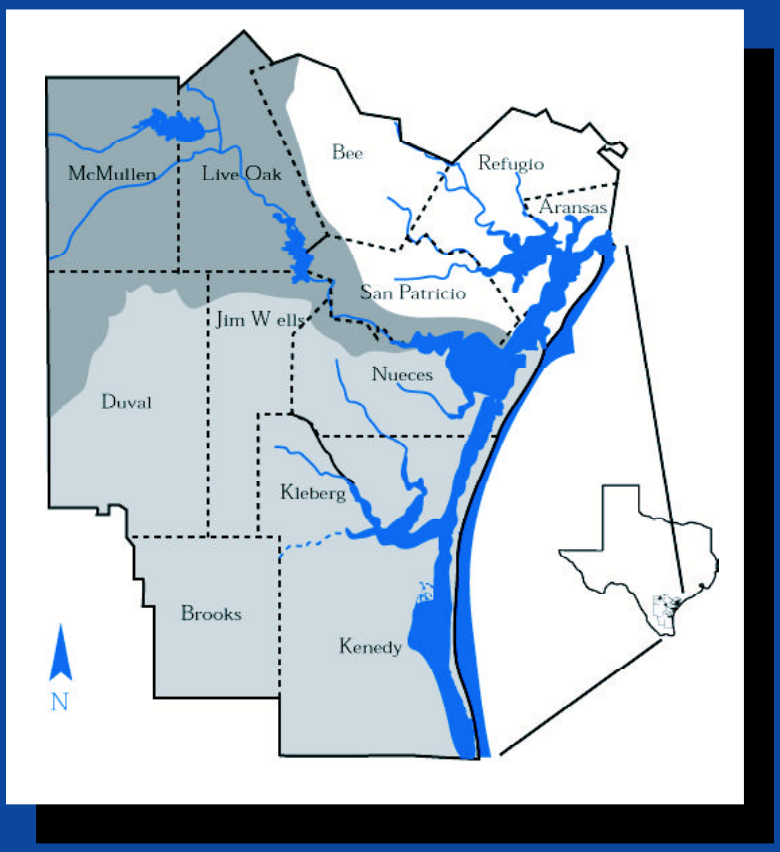
Selected Recreational Values of the Corpus Christi Bay National Estuary Program Study Area



Corpus Christi Bay National Estuary Program
CCBNEP-18 • September 1997

This project has been funded in part by the United States Environmental Protection Agency under assistance agreement #CE-9963-01-2 to the Texas Natural Resource Conservation Commission. The contents of this document do not necessarily represent the views of the United States Environmental Protection Agency or the Texas Natural Resource Conservation Commission, nor do the contents of this document necessarily constitute the views or policy of the Corpus Christi Bay National Estuary Program Management Conference or its members. The information presented is intended to provide background information, including the professional opinion of the authors, for the Management Conference deliberations while drafting official policy in the Comprehensive Conservation and Management Plan (CCMP). The mention of trade names or commercial products does not in any way constitute an endorsement or recommendation for use.

Selected Recreational Values of the Corpus Christi Bay National Estuary Program Study Area

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Publication CCBNEP-18
September 1997

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Published and distributed
by the
Texas Natural Resource Conservation Commission
Post Office Box 13087
Austin, Texas 78711-3087

CORPUS CHRISTI BAY NATIONAL ESTUARY PROGRAM

The Corpus Christi Bay National Estuary Program (CCBNEP) is a four-year, community based effort to identify the problems facing the bays and estuaries of the Coastal Bend, and to develop a long-range, Comprehensive Conservation and Management Plan. The Program's fundamental purpose is to protect, restore, or enhance the quality of water, sediments, and living resources found within the 600 square mile estuarine portion of the study area.

The Coastal Bend bay system is one of 28 estuaries that have been designated as an **Estuary of National Significance** under a program established by the United States Congress through the Water Quality Act of 1987. This bay system was so designated in 1992 because of its benefits to Texas and the nation. For example:

- Corpus Christi Bay is the gateway to the nation's sixth largest port, and home to the third largest refinery and petrochemical complex. The Port generates over $1 billion of revenue for related businesses, more than $60 million in state and local taxes, and more than 31,000 jobs for Coastal Bend residents.
- The bays and estuaries are famous for their recreational and commercial fisheries production. A study by Texas Agricultural Experiment Station in 1987 found that these industries, along with other recreational activities, contributed nearly $760 million to the local economy, with a statewide impact of $1.3 billion, that year.
- Of the approximately 100 estuaries around the nation, the Coastal Bend ranks fourth in agricultural acreage. Row crops -- cotton, sorghum, and corn -- and livestock generated $480 million in 1994 with a statewide economic impact of $1.6 billion.
- There are over 2600 documented species of plants and animals in the Coastal Bend, including several species that are classified as endangered or threatened. Over 400 bird species live in or pass through the region every year, making the Coastal Bend one of the premier bird watching spots in the world.

The CCBNEP is gathering new and historical data to understand environmental status and trends in the bay ecosystem, determine sources of pollution, causes of habitat declines and risks to human health, and to identify specific management actions to be implemented over the course of several years. The 'priority issues' under investigation include:

- altered freshwater inflow
- declines in living resources
- loss of wetlands and other habitats
- bay debris
- degradation of water quality
- altered estuarine circulation
- selected public health issues

The **COASTAL BEND BAYS PLAN** that will result from these efforts will be the beginning of a well-coordinated and goal-directed future for this regional resource.

STUDY AREA DESCRIPTION

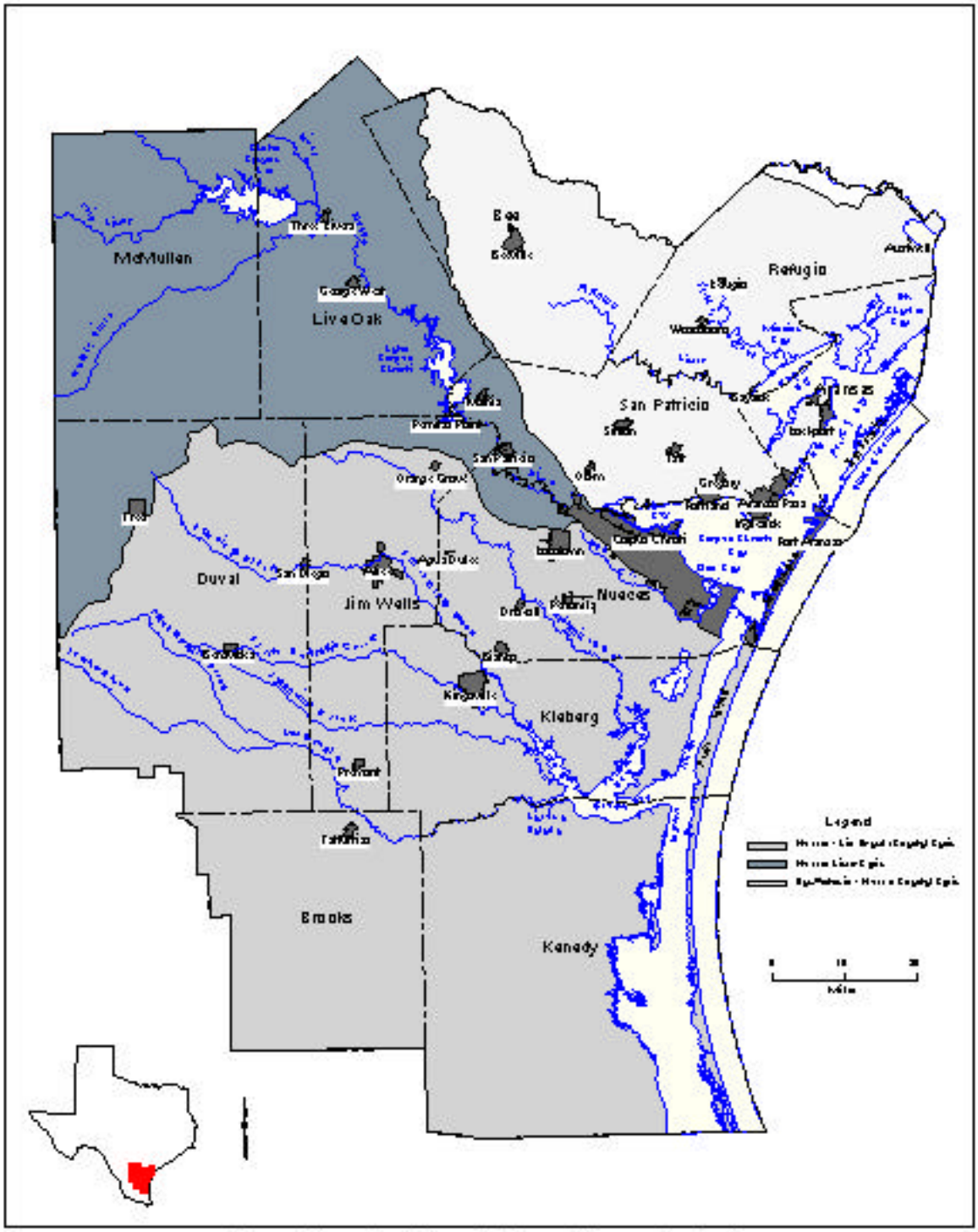
The CCBNEP study area includes three of the seven major estuary systems of the Texas Gulf Coast. These estuaries, the Aransas, Corpus Christi, and Upper Laguna Madre are shallow and biologically productive. Although connected, the estuaries are biogeographically distinct and increase in salinity from north to south. The Laguna Madre is unusual in being only one of three hypersaline lagoon systems in the world. The study area is bounded on its eastern edge by a series of barrier islands, including the world's longest -- Padre Island.

Recognizing that successful management of coastal waters requires an ecosystems approach and careful consideration of all sources of pollutants, the CCBNEP study area includes the 12 counties of the Coastal Bend: Refugio, Aransas, Nueces, San Patricio, Kleberg, Kenedy, Bee, Live Oak, McMullen, Duval, Jim Wells, and Brooks.

This region is part of the Gulf Coast and South Texas Plain, which are characterized by gently sloping plains. Soils are generally clay to sandy loams. There are three major rivers (Aransas, Mission, and Nueces), few natural lakes, and two reservoirs (Lake Corpus Christi and Choke Canyon Reservoir) in the region. The natural vegetation is a mixture of coastal prairie and mesquite chaparral savanna. Land use is largely devoted to rangeland (61%), with cropland and pastureland (27%) and other mixed uses (12%).

The region is semi-arid with a subtropical climate (average annual rainfall varies from 25 to 38 inches, and is highly variable from year to year). Summers are hot and humid, while winters are generally mild with occasional freezes. Hurricanes and tropical storms periodically affect the region.

On the following page is a regional map showing the three bay systems that comprise the CCBNEP study area.



Corpus Christi Bay National Estuary Program Study Area

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Acknowledgments

This study was conducted under the general oversight of Mr. Richard Volk, Director, Corpus Christi Bay National Estuary Program (CCBNEP). Several individuals provided critical input. Dr. Russ Miget, Texas Sea Grant College Program, and Mr. Larry McEachron and Mr. Robin Riechers, Texas Parks and Wildlife, oversaw sport fish data collections and provided excellent comments on draft material. Dr. H. Carter Whatley and Dr. Ross Purdy oversaw windsurfing and birdwatching data-collection efforts. Ms. Cecelia Rhoades conducted a thorough and comprehensive literature review of benefits of recreational activities in the CCBNEP study area. Mr. Ted Eubanks and Dr. John Richards provided significant insights and reality checks. Several other individuals provided review, comment, and editorial support, including Dr. Walter J. Milon, Dr. Teo Ozuna, Dr. Kenneth McConnel, Ms. Kathy Sitchin, and Ms. Patti Warden.

Selected Recreational Values of the Corpus Christi Bay National Estuary Program Study Area

Executive Summary

At a qualitative level, it is clear that residents and visitors hold significant value for the recreational opportunities available in the Corpus Christi, Aransas, and Upper Laguna Madre estuaries (the study area). The recreational services provided by the Corpus Christi Bay National Estuary Program (CCBNEP) study area include fishing, windsurfing, birdwatching, waterfowl hunting, camping, jet skiing, kayaking and canoeing, surfing, swimming, sailing, and powerboating. These activities provide nonmarket economic value to users, as well as positive economic impacts to the local economy. For example, in 1992, an estimated 75,000–100,000 people visited the Aransas National Wildlife Refuge and its surrounding communities, providing at least $5 million to the local economy. The *Corpus Christi Caller–Times* U.S. Open Sailboard Regatta held in May 1989 brought an estimated 25,000 people to the area, generating an estimated $750,000–$1 million (Williams 1989). In 1987, fishing generated an economic impact of $246 million and $147 million in the Nueces-Aransas and Laguna Madre estuaries, respectively (Fesenmaier et al. 1987).

Despite the importance of these activities to the local economy, to date, little research has been conducted to estimate the economic value of these recreational activities. The objective of this study is to help fill this information gap, and to enhance the CCBNEP's efforts to develop a sound and sociopolitically acceptable Comprehensive Conservation and Management Plan (CCMP). The baseline estimates we provide may be used in assessing actual changes in economic value resulting from actions outlined in the CCBNEP CCMP.

While other recreational activities (e.g., beach use) draw many visitors to the CCBNEP study area and provide significant benefits, an economic valuation task force convened by the CCBNEP determined that due to limited research funds the present study should focus on the estimation of sport-boat fishing, windsurfing, and birdwatching only. Sport-boat fishing was included because expenditure data on recreational fishing was outdated, and yet a survey mechanism was in place and readily adaptable to the current study. Windsurfing and birdwatching were chosen for analysis because they are recognized as significant contributors to the CCBNEP study area economy, as indicated in the previous examples. Also, no valuation studies exist for windsurfing (nationally) or, with the exception of Stoll and Johnson (1984), birdwatching (in the state of Texas).

Note that the term *value* can mean many different things to different people within the context of estuary conservation and enhancement. The value of an estuary is referenced here as the value of the services the estuary provides directly (e.g., recreational fishing) or indirectly (e.g., habitat that supports bird species which people enjoy viewing in the wild). A fundamental distinction between the way economists and other disciplines use the term value is the economist's emphasis on human preferences. The economic value to society of any recreational activity, for example, is defined as the dollar amount that the public is willing to give up in order to have access to some service. Value can also be expressed as the amount the public is willing to accept as compensation

for the removal of access. This measure of welfare is formally expressed in a concept called *willingness to pay* (or willingness to accept).

When assessing the value of or willingness to pay for recreational services provided by an estuary, economists essentially estimate demand. Markets typically divulge the price and quantity data from which demand curves and actual payments for the service can be deduced. In this case, we are dealing with *market goods and services* and employ market-based techniques to assess their value. Some goods and services, especially recreational activities like sport-boat fishing, windsurfing, and birdwatching, are not traded in markets; that is, they are not supplied by private firms, and consumers do not pay market prices. These are referred to as *nonmarket goods and services*. In the absence of markets, special techniques are needed to place consumer preferences, or value, for recreational activities on common ground with the demands for more conventional market commodities, such as commercially caught fish or oil and gas. Several nonmarket techniques have been developed to measure the value of recreational activities including travel cost and random utility models and the contingent valuation methodology.

This study employs the travel cost model (TCM) because it is well-suited for recreational activities such as sport-boat fishing, windsurfing, and birdwatching, which require significant travel and attract many participants for repeat visits. Using survey data collected from individual participants, the TCM analyzes the relationship between the cost of travel and the frequency of visits to infer information about the demand for the recreational activity. Significant costs may be associated with fielding the surveys necessary to collect relevant data, but the TCM is still considerably more cost-effective than alternative measurement techniques such as the random utility and contingent valuation methodologies.

A full explanation of the basic TCM and the economic theory that underlies the model can be found in numerous sources. For example, both Bockstael et al. (1989b) and McConnell (1985) present thorough reviews of the existing literature, summarize past research, and highlight many theoretical and applied issues that remain the focus of ongoing research. The models used in this study draw directly from existing literature, so a detailed exposition of the underlying theory is unnecessary. When needed, theoretical issues are discussed in the specific context of the current model.

Rather than adopt an overly complex specification, the approach taken here was to focus the available resources on developing a TCM that provides the value estimates required by the CCBNEP without introducing unneeded levels of detail and incurring unnecessary costs. For example, instead of focusing efforts on modeling substitution among fishing sites *within* the CCBNEP study area, the area was viewed as a single destination. Although there are many different sites within the area, detailed information about individual sites is not needed to estimate overall economic value or people's willingness to pay for the opportunity to go sport-boat fishing in the study area as a whole.

Furthermore, the model was not specified to deal with substitution to sites *outside* the study area. The final specification in the sport-boat fishing, windsurfing, and birdwatching TCM analyses focused on the CCBNEP study area as a single, unique destination site for these activities. If

important substitute sites for the activities do exist, then the current TCM will tend to overstate the consumer's true willingness to pay for sport-boat fishing, windsurfing, and birdwatching trips to the CCBNEP study area. A quantitative assessment of this potential overstatement cannot be developed with the available data, but it should be considered at a qualitative level when interpreting the results of the current empirical analysis.

Data for the sport-boat fishing value analysis were obtained through the Texas Parks and Wildlife (TPW), which administers an ongoing creel survey of anglers throughout the Coastal Bend. For this study, TPW developed a socioeconomic add-on questionnaire (CCBNEP survey) designed to collect travel expenditure and sociodemographic information from recreational anglers in Corpus Christi, Upper Laguna Madre, and Aransas estuaries. The CCBNEP survey was administered at the end of the normal interview, and targeted an individual chosen randomly out of the party. The normal creel survey is conducted at randomly selected, public-use boat access sites at the three bay systems within the study area. Between April 1996 and April 1997, 1,103 surveys were collected, of which 871 were used in the final empirical analysis.

Data used to test the TCM for windsurfing and birdwatching were generated by the Social Science Research Center at Texas A&M University, Corpus Christi (TAMU). TAMU developed and distributed a survey to 518 windsurfers at six different sites in and around the CCBNEP study area between April 1996 and April 1997. Windsurfers were intercepted at a number of different windsurfing sites: Port Aransas, Dodridge, Cole Park, Bird Island, JFK Causeway, Naval Air Station, North Jetty, and Poenisch Park. In addition, individuals were intercepted at both the U.S. Open Sailboard registration and championships event. Survey recipients were provided with a copy of the survey, a map indicating the geographic boundaries of the CCBNEP study area, and a stamped envelope in which to return their responses. Additional copies of the survey and pre-addressed stamped envelopes were left at windsurfing retail outlets throughout the Coastal Bend Area. 303 surveys were returned to TAMU, for a response rate of 58 percent.

Surveys were also distributed to over 2,761 birdwatchers in and around the CCBNEP study area. 1,508 surveys were distributed on-site at popular birdwatching spots in the study area. The response rate for this portion of the survey was 72 percent. In addition, 1,253 copies of the survey were mailed to a target group of birdwatching enthusiasts, including all members of the Texas Ornithological Society and Coastal Bend Audubon Society. A response rate of 44 percent was obtained from this mailing.

For each recreational activity analyzed in this study, the annual number of trips taken was assumed to be a function of travel cost, opportunity cost of time, income, and other demographic variables. In the case of sport-boat fishing, additional variables included employment status, years of fishing experience, and reported catch. The catch was included as a proxy for quality of the fishing experience (measured by success). Employment-status, sex, age, and level-of-commitment variables were added to the model for windsurfing; sex, age, and level of commitment were added to the model for birdwatching. The level-of-commitment variable was included to identify how the level of demand differs between enthusiastic and casual windsurfers and birders.

Analysis of the sport-boat fishing survey data suggested that the fishing trips themselves are of two types, indicating that a two-pronged approach would be needed in developing a TCM appropriate for the CCBNEP study area. The data on trip expenditures and length of stay indicated that single- and multi-day trips were probably regarded very differently by most anglers. Longer, multi-day trips involved significantly higher costs than single-day outings, and attracted anglers from greater distances. Therefore, separate TCMs were estimated for the overall sample and for two subsamples. The subsamples separated the overall group into trips lasting a single day and those of two or more days (multi-day trips).

The demand models for sport-boat fishing, windsurfing, and birdwatching were estimated empirically using a Maximum Likelihood (ML) approach, which recognizes that the travel cost data are of a discrete nature and subject to systematic truncation. The ML procedure is preferred because it corrects for potential bias present due to the fact that only active participants of the three recreational activities were surveyed.

Parameter estimates derived from the empirical analysis of demand were used to calculate consumer surplus (or net willingness to pay) as shown in Table E-1. The estimated ordinary consumer surplus for sport-boat fishing is $547. This estimate is derived under the implicit assumption that all fishing trips are of homogeneous length. However, as was noted previously, the survey gathered information from anglers on both single- and multi-day trips. The estimates of consumer surplus derived from the two subsample models confirm our observation that these trips are different in character. Under the ML approach, the consumer surplus associated with a typical single-day trip is estimated to be $472. For a typical multi-day trip, consumer surplus approaches $865. Thus, in estimating consumer's total willingness to pay and calculating the economic value associated with sport-boat fishing in the CCBNEP study area, it is important to distinguish between trips of differing length.

Table E-1. Study Results: 1996-1997 Recreational Value Estimates

Recreational Activity	Consumer Surplus Estimates[a]	Aggregate Net Benefits (per year)
Sport-boat fishing	$547[b]	$83 million[c]
Windsurfing	$828	$93 thousand[d]
Birdwatching	$91	$4.6 million[e]

a Average net willingness to pay per trip
b. Total sample
c. Assumes 150,926 fishing trips taken to CCBNEP study area per year
d. For participation in U.S. Open Sailboard Regatta only
e. For visits to Aransas National Wildlife Refuge only

Using parameters derived from the ML estimation of demand for windsurfing, consumer surplus for this activity is calculated to be $828 per trip. Consumer surplus for birdwatching is estimated to be $91 per trip.

The above estimates reflect an average individual's *net* willingness to pay (consumer surplus) for a trip to the CCBNEP study area to sport-boat fish, windsurf, or birdwatch. In order to calculate aggregate net benefits, consumer surplus estimates are multiplied by total participation in the three recreational activities. TPW estimates that the average number of fishing trips per year over the last three years is 150,926 (McEachron, personal communication, 1997). Multiplying this number by the estimated net willingness to pay results in an aggregate benefit of sport-boat fishing in the CCBNEP study area of approximately $83 million per year. Unfortunately, adequate participation rate information is lacking for both windsurfing and birdwatching. As an alternative we have calculated the value of windsurfing as represented by participation in the U.S. Open Sailboard Regatta hosted annually by the *Corpus Christi Caller–Times*. The average number of participants over the last three years is 112 (Macpherson, U.S. Windsurfing Association; personal communication, 1997). This suggests that people value that event alone at approximately $93 thousand annually. An approximation of aggregate willingness to pay for birdwatching is derived by multiplying visitation rates for the Aransas National Wildlife Refuge by our estimates of average total willingness to pay. Approximately 50,000 people visit the Aransas National Wildlife Refuge annually for birding (Jackson, Aransas National Wildlife Refuge; personal communication, 1997). This information allows us to calculate aggregate benefits for birdwatching at this site to be approximately $4.6 million annually. Clearly, given all the other sites where people go to view birds, this is an underestimate of the total value of birdwatching, however, this gives us a general idea of the level of value held for birdwatching in the CCBNEP study area.

The estimates generated in this study validate the notion that the recreational services provided by the CCBNEP study area are significant, and that improvements in habitat and water quality could result in significant gains in economic value. However, it must be pointed out that there are limitations to the current study and implications for further research needs. For example, as noted previously, limited information exists on actual numbers of visits to the CCBNEP study area to engage in particular recreational activities (participation or visitation rates). This information is needed in order to calculate aggregate value estimates. It is recommended that the CCBNEP work with other state and local institutions and businesses to generate such information to facilitate future benefits estimation efforts.

In addition, we currently have limited confidence in the results generated for the value of birdwatching. The birdwatching survey appeared to confuse the respondents, and so they may not have reported actual trips within the CCBNEP study area or the expenses associated with those trips. In addition, the TCM may in this case not be the most appropriate methodology for analyzing the demand for birdwatching trips in the CCBNEP area. For many of the reported "birdwatchers," travel to the CCBNEP study area appears to be part of a seasonal migration. During the winter, the population of the Coastal Bend swells with an influx of "Winter Texans" from the north. This group of people, largely retirees, travels from a significant distance and remains in the area for an extended period of time. Although many of these people find the opportunities for birdwatching attractive, their trips to the CCBNEP study area are largely motivated by other concerns. To avoid overstating total willingness to pay, we have focused on just those expenses incurred while in the Coastal Bend region. This approach should result in relatively conservative estimates of willingness to pay.

The sport-boat fishing survey provided the largest percentage of complete surveys. This is, in part, due to the quality of the survey design and implementation. The survey was brief and included clearly articulated questions leading to few incomplete surveys and high response rates. As such, it is recommended that a new birding survey be fielded; one that mirrors the CCBNEP sport-boat fishing survey in design and implementation.

Finally, it should be recognized that the value estimates generated in this study for sport-boat fishing, windsurfing, and birdwatching represent only a partial analysis of the value of the CCBNEP study area. Our study represents only a minor piece of a much bigger puzzle, which includes not only other recreational values but commercial values, passive use values, and the value of ecological functions and services. In the future, the CCBNEP might consider an application of the contingent valuation methodology to address the total value of the CCBNEP study.

I. Introduction

1. Background

The Corpus Christi Bay National Estuary Program (CCBNEP) began operating in December 1993. The first two years of the program were devoted to the characterization phase of a Comprehensive Conservation and Management Plan (CCMP) for the Coastal Bend (12-county) area of Texas. To demonstrate the benefits of their CCMP, the CCBNEP is gathering information about the economic value of study area natural resources and resource services, beginning with an assessment of the value of selected recreational activities.

At a qualitative level, it is clear that residents and visitors hold significant value for the recreational opportunities available in the Corpus Christi, Aransas, and Upper Laguna Madre estuaries (the study area). The recreational services provided by the Corpus Christi Bay National Estuary Program (CCBNEP) study area include fishing, windsurfing, birdwatching, waterfowl hunting, camping, jet skiing, kayaking and canoeing, surfing, swimming, sailing, and powerboating. These activities provide nonmarket economic value to users, as well as positive economic impacts to the local economy. For example, in 1992, an estimated 75,000–100,000 people visited the Aransas National Wildlife Refuge and its surrounding communities, providing at least $5 million to the local economy. The *Corpus Christi Caller–Times* U.S. Open Sailboard Regatta held in May 1989 brought an estimated 25,000 people to the area, generating an estimated $750,000–$1 million (Williams 1989). In 1987, fishing generated an economic impact of $246 million and $147 million in the Nueces-Aransas and Laguna Madre estuaries, respectively (Fesenmaier et al. 1987).

Despite the importance of these activities to the local economy, to date, little research has been conducted to estimate the economic value of these recreational activities. The objective of this study is to help fill this information gap, and to enhance the CCBNEP's efforts to develop a sound and sociopolitically acceptable Comprehensive Conservation and Management Plan (CCMP). The baseline estimates we provide may be used in assessing actual changes in economic value resulting from actions outlined in the CCBNEP CCMP.

The CCBNEP's ultimate goal is to understand the changes in economic value of the selected recreational activities that result from CCMP-related water-quality and habitat improvements in the estuary. This study, however, offers only the first step in that analysis; that is, it offers the preliminary results of an effort to estimate the current economic value attributable to selected recreational activities. The baseline estimates we provide may be used later in assessing impacts from actions outlined in the final CCMP. Consequently, the study does not offer a policy analysis or make recommendations. The goal is to identify net willingness to pay for recreational trips to the CCBNEP study area, focusing on values attributable to current conditions.

While the CCBNEP study area offers a number of recreational activities which draw visitors (e.g., beach use) and provide significant benefits, an economic valuation task force convened by the CCBNEP determined that due to limited research funds the present study should focus on only three of those activities: sport-boat fishing, windsurfing, and birdwatching. The decision to

include sport-boat fishing was based on the fact that expenditure data on recreational fishing was outdated, and yet a survey mechanism was in place and readily adaptable to the current effort. Windsurfing and birdwatching were chosen for the analysis because they are recognized as significant contributors to the CCBNEP study area economy. In addition, no valuation studies exist for windsurfing (nationally) or, with the exception of Stoll and Johnson (1984), birdwatching (in the state of Texas).

2. Definition of Value

The term *value* can mean many different things to different people within the context of estuary conservation and enhancement. To most people, the economic value of an estuary is related to the income and revenues generated by and the number of jobs associated with the development of some portion of the estuary, with tourism, or with other estuary-related industries. This view actually reflects economic impacts (which are measured using input-ouput analysis). While potentially important measures of economic benefit, economic impacts should be distinguished from economic value.[1]

To an environmental economist, the definition of value is much broader and more encompassing. The value of an estuary as referenced in this report is the value of the services the estuary provides directly (e.g., commercial or recreational fishing) or indirectly (e.g., habitat that supports bird species which people enjoy viewing in the wild). A fundamental distinction between the way economists and other disciplines use the term value is the economist's emphasis on human preferences. The economic value to society of any recreational activity, for example, is defined as the dollar amount an individual is willing to give up in order to have access to some service, such as fishing, rather than not have access to it; or, if the individual already has it, the amount of money the individual would be willing to accept to give it up.[2] The former measure of welfare is formally expressed in a concept called *willingness to pay*.

The economic definition of value is rooted in a simple idea: All resources are scarce. There is never enough money or land or water to do all the things that all individuals might wish. Because resources are scarce, it is necessary to make choices about how we intend to use what is available. As individuals, we make choices about the amount of money to devote to schools, roads, libraries, and natural resource protection programs. These choices are often based on complex *tradeoffs*. Thus, value is revealed in decisions about how we choose to allocate resources. People may recoil at the notion of placing a value on a natural resource or environmental amenity in management and policy decision making, but other uses of those natural resources might be proposed. Tradeoff is a key concept here, because society is always comparing alternatives. Develop or not develop?

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[1] Another study (Jones et al, 1997) has also been conducted that measures the economic impacts of services provided by the natural resources of the CCBNEP study area, including recreational services. This report includes information and data that have contributed to that effort, and vice versa.

[2] Some controversy exists in the economics community as to the appropriate measure of value—willingness to pay versus willingness to accept. For conceptual reasons and operational simplicity, this report focuses on willingness to pay.

Allow open-access commercial fishing, or restrict commercial fishing? Spend public funds for habitat restoration, or spend funds for better schools?

The most direct and visible monetary symbol for a good is its market price. The relationship between a good's market price and its value in terms of willingness to pay can, however, be confusing. We might think that because an individual spends nothing to visit a beach, then $0 is what the individual is willing to pay for the opportunity to swim or walk along the beach, and thus $0 is the value of the recreational experience to the individual. Such reasoning, however, is not necessarily correct. If an individual spends nothing to go to the beach, we know that the good is worth *at least* this much to the individual. They may also have been willing to spend more, for instance a maximum of $15, to go to the beach. In this case, the $0 price is only a lower-bound estimate of the total value of the good to the individual.

Thus, when assessing the value of a natural resource or resource service, the economist is interested in the net benefits an individual derives from the resource or resource service. These net benefits are represented by *net willingness to pay*, or the amount an individual would be willing to pay for the use of that good, such as fish, *beyond that which they actually do pay*. This study provides estimates of net willingness to pay—referred to technically as *ordinary consumer surplus* (OCS).

The economic framework for assessing the value of recreational services builds on the recognition that natural resources are like capital assets that yield a flow of services (commercial, recreational, ecological, and passive use) considered valuable by society. Economists typically refer to multiple sources of value (use and passive use) associated with these flows. *Use value* refers to the value of natural resources to the public attributable to the current, direct use of the services provided by those resources, including both consumptive (e.g., commercial fishing) and nonconsumptive (e.g., birdwatching). *Passive use values* arise apart from the active use of the natural resources. For example, passive use values might include the value of simply knowing that an estuary exists as a well-functioning ecosystem (*existence value*), or that future generations will enjoy wildlife-viewing opportunities that we currently experience (*bequest value*).

When attaching monetary value to quantities, be it the number of visits to a windsurfing site or the probability of viewing a particular species of bird, economists essentially are estimating demands for these environmental attributes. Markets typically divulge the price and quantity data from which demand curves and actual payments for a good can be deduced. In this case, we are dealing with *market goods and services* and employ market-based techniques to assess their value. Some goods and services, especially recreational activities like sport-boat fishing, windsurfing, and birdwatching, are not traded in markets; that is, they are not supplied by private firms, and consumers do not pay market prices. These are referred to as *nonmarket goods and services*. In the absence of markets, special techniques are needed to place consumer preferences, or value, for recreational activities on common ground with the demands for more conventional market commodities such as commercially caught fish or oil and gas. A variety of nonmarket techniques have been developed to measure the value of recreational activities, including *travel cost models*, *random utility models*, the *hedonic price method*, *contingent valuation methodology*, and *benefits transfer* (*user day values*).

3. Literature Review

A review of the literature (Rhoades 1996) indicates that a number of somewhat dated state agency and other reports outline participation rates and economic impacts of various recreational activities along the Texas coast. However, a very limited number of studies have been conducted that actually assess the economic value of recreational activities, especially in the CCBNEP study area. Exceptions include studies by Downing and Ozuna (1996), Ozuna (1989), Ozuna et al. (1993), Cameron (1992), and Stoll and Johnson (1984). Downing and Ozuna (1996) estimated the value of saltwater fishing in eight Texas Coastal Bays for three time periods (1987, 1988, 1989) using data collected through the Texas Parks and Wildlife yearly intercept survey augmented with a contingent valuation question. Median individual willingness to pay values per year per trip ranged from $85.02 (1989 dollars) to $121.81 for Corpus Christi, $119.22 to $152.70 for Aransas, and $83.06 to $130.25 for Upper Laguna Madre. Ozuna (1989) and Ozuna et al. (1993) examined individuals' willingness to pay (consumer surplus) for recreational services generally provided by the three Texas estuaries—Trinity-San Jacinto, Guadalupe-Mission-Aransas, and Nueces—using a travel cost model. Estimates of consumer surplus for the three estuaries ranged from $99–179 per household (1993 dollars). Cameron (1992) used Texas Parks and Wildlife 1987 survey data with an add-on contingent valuation methodology question to estimate that an across-the-board, 10 percent reduction in fishing days would result in an average value loss of $35. Stoll and Johnson (1984) estimated the total economic value of whooping cranes (including existence and option value) that winter at the Aransas National Wildlife Refuge using the contingent valuation method. They determined "[i]n aggregate, the total use, option, and existence values is estimated to lie in the range of one-half to one and one-half billion dollars annually for U.S. residents" (p. 391). Specifically, they found that visitors to the refuge were willing to pay $4.47 to visit the refuge with the whoopers but only $3.07 without them. An interesting fact was that refuge visitors were willing to pay $9.33 for the existence value of the whooping crane compared to only $1.03 for nonvisiting Texas residents and nonvisiting out-of-state residents (p. 390, Table 2). The authors conclude that attitudes, information, and previous resource-related experience are all-important in determining the willingness to pay to both use and maintain a natural resource, and should be more thoroughly studied.

The current study is an attempt to add to this limited amount of information regarding the economic value of recreational activities in the CCBNEP study area. The results from the following set of travel cost model analyses provide estimates of the current economic value attributable to three recreational uses in the study area: sport-boat fishing, windsurfing, and birdwatching.

II. Estimating the Economic Value of Selected Recreational Activities in the CCBNEP Study Area

1. Sport-Boat Fishing

After considering several potential options, the travel cost model (TCM) was identified as the most appropriate methodology for estimating consumers' willingness to pay for sport-boat fishing trips in the CCBNEP study area. The TCM is well suited for recreational activities, such as sport-boat fishing, that require significant travel and attract many participants for repeat visits. Using survey data collected from individual anglers, the TCM analyzes the relationship between the costs of travel and the frequency of visits to infer information about the demand for sport-boat fishing.

Data

The Texas Parks and Wildlife (TPW) administers an ongoing creel survey of anglers throughout the Coastal Bend. For this project, TPW developed a socioeconomic add-on questionnaire (CCBNEP survey) that was administered between April 1996 and April 1997 in conjunction with their annual creel survey. The CCBNEP survey (see Appendix A) was designed to collect travel expenditure and sociodemographic information from recreational anglers in Corpus Christi, Upper Laguna Madre, and Aransas estuaries. This add-on questionnaire was administered at the end of the normal interview, and targeted an individual chosen randomly out of the fishing party. The normal creel survey is conducted at randomly selected, public-use boat access sites at the three bay systems within the study area.

During both the high-use season and low-use season, the interview sites were subdivided into high-frequency and low-frequency sites. These designations were determined by looking at each of these sites in previous years, and by additional information provided by the enumerators of the ongoing creel survey. For the CCBNEP survey, anglers at high-frequency sites were subsampled less frequently than anglers encountered at low-frequency sites. Table II.1 shows how the sites are categorized. TPW sampling of high-frequency sites on the holidays of Memorial Day, July 4th, or Labor Day weekends included the CCBNEP survey.

In the event of a refused survey, the interviewer noted on the survey form a refusal, while still coding the Major Area, Station, Completion Date, Boat ID#, and Interview Time, so the number of refusals could be tracked by area. The interviewer then replaced this survey with the next intercept at the boat access site. The original subsampling strategy was not altered, and the interviewer used the count associated with the refusal to determine when the next interview should be completed.

Table II.1. Categories of interview sites in the TPW ongoing creel survey

High-Use Season		
	High-Frequency Sites (bay-site #)	Low-Frequency Sites
Aransas	5, 13, 16, 17, 17, 28, 29	all other sites
Corpus Christi	1, 3, 7, 9, 12, 14, 21	all other sites
Upper Laguna Madre	2, 16, 19, 27	all other sites
Low-Use Season		
	High-Frequency Sites (bay-site #)	Low-Frequency Sites
Aransas	5, 6, 13, 16, 17	all other sites
Corpus Christi	1, 3, 7, 9, 12	all other sites
Upper Laguna Madre	2, 16, 19, 27	all other sites

The TPW personnel approach fishers at local boat access ramps to conduct on-site surveys. Unlike the surveys used to collect data on birdwatching and windsurfing, the CCBNEP sport-boat fishing survey was filled out by the interviewer and did not require that the respondent complete the survey at a later time and return it by mail. As a result, a large percentage of the surveys were returned complete, or nearly complete, and contained the information required for empirical estimation of the TCM. A total of 1,103 surveys were available for the final empirical analysis. Of this total, over 200 lacked information for one or more of the variables used in the model, and had to be excluded from the sample.

Although brief, the CCBNEP sport-boat fishing survey included questions designed specifically with a TCM in mind, and focused attention on the data required to specify and estimate such a model. Respondents were queried about the length of their trip, the distance they traveled, the number of people in their party, and trip expenditures. Total trip expenditures were calculated as the sum of eight items: gas and travel fares, lodging, meals/food, bait/tackle and ice, license fees, launching fees, guide fees, and tournament fees. Data on travel time was not elicited by the survey, but was estimated from the information about travel distance.

The survey also included a limited set of questions regarding respondents' income and employment status. The survey asked that personal, before-tax income be assigned to one of seven categories. In addition, the survey asked the anglers to report the number of hours they work in a typical week. Despite the generality of the question about income, nearly 10 percent of the respondents refused to provide the requested information. Lack of response to this question was the most common reason why data were excluded from the empirical analysis. For those who did respond, the midpoint of each income category was taken as the best available estimate of personal income.[3]

[3] Responses in the highest category, "greater than $90,000," were assigned a value of $100,000. Less than 15% of the surveyed sample assigned themselves to this group. Sensitivity analysis indicated that adjusting this value up or down by $10,000 does not have a significant impact on the model's results.

The survey did not include detailed questions about other demographic factors. For example, respondents were not asked to provide their age, ethnicity, or gender. Ideally, these types of questions would have been included, but the value of additional information had to be traded off against the importance of maintaining a relatively brief interview. The survey did, however, include a question about years of fishing experience, and this variable was used in the final specification of demand.

The CCBNEP sport-boat fishing survey also recorded information on the number of fish landed by each party. These data were used to develop a proxy measure for anglers' perceptions about the quality of fishing in the CCBNEP study area. Past studies have shown that anglers are highly sensitive to the "quality" of the fishing experience—often measured in terms of fish catch or "success" (McConnell and Strand 1994; Milon 1988; Bockstael et al. 1989a; Andrews and Wilen 1988).

Using the sample included in the final empirical specification described below, Table II.2 provides a brief summary of key survey variables.

Table II.2. Summary information for sport-boat fishing data used in estimation of the TCM (N = 871)

Variable	Definition	Mean	Standard Deviation
TRIPS	Number of trips taken in past year	39.6	52.4
TRAVEL COST	Variable trip costs	$125.8	$208.5
HOURS	Round trip travel time	7.2	12.7
OPPCOST	Opportunity cost of time associated with trip	$146.6	$341.7
INCOME	Based on midpoint of income categories	$50,092	$28,879
EXPERIENCE	Years of experience in saltwater fishing	22.4	14.1
NUMFISH	Number of fish landed per member of party	0.29	0.60
UNEMP	Dummy variable indicating employment status	21.8% = nonworking	---
MILES	Round-trip mileage to fishing site	430.3	761.7

Trip expenses were calculated as the sum of all expenses reported. Ideally, expenses for durable items such as equipment and tackle would be separated from other trip expenses, but in the CCBNEP survey, expenditures on such items were grouped with other trip-related items. However, expenditures on gas, lodging, and meals dominated total costs, and therefore, expenditures on equipment-related items are unlikely to have had an important impact on the current results.

Estimates of travel time were derived from the data on distance traveled, under the assumption that respondents drove to the area at an average of 45 mph (Huppert 1989). As described in the next section, these estimates were then combined with information about wage rates to calculate the opportunity cost of travel time. The opportunity cost of travel time was computed as the product of travel time and hourly wage, where hourly wages were computed from the survey data on income and the number of hours worked in a typical week. More detail about this calculation is provided in the section that follows.

Model Specification

A full explanation of the basic TCM and the economic theory that underlies the model can be found in numerous sources. For example, both Bockstael et al. (1989b) and McConnell (1985) present thorough reviews of the existing literature, summarize the past research, and highlight many theoretical and applied issues that remain the focus of ongoing research. The model presented here draws directly from the existing literature, so a detailed exposition of the underlying theory is unnecessary. When needed, theoretical issues are discussed in the specific context of the current model.

Rather than adopt an overly complex specification, the approach taken here was to focus the available resources on developing a TCM that provides the value estimates required by the CCBNEP without introducing unneeded levels of detail and incurring unnecessary costs. For example, instead of focusing efforts on modeling substitution among fishing sites *within* the CCBNEP study area, the area was viewed as a single, overall destination. Although there are many different sites within the area, detailed information about individual sites is not needed to estimate overall economic value or people's willingness to pay for the opportunity to go sport-boat fishing in the overall study area.

Furthermore, the model was not specified to deal with substitution to sites *outside* the study area. The CCBNEP study area encompasses most of the area's saltwater fishing sites and offers unique opportunities for saltwater fishing. Although freshwater fishing sites might be considered as potential substitutes, the resource commitment needed to collect reliable data for such sites was beyond the scope of the current project. Therefore, the final specification focused on the CCBNEP study area as a single, unique destination site for saltwater fishing. If important substitute sites do exist, then the current TCM will tend to overstate the consumer's true willingness to pay for sport-boat fishing outings in the CCBNEP study area. A quantitative assessment of this potential overstatement cannot be developed with the available data, but it should be considered at a qualitative level when interpreting the results of the current empirical analysis.

Although the CCBNEP study area can be viewed as a single site, analysis of the survey data suggested that the fishing trips themselves are not of a single homogeneous type, indicating that a two-pronged approach would be needed in developing a TCM appropriate for the CCBNEP study area. The data on trip expenditures and length of stay indicated that single- and multi-day trips were probably regarded very differently by most anglers. Longer, multi-day trips involve significantly higher costs than single-day outings, and attract anglers from greater distances. Recognizing that these differences could have an important impact on the final estimates of consumer surplus and willingness to pay, the empirical analyses were designed both to analyze the overall sample and to separately consider trips of differing lengths. Separate TCMs were estimated for the overall sample and for two subsamples. The subsamples separated the overall group into trips lasting a single day and those lasting two or more days (multi-day trips).

For each model, the annual number of fishing trips was assumed to be a function of travel cost, opportunity cost of time, income, employment status, years of fishing experience, and reported catch:

$$\text{TRIPS} = f(\text{TRAVEL COST, OPPCOST, INCOME, UNEMP, EXPERIENCE, NUMFISH}) \quad (1)$$

The travel cost variable captures all trip-related expenses. The variable measuring the opportunity costs of time reflects an estimate of travel time, but does not include time on-site. Data about the time actually spent fishing were not directly available from the survey, and could not be accurately inferred from other trip-related questions. As a result, the opportunity cost variable probably understates the total time cost associated with a typical fishing trip. This understatement will be minimal for short, single-day trips, but could be more a serious problem for longer trips.

Having recognized these potential problems in measuring the time devoted to travel and fishing, difficulties still arose in determining how opportunity costs should be included in the empirical specification of the TCM. Because time costs are an important component of users' total commitment to recreational activities, they play an essential role in the TCM. In practice, numerous approaches have been taken to incorporate time costs in recreational demand models. Some have assumed that time should be valued at some fixed proportion of hourly wage, while others have simply included time as an adjustment factor in the demand equation. Bockstael et al. (1989b) provide a thorough review of the existing literature, and present a comprehensive model that clarifies the theoretical issues surrounding the value of time in recreational demand models.

The approach of Bockstael et al. (1989b) demonstrates that the value of time will differ for individuals who can vary their work hours and for those that work on a fixed, inflexible schedule. For participants who have variable work schedules, the opportunity cost of their time should be taken as the wage rate. If individuals work on such a discretionary schedule, then each hour spent recreating represents an hour of lost income. For workers on fixed schedules, the wage rate is not an appropriate measure for the opportunity cost of time, because such individuals cannot freely substitute between labor and leisure. Nonetheless, the recreational decisions of such workers are clearly influenced by the time associated with these activities. To address this point, Bockstael et al. (1989b) suggest estimating separate time effects for workers with and without flexible working schedules.

The sport-boat fishing survey included a question about the number of hours respondents work in a typical week, but did not ask respondents to indicate whether they work on a fixed or flexible schedule. As a result, the analysis could not follow the approach suggested by Bockstael et al. (1989b). Instead, following Huppert (1989), a distinction is made between working and nonworking anglers. For employed respondents, time costs were calculated as the product of the estimated wage rate and the number of hours required for travel. The time cost variable was set to zero for nonworking respondents, but a separate dummy variable was added to indicate that this group is subject to a different set of time constraints. Although the wage rate was taken as a measure of the opportunity cost of time for employed respondents, the empirical specification did not strictly assume that all workers can freely substitute between labor and leisure. Travel costs and opportunity costs were included as separate variables, so the coefficients on each can vary independently. As McConnell and Strand (1981) show, this approach will allow the data to reveal how the respondents substitute between time costs and direct, out-of-pocket expenditures.

Ideally, the demand specification would include demographic variables that can also explain variations in the demand for recreational fishing. The survey did not provide data about respondents' age or gender, so such factors could not be directly included in the model. The survey did include a question regarding experience level (measured in years) of each angler. Including this variable in the model will reveal whether experience plays a significant role in determining the demand for fishing trips.

The influence of perceived fishing quality was proxied by a variable measuring the average number of fish caught by each member of the interviewed parties. Although the survey focused on individuals, the data on fish landings reflect the total catch of the fishing party. To develop estimates of individual success, the overall catch was evenly apportioned among the members of the party. Because the variable measures fishing success, it is clearly not a perfect measure of fish abundance or quality. Still, one would anticipate that anglers who successfully land desirable species are likely to make more frequent outings to the area than those who do not.

Empirical Estimation

Empirical estimation of the model described in Equation 1 assumes that the number of trips observed for each individual is given by the function $f(\cdot)$ and some random component that cannot be captured by the set of explanatory variables. Assumptions about the function $f(\cdot)$ and the data-generating process that underlies the random element of trip demand dictate what exact approach must be taken in estimating the parameters of the TCM. Following the work of Creel and Loomis (1990), Grogger and Carson (1991), and Gomez and Ozuna (1993), the current model was estimated under the assumption that the observed number of trips can be described by a negative binomial distribution. Such an approach is consistent with the discrete nature of the dependent variable, the annual number of trips, which is the focus of the TCM. The number of trips taken in any given year is reported as a discrete, non-negative integer value. Thus, application of the standard distributional assumptions (e.g., normality) is inappropriate because the dependent variable in the TCM cannot take on a continuous range of values.

The negative binomial probability law used to develop the current TCM can be written as:

$$f(Z = z) = \frac{\Gamma(z + 1/\alpha)}{\Gamma(z+1)\Gamma(1/\alpha)} (\alpha\lambda)^{z} (1+\alpha\lambda)^{-(z+1/\alpha)} \qquad (2)$$

where Γ indicates the gamma function and $\lambda = \exp(x_i`\beta)$. The mean of the random variable Z is given by λ and its variance can be expressed as $\lambda(1 + \alpha\lambda)$. The vector x_i represents the set of explanatory variables reported for each individual i. The scaler α and the vector β are parameters to be estimated from the observed sample.

In addition to addressing the discrete nature of the dependent variable, estimation of an appropriate empirical model must also recognize that the reported number of trips never takes on a value less than one. The survey data only reflect the behavior of individuals who took at least a single trip to the study area. While this observation may be obvious, it has important implications for the empirical specification of the TCM. Exclusion of individuals who chose not to make a trip implies that the data have been systematically truncated. If this truncation is not recognized, the resulting parameter estimates will be biased. Moreover, this bias will extend to the estimates of consumer surplus that are derived from these parameters. To avoid this problem, one must modify the negative binomial distribution to reflect the fact that Z is only observed when Z > 0. Estimation of the resulting truncated negative binomial model relies on standard maximum likelihood techniques. The log-likelihood function for the truncated model can be written as follows:

$$\begin{aligned} \ln L = \sum_{i=0}^{N} \{ & \ln\Gamma(y_i + 1/\alpha) - \ln\Gamma(1/\alpha) + y_i \ln(\alpha\lambda_i) - (y_i + 1/\alpha) \\ & \ln(1+\alpha\lambda_i) - \ln\{1 - (1+\alpha)^{-\lambda_i/\alpha} \end{aligned} \qquad (3)$$

where N corresponds to the size of the truncated sample.[4]

As an alternative to the negative binomial distribution employed in the current analysis, a truncated Poisson distribution also can be used to model the data-generating process that underlies the discrete, nonzero values observed in the sample. Although this model can be somewhat easier to estimate, it imposes the restriction that the conditional mean of the dependent variable, λ, is equal to the conditional variance. If this specification is not accurate, then the resulting parameter estimates and the associated standard errors could be biased. To avoid this potential problem, the current model was estimated under the less restrictive assumptions imposed by use of the truncated negative binomial distribution.

[4] Gomez and Ozuna (1993) also consider a second variant of the truncated negative binomial estimator. Given the limited resources available for the current study, this specification was not pursued in the current analysis.

Model Results

Parameter estimates for the sport-boat fishing TCM are presented in Table II.3. This table includes results for the pooled sample, the sample of single-day trips, and the sample of multi-day trips. The overall sample included 871 observations. Nonresponse to one or more questions eliminated 232 observations from the available sample of 1,103 surveys. The subsample of single-day trips included 479 observations, while the remaining 392 were included in the subsample of multi-day trips.

Focusing first on the results from the pooled sample, notice that the estimated coefficients for both travel costs and opportunity cost of travel time are of the expected sign and significant at the 95 percent level of confidence. As McConnell and Strand (1981) note, a comparison of the estimated coefficients for travel costs and opportunity costs can reveal how the survey respondents trade off these two elements of overall trip costs. This comparison provides an opportunity to assess whether the model's results are consistent with theory and expectations. Calculating the ratio $\beta_{oppcost}/\beta_{travel\ cost}$ reveals that time costs are valued at only a fraction of respondents' reported hourly wage (i.e., leisure time is valued at less than wage rate). As was noted previously, the current estimates of opportunity costs do not reflect the value of time on-site. To the degree that travel and on-site time is correlated, the estimated coefficient may capture the value of the overall time commitment. This would imply that time costs are valued at an even smaller fraction of estimated hourly wages. Because many respondents work on fixed schedules and cannot freely substitute between labor and leisure, such a result is not particularly surprising.

For the model estimated with the pooled sample, the income coefficient is not significant but does have the expected positive sign. Interestingly, the dummy variable denoting employment status (1 = employed, 0 = nonworking) is significant, and has a *positive* impact on the demand for recreational fishing trips. This implies that unemployed or retired anglers make more outings to the CCBNEP study area. The remaining variables, those measuring fishing experience and angler success, do not have a significant impact on the demand for fishing trips. As was noted previously, the variable measuring success is a rather imprecise proxy of fishing quality/anticipated catch, and the lack of significance may be due to errors in measuring the true underlying determinant of demand.

Table II.3. Comparing estimates of the TCM for sport-boat fishing in the CCBNEP study area

	CONSTANT	TRAVEL COSTS	OPPCOST	INCOME ($1,000)	UNEMP	EXPERIENCE	NUMFISH	α	OCS per Trip
Combined Sample: N = 871, Log l = -3910									
Parameter estimates	3.67	-.00183	-.000899	.000368	.392	-.000279	.107	1.60	$547
T-statistic	(36.9)	(14.1)	(14.365)	(.197)	(3.42)	(.083)	(1.25)	(14.9)	
Single-Day Trips: N = 479, Log l = -2361									
Parameter estimates	4.06	-.00210	-.00400	.00538	.122	.00167	.219	1.02	$472
T-statistic	(40.9)	(5.96)	(10.4)	(.280)	(1.13)	(.450)	(1.53)	(14.3)	
Multi-Day Trips: N = 392, Log l = -4889									
Parameter estimates	2.45	-.00116	-.00708	.00782	.927	-.00173	.0242	1.95	$865
T-statistic	(11.9)	(5.29)	(6.57)	(2.32)	(4.598)	(.325)	(.377)	(7.20)	

The results for the models estimated with the single-day and multi-day subsamples closely mirror those of the overall sample. The coefficients associated with both travel costs and opportunity costs are negative in sign and statistically significant at the 95 percent level of confidence. Thus, as expected, the number of fishing trips decreases as both travel and opportunity costs increase. Most importantly, the coefficient estimates confirm the expectation that total consumer surplus is larger for the longer, more involved trips. A full discussion of the resulting estimates of consumer surplus is presented below.

The income variable has no significant impact on the frequency of single-day trips, but does contribute to a statistically significant impact on the number of multi-day trips. The magnitude of the income coefficient in the multi-day model indicates that an additional $10,000 in income will increase the annual number of sport-boat fishing trips by approximately 8 percent. For the multi-day sample, the dummy variable indicating employment status also has significant positive impact on the demand for extended sportfishing trips. Many of the individuals who indicated that they are not working are probably retired and likely have more time available for recreational activities such as fishing. As was seen in the results for the pooled sample, the variable measuring fishing success has the anticipated sign, but is not significant in either the single-day or multi-day specifications.

Estimating Consumer Surplus

The goal of the current demand analysis is not to merely estimate the parameters of the TCM, but rather to use these parameters as an input in deriving an estimate for the economic value of sport-boat fishing in the CCBNEP study area. Consumers' total willingness to pay can be calculated as the sum of total expenditures and consumer surplus. The data needed to estimate total expenditures are available from the survey, and the negative binomial specification used in estimating demand makes the calculation of ordinary consumer surplus (OCS) very simple.

As Creel and Loomis (1990) describe, the OCS derived from the $\hat{T}_i$ trips predicted for individual i can be calculated as follows:

$$OCS_i = \hat{T}_i \Big/ \hat{\beta}_{\text{travel cost}} \qquad (4)$$

where $\hat{\beta}_{\text{travel cost}}$ is the estimated value of the travel cost demand parameter. OCS per trip is then given by $1/\hat{\beta}_{\text{travel cost}}$. Thus, the results for the combined sample imply an OCS estimate of $547 for a typical sport-boat fishing trip.

However, this estimate is derived under the implicit assumption that all fishing trips are of homogeneous length. Table II.3 also contains parameter estimates for the models that were separately estimated with the subsamples of single- and multi-day trips. The estimates of consumer surplus derived from the two subsample models confirm our observation that these trips are different in character. The consumer surplus associated with a typical single-day trip is

estimated to be $472. For a typical multi-day trip, consumer surplus reaches $865. Thus, in estimating consumers' total willingness to pay and calculating the economic value associated with sport-boat fishing in the CCBNEP study area, it will be important to distinguish between trips of differing length.

2. Windsurfing

Again, while several different techniques exist for measuring the economic value of recreational activities, it was determined that the travel cost model (TCM) was the most appropriate approach for the analysis of windsurfing. The TCM is well suited for estimating the economic value of windsurfing for the similar reasons it suits the analysis of sport-boat fishing: travel expenditures and time costs influence decisions about the number of trips to take to participate in an activity that involves significant travel and attracts visitors from a wide geographic area. For a windsurfing site such as Corpus Christi Bay, which has few potential substitutes, the TCM is also attractive because it is a relatively simple and cost-effective approach.

Data

The data that underlie this analysis were collected from a survey that was distributed to over 515 windsurfers in and around the CCBNEP study area between April 1996 and April 1997. The survey was developed and implemented by the Social Science Research Center at Texas A&M University, Corpus Christi (TAMU) (see Appendix B). Windsurfers were intercepted at a number of different windsurfing sites: Port Aransas, Dodridge, Cole Park, Bird Island, JFK Causeway, Naval Air Station, North Jetty, and Poenisch Park. In addition, individuals were intercepted at both the U.S. Open Sailboard registration and championships event.

Survey recipients were provided with a copy of the survey, a map indicating the geographic boundaries of the CCBNEP study area, and a stamped postcard and return envelope in which to return their responses. Interviewers took respondents' names and addresses and asked that they return the postcard, with their name added, when they returned the survey separately in the envelope. Thus, it was possible both to discern who returned the survey and to maintain confidentiality. Additional copies of the survey and pre-addressed stamped envelopes were left at three local windsurfing retail outlets. After two weeks, a follow-up letter, postcard, survey, and stamped envelope were sent to each person (with the exception of those individuals who picked up surveys at retail outlets) who had not returned the initial survey. A total of 518 surveys were distributed, with a 58 percent response rate.

The survey instrument included detailed questions about both the frequency and costs of windsurfing trips to the CCBNEP study area. Specifically, respondents were asked how many windsurfing trips they had taken in the previous 12 months and what portion of these trips were

taken to sites in the CCBNEP study area.[5] Focusing on each respondent's most recent trip, additional information was collected about the number of miles traveled, the mode of transportation, and the time required to complete the trip. A separate section of the survey was reserved for questions regarding the costs associated with the most recent trip. The survey required that each respondent estimate his/her own share of costs in four different categories: transportation, lodging, food, and miscellaneous. Each of these categories was further subdivided in order to indicate the nature of each particular expense. For example, within the transportation category the survey separated costs associated with personal vehicles, rental vehicles, and other modes of transportation.

The survey closed with a series of inquiries about each windsurfer's age, race, occupational status, and income. The question regarding income requested that the respondent indicate which of seven categories reflected their before-tax household income. The midpoint of each category was then taken as the best estimate of the respondent's income.[6] Table II.4 summarizes some of the survey responses and highlights the variables included in the TCM analysis. The sample of 220 observations represents the total number of surveys that were used in the empirical analysis. More than 160 of the total 303 surveys were returned incomplete and lacked some portion of the data that was needed to be included in the final model specification. The majority of the surveys excluded from the analysis lacked information on either the distance or time required for travel to the site.

Total trip expenses were calculated by summing all expenses directly associated with the costs of travel. Transportation, lodging, and food made up the largest portion of these expenses. Any expenditures not directly associated with travel were subtracted from the total reported by each respondent. For example, final travel costs did not include the purchase of new equipment, souvenirs, etc. Unfortunately, the level of detail requested by the survey appears to have discouraged many respondents from completing the questions regarding travel expenses. As a result, expenditure data were available only for a subset of the observations, which includes information about trip frequency, travel time, and mileage. However, rather than restrict the analysis to only those that had completed the entire survey, a two-step approach was taken in estimating trip expenses. In the first step, the subsample that included information about both travel costs and travel distance was used to estimate the average variable cost associated with travel. A simple regression model was used to link costs and travel distance. In the second stage of the cost analysis, the former estimate was used to calculate trip expenditures for all surveys that included a response to the question regarding the distance traveled to the windsurfing site. This approach follows the method developed by Burt and Brewer (1971) in their study of the demand for water-based recreation sites in Missouri.

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[5] Early versions of the survey were limited to a question about the overall number of trips, and did not directly inquire about the CCBNEP study area. Data from later versions of the survey were used to calculate the ratio of CCBNEP study area trips to overall trips. The sample average of this ratio was then used to estimate the number of CCBNEP study area trips for participants who had been given the earlier survey.

[6] Responses in the highest category, "over $100,000," were assigned a value of $125,000. Less than 20% of the responses fell into this category. Again, sensitivity analysis indicated that adjusting this value up or down by $10,000 does not have a significant impact on the model's results.

Table II.4. Summary information for windsurfing data used in estimation of the TCM (N = 220)

Variable	Definition	Mean	Standard Deviation
TRIPS	Number of trips taken in past year	27.9	32.4
TRAVEL COST	Variable trip costs	$56.4	$117.1
OPPCOST	Opportunity cost of time associated with trip	$223.2	$295.9
INCOME	Based on midpoint of income categories	$64,954.5	$35,377.1
MALE	Dummy variable indicating gender of respondent	86.4 % = male	---
AGE	Age (in years) of respondent	40.3	11.4
UNEMP	Dummy variable indicating employment status	13.6 % = nonworking	---
MILES	Round-trip mileage to windsurfing site	600.0	1,245.4
HOURS	Sum of travel and windsurfing time (hours)	9.4	11.5

The regression analysis of travel costs was limited to those who reported that they drove to the windsurfing location; more than 90 percent of respondents indicated that this was their selected mode of transportation. The slope coefficient from the regression of trip expenditures on distance traveled revealed that variable costs were $0.094 per mile. Although this estimate is rather low (IRS currently allows a $0.30 deduction per mile), one should recall that respondents were asked to report their share of overall trip expenses. More than 75 percent of the respondents reported that their trip included two or more people, so trip expenses were generally shared by several members of the party. Moreover, standard estimates of per-mile vehicle costs generally reflect costs associated with wear and tear, as well as insurance and vehicle licensing. Such costs are probably not considered by most people when planning their trips, so it is likely the out-of-pocket expenses reported in the survey are a good measure of perceived travel costs. In addition, costs per mile are relatively low because a large portion of trip expenses were fixed and did not vary with the distance traveled.

Estimates for the opportunity cost of travel time were computed from survey information about employment status, income, and travel time. A detailed explanation of the theoretical and empirical issues surrounding estimates of the opportunity cost of travel and on-site time is provided in Section II.1, but the actual calculations are summarized here. Estimates of hourly wage were derived by dividing family income by a standard 2,080-hour annual work load.[7] Detailed information about on-site time was not available, but the survey did include a question indicating how many hours were actually spent on the water during a typical trip. This time was

[7] This calculation assumes a single-income family. The survey did not separately identify individual and family income.

added to the time required for travel before total opportunity costs were calculated.

Model Specification

As noted in Section II.1, a full explanation of the basic TCM and the economic theory that underlies the model is presented by both Bockstael et al. (1989b) and McConnell (1985). Given the practical constraints on the scope of the current project, a very basic approach was taken to the specification of the TCM. For example, substitution among sites *within* the CCBNEP study area was not considered. Because the goal of the analysis was to examine the area as a whole, this level of detail and complexity was not needed. As noted previously, the TCM also can be specified to measure the role substitute sites have in influencing decisions about recreational travel to a site. However, within this region of the country, the CCBNEP study area offers unique windsurfing opportunities. As a result, substitute sites *outside* the study area were not considered in the current analysis (i.e., the model does not include variables measuring the cost of travel to alternative windsurfing sites). If this assumption is incorrect, and substitution to other sites does play an important role in determining the demand for windsurfing trips to the CCBNEP study area, then the TCM will tend to overstate actual willingness to pay.

In the final specification, annual number of trips was assumed to be a function of travel expenses, opportunity cost of time, income, employment status, gender, age, and interest in windsurfing:

TRIPS = f(TRAVEL COST, OPPCOST, INCOME, UNEMP, MALE, AGE, COMMITTED SAILOR) (5)

Travel cost, opportunity cost, and income are obviously the critical driving factors behind the demand for windsurfing trips. Demographic factors such as gender and age generally have less dramatic impacts on demand, but can be important in explaining why different groups respond differently to changes in price or income. The variable measuring each participant's overall interest in windsurfing was taken from a survey question that asked the respondent to characterize their level of commitment to windsurfing. This variable was included in an effort to determine how demand differed between enthusiastic and casual windsurfers. The assumptions underlying the specification of the travel demand function and the empirical estimation of the model are provided below.

Empirical Estimation

The same empirical approach that was used for estimating the sport-boat fishing TCM was adopted for the analysis of windsurfing. Recognizing that the dependent variable, the number of trips taken in the previous 12 months, took on only discrete, non-negative values, a count data model was used in estimating demand. In particular, it was assumed that the observed number of windsurfing trips could be described by a truncated negative binomial distribution. Estimation of a truncated model was necessary, because survey data were available only from individuals who had actually gone windsurfing in the previous year. Further details about the characteristics of the empirical model are presented in Section II.1.

Model Results

Parameter estimates for the windsurfing TCM are presented in Table II.5. In reviewing the results presented in Table II.5, note that the estimated coefficients for travel cost and time cost are of the expected sign and are significant at the 90 and 95 percent levels of confidence, respectively. The annual number of windsurfing trips decreases as both travel costs and the opportunity cost of time increases.

The relationship between the coefficients for travel and time costs indicates that the travel time is valued at only a fraction of the respondents' wage rates. Again, following the suggestion of McConnell and Strand (1981), the exact tradeoff between travel and time costs can be revealed by computing the ratio $\beta_{oppcost}/\beta_{travel\ cost}$. Given that these results are based on an analysis of family income and have assumed that all workers have flexible schedules, the result that travel and leisure time is valued at less than the wage rate is generally consistent with theory and expectations.

As anticipated, the dummy variable denoting those participants that classified themselves as "committed sailors" had a strong positive influence on the number of annual trips. None of the remaining explanatory variables had a measured impact that was significant at the 90 percent level, or better. Although its effect was not significant, the negative sign on the income coefficient indicates that the number of windsurfing trips will decrease as family income increases. The lack of significance for this variable may reflect the limitations of using overall family income as a proxy for individual earnings.

The joint impact of both income and the opportunity cost of time is also captured by the dummy variable indicating the employment status of each respondent. The survey asked only whether the respondent held a full-time job, and did not distinguish between individuals who were full-time students, retired, or "truly" unemployed. As a result, the potential impact of this variable is uncertain. Persons who are not working have a relatively low opportunity cost of time and one might expect that such individuals would take more frequent windsurfing trips. However, nonworkers may lack the income needed to pay for such recreational outings. The negative coefficient that is observed in the final results suggests that this latter effect overwhelms the impact created by the lowered opportunity costs.

Table II.5. Parameter estimates for the TCM for windsurfing in the CCBNEP study area (N = 220, Log l = 898.6)

	CONSTANT	TRAVEL COSTS	OPPCOST	INCOME ($1,000)	MALE	AGE	COMMITTED SAILOR	UNEMP	α	OCS per Trip
Parameter	2.59	-.00121	-.000912	-.000815	-.197	.00654	1.25	-.484	1.27	$828
T-statistic	(6.53)	(1.90)	(2.24)	(.279)	(.074)	(.690)	(6.13)	(1.56)	(6.92)	

Estimating Consumer Surplus

Again, the goal of the current demand analysis is not to merely estimate the parameters of the TCM, but rather to use these parameters as an input in deriving an estimate for the economic value of windsurfing in the CCBNEP study area. Using the approach described in Section II.1, the consumer surplus estimates derived from the windsurfing TCM indicate that consumers have a net willingness to pay of $828 per trip.

3. Birdwatching

The TCM was selected from among several possible methodologies as the best candidate for estimating consumers' willingness to pay for birdwatching trips to the CCBNEP study area. Interest in birdwatching can motivate trips of significant distance, and the activity attracts visitors to the Coastal Bend from a wide array of locations. Thus, TCM should be well suited for analyzing the value of birdwatching trips. However, two important factors may limit the applicability of the results derived from the TCM model for birdwatching. The first concern focuses on the data collected for the current analysis and does not represent a general limitation of the TCM. Respondents to the current survey appear to have found the structure of certain questions somewhat confusing, and may not have provided reliable estimates of the number of birding trips to the CCBNEP study area or accurately recorded the costs associated with these trips. The second factor relates more directly to the theoretical assumptions that underlie the TCM. If trip expenses are to be taken as proxy for the price of a birdwatching trip, then it is important that the trip be largely focused on the activity of birdwatching. Otherwise, trip expenses may partially reflect a willingness to pay for other trip related activities. Analysis of the current data suggests that many of the observed trips were not taken for the sole purpose of birdwatching. As is explained below, both these issues are addressed by our decision to focus only on expenses that are reported to have occurred within the CCBNEP study area. For example, the cost associated with driving or flying to the study area were excluded from the calculation of total expenses. The expenditures considered in the model were limited to the costs of travel, food, lodging, etc. that were incurred within the study area. This approach avoids the confusing aspects of the survey and also avoids including trip expenses that were actually motivated by other interests.

Data

The data that underlie this analysis were collected from a survey that was distributed to over 2,761 birdwatchers in and around the CCBNEP study area. The survey was designed and implemented by the Social Science Research Center of Texas A&M University, Corpus Christi (TAMU; see Appendix C). 1,508 surveys were distributed on-site at popular birdwatching sites in the study area, including the Aransas National Wildlife Refuge, the Wharf Cat boat tours out of Rockport and Port Aransas, Hans Suter Park in Corpus Christi, Blucher Park, Hazel Bazemore, and Port Aransas Birding Center. As with the windsurfing survey, potential respondents were intercepted on-site and provided with a copy of the survey, a map showing the boundaries of the official CCBNEP study area, and a stamped postcard and return envelope in which to return the

completed survey. The response rate for this portion of the survey was 72 percent. In addition, 1,253 copies of the survey were mailed to a target group of birdwatching enthusiasts, including all members of the Texas Ornithological Society and Coastal Bend Audubon Society. Follow-up letters were not sent to these two groups. A response rate of 44 percent was obtained from the mailed survey.

The windsurfing and birding surveys were developed concurrently. Thus, like the windsurfing survey, the birding instrument was revised after data collection was underway. The original survey asked respondents to indicate the number of birdwatching trips they had made in the previous year, but did not explicitly ask them to record the number of trips that were made to the CCBNEP study area. There was no reliable way to estimate what portion of total trips was taken to the specific study area. As a result, many completed surveys could not be used for the TCM. In fact, most of the surveys that were mailed to birdwatching enthusiasts were excluded, so the final data largely represent a sample of individuals who were intercepted on-site. Of 911 surveys that were returned to TAMU, only 728 represented responses to the revised survey instrument and could be considered in the travel cost analysis. A portion of this subsample did not include responses to key questions and had to be excluded from the empirical estimation.

The analysis of the birdwatching data was further complicated by a degree of confusion that was created by the survey instrument itself. The survey included distinct sections for respondents to separately record what portion of trip costs occurred within Texas and what portion occurred in the specific CCBNEP study area. Unfortunately, participants were unclear as to whether they should include study area expenses in the total for Texas. Some respondents included all expenses in the their estimate of trip costs incurred in Texas, others limited this figure to expenses outside the CCBNEP study area, and still others read the question somewhat differently. To avoid any incorrect interpretation of these data, the TCM analysis for birdwatching focused only on expenses incurred within the CCBNEP study area. Respondents appear to have recorded this portion of total costs in a consistent manner. These estimates of costs were then linked to the distance traveled within the study area.

A focus on expenses incurred within the CCBNEP study area was also attractive because many birdwatchers appeared to have traveled to the area for a variety of reasons, and not for the sole purpose of birdwatching. In fact, many of the reported birdwatchers traveling to the CCBNEP study area appear to be part of a seasonal migration. During the winter, the population of the Coastal Bend swells with the influx of “Winter Texans” from the north. This group of people, largely retirees, travels from a significant distance and remains in the area for an extended period of time. Although many of these people find the opportunities for birdwatching attractive, their trips to the CCBNEP study area are largely motivated by other concerns. Therefore, including their reported costs for travel outside the CCBNEP study area would tend to overstate their actual willingness to pay for birdwatching trips.

Fortunately, the portion of the survey designed to collect demographic data was easily understood and readily answered by most survey participants. Every respondent was asked to identify his/her age, gender, education level, ethnicity, and income. To increase the rate of response, the survey

asked that participants select one of seven income categories. The midpoint of each category was then used as a proxy for overall family income.[8]

Using the sample of observations that were included in the final empirical specification, Table II.6 presents a brief summary of the most important survey variables.

The bulk of travel costs were driven by expenditures on transportation, food, and lodging. Spending on nontravel items such as birdwatching equipment and souvenirs were separated from overall trip costs. The detail requested in the survey made it possible to identify each respondent's expenditures on these types of items.

Some respondents included information about the distance they traveled from a local residence but did not include estimates of local expenses. To avoid excluding these observations from the empirical analysis, the same two-stage approach that was used for estimating travel costs for windsurfing was also applied to the birdwatching analysis. In the first stage, a regression analysis

Table II.6. Summary information for birdwatching data used in estimation of the TCM (N = 325)

Variable	Definition	Mean	Standard Deviation
TRIPS	Number of trips taken in past year	3.5	9.6
TRAVEL COST	Variable trip costs	$55.9	$97.1
OPPCOST	Opportunity cost of time associated with trip	$167.8	$405.2
INCOME	Based on midpoint of income categories	$64,369	$34,943
MALE	Dummy variable indicating gender of respondent	53.8 % = Male	---
AGE	Age (in years) of respondent	54.2	12.9
RETIRED	Dummy variable indicating employment status	40.6 %= Retired	---
MILES	Round-trip mileage to birdwatching site	799.3	1,387.5
HOURS	Sum of travel and birdwatching time (hours)	16.2	55.8

[8] Responses in the highest income category, "over $100,000" were assigned a value of $125,000. Less than 12% of the responses fell into this category. The model's results were not affected by changing this assumed value by $10,000 in either direction.

was used to determine how costs varied with travel distance. The model focused on the subsample of respondents who reported driving to their selected birdwatching site, and provided information about both the costs and distance associated with their most recent trip. The resulting estimate of costs per mile ($0.070) was then used in the second stage to estimate trip expenses for all survey observations that included data on local travel distance. Because the distance variable was available for a majority of the sample, this two-stage approach provided a larger overall sample for the TCM. As noted in Section II.2, the use of a regression model to estimate variable travel costs was first suggested by Burt and Brewer (1971).

Estimates for the opportunity cost of travel time were generated following the procedure described in Section II.2. Information about the actual time spent birdwatching was not available from the survey. As a result, the calculations of opportunity cost are based only on travel time and do not include the time spent on-site. This implies that the available measures will tend to understate actual opportunity costs.

Model Specification

Similar to the windsurfing study, it was assumed that the CCBNEP study area can be viewed as one large birdwatching site, avoiding the complications that would have arisen if the TCM had been specified to capture substitution among sites *within* the overall study boundaries. In addition, it was assumed that the CCBNEP study area offers unique opportunities for birdwatching, implying that the TCM avoids consideration of alternative sites *outside* the study area. Although the latter assumption likely overstates the distinctive character of the CCBNEP study area, it was the only practical way to proceed with estimation of the model. Collection of appropriate data about the location of alternative birdwatching sites would have exhausted the resources available for this study. If substitute sites do exist, then the willingness to pay estimates that are derived from the current analysis will tend to be overstated. The exact magnitude of this overstatement would depend on the degree to which birdwatchers are willing to substitute visits to the CCBNEP study area for trips to other comparable sites.

Before concluding that exclusion of substitute sites will result in an overestimate of consumer surplus, one should recall that the current model reflects only those expenses that were incurred within the CCBNEP study area. To the extent that some expenses outside the area were associated with completing a birdwatching trip, this assumption could lead the model to understate actual willingness to pay. In addition, our estimates of the time associated with each trip did not reflect the time actually spent on-site. This will tend to understate the opportunity cost associated with each trip, and will also contribute to an understatement of actual willingness to pay.

Similar to the windsurfing study, the dependent variable in the analysis was taken to be the number of trips made in the previous 12 months, and an implicit assumption of homogeneous trip length is maintained. Ideally, the model might have separately analyzed trips of differing length, but there were insufficient data to conduct such an analysis.

In the final specification, annual number of birdwatching trips was assumed to be a function of travel expenses, opportunity cost of time, income, gender, age, and interest in birdwatching:

TRIPS = f(TRAVEL COST, OPPCOST, INCOME, MALE, AGE, RETIRED, COMMITTED BIRDER) (6)

This specification closely mirrors that used for the windsurfing analysis except that it does not include a variable indicating the employment status of each respondent. Instead, a dummy variable is included that indicates whether the survey respondent is retired or still in the workforce. The birdwatching survey inquired about retirement status, but did not include a separate question about the employment status of younger survey participants.

The empirical specification for the opportunity cost of time distinguishes only between retired and nonretired birdwatchers. The survey did not include enough information to identify which respondents worked on fixed schedules and which operated under more flexible arrangements. For nonretired respondents, time costs were calculated as the product of the estimated wage rate and the number of hours required for travel. Although the wage rate was taken as a measure for the opportunity cost of time for employed respondents, the model did not strictly assume that all workers can freely substitute between labor and leisure. Travel costs and opportunity costs were included as separate variables, so the coefficients on each can vary independently. For the portion of the birdwatching sample that indicated that respondents are retired, the time cost variable was set to zero.

Empirical Estimation

Consistent with the approach used in estimating the TCMs for sport-boat fishing and windsurfing, the birdwatching model was estimated under the assumption that a truncated negative binomial could be used to model the distribution of birdwatching trips. As noted previously, this specification recognizes that the survey response data are of a discrete nature and were collected only from active birdwatchers. Further details about the empirical model are presented in the description of the sport-boat fishing TCM (see Section II.1).

Model Results

Parameter estimates for the birdwatching TCM are presented in Table II.7. A final sample of 325 observations was included in the empirical estimation. As noted previously, a large portion of the total set of completed surveys could not be used in the TCM, because the original survey did not include the specific data required for this analysis.

Although confusion among survey participants raised questions about the quality of the birdwatching data, the TCM results are generally consistent with expectations. The travel cost variable is statistically significant and of the expected sign. The variable that serves as a measure of the opportunity costs associated with travel time is not statistically significant, but does have the anticipated sign. The negative coefficient on the opportunity cost variables suggests that an increase in the opportunity cost of time tends to decrease the annual number of birdwatching trips. In addition, the coefficient on the income variable is statistically significant but defies the

expectation that increases in income should lead to more birdwatching trips, when other factors are held constant. It may be that individuals with higher incomes prefer other forms of recreational activities. The model also indicates that older individuals take significantly more birdwatching trips. However, controlling for the influence of age, retired individuals actually make fewer birdwatching trips. The results also indicate that respondents who classify themselves as "committed birdwatchers" take a significantly larger number of birdwatching trips.

Estimating Consumer Surplus

Following the approach outlined in Section II.1, estimates of consumer surplus were developed from the birdwatching TCM. These results indicate that consumers have a net willingness to pay of approximately $91 for a typical birdwatching trip. As noted previously, the magnitude of this estimate could have been affected by several key assumptions. First, the TCM summarized in Equation 6 does not reflect the potential impact of substitute sites outside the CCBNEP study area. This specification, which was dictated by the costs associated with collecting accurate data for a variety of substitute sites, could lead to overstatement of actual willingness to pay. On the other hand, our decision to focus only on travel expenditures within the CCBNEP study area will likely lead to an understatement of true willingness to pay. The net impact of these two effects is unclear, but should be, at a minimum, considered when applying the results of this analysis.

Table II.7 Parameter estimates for the TCM for birdwatching in the CCBNEP study area (N = 325, Log l = 523.7)

	CONSTANT	TRAVEL COSTS	OPPCOST	INCOME ($1,000)	MALE	AGE	COMMITTED BIRDER	RETIRED	α	OCS per Trip
Parameter	6.63	-.0110	-.00325	-.0156	.691	.416	.974	-1.93	2.02	$90.6
T-statistic	(.033)	(12.1)	(.826)	(4.32)	(2.54)	(3.97)	(2.87)	(5.10)	(.005)	

III. Conclusions

The estimates obtained through our TCM analyses reflect an average individual's *net* willingness to pay (consumer surplus) for a trip to the CCBNEP study area to sport-boat fish, windsurf, or birdwatch. In order to estimate aggregate benefits, these average net willingness to pay estimates are multiplied by total participation in the recreational activity. TPW estimates that the average number of fishing trips per year over the last three years is 150,926 (McEachron, personal communication, 1997). Multiplying this number by the consumer surplus estimates ($547 – combined sample) results in an aggregate benefit of sport-boat fishing in the CCBNEP study area of approximately $83 million per year. Unfortunately, adequate participation rate information is lacking for both windsurfing and birdwatching. As an alternative we have calculated the value of windsurfing as represented by participation in the U.S. Open Sailboard Regatta hosted annually by the *Corpus Christi Caller–Times*. The average number of participants over the last three years is 112 (Macpherson, U.S. Windsurfing Association; personal communication, 1997). This suggests that people value that event alone at approximately $93 thousand annually. An approximation of aggregate benefits for birdwatching is derived by multiplying visitation rates for the Aransas National Wildlife Refuge by our consumer surplus estimates. Approximately 50,000 people visit the Aransas National Wildlife Refuge annually for birding (Jackson, Aransas National Wildlife Refuge; personal communication, 1997). This information allows us to calculate aggregate benefits for birdwatching at this site to be approximately $4.6 million annually. Clearly, given all the other sites where people go to view birds, this is an underestimate of the total value of birdwatching. However, this estimate gives us a general idea of the level of value held for birdwatching in the CCBNEP study area.

The estimates generated in this study validate the notion that the recreational services provided by the CCBNEP study area are significant, and that improvements in habitat and water quality could result in significant gains in economic value. However, it must be pointed out that there are limitations to the current study and implications for further research needs. For example, as noted previously, limited information exists on actual numbers of visits to the CCBNEP study area to engage in particular recreational activities (participation or visitation rates). This information is needed in order to calculate aggregate benefit estimates. It is recommended that the CCBNEP work with other state and local institutions and businesses to generate such information to facilitate future benefits estimation efforts.

The TCM used for the analysis of sport-boat fishing, windsurfing, and birdwatching did not include substitute sites and thus consumer surplus values might be somewhat overstated. However, even if estimates overstate values by a factor of 2 or 3, consumer surplus would still be large and would imply that there is an important economic value associated with these recreational activities.

Further analysis of the value of sport-boat fishing might consider the role of fish abundance and quality in more detail. It is impossible to use the current results to estimate the value associated with marginal changes in the abundance and mix of different fish species. Results from a species-

specific analysis could be useful for assessing the value of marginal improvements/degradations of coastal habitat.

We currently have limited confidence in the results generated for the value of birdwatching. The birdwatching survey appeared to confuse the respondents, and so they may not have reported actual trips within the CCBNEP study area or the expenses associated with those trips. In addition, the TCM may in this case not be the most appropriate methodology for analyzing the demand for birdwatching trips in the CCBNEP area. For many of the reported "birdwatchers," travel to the CCBNEP study area appears to be part of a seasonal migration. During the winter, the population of the Coastal Bend swells with an influx of "Winter Texans" from the north. This group of people, largely retirees, travels from a significant distance and remains in the area for an extended period of time. Although many of these people find the opportunities for birdwatching attractive, their trips to the CCBNEP study area are largely motivated by other concerns. To avoid overstating total willingness to pay, we have focused on just those expenses incurred while in the Coastal Bend region. This approach should result in relatively conservative estimates of willingness to pay.

The sport-boat fishing survey provided the largest percentage of complete surveys. This is, in part, due to the quality of the survey design and implementation. The survey was brief and included clearly articulated questions leading to few incomplete surveys and high response rates. As such, it is recommended that a new birding survey be fielded; one that mirrors the CCBNEP sport-boat fishing survey in design and implementation. In addition, the survey might include questions regarding the importance of alternative, substitute birdwatching sites.

In addition, future analysis of the value of birdwatching might focus on interest in specific species. For example, it may be that particular endangered species are more highly valued by birdwatchers, in which case preservation of key habitats could be associated with significant increases in the economic value of birdwatching. Future work also might further examine the issue of "Winter Texans." Additional survey questions might be used to learn more about their travel behavior (e.g., do they stay in one place locally, or travel via motorhome throughout the Coastal Bend?) and their interest in birdwatching.

Finally, it should be recognized that the value estimates generated in this study for sport-boat fishing, windsurfing, and birdwatching represent only a partial analysis of the value of the CCBNEP study area. Our study represents only a minor piece of a much bigger puzzle, which includes not only other recreational values but commercial values, passive use values, and the value of ecological functions and services. In the future, the CCBNEP might consider an application of the contingent valuation methodology to address the value of the CCBNEP study area as a whole.

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APPENDIX A

CCBNEP Sportfishing Valuation Questionnaire

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CCBNEP Sportfishing Valuation Questionnaire

MAJOR AREA _____ STATION _____ COMP. DATE _____

BOAT ID NO. _____ INT. TIME _____

INSTRUCTIONS: Complete the blanks above during the interview; blanks at bottom of page may be completed after the survey. The following questionnaire is to be administered verbatim to one randomly chosen member of selected fishing party (i.e., Activities 1, 2 and 3). Circle the "R" if respondent could not or would not answer question.

As part of the Corpus Christi Bay National Estuary Program, I would like to ask you a few more questions to determine the value of sport fishing in the Coastal Bend.

1. **Are you a permanent Texas resident?** *(circle one)* Yes No R

   If "yes", then ask: Is this a one-day trip or will you spend at least one night away from your principal residence? (Note: If trip involved overnight stay on water, circle "overnight on water" without asking this question.)
   (circle one) One-day Multi-day Overnight on water R

   If "multi-day", then ask: How many days will fishing be your primary recreational activity in the Coastal Bend? *(enter number)* _____ R

   If "no", then ask: What will be the duration of your current stay in the Coastal Bend in days? *(enter number)* _____ R

2. **What is the zip code of your permanent residence? (i.e., where they pay taxes or vote)** *(enter 5-digit zip)* _____ R

3. **Including yourself, how many people reside permanently in your household?** *(enter number)* _____ R

4. **Including yourself, how many members of your household are with you on today's fishing trip? (Note: If angler is alone, enter "1" without asking this question.)** *(enter number)* _____ R

5. **To the nearest mile, how many one-way miles is it from your home to this boat launch site?** *(enter number)* _____ R

6. **To the nearest dollar, how much will you personally spend today on this fishing trip**
   a) from when you left home until you get back home on each of the following items?
   b) from when you left where you are staying until you get back there on each of the following items?

   (Note: For "one-day" trips, ask as worded with option "a". For "multi-day" and "non-resident" trips, ask as worded with option "b". For "overnight on water" trips, drop "today" and ask with option "a".)

gas and travel fares *(enter number)* _____ R		license fees *(enter number)* _____ R	
lodging *(enter number)* _____ R		launching fees *(enter number)* _____ R	
meals and groceries *(enter number)* _____ R		guide fees *(enter number)* _____ R	
bait, tackel and ice *(enter number)* _____ R		tournament fees *(enter number)* _____ R	

7. **How many saltwater fishing trips do you take per year**
   a) in Texas? *(enter number)* _____ R **b) in the Coastal Bend?** *(enter number)* _____ R

8. **Based on length of this fishing trip and dollars you have spent, do you consider this a typical trip for you?** *(circle one)* Yes No R

9. **How many years have you been saltwater recreational fishing?** *(enter number)* _____ R

10. **Which of the following best describes your total annual personal income, before taxes? Is it:**

	(circle one)
less than $15,000	1
15,000 to less than 30,000	2
30,000 to less than 45,000	3
45,000 to less than 60,000	4
60,000 to less than 75,000	5
75,000 to less than 90,000	6
greater than $90,000?	7
could/would not answer	R

11. **How many hours do you work in a normal work week?** *(enter number)* _____ R

Thank you very much for your time.

TRIP LENGTH _____ ACTIVITY _____ TOTAL PEOPLE IN PARTY _____

MINOR BAY FISHED _____ SPECIES SOUGHT _____ TOTAL FISH LANDED _____

APPENDIX B

Texas Coastal Bend Sail Board Survey

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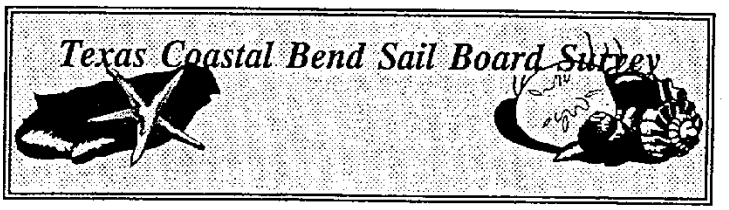

This is a survey to measure sail boarding activities in the Corpus Christi/Coastal Bend area of South Texas. We are examining the importance of local sailboarding. It is important for the sport that you fill this out honestly and return it.

Please do not place your name anywhere on this form. Your answers will, therefore, remain strictly anonymous.

When you have answered all items please place the completed survey in the enclosed stamped envelope and put it in the mail.

If you have any questions about this survey, please call the director, Dr. Ross Purdy at Texas A&M University - 512 994 2388 or email, rpurdy@falcon.tamucc.edu.

Thanks for your help.

Q1. Did you go board sailing in the past 12 months? (Circle one)

1. YES
2. NO, SKIP TO Q29

Q2. If you participate in board sailing, which best describes you? (Check only one of the following)

1. A **COMMITTED SAILOR**. A PERSON *WILLING* TO TRAVEL ON SHORT NOTICE TO SAIL WHEN THE WINDS ARE UP. WHO SAILS SEVERAL TIMES A WEEK IF THE WINDS ARE FAVORABLE. WHO SUBSCRIBES TO ONE OR MORE SAIL BOARDING MAGAZINES. WHO IS CONSTANTLY LOOKING FOR AND PURCHASING THE LATEST IN EQUIPMENT. WHO SPENDS MUCH TIME WITH OTHER SAILORS TALKING ABOUT BOARD SAILING. AND, FOR WHOM BOARD SAILING IS THE PRIMARY OUTDOOR ACTIVITY.

2. AN **ACTIVE** SAIL BOARDER. A PERSON WHO TRAVELS INFREQUENTLY AWAY FROM HOME SPECIFICALLY TO SAIL. WHO SAILS ABOUT ONCE A WEEK IF THE WINDS ARE FAVORABLE. WHO OCCASIONALLY READS THE BOARD SAILING MAGAZINES. WHO HAS GOOD EQUIPMENT BUT DOESN'T HAVE THE LATEST IN EVERYTHING. AND FOR WHOM BOARD SAILING IS AN IMPORTANT BUT NOT AN EXCLUSIVE OUTDOOR ACTIVITY.

3. A **CASUAL SAIL BOARDER**. A PERSON WHO SAILS ONLY OCCASIONALLY. WHO HAS LIMITED SKILLS AND ONLY GOES SAILING OCCASIONALLY. WHO HAS OLDER AND ONLY LIMITED EQUIPMENT. WHO DOES NOT SUBSCRIBE TO AND RARELY READS THE BOARD SAILING MAGAZINES. AND FOR WHOM SAILING IS AN ENJOYABLE YET INCONSISTENT OUTDOOR ACTIVITY.

Q3. Compared to your other outdoor recreational activities (such as hiking, camping, hunting, fishing), how would you comparatively rate board sailing ? (Circle one)

1. YOUR MOST IMPORTANT OUTDOOR ACTIVITY
2. YOUR SECOND MOST IMPORTANT OUTDOOR ACTIVITY
3. YOUR THIRD MOST IMPORTANT OUTDOOR ACTIVITY
4. ONLY ONE OF MANY OUTDOOR ACTIVITIES

Q4. For how many years have you been board sailing? _____YEARS

Q5. In the past 12 months, about how many times did you go board sailing?_____ TRIPS MONTHS

Q5A. How many of these board sailing trips were to or within the Coastal Bend Area? _____ TRIPS

Q6. Is this total more, about the same, or less than usual compared to previous years? (Check one)

1. MORE THAN USUAL
2. ABOUT THE SAME
3. LESS THAN USUAL

Q7. About how many hours do spend on the water when you go sailing?

_____ HOURS

Q8. How many direct miles did you travel between your home and the place you went board sailing most recently?

_____ MILES

Q9. How long did it take you to travel from home to the place where you sailed most recently?

_____ Hours _____ Minutes

Q10. If you had to replace all of your own sailing equipment with similar equipment, how much would the replacements cost?

1. Board(s) $ _____
2. Sails $ _____
3. Clothing $ _____
4. Related equipment $ _____

TOTAL $ _____

Q11. When did you sail <u>in the Corpus Christi/Coastal Bend Area</u> most recently?

_____ DAY _____ MONTH _____ YEAR

Q12. How many people, including yourself, went together to the place where you sailed?

_____ PEOPLE

Q13. Within the group that went together, how many people actually sailed?

_____ PEOPLE

Q14. Within the Corpus Christi/Coastal Bend Area with whom did you sail during your most recent trip? (Check all that apply)

1. BY YOURSELF
2. SPOUSE
3. CHILDREN
4. EXTENDED FAMILY
5. FRIENDS
6. SAILING CLUB OR ORGANIZATION
7. OTHER (PLEASE SPECIFY)

_____

Q15. At what location in the Coastal Bend Area did you sail most recently?

1. BIRD ISLAND
2. COLE PARK
3. OTHER PARKS ALONG OCEAN DRIVE
4. INDIAN POINT
5. OTHER (please specify)

_____

Q16. We are interested in your view of the conditions in the Corpus Christi area for board sailors. First, in your view is access to desirable sailing areas excellent, good, fair, or poor?

1. EXCELLENT
2. GOOD
3. FAIR
4. POOR

Q17. How do you evaluate the beach conditions where you sailed most recently in the Coastal Bend?

1. EXCELLENT
2. GOOD
3. FAIR
4. POOR

Q18. Are there adequate rest room facilities where you sailed most recently in the Corpus Christi/Coastal Bend area?

1. YES, HIGHLY ADEQUATE
2. YES, BUT BARELY ADEQUATE
3. NO, INADEQUATE

The following items are only for those people who live outside the Corpus Christi/Coastal Bend area. People who live in the Coastal Bend Area should skip to Q29.

Q19. How (or from whom) did you learn about board sailing in the Coastal Bend Area? (Check all that apply)

1. FAMILY
2. FRIENDS
3. SAILING ORGANIZATION OR CLUB
4. MAGAZINE OR NEWSPAPER ARTICLE
5. TRAVEL GUIDE OR BOOK
6. OTHER (PLEASE SPECIFY)

_____

Q20. What form of transportation did you use to travel to the Coastal Bend Area? (Check all that apply)

1. AIR
2. PERSONAL CAR
3. RENTAL CAR
4. OTHER (PLEASE SPECIFY)

_____

Q21. During your last trip to the Coastal Bend of South Texas, how much did you spend (or your prorated share) on each of the following items (if zero, please write "O" in the appropriate blank)

	In Coastal Bend	In Texas
TRANSPORTATION		
AIR/TRAIN/BUS FARES	$ _____	$ _____
PERSONAL VEHICLE/FUEL	$ _____	$ _____
RENTAL VEHICLE/FUEL	$ _____	$ _____
LODGING		
HOTEI/MOTEL	$ _____	$ _____
B&B	$ _____	$ _____
CAMPING	$ _____	$ _____
RV PARK	$ _____	$ _____
OTHER	$ _____	$ _____
FOOD		
RESTAURANTS	$ _____	$_____
GROCERIES (INCLUDING DRINKS)	$ _____	$ _____
OTHER (SUCH AS SNACKS)	$ _____	$ _____
MISCELLANEOUS		
EQUIPMENT	$ _____	$ _____
SOUVENIRS	$ _____	$ _____
ENTRANCE/REGISTRATION FEES	$ _____	$ _____
OTHER (PLEASE SPECIFY) _____	$ _____	$ _____
TOTAL (PLEASE ADD ALL COLUMNS)	$ _____	$ _____

Q22. In addition to the above expenditures in the Coastal Bend and Texas for this trip, how much did you additionally spend outside of Texas to make your most recent trip to the Coastal Bend?

$ _____

Q23. Please total the trip expenses itemized in **Q21 - Q22.** If this total does not seem reasonable, please re-evaluate and make the appropriate changes above.

$ _____ **TOTAL EXPENSES**

Q24. Please list additional goods and services that you might have purchased had they been available in the Coastal Bend Area.

1. _____

2. _____

Q25. During your visit to the Coastal Bend, how many days and nights did you stay in the area?

_____ DAYS

_____ NIGHTS

Q26. During your trip, did you have any additional interests in the Coastal Bend Area other than board sailing? (Check one)

1. YES
2. NO. SKIP TO **Q29**

Q27. What were these additional interests? (Check all that apply)

1. BUSINESS
2. SIGHTSEEING
3. SHOPPING
4. VISIT FAMILY OR FRIENDS
5. OTHER (PLEASE SPECIFY)

_____

Q28. To what degree did these other interests impact your decision to visit the Coastal Bend? (Check one)

1. NOT AT ALL IMPORTANT
2. SLIGHTLY IMPORTANT
3. MODERATELY IMPORTANT
4. VERY IMPORTANT
5. EXTREMELY IMPORTANT

The following questions will help us to know more about board sailors. The information you provide will remain strictly confidential, and you will not be identified with your answers.

Q29. What is your age?

_____ YEARS

Q30. Are you-

1. MALE
2. FEMALE

Q31. What is your approximate total household income before taxes? (Circle one)

1. LESS THAN $10,000
2. $10,000 - $19,999
3. $20,000 - $29,999
4. $30,000 - $49,999
5. $50,000 - $74,999
6. $75,000 - $100,000
7. Over $100,000

Q32. Are you currently employed?

1. YES
2. NO

Q33. What is the most advanced grade level of school that you successfully completed? (Check one)

GRADE SCHOOL

-- 1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7 -- 8

HIGH SCHOOL

-- 9 --10 --11 -- 12

COLLEGE/TECHNICAL

--13 ---14 --15 -- 16

GRADUATE SCHOOL

--17 --18 --19 --20 --21+

Q34. Are you -

1. ANGLO
2. AFRICAN-AMERICAN
3. HISPANIC
4. NATIVE AMERICAN
5. ASIAN
6. OTHER (PLEASE SPECIFY)

_____

Q35. What is the zip code of your home address?

_____ ZIP CODE

Q36. Was this survey completed by the person to whom it was given or to whom it was addressed? (Check one)

1. YES
2. NO

Q37. Overall, how understandable did you find the wording of the questions? (Check one)

1. NOT AT ALL UNDERSTANDABLE
2. SLIGHTLY UNDERSTANDABLE
3. MODERATELY UNDERSTANDABLE
4. VERY UNDERSTANDABLE
5. EXTREMELY UNDERSTANDABLE

Q38. Is there anything else you would like to tell us?

_____

_____

_____

Thank you very much for your time.

Please place this in the enclosed envelope and drop it in the mail.

APPENDIX C

Texas Coastal Bend Birding Survey

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Texas Coastal Bend Birding Survey

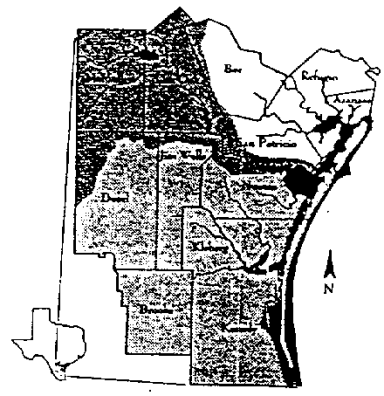
This is a survey to measure birding activities in the Coastal Bend area of South Texas. We are measuring the importance of bird watching in this area and your honest answers are very important to us. The survey is funded by the Environmental Protection Agency and supports the Corpus Christi Bay National Estuary Program.

Please do not place your name anywhere on this form. Your answers will, therefore, remain strictly anonymous. If you are certain you have previously completed a copy of this questionnaire please don't fill out another.

When you have answered all items please place the completed survey in the enclosed stamped envelope and put it in the mail.

If you have any questions about this survey, please call Dr. H. Carter Whatley at Texas A&M University-Corpus Christi - 512 994 5997 or email, whatley@falcon.tamucc.edu.

Thanks for your help.



Corpus Christi Bay National Estuary Program Study Area

Q1. In the past 12 months, did you travel away from home (more than one mile from your primary residence) for the primary purpose of birding (observing, feeding, or photographing wild birds)? (Check one)

1. YES
2. NO. SKIP TO Q32

Q2. If you participate in birding, which best describes you? (Circle only one of the following)

1. A <u>COMMITTED</u> BIRDER. A PERSON *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 FREQUENTLY PURCHASES MORE EQUIPMENT TO AID IN ATTRACTING, RECORDING AND SEEING BIRDS, AND FOR WHOM BIRDING IS THE PRIMARY OUTDOOR ACTIVITY.

2. AN <u>ACTIVE</u> BIRDER. A PERSON WHO TRAVELS AWAY FROM HOME SPECIFICALLY TO BIRD BUT MAY NEED LONGER NOTICE, WHO MAY OR MAY NOT BELONG TO A LOCAL BIRDING CLUB, WHO SUBSCRIBES TO GENERAL INTEREST BIRD MAGAZINES (SUCH AS WILD BIRD OR BIRDWATCHER'S DIGEST), 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

3. A <u>CASUAL</u> BIRDER. 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.

Q3. Compared to your other outdoor recreational activities (such as hiking, camping, hunting, fishing), how would you comparatively rate birding ? (Check one)

1. YOUR MOST IMPORTANT OUTDOOR ACTIVITY
2. YOUR SECOND MOST IMPORTANT OUTDOOR ACTIVITY
3. YOUR THIRD MOST IMPORTANT OUTDOOR ACTIVITY
4. ONLY ONE OF MANY OUTDOOR ACTIVITIES

Q4. For how many years have you birded? _____ YEARS

Q5. In the past 12 months, how many trips away from home did you take specifically to bird? _____ TRIPS

Q5A. How many of these bird watching trips were to or within the Coastal Bend Area? _____ TRIPS

Q6. Is this total more, about the same, or less than usual compared to previous years? (Check one)

1. MORE THAN USUAL
2. ABOUT THE SAME
3. LESS THAN USUAL

Q7. In the past 12 months, how many days did you bird in the following areas? (if none, please enter "O")

_____ DAYS IN THE COASTAL BEND AREA OF SOUTH TEXAS
_____ DAYS IN TEXAS
_____ DAYS IN THE UNITED STATES, EXCLUDING TEXAS
_____ DAYS OUT OF THE UNITED STATES
_____ **TOTAL DAYS BIRDING IN THE PAST 12 MONTHS**

Q8. What was the average length of a birding trip?

_____ DAYS

Q9. If you had to replace all of your birding equipment you currently use with similar equipment, how much would the replacements cost? (please enter "O" if not applicable)

1. BINOCULARS $ _____
2. SCOPE AND TRIPOD $ _____
3. CAMERA AND LENSES $ _____
4. TAPE RECORDER $ _____
5. BOOKS AND FIELD GUIDES $ _____
6. OTHER (PLEASE SPECIFY)

_____ $ _____

7. TOTAL $ _____

Q10. Are you a member of any local, state, or national birding or conservation organization? (Check one)

1. Yes
2. No

In the following section, you will be asked about your expenditures and experiences in the COASTAL BEND AREA during your most recent birding outing.

Q11. When did your most recent trip away from home (more than one mile from your primary residence) to observe, feed, or photograph birds occur in the Coastal Bend Area?

_____ DAY _____ MONTH _____ YEAR

Q12. How many people, including yourself, were in your travel party?

_____ PEOPLE

Q13. Within your travel party, how many people actually birded?

_____ PEOPLE

Q14. Within the Coastal Bend Area what type of group did you bird (associate) with during your trip? (Check all that apply)

1. BY YOURSELF
2. SPOUSE
3. CHILDREN
4. EXTENDED FAMILY
5. FRIENDS
6. BIRD CLUB OR ORGANIZATION
7. PROFESSIONAL TOUR GROUP
8. OTHER (PLEASE SPECIFY)

_____

Q15. How many miles did you travel from your home or the place you were staying locally to the place where you birded?

_____ MILES

Q16. About how long did it take you to get from your home or the place you were staying locally to the place where you birded?

_____ HOURS _____ MINUTES

The following items are only for those people who live outside the Coastal Bend Area. People who live here should skip to Q32

Q17. How (or from whom) did you learn about birding in the Coastal Bend Area? (Check all that apply)

1. FAMILY
2. FRIENDS
3. BIRDING ORGANIZATION OR CLUB
4. MAGAZINE OR NEWSPAPER ARTICLE
5. TRAVEL GUIDE OR BOOK
6. OTHER (PLEASE SPECIFY)

_____

Q18. How many one-way miles did you travel to reach the Coastal Bend Area from your home?

_____ MILES

Q19. How many hours of travel time did it take you to reach the Coastal Bend from your home?

_____ HOURS

Q20. What form of transportation did you use to travel to the Coastal Bend Area? (Check all that apply)

1. AIR
2. PERSONAL CAR
3. RENTAL CAR
4. OTHER (PLEASE SPECIFY)

_____

Q21. During your visit to the Coastal Bend, how many days and nights did you stay in the area?

_____ DAYS

_____ NIGHTS

Q22. During your most recent birding trip to the Coastal Bend Area, which of the following sites did you visit? (Circle all that apply)

1. ARANSAS NATIONAL WILDLIFE REFUGE
2. GOOSE ISLAND STATE PARK
3. CONNIE HAGAR COTTAGE SANCTUARY (ROCKPORT)
4. PORT ARANSAS BIRDING CENTER
5. MUSTANG ISLAND STATE PARK
6. PADRE ISLAND NATIONAL SEASHORE
7. HANS SUTER PARK
8. BLUCHER PARK
9. INDIAN POINT (PORTLAND)
10. OTHER (PLEASE SPECIFY)

_____

Q23. Please list the five bird species (or groups of species) that you were most interested in seeing in the Coastal Bend Area during your most recent trip.

_____ FIRST CHOICE

_____ SECOND CHOICE

_____ THIRD CHOICE

_____ FOURTH CHOICE

_____ FIFTH CHOICE

Q24. Would you have extended your trip to see one of these species? (Check one)

1. YES
2. NO
3. I'M NOT SURE

Q25. During your last trip to the Coastal Bend of South Texas, how much did you spend (or your prorated share) on each of the following items (if zero, please write "O" in the appropriate blank)

	In Coastal Bend	In Texas
TRANSPORTATION		
AIR/TRAIN/BUS FARES	$ _____	$ _____
PERSONAL VEHICLE/FUEL	$ _____	$ _____
RENTAL VEHICLE/FUEL	$ _____	$ _____
LODGING		
HOTEL/MOTEL	$ _____	$ _____
B&B	$ _____	$ _____
CAMPING	$ _____	$ _____
RV PARK	$ _____	$ _____
OTHER	$ _____	$ _____
FOOD		
RESTAURANTS	$ _____	$ _____
GROCERIES (INCLUDING DRINKS)	$ _____	$ _____
OTHER (SUCH AS SNACKS)	$ _____	$ _____
MISCELLANEOUS		
EQUIPMENT	$ _____	$ _____
SOUVENIRS	$ _____	$ _____
ENTRANCE/REGISTRATION FEES	$ _____	$ _____
OTHER (PLEASE SPECIFY) _____	$ _____	$ _____
TOTAL (PLEASE ADD ALL COLUMNS)	$ _____	$ _____

Q26. In addition to the above expenditures in the Coastal Bend and Texas for this trip, how much did you additionally spend outside of Texas to make your most recent trip to the Coastal Bend?

$ _____

Q27. Please total the trip expenses itemized in **Q25 - Q26.** If this total does not seem reasonable, please re-evaluate and make the appropriate changes above.

$ _____ **TOTAL EXPENSES**

Q28. Please list additional goods and services that you might have purchased had they been available in the Coastal Bend Area.

1. _____

2. _____

Q29. During your trip, did you have any additional interests in the Coastal Bend Area other than birding? (Check one)

1. YES
2. NO. SKIP TO Q32

Q30. What were these additional interests? (Circle all that apply)

1. BUSINESS
2. SIGHTSEEING
3. SHOPPING
4. VISIT FAMILY OR FRIENDS
5. OTHER (PLEASE SPECIFY)

_____

Q31. To what degree did these other interests impact your decision to visit the Coastal Bend? (Check one)

1. NOT AT ALL IMPORTANT
2. SLIGHTLY IMPORTANT
3. MODERATELY IMPORTANT
4. VERY IMPORTANT
5. EXTREMELY IMPORTANT

The following questions will **help us to know more about birders. The information you provide** will **remain strictly confidential,** and you will not be identified with your answers.

Q32. What is your age?

_____ YEARS

Q33. Are you-

1. MALE
2. FEMALE

Q34. What is your approximate total household income before taxes? (Circle one)

1. LESS THAN $10,000
2. $10,000 - $19,999
3. $20,000 - $29,999
4. $30,000 - $49,999
5. $50,000 - $74,999
6. $75,000 - $100,000
7. Over $100,000

Q35. Are you retired?

1. YES
2. NO

Q36. What is the highest grade level of school that you successfully completed? (Circle only one number)

GRADE SCHOOL

-- 1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7 -- 8

HIGH SCHOOL

-- 9 --10 --ll -- 12

COLLEGE/TECHNICAL

--13 ---14 --15 -- 16

GRADUATE SCHOOL

--l7 --18 --19 --20 --21+

Q37. Are you

1. ANGLO
2. AFRICAN-AMERICAN
3. HISPANIC
4. NATIVE AMERICAN
5. ASIAN
6. OTHER (PLEASE SPECIFY)

_____

Q39. What is the zip code of your home address?

_____ ZIP CODE

Q40. Was this survey completed by the person to whom it was given or to whom it was addressed? (Check one)

1. YES
2. NO

Q41. Overall, how understandable did you find the wording of the questions? (Check one)

1. NOT AT ALL UNDERSTANDABLE
2. SLIGHTLY UNDERSTANDABLE
3. MODERATELY UNDERSTANDABLE
4. VERY UNDERSTANDABLE
5. EXTREMELY UNDERSTANDABLE

Q42. Is there anything else you would like to tell us?

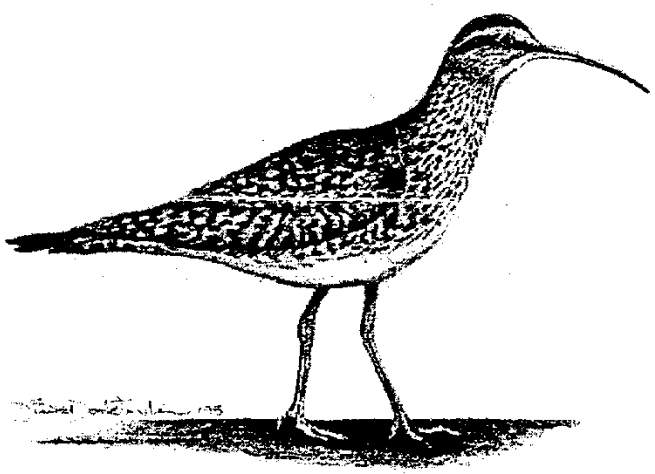
_____

_____

_____

Please place this in the enclosed envelope and drop it in the mail.

Thank you very much for your time.



Eskimo Curlew (*Numenius borealis*)
by Diane Taylor
Corpus Christi, Texas

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