

**Wildlife-associated  
Recreation on The New Jersey  
Delaware Bayshore**



The Economic Impact of Tourism Based on the  
Horseshoe Crab-Shorebird Migration in New Jersey

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# Table of Contents



<b>TABLE OF CONTENTS</b>	<b>IV</b>
<b>LIST OF TABLES</b>	<b>VI</b>
<b>EXECUTIVE SUMMARY</b>	<b>1</b>
<b>INTRODUCTION</b>	<b>8</b>
<b>Nature Travel and Tourism</b>	<b>8</b>
International Trends	8
General Nature Tourism Trends in the United States	9
Nature Tourism Trends in New Jersey	15
Nature Tourism in New Jersey's Delaware Bay Area	16
<b>DELAWARE BAY AREA WILDLIFE WATCHING STUDY</b>	<b>19</b>
<b>The Phenomenon</b>	<b>19</b>
<b>The Problem</b>	<b>20</b>
<b>Purpose of the Study</b>	<b>22</b>
<b>The Survey Response</b>	<b>25</b>
<b>A Snapshot of the Average Respondent to the Survey</b>	<b>27</b>
<b>Details of the Aggregate Population's Responses</b>	<b>28</b>
Commitment	28

Satisfaction	32
Economic Expenditures	34
Travelers' Profile	34
Trip Expenditures	35
Role and Value of Horseshoe Crab Management	40
<b>The Delaware Bayshore Intercept Populations' Responses</b>	<b>40</b>
Commitment	41
Satisfaction	42
Economic Expenditures	42
Travelers' Profile	42
Trip Expenditures	43
Role and Value of Horseshoe Crab Management	45
<b>Socio-Demographic Profile</b>	<b>46</b>
<b>CONCLUSIONS</b>	<b>49</b>
<b>RECOMMENDATIONS</b>	<b>53</b>
<b>CITATIONS</b>	<b>55</b>
<b>APPENDICES</b>	<b>59</b>

# List of Tables



Table 1: The Gross Economic Value of Respondents' Seasonal Trips to the Delaware Bayshore, by area of impact.....	5
Table 2: The Gross Economic Value of Respondents' Annual Trips to the Delaware Bayshore, by area of impact.....	6
Table 3: Preferred activities among U.S. travelers between 1995-96 (Newsweek, 1998) .....	10
Table 4: Percentages and millions of Americans who participated in outdoor recreation activities in 1982 and 1994 (NSRE 1996). ....	12
Table 5: Response rates for Delaware Bay Survey.....	26
Table 6: The Gross Economic Value of Trips to the Delaware Bayshore (seasonal and during migration and annually, by area of impact).....	38
Table 7: Seasonal Impact of Intercept Population, by area of impact .....	44
Table 8: The Annual Gross Economic Value of Respondents' Trips to the DBSA, combined sample and intercepts, by impact area.....	45

# Executive Summary



For millennia, horseshoe crabs and shorebirds have made an annual pilgrimage to the beaches of Delaware Bay. The spectacle of tens of thousands of Red Knots and Ruddy Turnstones feeding greedily on horseshoe crab eggs is perhaps the best-known gathering of such disparate animals in the world. Today, thousands of wildlife watchers consider the Bayshore a wildlife-viewing Mecca, and visit it each May to witness the horseshoe crab spawning/migratory shorebird phenomena. These visitors represent an enormous, yet under recognized, economic resource for Bayshore and New Jersey businesses and communities. Understanding the magnitude of this economic impact, as well as the demographics and other characteristics of this visiting population, are critical steps in developing any management approach for this resource or long-term economic development plan for the region.

To determine the economic impact of tourists visiting New Jersey's Delaware Bayshore during the horseshoe crab/shorebird spectacle, wildlife watchers were surveyed in an effort to better understand their viewing behaviors and expenditures. Because of the concerns cited by wildlife watchers regarding the potential over-harvesting of horseshoe crabs, survey efforts were concentrated on this specific event (the shorebird migration spectacle) and recreation (birding).

Surveys were mailed to 1,034 persons from three different mailing lists gathered from two New Jersey wildlife organizations as well as wildlife viewers in the State: New Jersey Audubon Society (NJAS), Cape May Bird Observatory (CMBO), and intercepts of New Jersey Bayshore wildlife viewers. Of the 1,034 surveys mailed, 602 were returned in

a usable form for a 58% raw response rate. The discarding of non-deliverables yielded an effective return rate of 63%. Salant and Dillman (1994) state, "...anything under 60-70 percent [effective return rate] should be a red flag – [with an acceptable response rate being] roughly 60 percent for a general-public mail survey, about 70 percent for a special-population telephone survey." The effective response rate of 62.59% for this general population mail survey reduced the need for a random telephone check of non-respondents to determine a no-response bias.

**T**he survey solicited information about the demographics, expenditures, motivations, and satisfaction rates of birders who visited the Delaware Bay Study Area (DBSA). In addition, the study probed these recreationists' for their level of commitment to conserving wildlife habitat along New Jersey's Delaware Bay (which includes Cape May). Finally, the survey attempted to determine the value birders placed on the Delaware Bay and its wildlife resources.

**R**espondents had been birding for an average of 18.28 years, and had taken 13.61 birding trips comprising 46.12 days during the previous year. New Jersey birders traveled frequently and widely within their own state, and spent about as many days birding within New Jersey (outside their home county) as they did out-of-state. Delaware Bay wildlife watchers resembled similar recreationists studied in other parts of the country regarding average age (55), gender (balanced, slight majority female), and years of formal education (over 16 years), but exceeded other studies in terms of average income. While most of our studies have found household incomes to be over \$50,000, the average household income for Delaware Bay birders exceeded \$80,000, with over half the respondents' income exceeding \$60,000.

**D**elaware Bay visitors appeared to be more active and committed birders than general nature enthusiasts. More than half (59.59%) considered themselves to be "active birders."



The respondents' investment in birding equipment, averaging \$2,821.63 (as measured by replacement cost), supported this impression of their level of commitment.

**T**his survey revealed that a nonresident party visiting Delaware Bay during the horseshoe crab/shorebird migration season consisted of 4.33 persons. During their most recent trip, these visitors stayed in the region for 3.82 days and 2.86 nights, spending an average of **\$463.46** in the DBSA, **\$522.61 per person** in New Jersey (**\$667.12 overall**) (Table 1). Birders interviewed for this survey were attracted to Delaware Bay throughout the year (not just during shorebird migration). The respondents averaged 8.23 days in the region during the most recent year, and spent a total of **\$1,437.28** on their visits to the Delaware Bay area (Table 2).

**H**owever, visitors place value upon their experiences beyond their direct expenditures. Therefore, in addition to the direct expenditures associated with their most recent trips, respondents were asked for an estimate of how much more they would have been willing to pay before deferring from taking their most recent trip. Delaware Bay birders indicated a willingness-to-pay an additional **\$259.49 (\$67.93 per day)** before they would have cancelled their most recent trip to see the horseshoe crab/shorebird migration spectacle.

**I**n addition, indirect and induced effects expand the impacts of these direct expenditures. Walsh (1984) found that regional economic multipliers typically averaged 2.0 and generally ranged between 1.5 and 2.5 in the United States. Therefore, we have chosen to adopt Walsh's multiplier of 2.0 as a reasonable compromise. Using Walsh's multiplier average of 2.0, it is not unreasonable to expect that the induced and indirect effects of these direct expenditures in the DBSA during the horseshoe crab/shorebird migration season (seasonal) would expand the economic impacts of each survey respondent to **\$926.92** and **\$1,334.24** for the total trip (Table 1). This figure, known as

Total Gross Output (TGO) expands to an annual value of **\$1,997** in the DBSA and **\$2,874.55** for overall spending (Table 2). The Total Gross Output, when combined with Consumer's Surplus (willingness-to-pay), is known as the Gross Economic Value (GEV). The DBSA seasonal GEV (of each person visiting New Jersey's Delaware Bayshore during the horseshoe crab/shorebird migration), therefore, is the combination of TGO (\$926.92) and consumer's surplus (\$259.49), totaling **\$1,186.41** (Table 1). The GEV of the respondent's overall expenditures is **\$1,593.73 seasonally** (Table 1) and **\$3,433.61 per year** (Table 2).

Applying the GEV to the survey respondent population as a whole, the 602 people surveyed represented **\$714,219** in economic impact to the Delaware Bay area during the horseshoe crab/migratory shorebird season (seasonal), and **\$959,425** overall (Table 1). However, this random sample is but a small part of a significantly larger population. For example, if we consider the percentage of NJAS respondents who visited Delaware Bay (75% of 161 respondents or 121 people; 35.3% of the total NJAS sample), an estimated maximum of 6,000 (rounded) NJAS members (of the total 17,000 members) traveled to the DBSA. This population alone, without adding additional CMBO or beach visitors, represents a seasonal GEV of **\$7,118,460** in the DBSA (\$9,562,380 overall, Table 1) and an annual GEV of **\$15,336,368** to the DBSA (\$20,601,672 overall) (Table 2). Based on interviews with local residents, community representatives, and agency personnel, the estimated total number of visitors to the intercept beaches in 1998 ranged between 6,000 and 10,000 visitors. Therefore the estimated GEV has been based upon a population range between 6,000 and 10,000, bringing the highest estimated seasonal GEV in the DBSA to **\$11,864,100 (\$15,937,300 overall)** (Table 1). The highest estimated annual GEV in the DBSA is **\$25,560,613 (\$34,336,120 overall)** (Table 2).

**Table 1: The Gross Economic Value of Respondents' Seasonal Trips to the Delaware Bayshore, by area of impact**

	<i>In Delaware Bay Study Area</i>	<i>Elsewhere in New Jersey</i>	<i>Total in New Jersey</i>	<i>Elsewhere in U.S.</i>	<i>Total</i>
<i>Description of Item</i>	(A)	(B)	(C=A+B)	(D)	(E=C+D)
<i>1) Average Expenditures on Last Trip</i>	\$463.46	\$59.15	\$522.61	\$144.51	\$667.12
<i>2) Average Daily Expenditures (average length in days of most recent trip, 3.82)</i>	\$121.32	\$15.48	\$136.81	\$37.83	\$174.64
<i>3) Seasonal Total Gross Output (TGO) using 2.0 multiplier</i>	\$926.92	\$118.30	\$1,045.22	\$289.02	\$1,334.24
<i>4) Consumer's Surplus on Most Recent Trip</i>	\$259.49	\$0.00	\$0.00	\$0.00	\$259.49
<i>5) Seasonal Gross Economic Value (GEV) (Total Economic Output + Consumer's Surplus)</i>	\$1,186.4	\$118.30	\$1,304.71	\$289.02	\$1,593.73
<i>6) Sample size</i>	1				602
<i>7) Low Population Estimate</i>					6,000
<i>8) High Population Estimate</i>					10,000
<i>9) Seasonal Gross Economic Value of Survey Respondents (602)</i>	\$714,219	\$71,217	\$785,435	\$173,990	\$959,425
<i>10) Seasonal Gross Economic Value of Low Total Population (6,000)</i>	\$7,118,460	\$709,800	\$7,828,260	\$1,734,120	\$9,562,380
<i>11) Seasonal Gross Economic Value of High Total Population (10,000)</i>	\$11,864,100	\$1,183,000	\$13,047,100	\$2,890,200	\$15,937,300

**Table 2: The Gross Economic Value of Respondents' Annual Trips to the Delaware Bayshore, by area of impact**

	<i>In Delaware Bay Study Area</i>	<i>Elsewhere in New Jersey</i>	<i>Total in New Jersey</i>	<i>Elsewhere in U.S.</i>	<i>Total</i>
<i>Description of Item</i>	(A)	(B)	(C=A+B)	(D)	(E=C+D)
<i>1) Average Expenditures on Last Trip</i>	\$463.46	\$59.15	\$522.61	\$144.51	\$667.12
<i>2) Average Daily Expenditures (average length in days of most recent trip)</i>	\$121.32	\$15.48	\$136.81	\$37.83	\$174.64
<i>3) Average Annual Expenditures (based on days per year)</i>	\$998.50	\$127.44	\$1,125.94	\$311.34	\$1,437.28
<i>4) Annual Gross Output (TGO - 2.0 multiplier)</i>	\$1,997.00	\$254.87	\$2,251.87	\$622.68	\$2,874.55
<i>5) Consumer's Surplus on Most Recent Trip</i>	\$259.49	\$0.00	\$259.49	\$0.00	\$259.49
<i>6) Consumer's Surplus per day (based on most recent trip)</i>	\$67.93	\$0.00	\$67.93	\$0.00	\$67.93
<i>7) Annual Consumer's Surplus (based on days per year)</i>	\$559.06	\$0.00	\$559.06	\$0.00	\$559.06
<i>8) Annual Gross Economic Value (Total Gross Output + Consumer's Surplus)</i>	\$2,556.06	\$254.87	\$2,810.93	\$622.68	\$3,433.61
<i>9) Sample size</i>					602
<i>10) Low Population Estimate</i>					6,000
<i>11) High Population Estimate</i>					10,000
<i>12) Annual Gross Economic Value of Survey Respondents (602)</i>	\$1,538,748.92	\$153,432.62	\$1,692,181.55	\$374,852.89	\$2,067,034.43
<i>13) Annual Gross Economic Value of Low Total Population (6,000)</i>	\$15,336,368.01	\$1,529,228.80	\$16,865,596.81	\$3,736,075.29	\$20,601,672.09
<i>14) Annual Gross Economic Value of High Total Population (10,000)</i>	\$25,560,613.35	\$2,548,714.66	\$28,109,328.01	\$6,226,792.15	\$34,336,120.16

An interesting and revealing relationship existed related to the degree to which the horseshoe crabs and migratory shorebird spectacle contributed to visitor satisfaction (**only 6.6% ranked it as unimportant**). Respondents stated that they would be willing to pay (in decreased annual household income) **\$212.45** for a management program to protect these resources. However, they also stated that they would be willing to tolerate no more than a **50.7%** decline in horseshoe crabs and migrant shorebirds before they would cease visiting the DBSA. Their comments, frequency of visitation, and loyalty to the Bayshore indicated they would return each year, ever hoping to see horseshoe crabs return should they disappear. As long as this visitation continues, they bring an economic impact to the region, but one that is contingent on the continued existence of viable populations to support the migration spectacle.

# Introduction



## *Nature Travel and Tourism*

### *International Trends*

**I**n a discussion paper prepared for a meeting on sustainable tourism held 27-28 May 1999 in Quintana Roo, Mexico, several points about nature tourism were precisely detailed. The Commission for Environmental Cooperation (CEC) developed the document, the only regional environmental organization that has its roots in expanded economic integration brought about by a trade liberalization agreement—NAFTA.

**T**he CEC (1999) paper developed for this meeting defines the issues faced by the industry so well that a direct quote seems in order:

“**T**he World Travel and Tourism Council (WTTC) estimates that global tourism and travel will generate US \$3,500 billion in 1998 (<http://www.wttc.org>). This is expected to account for an average 11.6 percent contribution to gross domestic product (GDP), which should grow to 12.5 percent by 2010. The WTTC estimates that tourism in North America will generate US \$1,077 billion in 1998, generating 20.73 million jobs and encouraging US \$189.09 billion worth of capital investment.

“**W**hile tourism has been growing at an annual rate of around four percent, nature travel has been estimated to be increasing at an annual rate of between ten and 30 percent (Reingold 1993). One study has estimated that between 40 and 60 percent of international visitors travel to enjoy and appreciate nature (Filion et al. 1992). Thus, the responsible

development and proper management of sustainable tourism in natural areas would benefit the economies of all three NAFTA nations as well as providing important financial resources for some of North America's poorest regions. Successfully managed initiatives to promote ecotourism require attention to the laws of nature and the local social and cultural environment that support them."

### *General Nature Tourism Trends in the United States*

Although detailed in previous reports (Eubanks et al. 1998; Eubanks 1998; Eubanks and Stoll 1999), the nature tourism and outdoor recreation trends in the United States bear repeating. According to the U.S. Department of Agriculture almost 150 million people participate in adventure travel activities such as mountaineering, scuba diving, biking, cross-country skiing, hiking, wildlife viewing, and camping. Nature travel has become a significant part of the global leisure travel industry. According to the Adventure Travel Society financial growth in adventure travel is expected to remain strong with a projected 4-6% increase each year.

Evidence of these trends was also presented in the July 27, 1998 issue of Newsweek magazine. The editors presented a list of preferred activities among U.S. travelers between 1995-1996, showing that a significant percentage of U.S. travelers are engaged in activities that can be characterized as "experiential," such as outdoor recreation, visits to historical sites and museums, trips to national and state parks, and attending cultural events and festivals (Table 3). By comparison, only a small percentage of U.S. travelers were interested in theme or amusement parks (8%, fewer than half of those interested in the outdoors).

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**Table 3: Preferred activities among U.S. travelers between 1995-96 (Newsweek, 1998)**

Activity	Percent of travelers participating
Shopping	32%
Outdoor	17%
Historical/Museum	14%
National/State Park	10%
Beach	11%
Cultural Events/Festivals	9%
Theme/Amusement Park	8%
Nightlife/Dancing	8%
Gambling	7%
Sporting Event	6%
Golfing/Tennis/Skiing	4%

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More specifically, wildlife-associated recreation (as opposed to outdoor recreation in general) now involves millions of Americans in hunting, fishing, and a variety of non-consumptive activities such as birding, bird feeding, and wildlife photography. According to the U.S. Fish and Wildlife Service (1997), 77 million U.S. residents 16 years old and older participated in some form of wildlife-associated recreation activity in 1996. During that year:

- 62.9 million people enjoyed primary wildlife watching activities such as observing, feeding, or photographing wildlife
- 35.2 million people in the United States fished
- 14 million people hunted



**H**owever, as noted in the USFWS survey, there is considerable overlap between those who hunt, fish, and wildlife-watch. For example, in 1996, 68% of hunters also fished, and 27% of the anglers also hunted. More interestingly, 65% of the anglers and 68% of the hunters also participated in wildlife-watching activities, and 41% of wildlife watchers also hunted and/or fished. Rather than representing discrete constituencies, wildlife recreationists are, in fact, a rather amorphous group of enthusiasts engaged in a variety of wildlife-associated activities. Taken as a whole, expenditures related to wildlife-associated recreation in the U.S. in 1996 totaled \$101 billion (USFWS 1997).

**T**he National Survey on Recreation and the Environment (NSRE 1996) has identified outdoor recreation trends over a 30-year period. Data from the 1994-1995 surveys, focusing on 62 outdoor recreation activities, have been examined in regard to participation by age, income level, and gender. While the popularity of some activities (such as tennis) have decreased, other activities such as birding, hiking, and backpacking are growing rapidly (Table 4).

**Table 4: Percentages and millions of Americans who participated in outdoor recreation activities in 1982 and 1994 (NSRE 1996).**

Percentages and millions of Americans who participated in outdoor recreation activities in 1982 and 1994.			
<u>Activity</u>	<u>Number in 1982-1983</u> <u>(millions)</u>	<u>Number in 1994-1995</u> <u>(millions)</u>	<u>Percent Change</u>
Birding	21.2	54.1	155.2
Hiking	24.7	47.8	93.5
Backpacking	8.8	15.2	72.7
Downhill Skiing	10.6	16.8	58.5
Camping (Primitive)	17.7	28.0	58.2
Attend Outdoor Concert/ Play	44.2	68.4	54.7
Off-Road Driving	19.4	27.9	43.8
Walking	93.6	133.7	42.8
Motorboating	33.6	47.0	39.9
Sightseeing	81.3	113.4	39.5
Camping (Developed)	30.0	41.5	38.3
Swimming/Natural Waters	56.5	78.1	38.2
Attend a Sport Event	70.7	95.2	34.7
Snowmobiling	5.3	7.1	34.0
Golf	23.0	29.7	29.1
Outdoor Team Sports	42.4	53.0	25.0
Camping (Overall)	42.4	52.8	24.5
Cross-Country Skiing	5.3	6.5	22.6
Boating	49.5	58.1	17.4
Swimming/Pool	76.0	88.5	16.4
Picnicking	84.8	98.3	15.9
Sledding	17.7	20.5	15.8
Running/Jogging	45.9	52.5	14.4
Water Skiing	15.9	17.9	12.6
Horseback Riding	15.9	14.3	10.1
Bicycling	56.5	57.4	1.6
Ice Skating	10.6	10.5	- 0.9
Fishing	60.1	57.8	-3.8
Sailing	10.6	9.6	- 9.4
Hunting	21.2	18.6	-12.3
Tennis	30.0	21.2	-29.3

The Recreation Roundtable, a consortium of companies directly involved in outdoor recreation, has, in cooperation with key federal agencies, sponsored an opinion survey of U.S. residents each of the past six years regarding outdoor recreational activities and experiences. Roper Starch, a world-renowned public opinion research firm, conducts this survey of Americans aged 18 and over. In their most recent report, entitled **Outdoor Recreation in the United States 1999: The Family and the Environment**, Roper Starch reports that 67% of Americans (18 years or older) participate in outdoor recreation at least monthly, enjoying activities that involve the use and enjoyment of natural resources. This is the highest percentage recorded during the six year history of the survey, and is a 10% increase over the previous year. For the first time, the 1999 report found a decline in the number of people who participate less often than once per year. That number had remained constant since 1994 at approximately 29%, in 1999, it declined to 20%. Roper Starch notes that these changes may simply reflect the timing of the survey, as it is now being done at the end of the summer rather than the end of the year (Recreation Roundtable 1999)

Simply put, these data demonstrate the degree to which outdoor recreation is important to most Americans. In fact, outdoor recreation, rather than a special interest, would appear to be one of a few activities that most Americans share in common. Whether it be biking, hiking, camping, birding, snow boarding, butterfly collecting, hunting, or fishing, most Americans are involved in at least one or more recreational activities that depend on the natural resources found outside the home. When asked the importance of specific reasons for participating in outdoor recreation, 41% of Americans say “experiencing nature” is “very important” (Recreation Roundtable 1999). This compares to the motivation drivers reported later in this survey, where “to enjoy the sights, sounds, and smells of nature” and “to be outdoors” are the most important reasons for wildlife watching.

In the summary that introduces the report, Roper Starch lists a series of bullets. Four of these summary paragraphs are particularly germane to this report. Therefore the following four bulleted summaries are directly quoted from the report (Recreation Roundtable 1999):

- “**W**hile environmental concern across the nation peaked a decade ago, it is still "top of mind" when considering national problems. Perhaps most importantly, many of the specific environmental problems viewed as most serious affect recreation.
- “**M**any Americans see recreation as one of the main reasons to protect the environment. Indeed, a sizable number say the key driver for environmental protection is to "preserve recreation areas and national parks."
- “**W**hile Americans are concerned about the environment, they do not think the answer to environmental protection is forbidding the use of public lands. In fact, nearly two in three Americans say outdoor recreation, overall, has a "good effect" on the environment. More than three quarters of the public say outdoor activities have either a "good effect" or "no effect." Americans who consider outdoor activity a detriment to the environment may avoid it or discourage others from doing it. This suggests a need for the recreation industry to communicate with the public about the actual effects of outdoor recreation on the environment.
- “**M**any Americans think the key to environmentally safe recreation is responsible behavior. In addition, nearly nine in ten say outdoor recreation benefits the environment because it gives people a reason to care about environmental protection. The same number say that if people would follow the rules in parks and recreation areas, there would be no significant effects of their land use on the environment.”

To reiterate, most Americans believe that outdoor recreation benefits the environment, particularly when this recreation is conducted responsibly. More than three in four Americans (78%) say outdoor recreation, overall, has a “good effect” or “no effect” on the environment, while just 11% say it has a “bad effect.” Many Americans (90%) see responsible behavior as the key to environmentally responsible recreation. While nearly nine in ten Americans (89%) believe that outdoor recreation can promote environmental responsibility, 86% are “very concerned that people who engage in outdoor recreation hurt the environment by leaving trash and damaging the landscape.” In other words, Americans value outdoor recreation, yet demand that its impacts be compatible with resource conservation (Recreation Roundtable 1999).

#### *Nature Tourism Trends in New Jersey*

According to the New Jersey Governor’s Office (NJGO), tourism is the second largest industry in the state. Tourism generated \$25.5 billion in revenue in 1998. The industry employed 633,000 people full time (up 10,000 from 1997), providing \$13 billion in wages (NJGO 1998). The New Jersey Commerce and Economic Growth Commission reported international visitors to the Garden State rose 17.5% in 1998 to 853,000 (NJCEGC 1999). In 1994, 6.4 million people visited natural areas in New Jersey, enjoying over 1 million overnight trips. In that same year, New Jersey State Parks received 12 million visits. Wildlife recreation, fishing, and hunting represented 75,000 jobs in New Jersey and generated \$5 billion in retail sales (NJDEP 1996).

Tourism to the average New Jersey resident conjures the image of specific destinations and attractions, such as Sea World, Atlantic City casinos, and Disney World. This Disneyesque view of tourism, an industry circumscribed by a fabricated, fictitious set of enticements, is without a doubt an important economic component in the travel and

tourism market as a whole. Yet experiential tourists are searching for the natural, historical, and cultural heart of a region, and their defining principle is authenticity. To this expanding segment of the travel and tourism market, what is real is what earns their time and investment. Their ambition is immersion in a rich natural, cultural, and historical experience.

Nature travel, such as historical and cultural tourism, is a quest for the essence, the soul of a region. The revelations may only be fleeting and momentary, yet these epiphanies are the very pith of experiential tourism.

#### *Nature Tourism in New Jersey's Delaware Bay Area*

Since the early 1980's, birders and other naturalists have visited New Jersey's Delaware Bayshore to witness the horseshoe crab and shorebird migration spectacle. As more people visited, more articles appeared in both the scientific and popular literature. Quickly the word spread and the Bayshore became one of the best-known wildlife watching locations in the eastern United States. Within a 3-hour drive of more than 30 million people, some Delaware Bay beaches became crowded on May weekends and even on some weekdays. Organizations such as the Cape May Bird Observatory and the New Jersey Division of Fish, Game, and Wildlife's Endangered and Nongame Species Program took a primary role in educating both visitors and local residents about to the importance of the beaches and how to avoid disturbing the shorebirds.

On the New Jersey side of the Delaware Bay, several beaches became the prime destinations for wildlife watchers. Fortescue, Thompson's Beach, Moore's Beach, Reed's Beach, and Norbury's Landing were the primary locations, although access was also possible from Lower Township up to and beyond Fortescue, a distance of more than 40 miles. The exact number of visitors to the Bayshore in May was unknown because most

wildlife and conservation organizations counted birds and crabs, not people. One estimate from the early 1990s was 4,000+ visitors, based on the fact that volunteers who helped protect the beaches handed out more than 3,000 educational brochures. Since they handed them out only on three or four weekends at only about one-half of the beaches used by visitors, it is likely that they contacted only a portion of all visitors.

**B**y the mid-1990's communities along the Bayshore began to wonder how much the birding tourists (avitourists) contributed to the local economy. Based on a study by Kerlinger and Weidner (1991) of birding economics on the Cape May Peninsula, it was estimated that the Bayshore horseshoe crabs and shorebirds attracted at least \$1 million in ecotourism revenues per year. This number was cited in a resolution signed by various conservation organizations in 1995 that called for a moratorium on horseshoe crab harvesting, and asked for more research that would determine the impacts of the harvest on both crabs and shorebirds.

**T**he horseshoe crab and shorebird spectacle has sparked a new interest in the Delaware Bayshore of New Jersey. Since the early 1980's, the Delaware Bayshore has become a significant ecotourism destination. The beaches with their horseshoe crabs and shorebirds are only a small part of one of the most biodiverse areas in North America. From the beaches inland through tidal marsh, swamp, upland forests, and farmland, the landscape is relatively undeveloped. The area is now the focus of intense conservation efforts by several agencies and organizations. For example, The Nature Conservancy has designated the Bayshore as one of its "Last Great Places." The U.S. Fish and Wildlife Service has established the Cape May National Wildlife Refuge. New Jersey's Department of Environmental Protection protects thousands of acres as wildlife management areas, state forests, and parks. The National Park Service has designated several area rivers for its Wild and Scenic River program. In addition, the New Jersey Audubon Society (Cape May Bird Observatory) and The Nature Conservancy have established interpretive centers in the area. These preserved lands and interpretive

centers serve as epicenters of ecotourism activity.

Nature-based tourism on the Bayshore includes birding, hiking, camping, hunting, fishing, crabbing, sightseeing, photography, biking, and more. It is growing rapidly and promises to be an important (and sustainable) industry for Bayshore communities. The industry is still in its infancy, however, because few recognize the true value of the resource. The present study focuses on nature-based tourism along the Delaware Bayshore, especially the horseshoe crab and migratory shorebird phenomenon. Understanding the magnitude of this tourism, along with its seasonal timing, economic impact, and tourist habits and demographics will provide planners, economists, state agency personnel, elected officials, legislators, business owners, and land-use planners with much needed information. This information will be useful for conservation purposes and for marketing the area as a nature tourism destination. It also provides the information needed to make decisions about long-term development in the area.



# Delaware Bay Area Wildlife Watching Study



## ***The Phenomenon***

Although they are called horseshoe crabs (*Limulus polyphemus*) or king crabs, these arthropods are more closely related to spiders. Each year in late April and early May, they begin to gather in the deeper water off the sandy beaches of the Delaware Bay in New Jersey and Delaware. From about the 10<sup>th</sup> of May through the middle of June, these giant arthropods haul themselves onto the beaches to procreate. When the water temperature and tide are optimal, millions of horseshoe crabs crawl up on the beach, mate, and lay their eggs in clusters of hundreds to thousands. Each female does this several times, leaving eggs one to more than four inches down in the sand, presumably out of the reach of predators.

Just as horseshoe crabs begin their breeding activities, hordes of voracious shorebirds also arrive. It is not an accident that these birds appear on the Bayshore beaches. After an arduous flight from South America, between 425,000 and one million shorebirds (Clark, Niles, and Burger 1993; Harrington and Flowers 1996; Berkson and Shuster 1999) arrive with an almost insatiable appetite. The birds include virtually the world population of Red Knots, and a significant percentage of the world's Ruddy Turnstones, Semipalmated Sandpipers, and Sanderlings. For all of these species, the horseshoe crab eggs represent an abundant and crucial source of food. After feeding on these eggs for 10 days to more than 2 weeks, most of the birds have gained enough weight (up to 40%) in order to proceed to their arctic nesting sites, completing their 3,000-4,000 mile journey (Clark, Niles, and Burger 1993; Harrington and Flowers 1996; Berkson and Shuster 1999). For many, the Delaware Bayshore represents the single most important refueling station in their entire migration. For Red Knots and other shorebirds,

the feeding stopover enables them to fly nonstop from the Bayshore to the Arctic. Scientists estimate that 1.8 million horseshoe crab females are required to produce enough eggs to feed the migrating shorebirds during their Delaware Bay stopover (Castro and Myers 1993; Clark, Niles, and Burger 1993; Harrington and Flowers 1996; Berkson and Shuster 1999). Because of the sheer numbers of birds and horseshoe crabs and their dependence on the Delaware Bayshore, the entire phenomenon is now recognized as one of the wonders of the natural world.

### ***The Problem***

Shorebirds are not the only animals that harvest the abundance of the Delaware Bayshore in May. The fishery for horseshoe crabs has existed for more than a century. The horseshoe crab is the target of a commercial bait fishery that historically has lacked coordinated, coast wide monitoring and regulation (Berkson and Shuster 1999). In the late 1800s and early 1900s, millions of horseshoe crabs were harvested along the Bayshore for use as fertilizer and pig feed. Because they were free and easy to harvest, the resource attracted the attention that led to its demise. The crabs seemed to have disappeared shortly after 1900, presumably from the excesses of an unmitigated harvest.

It was not until the late 1970's that the horseshoe crab and shorebird phenomenon was "rediscovered." Some hypothesize that the reason earlier ornithologists like Witmer Stone and others who chronicled the birdlife of Cape May did not write about the phenomenon was because it had disappeared as a result of over harvesting (Kerlinger 1998). It is likely that the early excesses in harvesting of horseshoe crabs and shorebirds, the latter through market hunting near the turn of the century, reduced the resource to such a point that it was not noticeable. Thus, horseshoe crab and shorebird populations took several decades to recover from their declines. By the late 1970's researchers from

the New Jersey Audubon's Cape May Bird Observatory and Manomet Observatory began counting the migrating shorebirds along the Bayshore and reported the incredible phenomenon.

**R**ecently, as groundfish fisheries have become more heavily regulated, fishers have moved to other less regulated and unregulated species (Berkson and Shuster 1999). By the late 1980's, the harvest of horseshoe crabs was back in full swing with more than one-half million crabs harvested each year to use for conch and eel bait. The crabs are harvested by hand and by trawl, just off the beaches. Hand harvesting had occurred for a couple of decades and was not the cause of much concern. However, with the advent of trawl harvesting in the waters just off the beaches, the harvest dramatically increased.

**W**ith no harvest regulations in effect and more harvesters attracted by the seemingly limitless resource, a controversy emerged. For about a decade, conservationists and some government agencies had claimed that harvesting of the crabs caused a decline in the numbers of crabs and the migrant shorebirds that feed on their eggs. Wildlife watchers and resource managers requested either a harvest moratorium or limits on crabs caught. The evidence of a decline in horseshoe crab numbers came from studies done by the New Jersey Bureau of Marine Fisheries, Delaware Division of Wildlife, a Fordham University professor's research, and a private research laboratory (Kerlinger 1998). Several different methods were used, all found the same thing; the horseshoe crab population had declined.

**T**he New Jersey Endangered and Nongame Species Program (Division of Fish, Game, and Wildlife) had also demonstrated that there were fewer Red Knots and other shorebirds on the New Jersey side of the Bay during migration than had been during the previous several years. Birders already realized this and fewer came to the New Jersey side of the Bay in the late 1990's. The birds had shifted their activities to the Delaware side of the Bay where there were more stringent regulations on the harvesting of

horseshoe crabs. Thus, the harvesting had reduced horseshoe crab numbers, their eggs, and the numbers of shorebirds that used the Jersey Bayshore during spring migration.

### ***Purpose of the Study***

**T**he purpose of this research project was to examine the economic impacts of wildlife and resource-related tourism along the New Jersey's Delaware Bayshore. This research examined the economic impacts of wildlife and resource-related recreation along the Delaware Bayshore between Cape May and Fortescue, New Jersey.

**W**ildlife watching, and in particular bird watching, is somewhat transparent in its impacts. Birdwatchers (birders) do not purchase licenses, as do hunters and anglers. With the exception of the equipment they may carry (binoculars, cameras, spotting scopes) birders generally blend with the local surroundings. In order to assess their interests and impacts, birders must be intercepted where they are most likely to be found.

**D**elaware Bay offered an exceptional opportunity to study birders and other wildlife watchers. The shorebird migration, lasting but a few weeks in the spring and associated with horseshoe crab spawning, attracts thousands of birders to a limited number of sites along the Bay. Delaware Bay, therefore, presented a unique opportunity to interact with, and intercept, a significant number of birders and other wildlife watchers participating in their pastime.

## ***Objectives***

**T**he first objective was to profile wildlife watchers along the New Jersey Bayshore. In this profile, traditional socio-demographic characteristics, as well as motivations, degrees of commitment, satisfaction levels, trip expenditures, and willingness-to-pay above trip expenditures were included.

**A** second objective related to estimating total wildlife watching activity along New Jersey's Delaware Bay by determining estimates of seasonal and annual participation. Although much of this recreation is now focused on the spring shorebird migration, birders were known to be present along the Bay in the summer and fall as well.

**T**he third objective pertained to identifying the magnitude of economic impacts. Participants engaging in wildlife watching activity make expenditures within the region and state for travel, food, lodging, and other items. These expenditures impact the communities in which local and state citizens reside. Management actions affecting the natural resource base and its usage will have impacts upon the magnitude of aggregate economic activities. Thus, the magnitude of such economic activity is of policy interest.

**F**inally, the fourth objective focused on exploring the relationship between the recreational activity (wildlife watching) and horseshoe crab management, the resource upon which the wildlife activity depends. By using contingent valuation, an estimate of the value these recreationists placed upon the resource and a series of management scenarios related to the crabs and Delaware Bay was estimated.

## ***Study Approach***

**T**he study area is defined by the presence of migrating spring shorebirds feasting on horseshoe crab eggs on the Delaware Bayshore in New Jersey (Delaware Bayshore Study Area, DBSA).

**T**hree populations of birders and general wildlife watchers were selected as the sampling frame. Sampling birders who visit Delaware Bay annually, but were absent during the survey period, required contacting members of organizations oriented toward this recreation. In selecting conservation organizations, two groups were chosen with the intent of sampling a diverse group of birders:

- Members of New Jersey Audubon Society (NJAS)
- Members of Cape May Bird Observatory (CMBO)

**T**he above named groups supplied mailing lists. In addition, surveyors were placed on the beaches to intercept on-site recreationists (intercepts) as they entered or departed. Surveyors collected information during May 1998. The surveyors explained the purpose of the survey, and asked each person intercepted to indicate their willingness to participate. Surveyors then collected mailing information from willing participants, and the mailing lists were then treated identically to the two supplied by CMBO and NJAS.

**A**fter eliminating duplicates in the mailing list, a total of 1,034 recreationists comprised the final survey list. The survey mailing approach was a modified Salant and Dillman (1994) survey protocol involving four separate mailings. Survey questionnaires with self-addressed stamped return envelopes were mailed in two timed intervals. All birders received identical surveys. Participants first received a personalized letter alerting

them that they would be receiving a survey. One week after the letter, the first survey was sent. One week after the survey was sent, a reminder/thank you postcard was sent to all participants. After an additional three-week interval, a second copy of the questionnaire was sent with a personalized cover letter to non-respondents.

The eight-page, self-administered questionnaire incorporated a series of traditional questions similar to those used by researchers in previous evaluation studies. Many of these questions had been used with birders in other areas of the country (Eubanks et al. 1993, Eubanks et al. 1998, Eubanks and Stoll, 1999). Participants were asked about their frequency of participation in birding (both in general as well as in the study area), their levels of commitment, the organizations to which they belonged, their investment in the recreation, and their motivations. They were asked about the general characteristics of their most recent trip to the study area, their expenditures related to this trip, their willingness-to-pay above and beyond this expenditure, and their level of satisfaction with this trip. Finally, participants were asked to respond to contingent valuation questions to determine the value they placed upon the resource and its protection.

### ***The Survey Response***

Of the 1,034 surveys, 602 were returned in a usable form for 58.22% raw response rate. After discarding the non-deliverables, the effective response rate was calculated at 62.59% (Table 5). These response rates were calculated as follows:

$$\text{Raw response rate} = \text{RU}/\text{N}$$

$$\text{Effective response rate} = (\text{RU} + \text{DNB} + \text{D} + \text{R} + \text{SO}) / (\text{N} - \text{ND})$$

Where:

RU = Returned Usable

SO = Screened out

DNB = Does not view wildlife/birds

N = Total Mailed

D = Deceased

ND = Non-deliverables

R = Refusal

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**Table 5: Response rates for Delaware Bay Survey**

Response	Totals
Returned Usable	602
Did Not Bird	0
Deceased	0
Refusal	32
Returned Unusable	0
Total Mailed	1034
Non-Deliverable	21
Raw Response	58.22%
Effective Response Rate	62.59%

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## ***The Results***

### ***A Snapshot of the Average Respondent to the Survey***

Using the average values reported in the survey to construct a profile, the typical person watching the migrating shorebirds on Delaware Bay is a 55-year-old, white, college-educated New Jersey woman, traveling with her husband or a friend, still working, earning more than \$80,000 a year (household income), with more than 16.9 years of formal education. There are 2.27 people at home (i.e., she is an “empty-nester”). She is an active birder, has birded for over 18 years, and considers herself equally or more skilled than other birders in general.

During the past year, she birded 65.4 days in New Jersey, with just more than 8 days spent at Delaware Bay, 13.3 days birding in other states, and 4.4 days outside of the United States (24.6% of respondents traveled outside of the U.S.). In the past year, she took 13.6 trips away from home to go birding, with each trip lasting 1.85 days. If she had to replace all of her birding equipment she would spend \$2,822. She would rank enjoying the sights, smells, and sounds of nature highest on a list of reasons to go birding.

She learned about the horseshoe crab/shorebird migration spectacle through her birding club. On her most recent trip, she drove 247 miles one-way from her home to come to the Delaware Bay during the spring, spending 3.82 days in the area, devoting most of that time (2.74 days) to birding and watching other wildlife. While her longest trip to Delaware Bay occurred in the spring, she also spent 2.06 days there in the fall and 1.98 days in the summer.

She spent \$463.46 dollars (her share) in the Delaware Bay area, and an additional

\$59.15 elsewhere in New Jersey during her most recent trip. She most likely went to Cape May Point State Park and/or Reed's Beach, and combined her birding with visiting the beach and experiencing Victorian Cape May. She would have been willing to buy a variety of goods and services had they been available in the area.

She had a very satisfying experience, and plans to visit again within the next 12 months, although if it costs her \$259 more per year to go, she is likely to quit making trips to the Delaware Bay.

### ***Details of the Aggregate Population's Responses***

#### *Commitment*

The depth of involvement in an outdoor recreation, and the competency an individual achieves is related to the dedication, zeal, and commitment with which an individual approaches the recreation pursuit. Commitment may be divided into three components: consistent behavior, investment, and degree of attachment (Buchanan 1985; Ditton et al. 1992). This survey measured commitment by assessing each individual's own perceptions of their level of commitment, the importance they place upon this type of recreation in their lives, their skills relative to other birders, their time committed to the recreation, their investment in equipment, the organizations to which they belong, and their motivations for being involved in this activity. As reported by Vaske et al. (1982), Applegate and Clark (1987) and others, non-consumptive recreationists such as birders begin to express consumptive attributes as they become more specialized (i.e., achievement becomes more important than the experience, leading to lowered satisfaction when no gains—such as sighting a new life bird—are made).

A broad-based profile of Delaware Bay wildlife watchers, therefore, required a sampling of all types of recreationists, from casual birders who rarely left their own backyard to the most avid travelers interested only in the next bird that might be added to their life list.

Most respondents affirmed that they had traveled more than one mile from home to watch wildlife (92.7%) or birds (97.5%) during the 12 months prior to the study. Respondents had been birding for an average of 18.28 years, had taken 13.61 birding trips away from home during the previous year, and had birded a total of 80.39 days during the previous year. By comparison, birders belonging to the American Birding Association spend an annual average of 84.5 days birding over 10.6 birding trips (Wauer 1991).

Several attempts have been made in previous studies to determine birders' skill level and commitment. This survey provided the following criteria for participants to use to define their own level of commitment to birding:

- A **committed** birder: *in general*, a person who is willing to travel on short notice to see a rare bird; who subscribes to a number of birding magazines (such as *Birding*) that specialize in the identification of birds and places where they may be seen; who leads field trips or seminars for local birding clubs; who keeps a detailed life list as well as a daily journal; who purchases ever-increasing amounts of equipment to aid in attracting, recording, and seeing birds; and, for whom birding is a primary outdoor activity.
- An **active** birder: *in general*, a person who travels infrequently away from home specifically to bird; who may or may not belong to a local birding club; who subscribes to general interest bird magazines (such as *Wild Bird* or *Birder's World*); who participates in, but does not lead, local field trips or seminars; who keeps a

general list of birds seen; and, for whom birding is an important but not an exclusive outdoor activity.

- A **casual** birder: *in general*, a person whose birding is incidental to other travel and outdoor interests; who may not belong to a formal birding organization; who may read an article on birds in a local newspaper but does not subscribe to birding magazines; who keeps no life list; and, for whom birding is an enjoyable yet inconsistent outdoor activity.

A majority of Delaware Bay birders consider themselves to be active birders (59.4%), with 18.7% categorizing themselves as "committed" birders and only 21.9% describing themselves as casual. These results are markedly different from tourists who travel to Nebraska's Platte River for the Sandhill Crane Migration—54.2% casual, 35.1% active (Eubanks et al. 1998), and those of McFarlane (1996), whose study group in Alberta, Canada was comprised of 43% casual, 38% novice, 12% intermediate, and 7% advanced birders. These New Jersey wildlife watchers were slightly less committed to birding than birders using the Great Texas Coastal Birding Trail (20.3%). Of the birders attending Texas' Rio Grande Valley Birding Festival, 32.3% considered themselves to be committed (with only 6.6% describing themselves as casual) birders.

Similarly, respondents were asked how birding rated as an outdoor activity in their lives. Close to 49% reported birding as their most important outdoor activities, and only 19.7% reported birding to be just one of many outdoor interests.

Kellert (1985) measured birding skill based upon the number of species an individual could identify. However skill alone is not an effective indicator of commitment and avidity (for example, would people who routinely shoot par and under be the only avid golfers?). Survey participants were asked to provide a self-evaluation of their skills

relative to other birders. More than half (57.7%) scored themselves as being equally or more skilled than other birders, while 42.3 % considered themselves to be less skilled.

**A**nother way to assess commitment to a recreation pursuit is to estimate a person's financial investment related to the activity. Weidner and Kerlinger (1990) found that active birders spent \$1,800 per year on their hobby. Wauer (1991) reported that American Birding Association members had annual expenditures related to their recreation in excess of \$3,300, with 17% of that total relating to the purchase of equipment. The Delaware Bay survey respondents considered themselves to be actively committed to birding, and their expenditures support this claim as they have invested significant amounts of money in equipment. The respondents' estimated replacement cost for their equipment and materials averaged \$2,822.

**W**itter and Shaw (1979) reported that over half of the birders in their study belonged to a minimum of five conservation and birding organizations and 90% belonged to at least three. Close to 90% of the Delaware Bay respondents belonged to at least one birding or conservation organization, 39.6% belonged to 5 or more, and 72.2% belonged to 3 or more. Respondents belonged to an average of 4.62 groups. The Nature Conservancy, New Jersey Audubon Society, and National Audubon Society attracted the largest numbers of members.

**D**ecker et al. (1987) proposed that the motivations for wildlife-related recreation can be segregated into three categories: (1) affiliation-oriented wildlife enthusiasts who become involved primarily to socialize with other recreationists; (2) achievement-oriented recreationists who are interested in reaching certain levels of performance; and, (3) appreciation-oriented wildlife recreationists who are attracted to the quietude of nature. In the Delaware Bay study, birders were presented with a series of motivation "drivers," and they were asked to rank the "drivers" according to importance. In general,

respondents ranked appreciation values high, with "to enjoy the sights, smells, and sounds of nature" and "to be outdoors" the most important motivations for their birding. Interestingly, Kellert (1985) found that 58% of casual birders cited "the aesthetic qualities of birds" as their primary reason for birding. Delaware Bay birders were not particularly competitive, ranking "to gain the respect of other birders" at the bottom of the list, nor anti-social, with "to get away from the family for a while" and "to be alone" also ranking low. Yet only 6.7% ranked 'to be with friends' as extremely important. Largely they were neither "affiliation" nor "competitive", rather, they were "appreciation" oriented.

### *Satisfaction*

Several researchers have studied the satisfaction ratings of outdoor enthusiasts. Vaske et al. (1982) assessed the differences between consumptive and nonconsumptive recreationists, and related satisfaction to goal specificity and the probability of achieving those goals (such as bagging a trophy buck). Vaske placed birding along a consumptive/nonconsumptive continuum, and predicted that birders would exhibit both consumptive and nonconsumptive elements.

Applegate and Clark (1987) specifically focused their research upon birders. They reported that birders, contrary to Vaske's prediction, expressed satisfaction levels quite consistent with other nonconsumptive activities. However, Applegate and Clark (1987) did find that more competent birders exhibited lower satisfaction ratings than less competent birders. McFarlane (1996) stated that motivations for birders are similar to those of hunters with "different degrees of importance depending upon the level of birding experience."

As has been previously discussed, the commitment and motivation scores of Delaware Bay birders describe a group of mostly specialists, rather than generalists. If

specific goals, such as adding a new bird to the life list, were set, a low satisfaction level would be expected (life birds become harder to find, trips aren't enjoyable unless a new species is added, therefore the trip is unsatisfactory). Satisfaction rating among the sample population was very high with 90.7% claiming they were extremely or very satisfied with their most recent trip to the DBSA. This would indicate that their expectations for their most recent trip were specific to the horseshoe crab and shorebird spectacle, and that their expectations were met.

**I**n addition, most Delaware Bay visitors indicated an interest in returning. Nearly 89% of the respondents reported plans to return within the next 12 months. In a similar study along Nebraska's Platte River (Eubanks et al. 1998), nearly 70% of the respondents (mainly casual birders) expected to return, 68.9% of the people attending the Rio Grande Valley Birding Festival expected to return to the area (the average distance traveled to get there was nearly 900 miles, which may impact return travel plans) (Eubanks and Stoll 1999) and 96.7% planned to return to the Great Texas Coastal Birding Trail (average travel distance, 727 miles) (Eubanks and Stoll 1999). These results indicate the wildlife watching along Delaware Bay may be expected to continue to grow rapidly. More new visitors are attracted to the DBSA by family, friends, and the media. These new visitors are combined with a significant percentage of travelers who choose to return regularly to the Bay in future years and more casual birders who happen to just discover New Jersey's Delaware Bayshore.

**D**elaware Bay recreationists complied, for the most part, with Decker's (1987) definition of "appreciation-oriented" wildlife recreationists. In a sense, during their trips to Delaware Bay during spring migration, they were experiential rather than achievement-oriented travelers, and the wildlife experience itself (rather than the specific species seen) seemed to determine their levels of satisfaction.

The survey questions relating to avidity, commitment and satisfaction and the respondent's answers are presented in Appendix 1.

### *Economic Expenditures*

#### Travelers' Profile

Travel party size averaged 4.33 persons. Delaware Bay wildlife watchers came with a variety of companions, mostly spouses (45.4%), friends (33.8%), family (17.0%), and clubs or organizations (29.6%). There were, however, a significant percentage who traveled alone (33.6%). Since travel groups consisted of various mixes of the above categories, the percentages do not add to 100%. Most respondents traveled to Delaware Bay by auto (87.6%), with only 4.2% coming to New Jersey by airplane or combined modes (6.0%). Average distance traveled was 247 one-way miles (95% confidence level ranged between 196.43 and 298.13 miles). Only 6.4% of the respondents lived within the study region (defined as coming from the same three digit zip code area (082) that includes Cape May).

Respondents learned about the Delaware Bay and its wildlife-watching opportunities through a variety of sources. While often learning from multiple sources, the largest number (53.0%) of respondents were informed about the Delaware Bay through a birding organization, followed by 45.3% who read about it in magazine or newspaper articles. Respondents also learned about Delaware Bay through friends (37%), family members (12%), travel guides or books (24.3%), birding festivals (18.8%), and the Internet (8%).

While in the Delaware Bay area, respondents visited a variety of sites. The sites receiving the most visitors were Cape May Point State Park (80.5%) and Reed's Beach (74.9%).



### Trip Expenditures

**T**his survey revealed that during respondents' most recent trip they stayed in the region for 3.82 days and 2.86 nights, and spent an average of \$463.46 in the DBSA, \$522.61 per person in New Jersey (and a total trip expenditure of \$667.12 overall). Birders interviewed for this survey were attracted to Delaware Bay throughout the year (not just during shorebird migration), averaging 8.23 days there per year and spending a total of \$1,437.28 on their annual travels to the Delaware Bay area.

**H**owever, visitors place value upon their experiences beyond their direct expenditures. A strict accounting of direct expenditures must be modified through an estimate of consumer's surplus to accurately capture the actual economic value of tourism to an area. For something to have economic value it does not have to be bought and sold in markets nor do markets always capture the full economic value of an item. Therefore, in addition to the direct expenditures associated with their most recent trips, respondents were asked for an estimate of how much more they would have been willing to pay (uncaptured value or, alternatively termed, consumer's surplus) before deferring from taking the trip. Delaware Bay birders indicated a willingness-to-pay an additional \$259.49 (an additional \$67.93 per day) before they would have cancelled their most recent trip to see the horseshoe crab/shorebird migration spectacle.

**T**hese willingness-to-pay responses were skewed (much as the distribution of income would be). If inaccurate, one could also use the median of \$100 and determine that the per day additional expenditure would then be estimated at \$26.18, a lower amount per respondent (an amount for which 50% of the willingness-to-pay responses were above and 50% below). This latter number minimizes influence of extreme observations in principle but, in doing so, implicitly assumes such responses are inaccurate (effectively

disenfranchising these respondents from influencing decisions when, in fact, their responses may be perfectly legitimate). Examination of the data revealed that none of the willingness-to-pay responses were in fact greater than 5% of respondent's reported annual incomes.

In addition, indirect and induced effects expand the impacts of direct expenditures. Such effects of re-spending and purchasing activities are estimated through the use of an economic multiplier. The appropriate “multiplier” varies from county to county, region to region, and is often substantial. Based upon previous studies, the “multiplier” for travel and tourism averages between 1.5 and 2.5. For example, the U.S. Bureau of Economic Analysis in 1992 estimated a tourism multiplier (food and lodging sectors) for Texas of 2.41. Eubanks et al. (1998) found a similar range (1.9-2.7) of multipliers from previous studies of communities along the Platte River in Nebraska. Walsh (1984) found that regional multipliers typically averaged 2.0 and generally ranged between 1.5 and 2.5 in the United States. Therefore, Walsh’s multiplier of 2.0 was chosen as a reasonable compromise.

Using Walsh’s multiplier average of 2.0, it is not unreasonable to expect that the induced and indirect effects of these direct expenditures would expand the estimated seasonal economic impact of each survey respondent to **\$926.92** in the DBSA and **\$1,334.24** (overall) (Table 6). The estimated annual economic impact (known as Total Gross Output, TGO) of each respondent in the DBSA is **\$1,997.00** and **\$2,874.55** overall. The Total Gross Output, when combined with Consumer’s Surplus (willingness-to-pay), is known as the Gross Economic Value (GEV). The seasonal GEV (of each person visiting New Jersey’s Delaware Bayshore), therefore, is the combination of TGO (\$926.92) and consumer’s surplus (\$259.49), totaling **\$1,186.41**. The respondent’s GEV of overall expenditures is **\$1,593.73 seasonally** and **\$3,433.61 per year** (Table 6).

Applying the GEV to the survey respondent population as a whole, the 602 people represented **\$714,219** in economic impact to the Delaware Bay area during the horseshoe crab/migratory shorebird season (seasonal) and an annual **\$1,538,749** impact to the Delaware Bay area. Of the 342 surveys sent to New Jersey Audubon members (NJAS), 161 were returned with 121 (75%) of the respondents reporting they had visited the DBSA. These 121 respondents comprised 35.3% of the total NJAS sample of 342. If we apply this conservative percentage (35% rather than 75%) to the 17,000 members of NJAS, we can estimate that 6,000 (rounded) NJAS members traveled to the DBSA. This population alone, without adding additional CMBO or ‘independent’ beach visitors, represents a seasonal GEV of **\$7,118,460** in the DBSA (\$9,562,380 overall) and an annual GEV of **\$15,336,368** to the DBSA (\$20,601,672 overall) (Table 6). As Fermata Inc.’s on-site associate estimated that the total number of weekend visitors to the intercept beaches ranged between 5,000 and 10,000 visitors, this estimate is a conservative number. To account for DBSA visitors who belong to the Cape May Observatory but not to New Jersey Audubon, and out of state (and other) visitors who were not members of either organization and were not interviewed, we chose to use 10,000 visitors as the high end of the estimated number of people traveling to the DBSA for the horseshoe crab and shorebird migration. Therefore the estimated GEV has been based upon a population range between 6,000 and 10,000, bringing the highest estimated seasonal GEV in the DBSA to **\$11,864,100 (\$15,937,300 overall)**. The highest estimated annual GEV in the DBSA is **\$25,560,613 (\$34,336,120 overall)**.

**Table 6: The Gross Economic Value of Trips to the Delaware Bayshore (seasonal and during migration and annually, by area of impact) <sup>1</sup>**

<i>Value per visitor</i>	<i>In DBSA</i>	<i>In NJ</i>	<i>Total Trip</i>
<i>Seasonal Total Gross Output</i>	\$926.92	\$1,045.22	\$1,334.24
<i>Seasonal Consumer's Surplus*</i>	\$259.49	\$259.49	\$259.49
<i>Seasonal Gross Economic Value (GEV)</i>	\$1,186.41	\$1,304.71	\$1,593.73
<i>Seasonal GEV of Survey Respondents (602)</i>	\$714,219	\$785,435	\$959,425
<i>Seasonal GEV of estimated low total sample (6,000)</i>	\$7,118,460	\$7,828,260	\$9,562,380
<i>Seasonal GEV of estimated high sample (10,000)</i>	\$11,864,100	\$13,047,100	\$15,937,300
<i>Annual Total Gross Output (TGO)</i>	\$1,997.00	\$2,251.87	\$2,874.55
<i>Annual Consumer's Surplus</i>	\$559.06	\$559.06	\$559.06
<i>Annual Gross Economic Value (GEV)</i>	\$2,556.06	\$2,810.93	\$3,433.61
<i>Annual GEV of Survey Respondents (602)</i>	\$1,538,749	\$1,692,182	\$2,067,034
<i>Annual GEV of estimated low total sample (6,000)</i>	\$15,336,368	\$16,865,597	\$20,601,672
<i>Annual GEV of estimated high total sample (10,000)</i>	\$25,560,613	\$28,109,328	\$34,336,120

Admittedly, TGO is not the only measure of economic impact to New Jersey. Additional measures of economic impact include changes in state income (wages, business profits, rent) and changes in employment (full time equivalent jobs). However, tourism agencies and organizations most frequently report total gross output as their measure of economic impact, so this study retains that measurement.

<sup>1</sup> These seasonal estimates are based upon reported days spent in the study area during the months of March to May. The average was 3.58 days during March to the end of May, a subset of the total of 8.23 days per year.

**D**elaware Bay birders spent most of their money on lodging, food and transportation. However, respondents indicated a willingness to purchase additional items in the Delaware Bay area had they been available. Most Delaware Bay wildlife watchers have the financial resources to purchase additional goods, but can do so only if these items and services made available at local businesses.

**T**he economic impact related to tourism is traditionally calculated in terms of non-resident dollars. Most of the expenditures of non-residents are considered to be "new" monies (Milon and Thunberg 1993). However, New Jersey residents, living both within and outside the study area, if deprived of the current opportunities to watch wildlife in the study area, would shift to other forms of outdoor recreation or bird elsewhere, as demonstrated by the declining tourism on the New Jersey side of the Delaware Bay combined with increasing tourism on the Delaware side of the Bay noted previously. Many of these dollars, therefore, would likely have flowed to different sectors of the economy, or even out of the state.

**I**n order to judge the impact of this specific form of outdoor recreation upon specific sectors in the regional economy, there is no distinction made between resident and nonresidents as spenders. However, these expenditures have been segregated according to where they were made (such as within the DBSA or within New Jersey). If residential economic output had been ignored, these numbers would have been decreased by 6.4% of the population. However, since this segment spent the least (living in the area, these visits were exclusively day-trips), their economic impact is a small component of overall economic impact.

**T**he survey questions relating to trip expenditures and the respondent's answers are presented in Appendix 2.

### Role and Value of Horseshoe Crab Management

In addition to questions about trip expenditures and consumer surplus, the survey included a set of questions designed to determine the degree to which horseshoe crab populations contributed to visitor satisfaction and how much (if any) respondents would be willing to spend each year for a horseshoe crab management program.

An interesting relationship appeared between the tolerance to horseshoe crab decline and the degree to which the horseshoe crab and migratory shorebird spectacle contributed to visitor satisfaction (only 6.6% ranked it as unimportant). The average amount people would pay per year for a management program (averaging \$212.45, with a 95% confidence interval between \$164.02 and \$260.88 per year) seemed, at first glance, to conflict with their willingness to tolerate a decline in Horseshoe Crab populations (no more than 50.7%) before they would cease visiting the DBSA. Yet, tolerance of declining populations does not mean the worth of the experience has not diminished relative to the past.

The survey questions relating to the value of horseshoe crab management and the respondent's answers are presented in Appendix 3.

### ***The Delaware Bayshore Intercept Populations' Responses***

To determine if there were differences between spending habits, socio-demographics, or willingness-to-pay for horseshoe crab management between the survey population

actually intercepted on the beach and the combined survey sample, each of the three population group's responses were calculated separately for a number of key points. The intercept population may be a more realistic representation of the entire sample of people who visit the DBSA as they correspond to the amalgamation of everyone who found their way to the beach to enjoy the horseshoe crab/shorebird migration spectacle, rather than members of organizations who may be more likely than the general population to visit the DBSA.

### *Commitment*

The Delaware Bay intercept population (those intercepted on-site) reported the highest incidence of traveling away from home in the 12 months prior to the survey to bird (98.3%, combined population—97.5%). They had been birding 17.09 years (combined population—18.28 years), taken 14.51 birding trips away from home (combined population—13.61 trips), and had birded a total of 85.31 days (combined population—80.39) during the previous year. A majority of the intercepts considered themselves to be active birders (58.8%, combined population—59.4%), with 17.2% listing themselves as committed birders (combined population—18.7%) and 24.0% calling themselves casual birders (combined population—21.9%).

When asked to compare birding to their other outdoor activities, the majority of the intercepts described birding as “most important” (45.9%, combined population—49%), with 22.7% calling birding only one of many activities (combined population—19.7%). Intercepts' financial investment in birding, as measured by the replacement costs of their equipment, was the highest of all the sample groups at \$2,847.26 (combined population—\$2,822).

An interesting divergence among the sample populations occurs when looking at

their membership in conservation groups. Only 76.2% of the intercepts belonged to a birding or conservation group. As the names for the other populations came from the membership lists of two conservation groups, over 97% of these two groups reported belonging to at least one organization (and the combined population—88%). When asked the total number of conservation organizations they belonged to, the average number for the intercepts responded 4.29 organizations (combined population—4.62).

### *Satisfaction*

A large majority of the intercepts reported being very or extremely satisfied with their most recent trip to the DBSA (91.3%), comparable to the combined population's 90.7% satisfaction rate. Nearly 89% of the combined population reported they planned to return to the DBSA to bird during the next twelve months. When looked at separately, only 84.5% of the intercepts planned to return, whereas 92.1% of the CMBO members and 97% of the NJAS members planned to return.

A breakdown of the results by sample populations of the survey questions relating to avidity, commitment and satisfactions are presented in Appendix 4.

### *Economic Expenditures*

#### Travelers' Profile

Intercepts traveled to the DBSA in the largest groups of the three samples, averaging 5.08 people (combined population—4.33; CMBO—3.69; NJAS—2.71) and traveled the farthest, 303 one-way miles (combined population—247; CMBO—201; NJAS—127).



### Trip Expenditures

The intercepts spent more days birding in the DBSA during their most recent trip (3.40 days) than NJAS members (2.88 days) and less than CMBO members (5.31) and the combined population (3.82 days). The intercepts' total birding trip days in the DBSA during the year prior to the survey, 8.54, was less than the CMBO members' 9.24 days, and more than the NJAS members' 5.57 days. The combined populations' average travel-related expenditures in the DBSA during the horseshoe crab/shorebird migration spectacle were estimated at \$463.46 (\$522.61 in New Jersey; overall \$667.12; totaling \$174.64 per day). The intercepts' total amount spent within the DBSA, \$442.92 was less than the CMBO members' \$611.39 and more than NJAS members' \$300.11 (Table 7). The intercepts also reported the highest amount in increased trip expenses that they would tolerate before canceling a trip (consumer's surplus) to the DBSA (\$283.93; CMBO—\$276.48; NJAS—\$169.69).

Using Walsh's 2.0 multiplier, the intercepts' seasonal TGO was an estimated \$885.84 in the DBSA. Combining this with the consumer's surplus (\$283.93) results in an estimated Gross Economic Value, per respondent visiting the DBSA during the horseshoe crab/shorebird migration spectacle of \$1,169.77. Applying this number to the low (6,000) and high (10,000) population estimates provides an estimated seasonal GEV in the DBSA ranging from \$7,018,620 to \$11,697,700 (Table 7).

**Table 7: Seasonal Impact of Intercept Population, by area of impact**

	<i>DBSA</i>	<i>Total NJ</i>	<i>Out-of-State</i>	<i>Total</i>
<i>1) Average Expenditures on Last Trip</i>	\$442.92	\$500.95	\$188.89	\$689.84
<i>2) Total Gross Output (TGO -2.0 multiplier)</i>	\$885.84	\$1,001.90	\$377.78	\$1,379.68
<i>3) Consumer's Surplus on Most Recent Trip</i>	\$283.93	\$283.93	\$283.93	\$283.93
<i>4) Seasonal Gross Economic Value (Gross Economic Output + Consumer's Surplus)</i>	\$1,169.77	\$1,285.83	\$661.71	\$1,663.61
<i>5) Seasonal Gross Economic Value of Survey Respondents (602)</i>	\$704,202	\$774,070	\$398,349	\$1,001,493
<i>6) Seasonal Gross Economic Value of Low Total Population (6,000)</i>	\$7,018,620	\$7,714,980	\$3,970,260	\$9,981,660
<i>7) Seasonal Gross Economic Value of High Total Population (10,000)</i>	\$11,697,700	\$12,858,300	\$6,617,100	\$16,636,100

Spending within New Jersey by the intercepts (\$500.95) was less than the CMBO members' \$645.03 and more than NJAS members' \$392.01. In keeping with having traveled farther than the other population groups, the intercepts spent more money out-of-state (\$188.89) than did CMBO (\$117.84) and NJAS members (\$17.43). Their overall spending for the entire trip (\$689.84) was higher than both the combined sample and the NJAS members. Taking the average daily amount spent in the DBSA during the intercepts' most recent trip to the DBSA (\$130.27) and multiplying it by the total number

of days spent in the DBSA over the 12-month period prior to the survey (8.54), the intercepts' average annual expenditures was estimated to be \$1,732.72. Again applying Walsh's multiplier of 2.0, the estimated annual Total Gross Output was \$3,465.43. With a daily consumer's surplus of \$83.51, and 8.54 days spent in the DBSA per year, the annual consumer's surplus for the intercepts was \$713.17. Combining the annual gross output with the annual consumer's surplus provides the total estimated annual Gross Economic Value (GEV), **\$4,178.60**, which is \$745 higher than the combined estimated annual GEV of **\$3,433.61**. Table 8 compares the GEV of the combined and intercepts sample results applied to the survey population, the low population and the high population in New Jersey and for the entire trip.

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**Table 8: The Annual Gross Economic Value of Respondents' Trips to the DBSA, combined sample and intercepts, by impact area.**

<i>Annual value per visitor</i>	<i>Combined In NJ</i>	<i>Intercepts In NJ</i>	<i>Combined Total</i>	<i>Intercepts Total</i>
<b>Total Gross Output (TGO)</b>	\$2,251.87	\$2,516.54	\$2,874.55	\$3,465.43
<b>Consumer's Surplus</b>	\$559.06	\$283.93	\$559.06	\$713.17
<b>Gross Economic Value (GEV)</b>	\$2,810.93	\$3,299.70	\$3,433.61	\$4,178.60
<b>GEV of Survey Respondents (602)</b>	\$1,692,182	\$1,944,281	\$2,067,034	\$2,515,515
<b>GEV of estimated low total sample (6,000)</b>	\$16,865,597	\$19,378,214	\$20,601,672	\$25,071,581
<b>GEV of estimated high total sample (10,000)</b>	\$28,109,328	\$32,297,024	\$34,336,120	\$41,785,969

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#### Role and Value of Horseshoe Crab Management

The intercepts indicated they would accept the highest management cost to protect the number of horseshoe crabs, \$256 (combined population—\$213; CMBO—\$215;

NJAS—\$142) and, at 50.4%, were very close to the aggregate's tolerance for percent decline in population (combined population—50.7%; CMBO—51.22%; NJAS—49.9%) before they would stop visiting the study area.

A breakdown of the intercepts' expenditures by area of impact is presented in Appendix 4.

### ***Socio-Demographic Profile***

Delaware Bay wildlife watchers resemble other wildlife watchers studied elsewhere regarding age, gender, income and education. Delaware Bay birders were middle-aged (average 54.97 years). This average age is slightly older than encountered in most earlier studies of birders, for example: 47 (Wiedner and Kerlinger 1990), 46 (Kerlinger and Wiedner 1991), 51 (Eubanks et al. 1993), 53 (Eubanks et al. 1998) and 54.8 (Payne 1991). However, as Wight (1996) notes, age varies among nature tourists with activities (younger recreationists choose more demanding activities such as scuba diving and rock climbing) and with other factors such as cost.

Delaware Bay birders were, by a slight majority, female (52.7%, compared to 47.3% male). Birding tends to be gender equivalent, as opposed to hunting (92% male) and fishing (69% male) (Shaw and Mangun 1984). A Canadian study concluded, "for experienced ecotourists such gender differentiation was not a general rule, but varied by activity" (Wight 1996). Although the term "ecotourism" refers to an ethic, while "nature tourism" refers to an activity, for the purposes of this report the terms will be treated as synonymous. Studies also indicate that gender varies in birding by site and attraction. For example, Scott et al. (1996) reported 77% of the attendees at the Rockport (Texas) Hummer/Bird Celebration were female, while travelers to Hawk Mountain Sanctuary

(Pennsylvania) were predominantly male (58.8%) (Kerlinger and Brett 1995). The fact that significant numbers of women participate in birding and wildlife watching is reflected in the travel and tourism industry. According to an August 1997 article in *Adventure Travel Business* (Bond 1997), the percentage of women participating in nature-based and cultural tours has risen to 75%.

**O**ver 86% of the survey respondents reported annual household incomes exceeding the national average (\$33,000). More than half of the households (51.8%) earned more than \$80,000 per year. Wight (1996) states "ecotourists have been more frequently described as having higher-spending markets and as having a higher-than-average income (over \$50,000)." Although estimated annual income has varied in other studies of birders, general earning levels for all birders studied indicate significant amounts of discretionary income.

**W**ight (1996) found that 82% of "experienced ecotourism travelers" had graduated from a college or university, compared to 45% of "general consumer" tourists. Delaware Bay birders were well educated, averaging 16.91 years of formal education. An impressive majority (92.6%) had attended college or graduate school, with nearly half (49.3%) receiving post-baccalaureate education. Delaware Bay visitors appear to be predominantly "empty nesters" (with an average household size of 2.27 persons), although only 32.5% were retired. Finally, the overwhelming majority of Delaware Bay birders were white (94.3%), with only slight representation from African-American, Native American, Hispanic and "other" populations.

**T**hirty-nine states (including Washington D.C.) and four countries were represented in the respondent sample, with New Jersey the origin of most visitors (52%). An additional 30.5% came from the neighboring states of New York and Pennsylvania, which the New Jersey Department of Commerce considers their core tourism market.

**T**he survey attempted to sample a cross section of birders from rural as well as urban settings. Non-consumptive wildlife recreations are often considered to be the interest of a growing urban population, a social group increasingly divorced from nature. Our sample supports this theory with 75.1 percent of respondents living in urban or suburban areas. The three states comprising nearly 80% of the visitors are largely urban (New Jersey 89.4%; New York 84.3%; Pennsylvania 68.9%); therefore the visitors to the study area would be expected to be urbanites. By comparison, the population of Cape May County, as of the 1990 census, is 66.7% urban and 33.3% rural. The fact that wildlife viewers reside in urban areas is more likely a reflection of socio-demographic shifts than residential preferences (i.e., rural versus urban).

**T**he survey questions related to socio-demographics, respondent responses, and general comments provided by respondents are presented in Appendices 5 and 6.

# Conclusions



In 1998, the people who traveled to New Jersey's Delaware Bay to witness the horseshoe crab-shorebird migration phenomena represented an average direct economic output of \$998.50 per person, per year in the Delaware Bay study area, \$1,125.94 in all of New Jersey, and \$1,437.28 everywhere on their total trip. The 602 people who responded to the survey alone represented a total gross economic output of \$1,538,749 in the DBSA, and they themselves are but a fraction of the total visitors who come to view the shorebirds and horseshoe crabs. If we assume a low of 6,000 visitors to the beaches each spring and a high of 10,000 visitors, the gross economic value to New Jersey is estimated to range between \$16,865,597 and \$28,109,328 per year. If we apply the typical gross economic value generated by the intercepts (a higher per person number), the estimate expands to a range of \$19,378,214 to \$32,297,024 in New Jersey. In other words, the gross annual economic value of this industry in the DBSA region ranges between \$16.9 and \$32 million.

At first, there appears to be a contradiction in the data when one compares the tolerance of up to a 50.7% decline in horseshoe crab populations, to the current satisfaction levels, plans to return, written comments about the importance of the area, the high number of people ranking the presence of the horseshoe crab as 'very important' in contributing to their trip satisfaction, plus their willingness to spend between \$164.02 and \$260.88 more per year for horseshoe crab management costs. How can this apparent inconsistency be explained? While people may continue to travel to the DBSA, they may do so less frequently and judge those "future" trips as less satisfying.

Another explanation may lie in the sheer numbers of horseshoe crabs and migratory

shorebirds. When people are confronted with the sight of millions of horseshoe crabs, migratory shorebirds, and resident birds such as Laughing Gulls crowded together on a relatively small stretch of beach, the impact of a 50% reduction in the horseshoe crab population may seem insignificant both to the natural spectacle and in supporting the migrant shorebirds during their stopover. This should be tested in a future survey by exploring a hypothetical decline in horseshoe crab populations with a resultant decline in the numbers of migrating shorebirds (i.e., a 50% decline in the horseshoe crab population would result in a concurrent decline of a given percent of migratory shorebirds). Birders could then be asked more concrete questions that project a quantified decline in shorebirds, possibly resulting in a change in their tolerance to a decline in the horseshoe crab population.

**I**f the respondents reported that they would tolerate no increased costs, or very little increased costs in order to manage the horseshoe crab population and that the horseshoe crab presence had very little impact on trip satisfaction, the logical conclusion would be that there was no interest in maintaining the horseshoe crab populations. This is not, however, the case. Instead, the data (both qualitative and quantitative) point to a very high visitor loyalty and commitment to Delaware Bay. Birders will return, perhaps lamenting the ‘good old days,’ but still hopeful they’ll see the last small flocks of Red Knots and other shorebirds. One respondent wrote she would return each year even if the horseshoe crabs were gone, watching the sea and hoping to see the first horseshoe crab return.

**W**hile some might be tempted to argue that there is no reason to manage the horseshoe crabs, as people will return to the New Jersey’s Delaware Bayshore no matter what, this is a foolhardy business strategy (and an unwise conservation strategy). The majority of the birders surveyed were committed and active birders, who considered themselves to be equally or more skilled at bird watching than the general population.



Allowing the horseshoe crab population to decline would lead to a plateau or decline in the number of people traveling to Delaware Bay (especially during May, an otherwise quiet month for tourism in the region). The larger market for nature tourism, especially viewing natural spectacles (such as the Sandhill Crane staging on the Platte River in Nebraska or the hummingbird migration in Texas) is represented by the casual wildlife viewer. The possibility of seeing millions of horseshoe crabs and flocks of tens of thousands of birds filling the sky will draw the casual and beginning birder, and bring continued growth to the area's nature tourism industry, but only if horseshoe crab eggs sustain the migratory shorebird populations.

A comparison between the wildlife viewers intercepted in the DBSA and those who belonged to the two major conservation organizations in New Jersey demonstrates a relatively strong conservation ethic, as well as expenditure patterns, in the sample frame as a whole. In fact, those intercepted along the beaches expressed the highest willingness-to-pay for resource conservation, and a significant commitment to (and skill within) the recreation. The debate concerning the over harvesting of horseshoe crabs transcends the institutions most visible in the conflict. Rather than a "fishing industry versus environmental organization" quarrel, the clash reflects a concern rooted in the various types of recreation and their economic benefits, all of which are dependent upon these natural resources. Without an accurate valuation of wildlife viewing, perhaps the most important of these recreation types, the development of a management plan for this fishery is meaningless. In truth, these data suggest that nothing related to this horseshoe crab fishery is more important to the long-term economic health of the region than the wildlife viewing of bird populations the horseshoe crabs and their eggs support.

To date, these wildlife-viewing valuations have been either lacking or ignored. For example, in the recent article in *Fisheries* titled "The Horseshoe Crab: The Battle for a True Multiple-use Resource," the words "recreation," "wildlife viewing," and "birding" are never mentioned (Berkson and Shuster 1999). A nature tourism industry constructed

around the horseshoe crab/shorebird migration spectacle is sustainable, lucrative, and beneficial to a broad spectrum of businesses. This industry supports a substantial number of local jobs, and attracts a significant amount of income from outside of the region. This study has quantified the extent of these economic benefits, and demonstrated what is at risk from the continued over exploitation of this unique natural resource.

## Recommendations



**O**ur studies have indicated that birders are willing and able to travel widely to pursue their hobby and experience natural phenomena (Eubanks et al. 1998, Eubanks and Stoll 1999). When and where they gather is driven by what they can see and experience, but it is in turn limited by the tourism infrastructure available in the area. If area hotels, motels and "bed and breakfasts" are not filled to capacity (some of the written responses indicated a lack of quality lodging in the area), then New Jersey's tourism promotion should be expanded beyond the Philadelphia-New York-New Jersey market and into the national birding market to promote the horseshoe crab/shorebird migration spectacle. For example an area birding festival could be centered on this event. With the available natural resources, a satisfied clientele, and a growing market, the Delaware Bay communities are well situated to expand their positions within the tourism industry.

**T**he horseshoe crab population must be managed to sustain not only the incredible numbers coming ashore to lay eggs, but to sustain high enough numbers of eggs to continue feeding the ravished migrating shorebird populations. A drop in the horseshoe crab population will not only limit the growth in the numbers of visitors coming to New Jersey's Delaware Bayshore, it may also cause them to visit beaches in other states that are managing and protecting their horseshoe crabs.

**F**inally, the future of nature tourism within this region lies with its remarkable wildlife diversity. Few regions within the U.S. have an opportunity to develop a multi-seasonal nature tourism industry. The increasing urban development within this region

threatens the sustainability of this infant industry, denying local communities the opportunity to marry resource conservation with economic development.

The extent of the resources available for wildlife viewers in this region of New Jersey is enviable. From the incredible flights of hawks and other raptors, the migration of millions of land birds, wetlands alive with water birds and waterfowl, to the world class nature spectacle of Delaware Bay beaches carpeted with horseshoe crabs and shorebirds gorging upon the freshly laid crab eggs, the New Jersey Delaware Bayshore is a resource of untapped economic value. These economic values combined with other spiritual, ecological, educational, social, and cultural values, make a strong case that the conservation of this region should be of paramount importance to New Jersey and the nation.

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# Appendices

