Appendix I

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*Field sparrow*

# Regional Economic Impacts

***NOTE:*** **Appendix I (Regional Economic Impacts)** was developed prior to the finalization of alternatives as presented in Chapter 4 of the draft CCP/EIS. The report presents a description of the methods used to conduct a regional economic impact analysis, and an analysis of CCP management strategies that could affect stakeholders and residents and the local economy. Refuge management activities of economic concern in the analysis are:

- Refuge purchases of goods and services within the local community;
- Refuge personnel salary spending;
- Revenues generated from Refuge Revenue Sharing;
- Spending in the local community by Refuge visitors; and
- Other management activities –Cooperative Farming Program.

Differences between alternative strategies analyzed in the report and those presented in the draft CCP/EIS are minor. In the report, alternative A (No Action Alternative) included cooperative farming as one of the strategies. In Chapter 4 of the draft CCP/EIS, the strategy of cooperative farming was subsequently moved to alternative C. While farming operations are not currently occurring on the refuge, the impacts to cooperators associated with farming 600 acres of corn or soybeans are briefly discussed in the report. A Federal court order would need to be resolved before the cooperative farming program could resume; therefore, the economic impacts of farming were not included in the economic analysis of alternative A in the report. This change did not result in a significant difference for the report or the draft CCP/EIS, and the original Regional Economic Impacts report is presented here.

# Regional Economic Impacts of Current and Proposed Management Alternatives for Prime Hook National Wildlife Refuge

**By Lynne Koontz**

## Introduction

The National Wildlife Refuge System Improvement Act of 1997 requires all units of the National Wildlife Refuge System to be managed under a Comprehensive Conservation Plan (CCP). The CCP must describe the desired future conditions of a Refuge and provide long range guidance and management direction to achieve refuge purposes. Prime Hook National Wildlife Refuge, located in Sussex County, Delaware is in the process of developing a range of management goals, objectives, and strategies for the CCP. The CCP for the Refuge must contain an analysis of expected effects associated with current and proposed Refuge management strategies.

For refuge CCP planning, an economic analysis provides a means of estimating how current management (No Action Alternative) and proposed management activities (alternatives) affect the local economy. This type of analysis provides two critical pieces of information: 1) it illustrates a Refuge's contribution to the local community; and 2) it can help in determining whether economic effects are or are not a real concern in choosing among management alternatives.

It is important to note that the economic value of a refuge encompasses more than just the impacts of the regional economy. Refuges also provide substantial nonmarket values (values for items not exchanged in established markets) such as maintaining endangered species, preserving wetlands, educating future generations, and adding stability to the ecosystem (Carver and Caudill, 2007). However, quantifying these types of nonmarket values is beyond the scope of this study.

This report first presents the methods used to conduct a regional economic impact analysis are described. An analysis of the final CCP management strategies that could affect stakeholders and residents and the local economy is then presented. The Refuge management activities of economic concern in this analysis are:

- Refuge purchases of goods and services within the local community;
- Refuge personnel salary spending;
- Revenues generated from Refuge Revenue Sharing;
- Spending in the local community by Refuge visitors; and
- Other management activities –Cooperative Farming Program.

### Methods for a Regional Economic Impact Analysis

Economic input-output models are commonly used to determine how economic sectors will and will not be affected by demographic, economic, and policy changes. The economic impacts of the management alternatives for Prime Hook NWR were estimated using IMPLAN (Impact Analysis for Planning), a regional input-output modeling system developed by the USDA Forest Service. IMPLAN is a computerized database and modeling system that provides a regional input-output analysis of economic activity in terms of 10 industrial groups involving more than five hundred economic sectors (Olson and Lindall, 1999). The IMPLAN model draws upon data collected by the Minnesota IMPLAN Group

from multiple federal and state sources including the Bureau of Economic Analysis, Bureau of Labor Statistics, and the U.S. Census Bureau (Olson and Lindall, 1999). The year 2007 IMPLAN Sussex County data profile was used in this study. The IMPLAN county level employment data estimates were found to be comparable to the US Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System data for the year 2007.

Because of the way industries interact in an economy, a change in the activity of one industry affects activity levels in several other industries. Because of the way industries interact in an economy, activity in one industry affects activity levels in several other industries. For example, if more visitors come to an area, local businesses will purchase extra labor and supplies to meet the increase in demand for additional services. The income and employment resulting from visitor purchases from local businesses represent the *direct* effects of visitor spending within the economy. Direct effects measure the net amount of spending that stays in the local economy after the first round of spending, the amount that doesn't stay in the local economy is termed a leakage (Carver and Caudill, 2007). In order to increase supplies to local businesses, input suppliers must also increase their purchases of inputs from other industries. The income and employment resulting from these secondary purchases by input suppliers are the *indirect* effects of visitor spending within the economy. Employees of the directly affected businesses and input suppliers use their incomes to purchase goods and services. The resulting increased economic activity from new employee income is the *induced* effect of visitor spending. The indirect and induced effects are known as the secondary effects of visitor spending. "Multipliers" (or "Response Coefficients") capture the size of the secondary effects, usually as a ratio of total effects to direct effects (Stynes, 1998). The sums of the direct and secondary effects describe the total economic impact of visitor spending in the local economy.

For each alternative, regional economic effects from the IMPLAN model are reported for the following categories:

- **Local Output** represents the change in local sales or revenue.
- **Employment** represents the change in number of jobs generated in the region from a change in regional output. IMPLAN estimates for employment include both full time and part time workers, which are measured in total jobs.
- **Labor Income** includes employee wages and salaries, including income of sole proprietors and payroll benefits.

There are three alternatives evaluated in the CCP. The CCP provides long range guidance and management direction to achieve Refuge purposes over a 15 year timeframe. The economic impacts reported in this report are on an annual basis in 2007 dollars. Large management changes often take several years to achieve. The estimates reported for Alternatives B and C represent the final economic effects after all changes in management have been implemented.

# Economic Impacts of Alternative A

## Impacts from Refuge Revenue Sharing

Under provisions of the Refuge Revenue Sharing (RRS) Act, local counties receive an annual payment for lands that have been purchased by full fee simple acquisition by the Service. Payments are based on the greater of 75 cents per acre or 0.75% of the fair market value of lands acquired by the Service. The exact amount of the annual payment depends on Congressional appropriations, which in recent years have tended to be less than the amount to fully fund the authorized level of payments. In 2008, Sussex County received a RRS payment of $46,850. Table 1 shows the resulting economic impacts of RRS payments under Alternative A. Accounting for both the direct and secondary effects, RRS payments for Alternative A generate total annual economic impacts of $61.4 thousand in local output and $16.7 thousand in labor income in the local impact area.

**Table 1.** Annual Impacts from Refuge Revenue Sharing Payments for Alternative A.

| | Local output ($ Thousands) | Labor income ($ Thousands) | Employment (# full & part time jobs) |
|---|---|---|---|
| Direct effects | $46.8 | $11.9 | 0 |
| Secondary effects | $14.6 | $4.8 | 0 |
| **Total economic impact** | $61.4 | $16.7 | 0 |

## Impacts from Public Use and Access Management

### Refuge Visitor Expenditures in Local Economy

Spending associated with recreational visits to national wildlife Refuges generates significant economic activity. The FWS report Banking on Nature: The Economic Benefits of National Wildlife Refuges Visitation to Local Communities estimated the impact of national wildlife Refuges on their local economies (Carver and Caudill, 2007). According to the report, more than 34.8 million visits were made to national wildlife Refuges in FY 2006 which generated $1.7 billion of sales in regional economies. Accounting for both the direct and secondary effects, spending by national wildlife visitors generated nearly 27,000 jobs, and over $542.8 million in employment income (Carver and Caudill, 2007). Approximately eighty two percent of total expenditures were from non-consumptive activities, twelve percent from fishing, and six percent from hunting (Carver and Caudill, 2007).

The Refuge offers a wide variety of year round accessible recreational opportunities including big game hunting, upland game hunting, fishing, migratory game bird and waterfowl hunting, and non-consumptive wildlife viewing, education and photography opportunities. Information on state and regional trends and associated economic impacts of these recreational activities were presented in the Affected Environment chapter. This section focuses on the local economic impacts associated with Refuge visitation. Annual Refuge visitation estimates are based on several Refuge statistic sources including: visitors entering the Visitor Center/Office, hunting permits, and general observation by Refuge personnel. Annual Refuge visitation estimates are on a per visit basis. Table 2 summarizes estimated Refuge visitation by type of visitor activity for Alternative A.

**Table 2.** Estimated Annual Refuge Visitation by Visitor Activity for Alternative A.

| Visitor activity | Total number of visits | Percentage of non-local visits (%) | Total number of non-local visits | Number of hours spent at Refuge | Number of non-local visitor days[a] |
|---|---|---|---|---|---|
| **Consumptive use** | | | | | |
| Fishing | 8,886 | 40% | 3,554 | 8 | 3,554 |
| Big game hunting | 831 | 83% | 690 | 8 | 690 |
| Waterfowl and migratory bird hunting | 1585 | 25% | 396 | 8 | 396 |
| Upland game hunting | 166 | 10% | 17 | 8 | 17 |
| **Non-consumptive use** | | | | | |
| Nature trails/other wildlife observation/office visits | 115,732 | 46% | 53,237 | 4 | 26,618 |
| **Total** | 127,200 | | 57,894 | | 31,275 |

[a]One visitor day = 8 hours.

To determine the local economic impacts of visitor spending, only spending by persons living outside the local area of Sussex County are included in the analysis. The rational for excluding local visitor spending is twofold. First, money flowing into Sussex County from visitors living outside the local area (hereafter referred to as non-local visitors) is considered new money injected into the local economy. Second, if residents of Sussex County visit the Refuge more or less due to the management changes, they will correspondingly change their spending of their money elsewhere in Sussex County, resulting in no net change to the local economy. These are standard assumptions made in most regional economic analyses at the local level. Refuge visitation statistics and hunting permits were used to determine the percentage of non-local Refuge visitors. Table 2 shows the estimated percent of non-local Refuge visits for Alternative A.

A visitor usually buys a wide range of goods and services while visiting an area. Major expenditure categories include lodging, restaurants, supplies, groceries, and recreational equipment rental. In this analysis we use the average daily visitor spending profiles from the Banking on Nature report (Carver and Caudill, 2007) that were derived from the 2006 NSHFWR. The NSHFWR reports trip related spending of state residents and non residents for several different wildlife-associated recreational activities. For each recreation activity, spending is reported in the categories of lodging, food and drink, transportation, and other expenses. Carver and Caudill (2007) calculated the average per-person per-day expenditures by recreation activity for each FWS region. Residents were defined as living within 30 miles of the Refuge and nonresidents as living outside the 30 mile radius (Carver and Caudill, 2007). For our analysis, non-local visitors match the nonresident spending profile definition. Therefore, we used the spending profiles for nonresidents for FWS Region 5 (the region Prime Hook NWR is located in). Nonresident average daily spending profiles for big game hunting ($48.81 per-day), small game hunting ($93.79 per-day), migratory bird hunting ($107.48 per-day), and fresh water fishing ($53.34 per-day) were used to estimate non-local visitor spending for the Refuge hunting and fishing related activities. The average daily nonresident spending profile for non-consumptive wildlife recreation (observing, feeding, or photographing fish and wildlife) was used for non-consumptive wildlife viewing activities ($84.83 per-day).

The visitor spending profiles are estimated on an average per day (8 hours) basis. Because some visitors only spend short amounts of time on the Refuge, counting each Refuge visit as a full visitor day would overestimate the economic impact of Refuge visitation. In order to properly account for the amount of spending, the annual number of non-local Refuge visits were converted to visitor days.

Refuge personnel estimate that non-local hunters and anglers spend a full visitor day (8 hours) on the Refuge. Non-local visitors that view wildlife on nature trails or participate in other wildlife observation activities typically spend 4 hours (1/2 half a visitor day) on the Refuge. Table 2 shows the number of non-local visitor days by recreation activity for Alternative A.

Total spending by non-local Refuge visitors was determined by multiplying the average non-local visitor daily spending by the number of non-local visitor days. Table 3 summarizes the total economic impacts associated with current non-local visitation for Alternative A. Non-local Refuge visitors would spend over $2.5 million in Sussex County annually. This spending would directly account for $2.4 million in local output, 23 jobs, and $674.2 thousand in labor income in the local economy. The secondary or multiplier effects would generate an additional $1 million in local output, 8 jobs, and $303.7 thousand in labor income. Accounting for both the direct and secondary effects, spending by non-local visitors for Alternative A would generate total economic impacts of $3.5 million in local output, 31 jobs and $977.9 thousand in labor income.

**Table 3.** Annual Impacts of Non-Local Visitor Spending for Alternative A.

| | Local output ($ Thousands) | Labor income ($ Thousands) | Employment (# full & part time jobs) |
|---|---|---|---|
| Direct effects | $2,437.4 | $674.2 | 23 |
| Secondary effects | $1,015.9 | $303.7 | 8 |
| **Total economic impact** | $3,453.3 | $977.9 | 31 |

## Costs of Administering Hunting Programs

Table 4 provides a breakdown of the funding and staff time required for managing each hunting program under Alternative A. All hunting programs under Alternative A would cost almost $31 thousand dollars and 95 days of staff time annually. The deer and waterfowl hunting programs account for 95% of all costs and 94% of all staff time. While the deer and waterfowl hunting programs have similar total costs, $14.8 and $14.5 thousand respectively, the waterfowl hunting program requires 51 days of staff time compared to 38 days for the deer hunting program.

**Table 4.** Annual Costs Associated with Hunting Programs for Alternative A.

| | Big Game-Deer | | Big Game-Turkey | | Upland Game | | Waterfowl | | Other Migratory Birds | | All Hunting | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Item | Staff Days | Cost | Staff Days | Cost | Staff Days | Cost | Staff Days | Cost | Staff Days | Cost | Staff Days | Cost |
| Planning | 6.5 | $2,100 | - | - | 0.5 | $150 | 5.5 | $1,800 | 0.5 | $150 | 13 | $4,200 |
| Processing applications | 5 | $1,300 | - | - | - | - | - | - | - | - | 5 | $1,300 |
| Printing costs-handouts | 1.5 | $3,040 | - | - | 0.25 | $60 | 1 | $300 | - | - | 2.75 | $3,400 |
| Law Enforcement | 7.5 | $1,350 | - | - | 0.75 | $200 | 3.5 | $650 | 0.75 | $200 | 12.5 | $2,400 |

| Item | Big Game-Deer | | Big Game-Turkey | | Upland Game | | Waterfowl | | Other Migratory Birds | | All Hunting | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Staff Days | Cost | Staff Days | Cost | Staff Days | Cost | Staff Days | Cost | Staff Days | Cost | Staff Days | Cost |
| Inquiries | 10 | $2,380 | - | - | 1 | $250 | 4 | $950 | 1 | $250 | 16 | $3,830 |
| Facilities maintenance & supplies | 3.5 | $2,500 | - | - | - | - | 30 | $8,550 | - | - | 33.5 | $11,050 |
| Hunt operations | 4 | $1,000 | - | - | 1.25 | $350 | 7 | $1,900 | - | - | 12.25 | $3,250 |
| Fuel, electricity | - | $400 | - | - | - | - | - | - | - | - | 0 | $400 |
| Toilet rental | - | $750 | - | - | - | - | - | $375 | - | - | 0 | $1,125 |
| **Total** | 38 | $14,820 | 0 | $0 | 3.75 | $1,010 | 51 | $14,525 | 2.25 | $600 | 95 | $30,955 |

Table 5 shows the breakdown of total program expenses between staff and actual expenses for each hunting program and the Refuge cost recovery for each hunting program. The Refuge receives 80% of total fees collected. For all programs, over $12 thousand is recovered by the Refuge under Alternative A. Accounting for total Refuge expenditures and total Refuge cost recovery, the total program cost of all hunting programs under Alternative A is $18.9 thousand.

**Table 5.** Annual Costs Associated with Hunting Programs for Alternative A.

| | Big Game-Deer | Big Game-Turkey | Upland Game | Waterfowl | Other Migratory Birds | All Hunting |
|---|---|---|---|---|---|---|
| ***Refuge Expenditures*** | | | | | | |
| Staff salary expenses | $9,312 | - | $950 | $13,799 | $600 | $24,661 |
| Non-salary expenses | $5,508 | - | $60 | $726 | - | $6,294 |
| Total Expenditures | $14,820 | - | $1,010 | $14,525 | $600 | $30,955 |
| Cost Recovery from Hunting Fees | | | | | | |
| Total amount collected | $8,313 | - | $302 | $6,416 | - | $15,031 |
| Amount returned to Refuge (80%) | $6,650 | - | $242 | $5,133 | - | $12,025 |
| **Total Program Cost** (total expenditures – total returned from fees) | $8,170 | $0 | $768 | $9,392 | $600 | $18,930 |
| Value of Volunteer Contributions ($20.25/hour) | 272 hrs $5,508 | | | 242 hrs $4,901 | | 514hrs $10,409 |

Additionally, as shown in Table 5, volunteers contribute 272 hrs of time assisting the deer hunting program with maintenance of deer stands, mowing, and hunt operations. Volunteers contribute 242 hours the waterfowl hunting program including State assistance, maintenance, and grassing duck blinds. Accounting for volunteer hours at a rate of $20.25 per/hour, the value of volunteer time totals $10.4 thousand for Alternative A.

## Impacts from Refuge Administration

### Staff – Personal Purchases

Refuge Employees reside and spend their salaries on daily living expenses in communities near the Refuge thereby generating impacts within the local economy. Household consumption expenditures consist of payments by individuals/households to industries for goods and services used for personal consumption. The IMPLAN modeling system contains household consumption spending profiles that account for average household spending patterns by income level. These profiles allow for leakage of household spending to outside the region. The current approved Refuge staff consists of five employees for Alternative A (Table 6).

**Table 6.** Current Approved Staff (Alternative A).

| |
|---|
| Refuge Manager |
| Wildlife Biologist |
| Park Ranger |
| Administrative Support Asst |
| Maintenance Worker |

Based on FY 2009 salary charts, it was estimated that annual salaries for Alternative A total over $371 thousand. Table 7 shows the economic impacts associated with spending of salaries in local area by Refuge employees under Alternative A. For Alternative A, salary spending by Refuge personnel would directly account for $244.6 thousand in local output, 1.5 jobs, and $52.6 thousand in labor income in the local economy. Accounting for both the direct and secondary effects, salary spending by Refuge personnel for Alternative A would generate total economic impacts of $313.6 thousand in local output, 2 jobs and $74 thousand in labor income.

**Table 7.** Annual Local Economic Impacts of Salary Spending by Refuge Personnel.

| | **Local output ($ Thousands)** | **Labor income ($ Thousands)** | **Employment (# full & part time jobs)** |
|---|---|---|---|
| Direct effects | $244.6 | $52.6 | 1.5 |
| Secondary effects | $69.0 | $21.4 | 0.5 |
| **Total economic impact** | $313.6 | $74.0 | 2 |

### Work-related Purchases

A wide variety of supplies and services are purchased for Refuge operations and maintenance activities. Refuge purchases made in Sussex County, contribute to the local economic impacts associated with the Refuge. Major local expenditures include: supplies and services related to building maintenance and construction; auto repairs, parts, and fuel; and utilities. Average annual non-salary expenditures for Alternative A are anticipated to be $234 thousand. Table 8 shows the economic impacts associated with work related expenditures in Sussex County. According to Refuge records, approximately $32.8 thousand (14%) of the annual non-salary budget expenditures are spent on goods and services purchased in Sussex County. For Alternative A, work related expenditures would directly account for $32.8thousand in local output and $3.4 thousand in labor income in the local economy. Accounting for both the direct and secondary effects, work related purchases for Alternative A would generate total economic impacts of $37 thousand in local output and $4.8 thousand in labor income.

**Table 8.** Local Economic Impacts of Refuge Related Purchases for Alternative A.

| | Local output ($ Thousands) | Labor income ($ Thousands) | Employment (# full & part time jobs) |
|---|---|---|---|
| Direct effects | $32.8 | $3.4 | 0 |
| Secondary effects | $4.2 | $1.4 | 0 |
| **Total economic impact** | $94,900 | $28,400 | 1.2 |

## Other Management Activities – Cooperative Farming

Farming historically took place on the Refuge under an annual cooperative farming agreement where cooperators harvested corn or soybeans. Rather than paying land rent, cooperators provided the Refuge with in-kind services such as the planting of cover crops (barley, wheat, ryegrass, buckwheat and/or clover) to benefit wildlife. Refuge cropland acreage increased to approximately 1,000 acres in 1987 but then gradually declined (due to access, saltwater intrusion, and research) to approximately 600 acres by 2002.

In April 2006, a complaint challenging the legality of the Refuge cooperative farm program was filed the U.S. District Court by Delaware Audubon Society, the Center for Food Safety, and Public Employees for Environmental Responsibility. The Refuge suspended the farm program in December of 2006 when the existing agreements with cooperators expired. In March 2009, a federal court order officially prohibited the Refuge cooperative program until necessary compatibility determinations have been addressed as part of the CCP.

Alternative A would continue the cooperative farming program on a maximum of 600 acres to provide cover-crops for ducks (primarily mallard, black duck, pintail, and wood duck) and Canada geese during the fall and winter. While farming operations are not currently occurring on the Refuge, the impacts to cooperators associated with farming 600 acres of corn or soybeans are discussed below. However, the federal court order would need to be resolved before the cooperative farming program could resume therefore, the economic impacts of farming were not included in the economic analysis of Alternative A.

*Value of Refuge Cropland and Associated Government Payments*

Under Alternative A, either corn or soybeans would be grown with conventional tillage practices using Roundup Ready corn or no-tillage practices with Roundup Ready soybeans. To determine the value of farming 600 acres of corn or soybeans, the 2004-2008 USDA National Agricultural Statistics Service

(2009) crop data for Sussex County and Delaware were used to determine the five year annual average annual yield (133 bushels/acre for corn and 29 bushel/acre for soybeans) for Sussex County and the five year average annual price ($3.45/bushel for corn and $7.63/bushel for soybeans) for Delaware (county level price data were not available).

The 2006 crop enterprise budgets from the University of Delaware Cooperative Extension (2009) and the USDA Economic Research Service 2009 corn cost-of-production forecast (USDA*a*, 2009) were used to estimate the average cost per acre to grow corn or soybeans. According to the 2006 enterprise budgets, the anticipated costs (excluding rent or land payments) are $297.71/acre for corn and $163.51/acre of soybeans. Fertilizer and nitrogen costs associated with growing an acre of corn have increased substantially in recent years, estimates from the USDA 2009 cost-of-production for corn were $32.43/acre higher ($102.33/acre compared to $69.90/acre) than the 2006 University of Delaware corn enterprise budget. To account for cost increases since 2006, fertilizer/nitrogen cost in the 2006 corn enterprise budget was adjusted by $32.43/acre for a total anticipated corn production cost of $330.14/acre.

As shown in Table 9, profit per acre was determined by multiplying the yield (bushels/acre) times the price ($/bushel) and subtracting the per acre cost. The anticipated profit from farming 600 acres would be $77.2 thousand for corn or $34.7 thousand for soybeans.

**Table 9.** Anticipated Profit and Commodity Payments Associated with 600 Acres of Corn or Soybeans in Sussex County.

| | **Corn** | **Soybeans** |
|---|---|---|
| Yield (bushel/acre – 5 yr annual average) | 133 | 29 |
| Price ($/bushel– 5 yr annual average) | $3.45 | $7.63 |
| Cost ($/per acre) | $330.14 | $163.51 |
| Profit per acre (yield*price-cost) | $128.71 | $57.76 |
| **Anticipated profit from 600 acres** | **$77,226** | **$34,656** |
| *Farm Bill Commodity Program* | | |
| Payment rate ($/bushel) | 0.28 | 0.44 |
| Base acres (83.3% of 600 acres) | 500 | 500 |
| **Anticipated payment for 600 acres (payment rate *yield*base acres)** | **$18,613** | **$6,377** |

The Food, Conservation, and Energy Act of 2008 continued the previous Farm Bill legislation (Farm Security and Rural Investment Act of 2002) for providing income support to producers through direct payments (USDA*b*, 2009). An eligible farm's "payment amount" for a given commodity is determined by: 1) the payment rate for the specified commodity ($0.28/bushel for corn, $0.44/bushel for soybeans); 2) the payment acres – 83.3% of base acres for 2009-2011; and 3) the commodity payment yield (USDA*b*, 2009). As shown in Table 9, based on the Sussex County five year average yield of 133 bushels/acre for corn and 29 bushels/acre for soybeans, the anticipated annual payment for 600 acres would be approximately $18.6 thousand for corn or $6.4 thousand for soybeans.

## Summary of Economic Impacts for Alternative A

Table 10 summarizes the direct and total economic impacts of Refuge management activities for Alternative A in Sussex County. Under Alternative A, Refuge management activities directly related to Refuge operations generate an estimated $2.7 million in local output, 25 jobs and $742 thousand in labor income in the local economy. Including direct, indirect, and induced effects, all Refuge activities would generate total economic impacts of $3.9 million in local output, 33 jobs and $1.1 million in labor income. In 2007, total labor income was estimated at $2.996 billion and total employment was estimated at 87,113 jobs for Sussex County (IMPLAN 2007 data). Total economic impacts associated with Refuge operations under Alternative A represent less than one percent of total income (0.04%) and total employment (0.04%) in the overall Sussex County economy. Total economic effects of Refuge operations play a much larger role in the Prime Hook communities near the Refuge such as Milton and Lewes where most of the Refuge public use related economic activity occurs.

**Table 10.** Economic Impacts of Refuge Management Activities for Alternative A.

| | Local output ($ Thousands) | Labor income ($ Thousands) | Employment (# full & part time jobs) |
|---|---|---|---|
| **Refuge revenue sharing** | | | |
| Direct effects | $46.8 | $11.9 | 0 |
| Total effects | $61.4 | $16.7 | 0 |
| **Refuge administration (staff salary spending and work related purchases)** | | | |
| Direct effects | $277.4 | $56.0 | 2 |
| Total effects | $350.6 | $78.8 | 2 |
| **Public use activities** | | | |
| Direct effects | $2,437.4 | $674.2 | 23 |
| Total effects | $3,453.3 | $977.9 | 31 |
| **Aggregate impacts** | | | |
| Direct effects | $2,761.60 | $742.05 | 25 |
| Total effects | $3,865.30 | $1,073.39 | 33 |

# Economic Impacts of Alternative B

## Impacts from Refuge Revenue Sharing

Same as Alternative A.

## Impacts from Public Use and Access Management

### Refuge Visitor Expenditures in Local Economy

Changes in Refuge management activities can affect recreational opportunities offered and visitation levels. Table 11 shows the estimated visitation levels associated with each visitor activity for Alternative B. Under Alternative B, annual visitation is anticipated to increase for fishing (5%), big game hunting (10%), waterfowl hunting (10%), upland game hunting (5%), and nonconsumptive use activities (15%) compared to Alternative A (Table 2). The percentage of nonlocal waterfowl hunters is anticipated to increase by 10% (from 25% to 35%) compared to Alternative A.

**Table 11.** Estimated Annual Refuge Visitation by Visitor Activity for Alternative B.

| Visitor activity | Total number of visits | Percentage of non-local visits (%) | Total number of non-local visits | Number of hours spent at Refuge | Number of non-local visitor days[a] |
|---|---|---|---|---|---|
| **Consumptive-use** | | | | | |
| Fishing | 9,775 | 40% | 3,910 | 8 | 3,910 |
| Big game hunting | 873 | 83% | 724 | 8 | 724 |
| Waterfowl and migratory bird hunting | 1,664 | 35% | 582 | 8 | 582 |
| Upland game hunting | 174 | 10% | 17 | 8 | 17 |
| **Nonconsumptive-use** | | | | | |
| Nature trails/ other wildlife observation/office visits | 133,092 | 46% | 61,222 | 4 | 30,611 |
| **Total** | 145,578 | | 66,456 | | 35,845 |

[a]One visitor day = 8 hours.

Table 12 summarizes the total economic impacts associated with current non-local visitation for Alternative B. Non-local Refuge visitors would spend over $2.9 million in Sussex County annually. This spending would directly account for $2.8 million in local output, 27 jobs, and $775.5 thousand in labor income in the local economy. The secondary or multiplier effects would generate an additional $1.2 million in local output, 10 jobs, and $349 thousand in labor income. Accounting for both the direct and secondary effects, spending by non-local visitors for Alternative B would generate total economic impacts of $3.97 million in local output, 37 jobs and $1.1million in labor income. Due to the increased visitation levels for Alternative B, the associated economic effects of visitor spending would generate $518.8 thousand more in local output, 6 more jobs, and $146.9 thousand more in labor income than Alternative A.

**Table 12.** Annual Impacts of Non-Local Visitor Spending for Alternative B.

| | Local output ($ Thousands) | Labor income ($ Thousands) | Employment (# full & part time jobs) |
|---|---|---|---|
| Direct effects | $2,803.3 | $775.5 | 27 |
| Secondary effects | $1,168.5 | $349.3 | 10 |
| **Total economic impact** | $3,971.8 | $1,124.8 | 37 |

## Costs of Administering Hunting Programs

Table 13 provides a breakdown of the funding and staff time required for managing each hunting program under Alternative B. All hunting programs under Alternative B would cost $13 thousand dollars and 40 days of staff time annually. The deer and waterfowl hunting programs account for 82% of all costs and 81% of all staff time. While the deer and waterfowl hunting programs both cost approximately $5.4 thousand, have similar total costs, the deer hunting program requires 18 days of staff time compared to 14.5 days for the waterfowl hunting program. The hunt programs for Alternative B are $17.9 thousand less than and require 54.75 fewer staffing days compared to Alternative A.

**Table 13.** Annual Costs Associated with Hunting Programs for Alternative B.

| | Big Game-Deer | | Big Game-Turkey | | Upland Game | | Waterfowl | | Other Migratory Birds | | All Hunting | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Item | Staff Days | Cost | Staff Days | Cost | Staff Days | Cost | Staff Days | Cost | Staff Days | Cost | Staff Days | Cost |
| Planning | 3 | $1,000 | 0.5 | $150 | 0.5 | $150 | 3 | $1,000 | 0.5 | $150 | 7.5 | $2,450 |
| Processing applications | 1 | $400 | 0.5 | $150 | | | 1 | $400 | | | 2.5 | $950 |
| Printing costs-handouts | 0.5 | $800 | 0.5 | $150 | 0.25 | $220 | 1 | $1,250 | - | $0 | 2.25 | $2,420 |
| Law Enforcement | 7.5 | $1,350 | 0.5 | $125 | 0.75 | $200 | 3.5 | $650 | 0.75 | $200 | 13 | $2,525 |
| Inquiries | 5 | $1,190 | 1 | $250 | 1 | $250 | 5 | $1,200 | 1 | $250 | 13 | $3,140 |
| Facilities maintenance & supplies | 1 | $600 | - | $0 | | | 1 | $800 | | | 2 | $1,400 |
| Hunt operations | - | $0 | - | $0 | - | $0 | - | $0 | | | 0 | $0 |
| Fuel, electricity | - | $60 | | | - | $60 | | $60 | | | 0 | $180 |
| Toilet rental | - | $0 | | | | | | $0 | | | 0 | $0 |
| **Total** | **18** | **$5,400** | **3** | **$825** | **2.5** | **$880** | **14.5** | **$5,360** | **2.25** | **$600** | **40.25** | **$13,065** |

Table 14 shows the breakdown of total program expenses between staff and actual expenses and the Refuge cost recovery for each hunting program. Under Alternative B, the Refuge must pay $2,870 to contractors for application fee collection. The Refuge receives 80% of the remainder of total fees collected. For all programs, $3.8 thousand is recovered by the Refuge under Alternative B. Accounting for total Refuge expenditures and total Refuge cost recovery, the total program cost of all hunting programs under Alternative A is $9.2 thousand.

**Table 14.** Annual Costs Associated with Hunting Programs for Alternative B.

| | Big Game-Deer | Big Game-Turkey | Upland Game | Waterfowl | Other Migratory Birds | All Hunting |
|---|---|---|---|---|---|---|
| ***Refuge Expenditures*** | | | | | | |
| Staff salary expenses | $4,235 | $675 | $600 | $3,385 | $600 | $9,495 |
| Non-salary expenses | $1,165 | $150 | $280 | $1,975 | | $3,570 |
| Total Expenditures | $5,400 | $825 | $880 | $5,360 | $600 | $13,065 |
| ***Cost Recovery from Hunting Fees*** | | | | | | |
| Total amount collected | $1,790 | $300 | $0 | $5,570 | $0 | $7,660 |
| Amount returned to Refuge (80% of total after contractor fees ) | | | | | | $3,832 |
| **Total Program Cost** (total expenditures - total returned from fees) | **$5,400** | **$0** | **$880** | **$5,360** | **$600** | **$9,233** |
| Value of Volunteer Contributions ($20.25/hour) | 32 hrs<br>$648 | | | 16 hrs<br>$324 | | 48hrs<br>$972 |

Additionally, as shown in Table 14, volunteers contribute 32 hrs of time assisting the deer hunting program with mowing of non-ambulatory hunt areas and hunt operations. Volunteers contribute 16 hours the waterfowl hunting program with blind stake placement and maintenance. Accounting for volunteer hours at a rate of $20.25 per/hour, the value of volunteer time totals $972 for Alternative B. The volunteer contributions for Alternative B are 466 hours and $9.4 thousand less than Alternative A.

## Impacts from Refuge Administration

### Staff – Personal Purchases

Proposed staff for Alternative B includes all approved staff positions (Alternative A, Table 6) plus five additional positions. The new positions are for: Maintenance Worker; Law Enforcement Officer; Wildlife Biologist; Visitor Services Professional; and a Clerk. Table 15 shows the economic impacts associated with spending of salaries in Sussex County by Refuge employees under Alternative B. For Alternative B, salary spending by Refuge personnel would directly account for $461.6 thousand in local output, 3 jobs, and $99.1 thousand in labor income in the local economy. Accounting for both the direct and secondary effects, salary spending by Refuge personnel for Alternative B would generate total economic impacts of over $591.9 thousand in local output, 4 jobs and $139.5 thousand in labor income. Due to the increased staffing levels for Alternative B, the associated economic effects of staff salary

spending would generate $278.3 thousand more in local output, 2 more jobs, and $65.5 thousand more in labor income than Alternative A.

**Table 15.** Local Economic Impacts of Salary Spending by Refuge Personnel for Alternative B.

| | Local output ($ Thousands) | Labor income ($ Thousands) | Employment (# full & part time jobs) |
|---|---|---|---|
| Direct effects | $461.6 | $99.1 | 3 |
| Secondary effects | $130.3 | $40.4 | 1 |
| **Total economic impact** | $591.9 | $139.5 | 4 |

### Work-related Purchases

Non-salary expenditures for Alternative B are anticipated to increase in proportion with the salary increase for the new staff positions for a total annual non-salary budget $462 thousand (89% increase compared to Alternative A). Table 16 shows the economic impacts associated with work related expenditures in Sussex County for Alternative B. These estimates assume 14% of the non-salary budget ($61.8 thousand) will be spent on goods and services purchased in Sussex County (same percentage as current and Alternative A). Work related expenditures under Alternative B would directly account for $68.1 thousand in local output and $6.4 thousand in labor income in the local economy. Accounting for both the direct and secondary effects, work related purchases for Alternative B would generate a total economic impact of $67.7 thousand in local output and $8.9 thousand in labor income. Due to the increased non-salary expenditures for Alternative B, the associated economic effects of work related purchases would generate $32.7 thousand more in local output and $4.1 thousand more in labor income than Alternative A.

**Table 16.** Local Economic Impacts of Refuge Related Purchases for Alternative B.

| | Local output ($ Thousands) | Labor income ($ Thousands) | Employment (# full & part time jobs) |
|---|---|---|---|
| Direct effects | $61.8 | $6.4 | 0 |
| Secondary effects | $7.9 | $2.5 | 0 |
| **Total economic impact** | $69.7 | $8.9 | 0 |

## Other Management Activities – Cooperative Farming

The cooperative farming program would be eliminated under Alternative B. The value of the farm program was discussed but not included in the economic analysis of Alternative A because a federal court order would need to be resolved before the cooperative farming program could resume. Therefore, there are no changes in economic impacts associated with the cooperative farming program between Alternatives A and B.

## Summary of Economic Impacts for Alternative B

Table 17 summarizes the direct and total economic impacts of Refuge management activities for Alternative B in Sussex County. Under Alternative B, Refuge management activities directly related to Refuge operations generate an estimated $3.3 million in local output, 30 jobs and $892.9 thousand in labor income in the local economy. Including direct, indirect, and induced effects, Refuge activities would generate total economic impacts of $4.7 million in local output, 41 jobs and $1.29 million in labor income. In 2007, total labor income was estimated at $2.996 billion and total employment was estimated

at 87,113 jobs for Sussex County (IMPLAN 2007 data). Total economic impacts associated with Refuge operations under Alternative B represent less than one percent of total income (0.04%) and total employment (0.05%) in the overall Sussex County economy. Total economic effects of Refuge operations play a larger role in the Prime Hook communities near the Refuge such as Milton and Lewes where most of the Refuge public use related economic activity occurs.

**Table 17.** Summary of Refuge Management Activities for Alternative B.

| | Local output ($ Thousands) | Labor income ($ Thousands) | Employment (# full & part time jobs) |
|---|---|---|---|
| **Refuge Revenue Sharing** | | | |
| Direct effects | $46.8 | $11.9 | 0 |
| Total effects | $61.4 | $16.7 | 0 |
| **Refuge administration (staff salary spending and work related purchases)** | | | |
| Direct effects | $523.4 | $105.5 | 3 |
| Total effects | $661.6 | $148.4 | 4 |
| **Public use activities** | | | |
| Direct effects | $2,803.3 | $775.5 | 27 |
| Total effects | $3,971.8 | $1,124.8 | 37 |
| **Aggregate impacts** | | | |
| Direct effects | $3,373.5 | $892.9 | 30 |
| Total effects | $4,694.8 | $1,289.9 | 41 |

Table 18 summarizes the change in economic effects associated with Refuge operations under Alternative B as compared to Alternative A. Due to increases in Refuge administration and visitation, Alternative B would generate $829.5 thousand more in local output, 7 additional jobs and $216.5 thousand more in labor income as compared to Alternative A.

**Table 18.** Change in Economic Impacts under Alternative B Compared to Alternative A.

| | Local output ($ Thousands) | Labor income ($ Thousands) | Employment (# full & part time jobs) |
|---|---|---|---|
| **Refuge Revenue Sharing** | | | |
| Direct effects | $0 | $0 | 0 |
| Total effects | $0 | $0 | 0 |
| **Refuge Administration (staff salary spending and work related purchases)** | | | |
| Direct effects | $246.0 | $49.5 | 1 |
| Total effects | $311.0 | $69.6 | 2 |
| **Public use activities** | | | |
| Direct effects | $365.9 | $101.3 | 3 |
| Total effects | $518.5 | $146.9 | 5 |
| **Aggregate impacts** | | | |
| Direct effects | $611.9 | $150.8 | 5 |
| Total effects | $829.5 | $216.5 | 7 |

# Economic Impacts of Alternative C

## Impacts from Refuge Revenue Sharing

Same as Alternative A.

## Impacts from Public Use and Access Management

### Refuge Visitor Expenditures in Local Economy

Table 19 shows the estimated visitation levels associated with each visitor activity for Alternative C. Under Alternative C, annual visitation is anticipated to slightly increase for big game hunting (5%), waterfowl hunting (5%) and upland game hunting (2.5%) compared to Alternative A (Table 2). No change is anticipated for nonconsumptive activities while fishing is anticipated to decrease by 10% compared to Alternative A. Additionally, the percentage of nonlocal waterfowl hunters is anticipated to increase by 10% (from 25% to 35%) compared to Alternative A.

**Table 19.** Estimated annual Refuge visitation by visitor activity for Alternative C.

| Visitor activity | Total number of visits | Percentage of non-local visits (%) | Total number of non-local visits | Number of hours spent at Refuge | Number of non-local visitor days[a] |
|---|---|---|---|---|---|
| **Consumptive use** | | | | | |
| Fishing | 7,997 | 40% | 3,199 | 8 | 3,199 |
| Big game hunting | 873 | 83% | 724 | 8 | 724 |
| Waterfowl and migratory bird hunting | 1,664 | 35% | 582 | 8 | 582 |
| Upland game hunting | 170 | 10% | 17 | 8 | 17 |
| **Non-consumptive use** | | | | | |
| Nature trails/ other wildlife observation/office visits | 115,732 | 46% | 53,237 | 4 | 26,618 |
| **Total** | 126,436 | | 57,759 | | 31,141 |

[a]One visitor day = 8 hours.

Table 20 summarizes the total economic impacts associated with current non-local visitation for Alternative C. Non-local Refuge visitors would spend over $2.5 million in Sussex County annually. This spending would directly account for $2.4 million in local output, 23 jobs, and $675 thousand in labor income in the local economy. The secondary or multiplier effects would generate an additional $1 million in local output, 8 jobs, and $304 thousand in labor income. Accounting for both the direct and secondary effects, spending by non-local visitors for Alternative C would generate total economic impacts of $3.5 million in local output, 31 jobs and $979 thousand in labor income. Due to the slight increases in visitation levels for Alternative C, the associated economic effects of visitor spending would generate $3.4 thousand more in local output and $1.1 thousand more in labor income than Alternative A.

**Table 20.** Annual Impacts of Non-Local Visitor Spending for Alternative C.

| | Local output ($ Thousands) | Labor income ($ Thousands) | Employment (# full & part time jobs) |
|---|---|---|---|
| Direct effects | $2,439.7 | $675.0 | 23 |
| Secondary effects | $1,017.0 | $304.1 | 8 |
| **Total economic impact** | $3,456.7 | $979.0 | 31 |

## Costs of Administering Hunting Programs

Table 21 provides a breakdown of the funding and staff time required for managing each hunting program under Alternative C. All hunting programs under Alternative C would cost $11.8 thousand dollars and 35.25 days of staff time annually. The deer and waterfowl hunting programs account for 87% of all costs and staff time. While the deer and waterfowl hunting programs both cost approximately $5.4 thousand, have similar total costs, the deer hunting program requires 17 days of staff time compared to 13.5 days for the waterfowl hunting program. The hunt programs for Alternative C are $19.2 thousand less than and require 59.75 fewer staffing days compared to Alternative A.

**Table 21.** Annual Costs Associated with Hunting Programs for Alternative C.

| | Big Game-Deer | | Big Game - Turkey | | Upland Game | | Waterfowl | | Other Migratory Birds | | All Hunting | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Item | Staff Days | Cost | Staff Days | Cost | Staff Days | Cost | Staff Days | Cost | Staff Days | Cost | Staff Days | Cost |
| Planning | 3 | $1,000 | - | - | 0.5 | $150 | 3 | $1,000 | 0.5 | $150 | 7 | $2,300 |
| Processing applications | 1 | $400 | - | - | - | - | 1 | $400 | - | - | 2 | $800 |
| Printing costs-handouts | 0.5 | $800 | - | - | 0.25 | $220 | 1 | $1,250 | - | - | 1.75 | $2,270 |
| Law Enforcement | 7.5 | $1,350 | - | - | 0.75 | $200 | 3.5 | $650 | 0.75 | $200 | 12.5 | $2,400 |
| Inquiries | 4 | $950 | - | - | 1 | $250 | 4 | $950 | 1 | $250 | 10 | $2,400 |
| Facilities maintenance & supplies | 1 | $600 | - | - | - | - | 1 | $800 | - | - | 2 | $1,400 |
| Hunt operations | - | $0 | - | - | - | $0 | - | $0 | - | - | 0 | $0 |
| Fuel, electricity | - | $60 | - | - | - | $60 | - | $60 | - | - | 0 | $180 |
| Toilet rental | - | $0 | - | - | - | - | - | $0 | - | - | 0 | $0 |
| **Total** | **17** | **$5,160** | **0** | **$0** | **2.5** | **$880** | **13.5** | **$5,110** | **2.25** | **$600** | **35.25** | **$11,750** |

Table 22 shows the breakdown of total program expenses between staff and actual expenses and the Refuge cost recovery for each hunting program. Under Alternative C, the Refuge must pay $2,620

to contractors for application fee collection. The Refuge receives 80% of the remainder of total fees collected. For all programs, $3.8 thousand is recovered by the Refuge under Alternative C. Accounting for total Refuge expenditures and total Refuge cost recovery, the total program cost of all hunting programs under Alternative A is $8 thousand.

**Table 22.** Annual Costs Associated with Hunting Programs for Alternative C.

| | Big Game - Deer | Big Game - Turkey | Upland Game | Waterfowl | Other Migratory Birds | All Hunting |
|---|---|---|---|---|---|---|
| ***Refuge Expenditures*** | | | | | | |
| Staff salary expenses | $3,995 | $0 | $600 | $3,135 | $600 | $8,330 |
| Non-salary expenses | $1,165 | $0 | $280 | $1,975 | | $3,420 |
| Total Expenditures | $5,160 | $0 | $880 | $5,110 | $600 | $11,750 |
| ***Cost Recovery from Hunting Fees*** | | | | | | |
| Total amount collected | $1,790 | $0 | $0 | $5,570 | $0 | $7,360 |
| Amount returned to Refuge (80% of total after contractor fees ) | | | | | | $3,792 |
| **Total Program Cost** (total expenditures - total returned from fees) | **$5,160** | **$0** | **$880** | **$5,110** | **$600** | **$7,958** |
| Value of Volunteer Contributions ($20.25/hour) | 24 hrs<br>$486 | | | 16 hrs<br>$324 | | 40hrs<br>$810 |

Additionally, as shown in Table 22, volunteers contribute 24 hrs of time assisting the deer hunting program with mowing of non-ambulatory hunt areas and hunt operations. Volunteers contribute 16 hours the waterfowl hunting program with blind stake placement and maintenance. Accounting for volunteer hours at a rate of $20.25 per/hour, the value of volunteer time totals $972 for Alternative B. The volunteer contributions for Alternative B are 474 hours and $9.6 thousand less than Alternative A.

## Impacts from Refuge Administration

### Staff – Personal Purchases

Proposed staff for Alternative C includes all current staff positions (Alternative A, Table 6) plus two additional positions for a Maintenance Worker and Law Enforcement Officer. Table 23 shows the economic impacts associated with spending of salaries in Sussex County by Refuge employees under Alternative C. For Alternative C, salary spending by Refuge personnel would directly account for $356.6 thousand in local output, 2 jobs, and $76.6 thousand in labor income in the local economy. Accounting for both the direct and secondary effects, salary spending by Refuge personnel for Alternative C would generate total economic impacts of $457.2 thousand in local output, 3 jobs and $107.9 thousand in labor income. Due to the increased staffing levels for Alternative C, the associated economic effects of staff salary spending would generate $143.6 thousand more in local output, 1 more job, and $33.9 thousand more in labor income than Alternative A.

**Table 23.** Local Economic Impacts of Salary Spending by Refuge Personnel for Alternative C.

| | Local output ($ Thousands) | Labor income ($ Thousands) | Employment (# full & part time jobs) |
|---|---|---|---|
| Direct effects | $356.6 | $76.6 | 2 |
| Secondary effects | $100.6 | $31.3 | 1 |
| **Total economic impact** | $457.2 | $107.9 | 3 |

### Work-related Purchases

Non-salary expenditures for Alternative C are anticipated to increase in proportion with the salary increase for the new staff positions for a total annual non-salary budget of $357 thousand (46% increase compared to Alternative A). Table 24 shows the economic impacts associated with work related expenditures in Sussex County for Alternative C. These estimates assume 14% of the non-salary budget ($47.7 thousand) will be spent on goods and services purchased in Sussex County (same percentage as Alternative A). Work related expenditures under Alternative B would directly account for $47.7 thousand in local output and $5 thousand in labor income in the local economy. Accounting for both the direct and secondary effects, work related purchases for Alternative C would generate a total economic impact of $53.8 thousand in local output and $6.9 thousand in labor income. Due to the increased non-salary expenditures for Alternative C, the associated economic effects of work related purchases would generate $16.8 thousand more in local output and $2.1 thousand more in labor income than Alternative A.

**Table 24.** Local Economic Impacts of Refuge Related Purchases for Alternative C.

| | Local output ($ Thousands) | Labor income ($ Thousands) | Employment (# full & part time jobs) |
|---|---|---|---|
| Direct effects | $47.7 | $5.0 | 0 |
| Secondary effects | $6.1 | $2.0 | 0 |
| **Total economic impact** | $53.8 | $6.9 | 0 |

## Other Management Activities – Cooperative Farming

Same as Alternative B.

## Summary of Economic Impacts for Alternative C

Table 25 summarizes the direct and total economic impacts of all Refuge management activities for Alternative C in Sussex County. Under Alternative C, Refuge management activities directly related to all Refuge operations generate an estimated $2.9 million in local output, 26 jobs and $768.4 thousand in labor income in the local economy. Including direct, indirect, and induced effects, all Refuge activities would generate total economic impacts of $4.03 million in local output, 34 jobs and $1.1 million in labor income. Total economic impacts associated with Refuge operations under Alternative C represent less than one percent of total income (0.04%) and total employment (0.04%) in the overall Sussex County economy. Total economic effects of Refuge operations play a larger role in the Prime Hook communities near the Refuge such as Milton and Lewes where most of the Refuge public use related economic activity occurs.

**Table 25.** Summary of Refuge Management Activities for Alternative C.

| | Local output ($ Thousands) | Labor income ($ Thousands) | Employment (# full & part time jobs) |
|---|---|---|---|
| **Refuge Revenue Sharing** | | | |
| Direct effects | $46.8 | $11.9 | 0 |
| Total effects | $61.4 | $16.7 | 0 |
| **Refuge administration (staff salary spending and work related purchases)** | | | |
| Direct effects | $404.3 | $81.6 | 2 |
| Total effects | $511.0 | $114.8 | 3 |
| **Public use activities** | | | |
| Direct effects | $2,439.7 | $675.0 | 23 |
| Total effects | $3,456.7 | $979.0 | 31 |
| **Aggregate impacts** | | | |
| Direct effects | $2,890.8 | $768.4 | 26 |
| Total effects | $4,029.1 | $1,110.5 | 34 |

Table 26 summarizes the change in economic effects associated with Refuge operations under Alternative C as compared to Alternative A. Due to increases in Refuge administration and visitation, Alternative C would generate $163.8 thousand more in local output, 1 additional job and $37.1 thousand more in labor income as compared to Alternative A.

**Table 26.** Change in Economic Impacts under Alternative C Compared to Alternative A.

| | Local output ($ Thousands) | Labor income ($ Thousands) | Employment (# full & part time jobs) |
|---|---|---|---|
| **Refuge Revenue Sharing** | | | |
| Direct effects | $0 | $0 | 0 |
| Total effects | $0 | $0 | 0 |
| **Refuge Administration (staff salary spending and work related purchases)** | | | |
| Direct effects | $126.9 | $25.6 | 1 |
| Total effects | $160.4 | $36.0 | 1 |
| **Public use activities** | | | |
| Direct effects | $2.3 | $0.8 | 0 |
| Total effects | $3.4 | $1.1 | 0 |
| **Aggregate impacts** | | | |
| Direct effects | $129.2 | $26.4 | 1 |
| Total effects | $163.8 | $37.1 | 1 |

## Summary and Conclusions

Under Alternative A, Refuge management activities directly related to Refuge operations generate an estimated $2.7 million in local output, 25 jobs and $742 thousand in labor income in the local economy. Including direct, indirect, and induced effects, all Refuge activities would generate total economic impacts of $3.9 million in local output, 33 jobs and $1.1 million in labor income. Total economic impacts associated with Refuge operations across all Alternatives represents less than one percent of total income and total employment in the overall Sussex County and the economy. Total economic effects of Refuge operations play a larger role in the Prime Hook communities near the Refuge such as Milton and Lewes where most of the Refuge public use related economic activity occurs.

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