer Hunting

| Sector | Primary Impact | Secondary Impact | Total Impact |
|---|---|---|---|
| 1. Agriculture | $     0 | $     412 | $     412 |
| 2. Mining | 0 | 278 | 278 |
| 3. Construction | 0 | 126 | 126 |
| 4. Durable goods manufacturing | 0 | 332 | 332 |
| 5. Non-durable goods manu-facturing | 0 | 950 | 950 |
| 6. Transportation and Utilities | 0 | 394 | 394 |
| 7. Wholesale | 0 | 41 | 41 |
| 8. General merchandise stores and other retail | 4,051 | 14 | 4,065 |
| 9. Travel | 417 | 103 | 520 |
| 10. Finance, Insurance and Real Estate | 0 | 807 | 807 |
| 11. Services | 0 | 477 | 477 |
| Totals | 4,468 | 3,934 | 8,402 |

The deer hunting multiplier for the Kansas economy is 1.88.

Duck and Goose Hunting

| Sector | Primary Impact | Secondary Impact | Total Impact |
|---|---|---|---|
| 1. Agriculture | $     0 | $ 20,175 | $ 20,175 |
| 2. Mining | 0 | 12,340 | 12,340 |
| 3. Construction | 0 | 4,150 | 4,150 |
| 4. Durable goods manufacturing | 0 | 16,192 | 16,192 |
| 5. Non-durable goods manu-facturing | 0 | 44,197 | 44,197 |
| 6. Transportation and Utilities | 0 | 12,723 | 12,723 |
| 7. Wholesale | 0 | 1,318 | 1,318 |
| 8. General merchandise stores and other retail | 73,220 | 468 | 73,688 |
| 9. Travel | 75,050 | 3,905 | 78,955 |
| 10. Finance, Insurance and Real Estate | 0 | 24,741 | 24,741 |
| 11. Services | 0 | 14,472 | 14,472 |
| Totals | 148,270 | 154,681 | 302,951 |

The duck and goose hunting multiplier for Kansas economy is 2.04.

Table 10--(Continued)

Environmental Study

| Sector | Primary Impact | Secondary Impact | Total Impact |
|---|---|---|---|
| 1. Agriculture | $ 0 | $ 3,536 | $ 3,536 |
| 2. Mining | 0 | 2,123 | 2,123 |
| 3. Construction | 0 | 664 | 664 |
| 4. Durable goods manufacturing | 0 | 2,836 | 2,836 |
| 5. Non-durable goods manu-facturing | 0 | 7,673 | 7,673 |
| 6. Transportation and Utilities | 0 | 2,026 | 2,026 |
| 7. Wholesale | 0 | 209 | 209 |
| 8. General merchandise stores and other retail | 8,934 | 76 | 9,010 |
| 9. Travel | 14,856 | 648 | 15,504 |
| 10. Finance, Insurance and Real Estate | 0 | 3,876 | 3,876 |
| 11. Services | 0 | 2,260 | 2,260 |
| Totals | 23,790 | 25,927 | 49,717 |

The environmental study multiplier for the Kansas economy is 2.09.

Fishing

| Sector | Primary Impact | Secondary Impact | Total Impact |
|---|---|---|---|
| 1. Agriculture | $ 0 | $ 3,347 | $ 3,347 |
| 2. Mining | 0 | 2,070 | 2,070 |
| 3. Construction | 0 | 724 | 724 |
| 4. Durable goods manufacturing | 0 | 2,688 | 2,688 |
| 5. Non-durable goods manu-facturing | 0 | 7,374 | 7,374 |
| 6. Transportation and Utilities | 0 | 2,225 | 2,225 |
| 7. Wholesale | 0 | 231 | 231 |
| 8. General Merchandise Stores and other retail | 14,316 | 81 | 14,397 |
| 9. Travel | 11,506 | 668 | 12,174 |
| 10. Finance, Insurance and Real Estate | 0 | 4,361 | 4,361 |
| 11. Services | 0 | 2,555 | 2,555 |
| Totals | 25,822 | 26,324 | 52,146 |

The fishing multiplier for the Kansas economy is 2.02.

Table 10--(Continued)

Teal Hunting

| Sector | Primary Impact | Secondary Impact | Total Impact |
|---|---|---|---|
| 1. Agriculture | $ 0 | $ 10,556 | $ 10,556 |
| 2. Mining | 0 | 6,417 | 6,417 |
| 3. Construction | 0 | 2,108 | 2,108 |
| 4. Durable goods manufacturing | 0 | 8,470 | 8,470 |
| 5. Non-durable goods manu-facturing | 0 | 23,052 | 23,052 |
| 6. Transportation and Utilities | 0 | 6,454 | 6,454 |
| 7. Wholesale | 0 | 668 | 668 |
| 8. General merchandising stores and other retail | 34,449 | 238 | 34,687 |
| 9. Travel | 40,953 | 2,006 | 42,959 |
| 10. Finance, Insurance and Real Estate | 0 | 12,489 | 12,489 |
| 11. Services | 0 | 7,298 | 7,298 |
| Totals | 75,402 | 79,756 | 155,158 |

The teal hunting multiplier for the Kansas economy is 2.06.

Pheasant Hunting

| Sector | Primary Impact | Secondary Impact | Total Impact |
|---|---|---|---|
| 1. Agriculture | $ 0 | $ 7,456 | $ 7,456 |
| 2. Mining | 0 | 4,479 | 4,479 |
| 3. Construction | 0 | 1,405 | 1,405 |
| 4. Durable goods manufacturing | 0 | 5,980 | 5,980 |
| 5. Non-durable goods manu-facturing | 0 | 16,184 | 16,184 |
| 6. Transportation and Utilities | 0 | 4,287 | 4,287 |
| 7. Wholesale | 0 | 443 | 443 |
| 8. General merchandise stores other other retail | 19,145 | 159 | 19,304 |
| 9. Travel | 31,187 | 1,369 | 32,556 |
| 10. Finance, Insurance and Real Estate | 0 | 8,209 | 8,209 |
| 11. Services | 0 | 4,786 | 4,786 |
| Total | 50,332 | 54,757 | 105,089 |

The pheasant hunting multiplier for the Kansas economy is 2.09.

Table 10--(Concluded)

STATE EXPENDITURES

| Sector | Primary Impact | Secondary Impact | Total Impact |
|---|---|---|---|
| 1. Agriculture | $ 576 | $ 19,687 | $ 20,263 |
| 2. Mining | 0 | 12,687 | 12,687 |
| 3. Construction | 0 | 3,613 | 3,613 |
| 4. Durable goods manufacturing | 5,910 | 18,108 | 24,018 |
| 5. Non-durable goods manufacturing | 13,436 | 32,382 | 45,818 |
| 6. Transportation and utilities | 6,333 | 9,022 | 15,355 |
| 7. Wholesale | 23 | 858 | 881 |
| 8. General merchandise stores and other retail | 26,932 | 352 | 27,284 |
| 9. Travel | 28,974 | 2,740 | 31,714 |
| 10. Finance, Insurance and Real Estate | 10,265 | 15,378 | 25,643 |
| 11. Services | 17,089 | 9,077 | 26,166 |
| Total | 109,538 | 123,904 | 233,442 |

The state spending multiplier for the Kansas economy is 2.13.

Total Impact

| Sector | Primary Impact | Secondary Impact | Total Impact |
|---|---|---|---|
| 1. Agriculture | $ 576 | $197,811 | $ 198,387 |
| 2. Mining | 0 | 120,460 | 120,460 |
| 3. Construction | | 38,385 | 38,385 |
| 4. Durable goods manufacturing | 5,910 | 161,005 | 166,915 |
| 5. Non-durable goods manufacturing | 13,436 | 420,441 | 433,877 |
| 6. Transportation and Utilities | 6,333 | 115,345 | 121,678 |
| 7. Wholesale | 23 | 11,856 | 11,879 |
| 8. General merchandise stores other other retail | 558,860 | 4,281 | 563,141 |
| 9. Travel | 741,561 | 36,135 | 777,696 |
| 10. Finance, Insurance and Real Estate | 10,265 | 220,298 | 230,563 |
| 11. Services | 17,089 | 128,716 | 145,805 |
| Total | 1,354,053 | 1,454,734 | 2,808,787 |

The total impact multiplier for the Kansas Economy is 2.07.

The multiplier and average daily expenditures for user groups found above can be used to estimate the economic impacts of different numbers of users in a group, assuming the same ratio of Kansas to non-Kansas residents using the Bottoms. For example, we can compare the impacts of duck and goose hunting for a poor season, 1981-82, and for a good season, 1977-78, using hunter days from Kansas Fish and Game records. The product of hunter days and average daily hunting expenditures from Table 7 is the primary impact. Primary impact times the duck and goose hunting multiplier from Table 10 yield the total impacts (Table 11). Total impact less primary impact is the secondary impact.

Table 11--Estimated Impacts of Different Waterfowl Hunting Opportunities on the Kansas Economy.

| | Number of Hunter Days | Primary Impact | Secondary Impact | Total Impact |
|---|---|---|---|---|
| A good waterfowl year: | | | | |
| 1977-78 | 11,675 | $440,211.71 | $457,820.17 | $898,031.88 |
| A poor waterfowl year: | | | | |
| 1981-82 | 2,260 | $ 85,214.43 | $ 88,623.01 | $173,837.44 |

AN INPUT-OUTPUT MODEL FOR BARTON COUNTY

It is possible to adapt the Kansas model to Barton County using the location quotient method. The location quotient is a number used to compare the relative importance of an industry in

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one region to its relative importance in a larger region. We used Commerce Department employment data (U.S. Dept. of Commerce, 1986), which breaks employment into sectors for each county and the state, to compare the structure of the Barton County economy with the structure of the Kansas economy. The location quotient for industrial sector i in Barton County is defined as

$$LQ_i = \frac{E_{ib}}{E_b} \div \frac{E_{iks}}{E_{ks}}$$

where

$LQ_i$ = location quotient for industry i

$E_{ib}$ = employment in industry i in Barton County

$E_b$ = total employment in Barton County

$E_{iks}$ = employment in industry i in Kansas

$E_{ks}$ = total employment in Kansas

This method indirectly shows the adequacy of production in the county by Kansas standards: when the quotient for a given sector equals or exceeds one, we can assume that local requirements for that sector's production are met locally at least to the same degree that requirements for state production are met within the state. In this case, we do not alter the Kansas model, i.e., if $LQ_i > 1$ then $a_{ij} = a_{ij}$. When the quotient is less than one, it indicates that that sector in Barton County employs a relatively smaller proportion of workers than the comparable state sector, indicating that the county is less self-sufficient than the state and therefore will have to import more of that good from outside

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the county. In such a case the model must be adapted for Barton County by deriving new regional coefficients for the sector. Barton County production coefficients, $a_{ij}$, in row i are computed as: Barton County $a_{ij}$ = $LQ_i$ times Kansas $a_{ij}$, where Barton County coefficient, $a_{ij}$, equals the product of the location quotient for sector i, $LQ_i$ times the Kansas coefficient $a_{ij}$, for all j's. This equation will derive all of the appropriate row coefficients for industrial sector i in the Barton County coefficient table. Table 12 sets out the primary, secondary, and total impacts of Cheyenne Bottoms use on Barton County.

Table 12--Primary, Secondary, and Total Impacts on the Barton County Economy of User and State Expenditure. Discrepancies are due to rounding.

USER EXPENDITURES

Bird Watching

| Sector | Primary Impact | Secondary Impact | Total Impact |
|---|---|---|---|
| 1. Agriculture | $ 0 | $ 71,007 | $ 71,007 |
| 2. Mining | 0 | 41,173 | 41,173 |
| 3. Construction | 0 | 12,684 | 12,684 |
| 4. Durable goods manufacturing | 0 | 44,954 | 44,954 |
| 5. Non-durable goods manufacturing | 0 | 141,719 | 141,719 |
| 6. Transportation and Utilities | 0 | 45,000 | 45,000 |
| 7. Wholesale | 0 | 4,628 | 4,628 |
| 8. General merchandise stores and other retail | 128,911 | 1,548 | 130,460 |
| 9. Travel | 477,284 | 14,573 | 491,857 |
| 10. Finance, Insurance and Real Estate | 0 | 42,772 | 42,772 |
| 11. Services | 0 | 45,727 | 45,727 |
| Total | 606,195 | 465,784 | 1,071,980 |

The birdwatching multiplier for the Barton County economy is 1.77.

Table 12--(Continued)

Deer Hunting

| Sector | Primary Impact | | Secondary Impact | Total Impact |
|---|---|---|---|---|
| 1. Agriculture | $ | 0 | $ 121 | $ 121 |
| 2. Mining | | 0 | 80 | 80 |
| 3. Construction | | 0 | 35 | 35 |
| 4. Durable goods manufacturing | | 0 | 77 | 77 |
| 5. Non-durable goods manufacturing | | 0 | 258 | 258 |
| 6. Transportation and Utilities | | 0 | 127 | 127 |
| 7. Wholesale | | 0 | 13 | 13 |
| 8. General merchandise stores and other retail | | 1,192 | 4 | 1,196 |
| 9. Travel | | 417 | 33 | 450 |
| 10. Finance, Insurance and Real Estate | | 0 | 129 | 129 |
| 11. Services | | 0 | 140 | 140 |
| Total | | 1,609 | 1,017 | 2,626 |

The deer hunting multiplier for the Barton County economy is 1.63.

Duck and Goose Hunting

| Sector | Primary Impact | | Secondary Impact | Total Impact |
|---|---|---|---|---|
| 1. Agriculture | $ | 0 | $ 9,586 | $ 9,586 |
| 2. Mining | | 0 | 5,601 | 5,601 |
| 3. Construction | | 0 | 1,768 | 1,768 |
| 4. Durable goods manufacturing | | 0 | 6,070 | 6,070 |
| 5. Non-durable goods manufacturing | | 0 | 19,206 | 19,206 |
| 6. Transportation and Utilities | | 0 | 6,294 | 6,294 |
| 7. Wholesale | | 0 | 648 | 648 |
| 8. General merchandise stores and other retail | | 21,578 | 216 | 21,794 |
| 9. Travel | | 62,746 | 2,004 | 64,750 |
| 10. Finance, Insurance and Real Estate | | 0 | 6,015 | 6,015 |
| 11. Services | | 0 | 6,442 | 6,442 |
| Total | | 84,324 | 63,850 | 148,174 |

The duck and goose hunting multiplier for the Barton County economy is 1.76.

Table 12--(Continued)

Environmental Study

| Sector | Primary Impact | Secondary Impact | Total Impact |
|---|---|---|---|
| 1. Agriculture | $ 0 | $ 2,086 | $ 2,086 |
| 2. Mining | 0 | 1,230 | 1,230 |
| 3. Construction | 0 | 400 | 400 |
| 4. Durable goods manufacturing | 0 | 1,321 | 1,321 |
| 5. Non-durable goods manufacturing | 0 | 4,199 | 4,199 |
| 6. Transportation and Utilities | 0 | 1,429 | 1,429 |
| 7. Wholesale | 0 | 147 | 147 |
| 8. General merchandise stores and other retail | 5,829 | 49 | 5,878 |
| 9. Travel | 13,195 | 446 | 13,641 |
| 10. Finance, Insurance and Real Estate | 0 | 1,374 | 1,374 |
| 11. Services | 0 | 1,475 | 1,475 |
| Total | 19,024 | 14,156 | 33,180 |

The environmental study multiplier for the Barton County economy is 1.74.

Fishing

| Sector | Primary Impact | Secondary Impact | Total Impact |
|---|---|---|---|
| 1. Agriculture | $ 0 | $ 2,086 | $ 2,086 |
| 2. Mining | 0 | 1,300 | 1,300 |
| 3. Construction | 0 | 493 | 493 |
| 4. Durable goods manufacturing | 0 | 1,323 | 1,323 |
| 5. Non-durable goods manufacturing | 0 | 4,322 | 4,322 |
| 6. Transportation and Utilities | 0 | 1,792 | 1,792 |
| 7. Wholesale | 0 | 185 | 185 |
| 8. General merchandise stores and other retail | 12,751 | 59 | 12,811 |
| 9. Travel | 10,396 | 506 | 10,902 |
| 10. Finance, Insurance and Real Estate | 0 | 1,773 | 1,773 |
| 11. Services | 0 | 1,921 | 1,921 |
| Total | 23,147 | 15,759 | 38,906 |

The fishing multiplier for the Barton County economy is 1.68.

Table 12--(Continued)

Teal Hunting

| Sector | Primary Impact | Secondary Impact | Total Impact |
|---|---|---|---|
| 1. Agriculture | $ 0 | $ 5,072 | $ 5,072 |
| 2. Mining | 0 | 2,951 | 2,951 |
| 3. Construction | 0 | 919 | 919 |
| 4. Durable goods manufacturing | 0 | 3,211 | 3,211 |
| 5. Non-durable goods manufacturing | 0 | 10,139 | 10,139 |
| 6. Transportation and Utilities | 0 | 3,264 | 3,264 |
| 7. Wholesale | 0 | 336 | 336 |
| 8. General merchandise stores and other retail | 10,154 | 112 | 10,266 |
| 9. Travel | 33,710 | 1,049 | 34,759 |
| 10. Finance, Insurance and Real Estate | 0 | 3,109 | 3,110 |
| 11. Services | 0 | 3,327 | 3,327 |
| Total | 43,864 | 33,490 | 77,355 |

The teal hunting multiplier for the Barton County economy is 1.76.

Pheasant Hunting

| Sector | Primary Impact | Secondary Impact | Total Impact |
|---|---|---|---|
| 1. Agriculture | $ 0 | $ 4,071 | $ 4,071 |
| 2. Mining | 0 | 2,343 | 2,343 |
| 3. Construction | 0 | 704 | 704 |
| 4. Durable goods manufacturing | 0 | 2,577 | 2,577 |
| 5. Non-durable goods manufacturing | 0 | 8,095 | 8,095 |
| 6. Transportation and Utilities | 0 | 2,488 | 2,488 |
| 7. Wholesale | 0 | 256 | 256 |
| 8. General merchandise stores and other retail | 5,643 | 86 | 5,729 |
| 9. Travel | 28,072 | 820 | 28,893 |
| 10. Finance, Insurance and Real Estate | 0 | 2,351 | 2,351 |
| 11. Services | 0 | 2,509 | 2,509 |
| Total | 33,715 | 26,301 | 60,017 |

The pheasant hunting multiplier for the Barton County economy is 1.78.

Table 12--(Concluded)

STATE EXPENDITURES

| Sector | Primary Impact | Secondary Impact | Total Impact |
|---|---|---|---|
| 1. Agriculture | $ 576 | $ 15,164 | $ 15,740 |
| 2. Mining | 0 | 9,927 | 9,927 |
| 3. Construction | 0 | 2,944 | 2,944 |
| 4. Durable goods manufacturing | 5,910 | 10,532 | 16,442 |
| 5. Non-durable goods manufacturing | 13,436 | 21,059 | 34,495 |
| 6. Transportation and utilities | 6,333 | 8,030 | 14,363 |
| 7. Wholesale | 23 | 754 | 777 |
| 8. General merchandise stores and other retail | 26,932 | 288 | 27,220 |
| 9. Travel | 28,974 | 2,295 | 31,269 |
| 10. Finance, Insurance and Real Estate | 10,265 | 6,888 | 17,153 |
| 11. Services | 17,089 | 7,488 | 24,577 |
| Total | 109,538 | 85,369 | 194,907 |

The state spending multiplier for the Barton County economy is 1.78.

Total Impact

| Sector | Primary Impact | Secondary Impact | Total Impact |
|---|---|---|---|
| 1. Agriculture | $ 576 | $109,193 | $ 109,769 |
| 2. Mining | 0 | 64,604 | 64,604 |
| 3. Construction | 0 | 19,945 | 19,945 |
| 4. Durable goods manufacturing | 5,910 | 70,064 | 75,974 |
| 5. Non-durable goods manufacturing | 13,436 | 208,997 | 222,433 |
| 6. Transportation and utilities | 6,333 | 68,425 | 74,758 |
| 7. Wholesale | 23 | 6,965 | 6,988 |
| 8. General merchandise stores and other retail | 212,991 | 2,362 | 215,353 |
| 9. Travel | 654,795 | 21,726 | 676,521 |
| 10. Finance, Insurance and Real Estate | 10,265 | 64,412 | 74,677 |
| 11. Services | 17,089 | 69,030 | 86,119 |
| Total | 921,418 | 705,723 | 1,627,141 |

The Cheyenne Bottoms multiplier for the Barton County economy is 1.77.

## COSTS AND BENEFITS

These figures represent the economic impact of the Bottoms on Kansas and Barton County. This type of analysis shows, given the structure of the Kansas and Barton County economies, what a dollar of expenditures in a given sector will generate in terms of financial wealth for the county and state. An impact study acknowledges that state expenditures, which could in another type of analysis be viewed as a cost of operating the Bottoms, generate wealth for society. Clearly the issues relating to the maintenance and continuing existence of Cheyenne Bottoms could be seen in terms of costs anad benefits to society rather than in terms of the financial impacts of Bottoms-related expenditures. Other investigators, people from Kansas Fish and Game, from the Great Bend Chamber of Commerce, and from the Bottoms neighborhood suggested the following possible costs and benefits of Cheyenne Bottoms:

Costs of Cheyenne Bottoms:

    Opportunity loss--some wetlands can be drained and plowed

    Flood control--eliminates redeposition of topsoil

    Habitat for nuisance plants and wildlife

    Diminished tax base--state-owned land is not taxed

    Difficulties of farming on acreage interrupted by Bottoms

Benefits of Cheyenne Bottoms:

    Flood control--potential for water diversion

    Water quality control--wetlands allow contaminants to settle out

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Gene pool maintenance--unique wildlife habitat contributes to genetic diversity

Aesthetic enjoyment

Retention and attraction of tourist dollars for the state

Site for scientific research and instruction

Forage and wildlife production

Habitat for migratory waterfowl


## CONCLUSION

A large part of the total impact of Cheyenne Bottoms derives from expenditures of birdwatching, which is by far the most popular activity at the Bottoms. Since the primary impacts for all usage activities are confined to the retail and travel sectors, the secondary impacts of the uses are a reflection of how these sectors interface with the Kansas economy. A relatively large percentage of the inputs to retail and travel sector products comes from the agriculture; durable goods manufacturing; non-durable goods manufacturing; and finance, insurance, and real estate sectors. Therefore, the secondary impacts from increased demand in the travel and retail sectors are greatest in those four sectors. Since birdwatching is the predominant use, when we look at the total economic impact of Cheyenne Bottoms, we also find large secondary impacts in these four sectors.

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