Valuing Nature in Texas

A Characterization of Ecotourism in the Texas Lower Rio Grande Valley

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Ecotourism in the Texas Lower Rio Grande Valley[1]

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1. Introduction

Located on the southernmost portion of the Texas coastal region, the Lower Rio Grande Valley (the Valley) lies in one of the most ecologically complex and biodiverse regions in all of North America. As more and more people become aware of the ecological treasures that exist there, ecotourism in the Valley has developed into a rapidly growing sector of the regional economy. Tourism is the 3rd largest industry in Texas, and ecotourism makes up a significant share of total tourism in the state. Texas is the number one bird-watching state/province in North America, and the Valley is often considered the number two bird-watching destination in North America. The four counties of the Valley – Hidalgo, Starr, Willacy, and Cameron (see Figure 1) – together have recorded almost 500 bird species – more than all but four states.

Ironically, while ecotourism is growing, the Valley's fragile ecosystem is facing unprecedented pressure from other economic activities. One of the key pressures is water. As agricultural production, industry, and a rapidly growing urban population use all but a trickle of the Rio Grande (the region's only major source of fresh water), the water needs of the ecosystem are rarely considered and this fragile natural asset is deteriorating. An important obstacle to more widespread recognition of the ecosystem's water needs is that the economic value of using water to sustain the Valley's ecosystem has never been quantified. Without "economic

[1] This paper is the result of work carried out as part of HARC's Valuing Nature in Texas Program, which uses economic techniques to demonstrate the intangible, but real, economic value provided by the natural environment in Texas. Research was supported by grants from the Houston Endowment and the Texas Coastal Management program with funds from the National Oceanic and Atmospheric Administration (NOAA). We would like to thank Sean Smith (Texas Parks and Wildlife), Vern Vincent (University of Texas – Pan Am) and Ted Eubanks (Fermata, Inc.) for their helpful comments and suggestions on earlier drafts. All errors and omissions remain our responsibility alone.

representation" of this value, it is difficult for water managers, planners, and users to consider the ecosystem, along with agriculture, industry, and municipalities, when making water use decisions.

A detailed understanding of the Valley's ecotourism sector and the role water plays in supporting it can help establish the ecosystem as an economically important user of Rio Grande water. Without sufficient water, the region's ecosystem will continue to decline, with potentially detrimental effects on the ecotourism industry. Within this overall context, this paper serves to characterize the ecotourism sector and its role in the regional economy of the Lower Rio Grande Valley.

2. Overview of Ecotourism

In December, 1998, the United Nations declared 2002 the "International Year of Ecotourism," in accordance with the UN environment and development agenda to encourage efforts by governments, international and regional organizations, and non-governmental organizations to promote development and protect the environment. Although ecotourism represents only a small portion (5% to 10%) of the global travel market, it is currently one of the fastest growing tourism markets. Vincent and Thompson (2002) estimate that growth rates for ecotourism range between 10% and 30% annually, compared to 4% for tourism in general.

Birding and other forms of ecotourism and outdoor recreation are extremely popular with Americans and are becoming increasingly widespread. The National Survey on Recreation and the Environment, conducted by the U.S. Forest Service, reported that 33% of Americans participated in birding one or more times in the previous twelve months. They also noted that the percentage of the population that participates in birding has increased from 12% in 1982-83 to 33% in 2000-2001 (U.S. Forest Service, 2001). The U.S. Fish and Wildlife Service and U.S.

Bureau of the Census (1997) also conducted a survey detailing expenditures and popularity of several wildlife related activities. The survey found that 31% of Americans and 25% of Texans are annually involved with wildlife-watching.

"Nature-based tourism" and "nature-tourism" are often used interchangeably to refer to the same activity that we refer to throughout this report as "ecotourism," although a variety of definitions exist for ecotourism. The International Ecotourism Society defines ecotourism as "responsible travel to natural areas that conserves the environment and sustains the well-being of local people." McNeely et al (1992) define it as "tourism that involves traveling to relatively undisturbed natural areas with the specific object of studying, admiring, and enjoying the scenery and its wild plants and animals, as well as any existing cultural aspects (both past and present) found in those areas." Sirakaya, Sasidharan, and Sonmez (1999) note that ecotourism is a form of tourist activity and development that produces a minimal negative impact on the host environment; an evolving commitment to environmental protection and conservation of resources; the generation of financial resources to support and sustain ecological and socio-cultural resources; and an active involvement and cooperation of local residents, as well as tourists. in enhancing environmental, economic, and social benefits to the host community. No attempt is made here to distinguish between or reconcile these different definitions, and the term "ecotourism" is used simply because it is less awkward than the term "nature-based tourism."

Although tourism can be based on natural attractions, it is not necessarily ecologically or socially sustainable. Sustainable tourism is therefore distinct from ecotourism: not all sustainable tourism is ecotourism, nor is all ecotourism sustainable. Sustainable tourism, based on the concept of sustainable development, is concerned with the social, economic and environmental impacts of tourism activities, be they ecologically based or otherwise. Within the

concept of sustainable tourism, much discussion exists pertaining to tourism management techniques to achieve sustainability. By monitoring damage to the natural environment, paying attention to the location's carrying capacity, and overall minimizing negative impacts and maximizing positive ecological, sociocultural and economic impacts, ecotourism can be sustainable. Indeed, the Quebec Declaration on Ecotourism (United Nations Environmental Programme, 2002) "embraces the principles of sustainable tourism... and the following principles which distinguish it from the wider concept of sustainable tourism:

- Contributes actively to the conservation of natural and cultural heritage,
- Includes local and indigenous communities in its planning, development and operation, contributing to their well-being,
- Interprets the natural and cultural heritage of the destination to visitors,
- Lends itself better to independent travelers, as well as to organized tours for small size groups."[2]

Thus, while not all definitions of ecotourism require sustainability, ecotourism can clearly fit within the concept of sustainable tourism, providing a framework by which those promoting tourism and those promoting nature conservation can work towards similar objectives.[3]

[2] In the framework of the UN International Year of Ecotourism, 2002, under the aegis of the United Nations Environment Programme (UNEP) and the World Tourism Organization (WTO), over one thousand participants coming from 132 countries, from the public, private and non-governmental sectors met at the World Ecotourism Summit, hosted in Quebec City, Canada, by Tourisme Quebec and the Canadian Tourism Commission, between 19 and 22 May 2002. The Quebec Declaration on Ecotourism was one of the outcomes of this event.

[3] For a detailed discussion on this issue see the Commission for Environmental Cooperation, "Sustainable Tourism in Natural Areas (99.01.05) The Development of Sustainable Tourism in North America: Background, Issues, and Opportunities," Discussion Paper, prepared for A Dialogue on Sustainable Tourism in Natural Areas in North America, 27-28 May 1999, Playa del Carmen, Mexico.

3. Ecotourism in the Texas Lower Rio Grande Valley

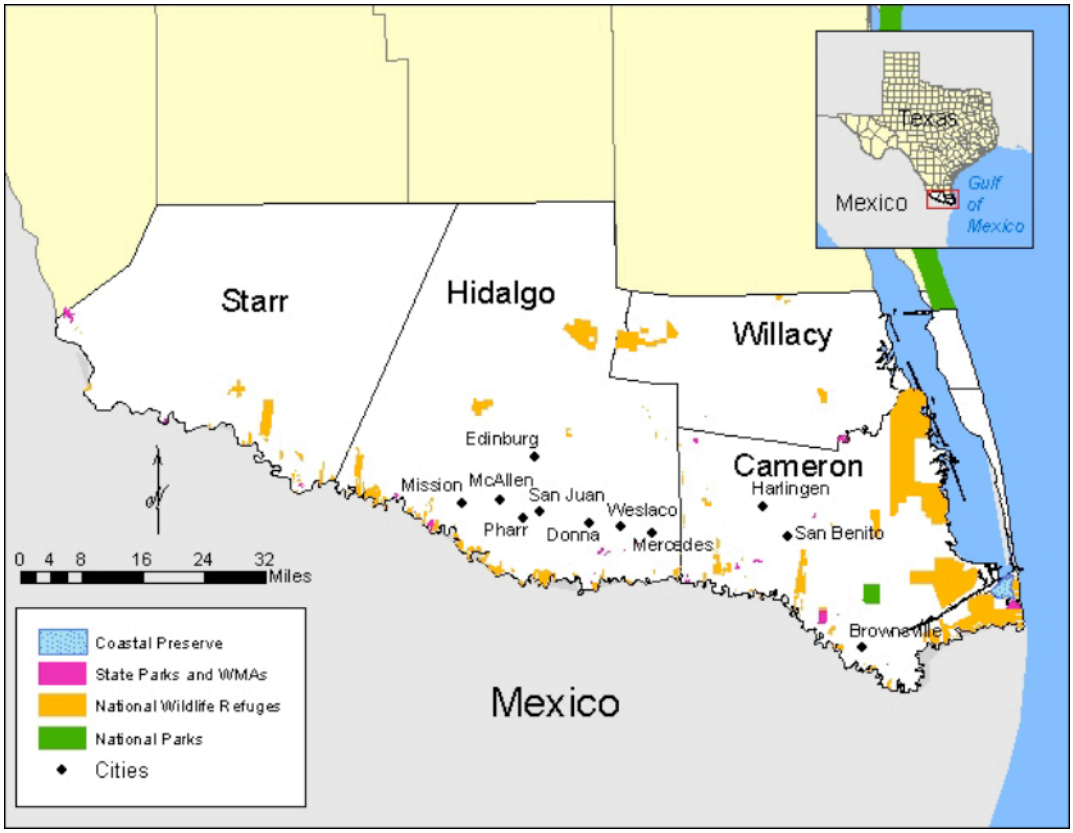
Known internationally as a destination for ecotourism, Texas hosts more than 75% of the bird species in the country. Texas is often characterized as having 3 of the top 12 birding "hot spots" in North America, and is the number one bird watching destination in the U.S. It also has 5,500 plant species, of which arguably 425 occur only in Texas, and 1,100 vertebrate species, of which 60 appear nowhere else in the world (Audubon Texas 2001a).

Within Texas, the Lower Rio Grande Valley is one of the most biodiverse areas in all of North America.[4] The region is home to a unique ecosystem known as the Tamaulipan brushland. Cameron, Hidalgo, Starr, and Willacy counties all lie in the Matamoran district, which is composed of 11 uniquely identified biotic communities, as characterized by the U.S. Fish and Wildlife Service (Jahrsdoefer and Leslie 1989). Each of these biotic communities, ranging from the coastal brushland potholes to the Chihuahuan thorn forest, contributes a unique variety of habitats to support a wide diversity of plant and animal life, as demonstrated by the sheer numbers of species found in the region. It is a major crossroads for migratory birds, and is an important transition region between temperate and tropical zones.

Ecotourism in the Valley focuses primarily on birding, but also accommodates butterfly, dragonfly and other wildlife and outdoors enthusiasts. Due to the diversity of birds in Texas, birders flock to the state, making it the most visited state for birding. The Valley, often considered the number two birding site in North America, draws thousands of people and millions of dollars into the region. The Valley's remarkable biodiversity and its role as a major

[4] For a comprehensive overview of the ecosystem in the Lower Rio Grande Valley, see "A Characterization of Multiple Ecosystems of the Lower Rio Grande Valley," Valuing Nature in Texas Working Paper VNT-02-03, Houston Advanced Research Center, or Jahrsdoerfer and Leslie (1988). See also Fermata Inc.'s website, <http://www.fermatainc.com/nat_riogrande.html>.

Figure 1. Public Protected Areas of the Lower Rio Grande Valley



stopover on one of North America's migratory flight paths, have led to the development of a burgeoning ecotourism sector.

Protected Areas of the Lower Rio Grande Valley: Valuable Natural Assets

A variety of wildlife preserves and refuges have been established to protect remaining fragments of the Valley's diversity of ecosystems (See Figure 1). These protected areas are valuable natural assets upon which the region's ecotourism activities are based. Details about the acreages of these protected areas are presented in Table 1.

Established in 1943 for the protection of migratory birds, the Santa Ana National Wildlife Refuge encompasses a 2,088 acre tract in an important ecological crossroads along the banks of the Rio Grande where subtropical climate, gulf coast, great plains, and Chihuahuan desert meet.

Table 1. Public Birding/Ecotourism Sites in the LRGV

Site	Size (Ac)
Santa Ana NWR	2,088
Laguna Atascosa NWR	45,000
Sabal Palm Audubon Sanctuary	535
Lower Rio Grande Valley NWR*	90,000
Las Palomas WMA	3,311
Bentsen Rio Grande SP	760
Chihuahua Woods Nature Preserve	349
Boca Chica SP	1,055
McAllen Nature Park	15
Harlingen Bird Sanctuary	40
Hugh Ramsey Nature Park	50
Anzalduas County Park	96
Total	**143,299**

*Founded in 1979, the Lower Rio Grande National Wildlife Refuge is still in its acquisition phase. While it currently contains 90,000 acres, it will eventually contain 132,500 acres along the last 275 miles of the Rio Grande as it flows into the Gulf. Some 40,000 acres of tracts are currently open, free of charge to the public.

This thorn forest habitat is host or home to nearly 400 different types of birds and a myriad of other species. Additionally, it is habitat for about one-half of all butterfly species found in the United States. Before dams and flood control structures significantly reduced the flow of the Rio Grande, periodic floods cut shifting channels into the delta, creating crescent-shaped oxbow lakes, referred to as 'resacas.' Santa Ana's management program attempts to imitate the historical flooding of the Rio Grande, maintaining the bottomland hardwood forest and providing crucial nesting and feeding habitat for birds, watering holes for animals, and a refuge system for amphibians, reptiles, crustaceans and insects. However, even when technically feasible, this goal faces significant challenges in the larger political, social and economic context of water use in the region (U.S. Fish and Wildlife Service, 2001b).

Laguna Atascosa NWR is the largest single protected area of natural habitat left in the Lower Rio Grande Valley.[5] Similar to other refuges in the Valley, its 45,000 acres encompass a unique blending of temperate, subtropical, coastal, and desert habitats. Many native plants and wildlife typical of northern Mexico are found at the northernmost edge of their range, while waterfowl such as sandhill cranes migrate south to the refuge for the mild winters (U.S. Fish and Wildlife Service, 2002).

The Sabal Palm Audubon Center and Sanctuary, located near Brownsville on the banks of the Rio Grande, preserves a 527-acre portion of remaining sabal palm forest. Prior to development and flood control efforts, sabal palms grew profusely along the edge of the Rio Grande in small stands or groves extending approximately 80 miles upstream from the Gulf of Mexico. Although little of it remains, this forest ecosystem is one of the most beautiful and critical ecosystems of south Texas and northern Mexico (Audubon Texas, 2001b).

Comprising more than one hundred separate land tracts that lie between Falcon Dam and the Gulf of Mexico, the Lower Rio Grande Valley National Wildlife Refuge (LRGV NWR) creates a patchwork of protected areas along the last 275 river miles of the Rio Grande. Established in 1979, the LRGV NWR compliments an existing wildlife corridor of lands managed for the benefit of wildlife by the Texas Parks and Wildlife Department, National Audubon Society, The Nature Conservancy, private landowners, and the Santa Ana and Laguna Atascosa NWRs. The LRGV NWR land tracts currently total more than 90,000 acres. Through the purchasing of properties and conservation easements, LRGV NWR expects to eventually encompass 132,500 acres in the lower four counties of the Valley. Because it has land tracts that lie across virtually the entire geography of the Valley, the LRGV NWR is one of the most

[5] While the Lower Rio Grande Valley NWR has more acreage than Laguna Atascosa, its acreage is divided among many tracts.

biologically diverse NWRs in the continental United States, containing representations of 11 distinct biotic communities that are host or home to 1,100 types of plants, 700 vertebrate species (including 484 bird species) and more than 300 species of butterflies (U.S. Fish and Wildlife Service, 2001a).

The Las Palomas Wildlife Management Area consists of 3,311 acres of land spread amongst 18 units in Cameron, Hidalgo, and Presido counties of the Lower Rio Grande Valley. This land was purchased to preserve native brush nesting habitat, as well as farmland and wetlands for white-winged doves. Managed by Texas Parks and Wildlife, the tracts range in size from two acres to 604 acres (Texas Parks and Wildlife Department, 2003b).

Along the Rio Grande River, Bentsen-Rio Grande Valley State Park is located 5 miles southwest of Mission, in Hidalgo County. The original 587.7 acres of subtropical resaca woodlands and brushland of thicket-forming thorny shrubs and small trees were acquired from private owners in 1944. The park recently acquired additional land to increase its size to 760 acres. This park is one of the best places in the United States to observe subtropical birds and wildlife that are more commonly found in Mexico. Birds from both the eastern and western United States are also found in the area; and during spring migration, the park is especially interesting to birders. Unusual birds include: paraque, groove-billed ani, green kingfisher, blue bunting, black-bellied whistling duck, clay-colored robin, rose-throated becard, tropical parula and masked tityra. Together with other protected areas along the Rio Grande, the park is also one of the last natural refuges in Texas for cats such as the ocelot and jaguarundi (Texas Parks and Wildlife Department, Publication Date Unknown-a).

The Chihuahua Woods Nature Preserve, managed by the Nature Conservancy and located in Hidalgo county, is a small private preserve (349 acres) with a unique ecosystem containing an

expansive variety of trees, shrubs and thickets. The preserve is home to many species native to the Valley, and its plant life provides a range of seasonal foods and cover for wildlife. Additionally, many cacti still survive in the thorny scrubland.(The Nature Conservancy, 2003).

Boca Chica State Park, containing approximately 1055 acres in the Boca Chica sub delta of the Rio Grande River, in southeastern Cameron County, was acquired and opened in May 1994 in order to protect its native vegetation, fauna, and geological structures in a natural state. One of the major sections, the Barnes Tract, includes the Mesa de Gavilan (a flat upland about 5 feet above sea level), the south shore of South Bay, the west shore of Boca Chica Bay, and the flat, sandy, northern end of Boca Chica Island. It consists of low, shrubby, salt-tolerant vegetation with grasses and herbs interspersed. Trecul's yuccas and Nopal prickly pears rise above this low vegetation on higher elevations. On Boca Chica Island, the Barnes Tract consists of low, newly-forming sand dunes with their anchoring vegetation amidst bare sand flats. A variety of endangered and rare birds can be seen on almost every visit, including brown Pelicans, reddish egrets, roseate spoonbills, osprey, white-tailed kites, Aplomado falcons, snowy plovers, least and sooty terns, black skimmers, Chihuahua ravens, and Cassin's, Botteri's, and seaside sparrows. Many marine shellfish and finfish rely on South Bay as an important hypersaline nursery area. The area serves as a major winter ground for endangered peregrine falcons and piping plovers. The park is managed by Bentsen-Rio Grande State Park (Texas Parks and Wildlife Department, Publication Date Unknown-b).

Because it is a flyway between North and South America, migratory birds essentially become “bottlenecked” in the Valley as they make their migrations. The Santa Ana National Wildlife Refuge, Bentsen-Rio Grande State Park, and Sabal Palm Grove, among others, are part of the Great Texas Coastal Birding Trail (GTCBT) that helps attract ecotourism. The Great

Texas Coastal Birding Trail winds through 43 Texas counties, encompassing the entire Texas coastal region. Completed in April 2000, the Trail features 308 distinct wildlife-viewing sites (Texas Parks and Wildlife Service, 2003a). In addition to the GTCBT, the World Birding Center is an ambitious project to further elevate recreational birding as an outdoor activity and pastime. Stretching from Roma to South Padre Island the World Birding Center creates an opportunity to introduce visitors to several hundred species of birds found in six differing biotic communities. The concept of a birding center, originally envisioned by the Texas Parks & Wildlife Department, is now a partnership between nine local municipalities and U.S. Fish and Wildlife Service, and Texas Parks & Wildlife. Three sites, Bentsen-Rio Grande, Resaca de la Palma and Estero Llano Grande are state parks which have partnered with Mission, Brownsville, and Weslaco respectively. The remaining sites are operated by the local communities of McAllen, Hidalgo, Edinburg, Harlingen, South Padre Island and Roma, the last of which is in partnership with U.S. Fish & Wildlife Service. These sites collectively will fulfill the mission of the World Birding Center which states, "The World Birding Center, a Texas Parks and Wildlife partnership project, will work to significantly increase the appreciation, understanding and conservation of birds, wildlife, habitat and Texas' natural heritage for current and future generations through education, community involvement and sustainable nature tourism" (World Birding Center, Publication Date Unknown).

In addition to the various protected areas just described, well-preserved habitat also exists on private land, most notably on many of the large ranches that dominate South Texas. The Fennessey ranch, just outside of the study area, boasts over 750,000 acres of land, of which 4,000 are wetlands. The King Ranch contains 700,000 acres of pristine land, adjacent to its other ranching and commercial operations. The Kenedy Ranch possesses over 400,000 acres of land.

A small but growing number of ranches offer birding and other ecotourism activities that depend on their vast tracts of native habitat. These are discussed in greater detail below. As interest in nature tourism grows, and local communities look for ways to diversify their economies, ecotourism may provide an alternative means of generating income from the land. In a state that is 94% privately owned, the wildlife resources of Texas are entrusted to the stewardship of private landowners. Many landowners in Texas already derive substantial income from the wildlife-associated recreation of hunters and anglers.

3.1. ***The Multiple Nature Tourism Services in the LRGV***

Throughout the Lower Rio Grande Valley, many bed and breakfasts, ranches, hotels, tour operators and restaurants derive much of their business from ecotourists. Bed and breakfasts cater specifically to ecotourists and wildlife enthusiasts, advertising birding, butterfly watching, and fishing. Some bed and breakfasts, such as the Brown Pelican Inn and The Inn at Chachalaca Bend, cater to birders and offer birding packages with boat tours and photo safaris. The Inn at Chachalaca Bend even includes birding checklists for their property. The Brown Pelican Inn's birding package for 4 nights is $500 plus tour costs. Their package includes time for visits to the state parks and wilderness preserves in the surrounding area, making those public goods an input into their product. In addition to bed and breakfasts, numerous hotels, RV parks, nature tours, private zoos, and optical equipment stores advertise their role in the ecotourism industry and proximity to the birding industry.

As noted above, private ranches have begun to capitalize on the ecotourism industry as well. The Kenedy, King, and Fennessey ranches are among those that offer ecotourism passes for birding, hunting, hiking, and wildlife viewing. The Fennessey Ranch, for example, is part of a 750,000 acre private land empire that has remained in the same family for many decades. It

includes over 4,000 acres of wetlands, meadows, and natural lakes, and over nine miles of mission river frontage. They offer bird lists, hawk watches, hummingbird hayrides, hiking, birding, hunting, and boating passes. During migration seasons, they employ professionals to guide tours for birds and butterflies. Photo safaris are marketed as well. In addition to their private lands, they advertise that they are only one hour from the Aransas NWR, King Port, Corpus Christi, and Port Aransas.

The King Ranch, between Corpus Christi and Brownsville, encompasses 825,000 acres, of which 700,000 are advertised as pristine habitat for birders and hunters. Tours for birdwatchers range from a $23.50 half-day tour where 50 different species of birds can be viewed to $150 for private full-day tours where over 60 different species can be expected to be seen, including many endangered and rare species. Additionally, the ranch offers a plethora of other nature tours to see native plants, dragonflies, butterflies, and rare species such as the bobcat and the javelina (King Ranch, 2003).

Many private ranches in South Texas are connected through the South Texas Heritage Trail. Ranches on this trail that conduct ecotourism tours include the B Bar B Ranch, Cozad Ranch, El Canelo Ranch, Knoll Farms, La Copita Ranch, La Mariposa Ranch, La Mota Ranch, Lomitas Ranch, Lobo Creek Ranch, Martin Refuge, Margo Ranch, Rancho San Buenaventura, and the Santa Maria Ranch. Of these, the El Canelo Ranch, Margo Ranch, Martin Refuge, Lomitas Ranch, and Cozad Ranch are located in the LRGV. The El Canelo Ranch, for example, offers tours and overnight stays on its property, with the opportunity to view many of the 300 species of birds that have been sighted there (El Canelo Ranch, 2000).

Several organized annual events in the Valley attract large numbers of ecotourists into the region. The Texas Tropics Nature Festival, held in McAllen during March, allows people to

explore the area that functions as an important migratory route for birds and butterflies. The October Texas Butterfly Festival in Mission celebrates the Valley's nearly 300 species of butterflies. Wild in Willacy takes place in November and seeks to "Have a 'wild' time in the wild outdoors in Willacy County" (Hunter, 2000). The largest of these festivals, the Rio Grande Birding Festival in Harlingen, in November, annually attracts 2,000 birders to the region.

*3.2. **Economic Impact of Ecotourism in the LRGV***

Expenditures and economic impacts from ecotourism are notoriously difficult to characterize. Definitions differ about what constitutes the "ecotourism industry," and because ecotourism is comprised of elements of other sectors such as the travel, hotel, and restaurant industries, obtaining accurate economic data regarding ecotourism (and tourism in general) presents a challenge. However, by any account, the ecotourism industry in Texas is enormous. The Texas Comptroller's office estimates that the industry contributed approximately $25.4 billion to the $39.9 billion tourism industry in the state. By comparison, the Texas gross state product (GSP) totaled $807.4 billion in 2002 (Strayhorn, 2002a). Thus, nature based tourism is arguably one of the largest industries in Texas. Nature based tourism is estimated to have increased by 63% from 1980 to 1990, and is the fastest growing sector of the travel industry. It generates $1 billion in state taxes, $739 million in local taxes, and $1.4 billion of economic activity (Audubon Texas, 2001a).

The unique ecological assets of the Texas Lower Rio Grande Valley have made ecotourism an increasingly important component of the region's economy. Comprised of the four southernmost counties in Texas – Cameron, Hidalgo, Willacy and Starr –the Valley is one of the poorest, though fastest growing regions in the United States, historically ranking among the very worst in the U.S. in terms of unemployment rates, income, and poverty rates. Average

per capita personal income for 2001 in 2001 dollars ranged from a meager $9,769 in Starr County to $15,334 in Cameron County, compared with a per capita personal income of $28,472 for Texas and $30,511 for the nation. Total income per county in 2001 ranged from $537 million in Starr County to $5.3 billion in Cameron County to $8.2 billion in Hidalgo County. The Valley's four counties yielded a total gross regional product of $14.2 billion in 2001. Over 19,000 people were employed in the tourism industry, which contributed $1.2 billion in travel spending receipts (U.S Bureau of Economic Analysis, 2001). Basic figures regarding personal income and production earning in the Valley are summarized in Table 2. In the larger, thirteen-county region South Texas Border Region, as noted by the Texas state comptroller's office, tourism was the fourth largest industry by employment, behind government, health services, and wholesale and retail trade (Strayhorn, 2002b). Moreover, tourism between 1994 and 2001 grew at an average annual rate of 4.9%, in terms of total spending, making it one of the fastest growing industries in the region (Office of the Governor, Economic Development and Tourism, 2001).

While irrigated agriculture played a historically significant role in shaping the Valley's economy and culture, agriculture today contributes less that 1% of total personal income in most counties (U.S. Bureau of Economic Analysis. 2003).[6] Manufacturing also remains a small sector.[7] In contrast, services represent a major and expanding job source. In the Valley, services sector jobs have increased in the 1990s at an annual rate of 6.2 percent and now account for over 22 percent of all non-farm jobs (Schmandt et al., 2000). Most of that growth has come

[6] 2001 Farm earnings for Cameron, Hidalgo, Willacy, and Starr counties totaled $36.5, $76.7, -$1.8 and $11.7 million, respectively.

[7] Cameron County derives about 6.4 percent of its earnings from manufacturing while neighboring Hidalgo County generates 3.7 percent from this source. In the remaining counties in the region, manufacturing accounts for a very small share of total earnings.

Table 2. Personal Income and Production Earnings by County, 2001 ($000)

□	Cameron	Hidalgo	Starr	Willacy	Total
Per Capita Personal Income	15,334	13,788	9,769	12,760	
Total Personal Income [a]	5,283,442	8,169,870	537,137	253,484	14,243,933
Non-farm Personal Income	5,246,957	8,093,164	525,960	255,290	14,121,371
□	99.3%	99.1%	97.9%	100.7%	99.1%
Farm Earnings	36,485	76,706	11,177	-1,806	122,562
□	0.7%	0.9%	2.1%	-0.7%	0.9%
Dividends, Interest and Rent	775,057	1,061,418	52,749	32,951	1,922,175
□	14.7%	13.0%	9.8%	13.0%	13.5%
Transfer Payments	1,352,068	2,073,001	214,945	96,475	3,736,489
□	25.6%	25.4%	40.0%	38.1%	26.2%
Total Travel Spending [b]	485,387	704,690	18,386	13,468	1,221,931
□	9.2%	8.6%	3.4%	5.3%	8.6%
Production Earnings [c]	3,366,168	5,341,861	276,409	97,024	9,081,462
Farm Earnings	36,485	76,706	11,177	-1,806	122,562
□	1.1%	1.4%	4.0%	-1.9%	1.3%
Non-farm Earnings	3,329,683	5,265,155	265,232	98,830	8,958,900
□	98.9%	98.6%	96.0%	101.9%	98.7%
Manufacturing	341,041	300,049	2,229	1,067	644,386
□	10.1%	5.6%	0.8%	1.1%	7.1%
Retail Trade	301,060	587,902	35,219	10,928	935,109
□	8.9%	11.0%	12.7%	11.3%	10.3%
Health Care [d]	549,438	91,090	–	9,049	649,577
□	16.3%	1.7%	□	9.3%	7.2%
Government	939,080	1,468,716	136,472	39,546	2,583,814
□	27.9%	27.5%	49.4%	40.8%	28.5%
Total Travel Spending [b]	485,387	704,690	18,386	13,468	1,221,931
□	14.4%	13.2%	6.7%	13.9%	13.5%

Sources: U.S. Bureau of Economic Analysis (2001) and Office of the Governor, Economic Development and Tourism(2001)

[a] Percentages are based on contribution to total personal income.

[b] Total Travel Spending is derived from the Texas Department of Economic Development, 2001 and does not refer to any single industry or sector. It is possible that there is some overlap with the other listed categories, though we believe such an overlap is small, if one exists at all.

[c] "Production Earnings" excludes income derived from transfer payments and interest, dividends, and rent. Percentages reflect the particular sector's contribution to production earnings, rather than total personal income.

[d] The health care data for Starr county was undisclosed by the U.S. Bureau of Economic Analysis due to privacy issues. Thus, total health care data excludes Starr county.

in health services and in services related to tourism, i.e., recreation and entertainment. The annual presence of more than 125,000 Winter Texans – typically retirees from the northern U.S. who spend part or all of the winter in Texas – creates significant additional demand for goods and especially services.[8]

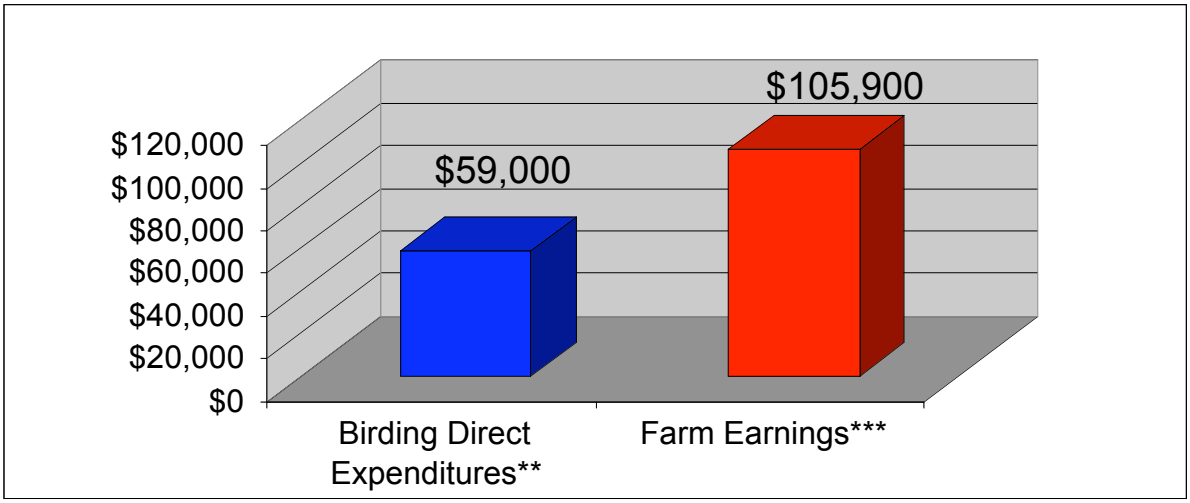
The wildlife refuges and birding festivals that take place in the Lower Rio Grande Valley have significant economic impacts on the regional economy. In the Valley, ecotourism reportedly generates between $100 million and $170 million annually and employs several thousand people (Chapa, 2004). In the feasibility study for the World Birding Center, it was determined that a greater percentage of the local population would be willing to pay entrance fees for the World Birding Center than for the planned Dallas Cowboys training camp (Youth, 2001).

Eubanks and Stoll (1999) compared the economic impact between attendees to the Rio Grande Valley Birding Festival and those who participated in the Great Texas Coastal Birding Trail (GTCBT). While attendees to the Rio Grande Valley Birding Festival tend to be committed birders, those who traveled the GTCBT tended to be more casual birders who consider birding as one of many outdoor hobbies. Birders who attend the four-day Rio Grande Valley Birding Festival in Harlingen spend, on average, $1,352.86 each year for their trips to the festival and the GTCBT. This direct expenditure translates into a Total Gross Output (TGO) of $2,705.72 annually, per visitor to the festival, for a total economic impact of $1.5 million.[9] In

[8] See Vincent et al., (2003) for a detailed description of Winter Texans and other winter visitors to the Texas Rio Grande Valley. An estimated 40-50% of the Winter Texans visit wildlife reserves during their stay. Mexican residents who travel to the Valley represent an increasing source of income for the region's economy. While these visitors frequently travel to Texas primarily to shop and to visit Fiesta Texas and Sea World, many of also take time to visit some of the wildlife refuges in the area (Vincent, 2004)

[9] Eubanks, Kerlinger, and Payne 1995 in Avitourism and American Birding Association, "The Growth of Birding and an Economic Value of Birders: Part 10: A Texas Perspective," <http://americanbirding.org/programs/consecond10.htm>, 2003. Accessed 11 Jun 2003.

Figure 2. Birding revenue from 3 major sites vs. farm earnings in the Lower Rio Grande Valley* (1994, $000)



* The LRGV is defined here as Cameron, Hidalgo, Willacy, and Starr counties.
**Birding impact was drawn from Eubanks et al. (1995), and refers only to the direct expenditures in the Valley from birders visiting Santa Ana NWR, Laguana Atascosa NWR, and the Sabal Palm Audubon Society.
*** Farm Earnings consists of proprietor's net farm income, the wages of hired farm labor, the pay-in-kind of hired farm labor, and the salaries of officers of corporate farms.

contrast, more casual birders – those who travel the GTCBT, spend $2,452.18 directly along the GTCBT, for a TGO of $4,904.36 per traveler.

Eubanks et al. (1995) estimate that birdwatchers at the Santa Ana National Wildlife Refuge, Laguna Atascosa National Wildlife Refuge, and Sabal Palm Audubon Sanctuary contribute more than an estimated $59 million in annual direct expenditures to the LRGV economy. By comparison (see Figure 2), farm earnings in the region accounted for $105.9 million in 1994 (Schmandt et al. 2000). Based on 100,000 visitors per year, the Santa Ana National Wildlife Reserve generates an estimated $14 million in local direct expenditures and has an economic impact of $34.5 million. Laguna Atascosa attracts around 48,000 birders yearly for approximately $5.6 million in local expenditures and a $20 million impact. The Sabal Palm Grove Sanctuary attracts 8,850 visitors for roughly $6.9 million and an additional $1.1 million in the surrounding area.

Table 3. Three Major Economically Significant Birding Sites in the LRGV

Site	Visitors	Economic Impact (Annual)
Santa Ana NWR	100,000	$34,500,000
Laguna Atascosa NWR	48,000	$20,000,000
Sabal Palm Audubon Sanctuary	8,850	$8,000,000

Source: Eubankset al. (1995), based on survey data

Direct expenditures measure the amount of money spent by a tourist getting to, from, and while visiting a site. However, when the regional or national income changes by a greater amount than the original injection to the economy, this is called the multiplier effect. Applying a conservative multiplier of two to the $59 million in direct expenditures described above would translate into an economic impact of $118 million. However, it is important to note that this is only a partial estimate for ecotourism impact from the Valley; these three sites only account for 34% of the total public land that attracts birders and nature enthusiasts. Moreover, this estimate does not include impacts from other ecotourism activities such as backpacking, butterfly watching, or adventure sports. Thus, the total economic impact of all nature tourism activities would be expected to be greater than $118 million. Unfortunately, the economic impacts of the other major ecotourism sites in the LRGV have not yet been measured.

4. Conclusions

Despite difficulties in the measurement of ecotourism production and impact, there can be little doubt that ecotourism is playing an increasingly important role in the Lower Rio Grande Valley. Activities such as bird watching, photography, backpacking, horseback riding, cycling, wildlife viewing, and canoeing are increasingly popular as urban residents and visitors strive to connect with nature. The Valley is endowed with unique ecological assets that serve as the basis of ecotourism and its various components, such as lodging, dining, and tour operators. Projects

such as the Great Texas Coastal Birding Trail and the World Birding Center seek to take advantage of the valuable natural assets that exist in the region, with the expectation of further developing the ecotourism industry in the Valley.

While some recent research has sought to estimate the value of several wildlife refuges, there remains and overall lack of consistent and complete data regarding the economics of ecotourism in the Valley. Thus, the need exists for more detailed and comprehensive empirical studies that will allow us to better understand the role of ecotourism in the Valley and the way it affects the local economy.

Even as the Valley's ecotourism sector continues to gain momentum, the fragile natural assets upon which it depends – that is, the region's uniquely diverse habitats and ecosystems – are experiencing increasing pressure from human development. Obtaining resources to sufficiently preserve these natural assets presents a formidable challenge. Beyond dollars, an adequate amount of water is of critical importance to sustaining the remarkable biodiversity of the Valley. Yet as domestic, industrial and agricultural users compete for water in the face of persistent scarcity, the ecosystem's water needs are typically overlooked.

An estimated value for the water in the production of ecotourism can help to establish the economic rationale for using scarce water to preserve and maintain the Valley's ecosystems. While existing agricultural economics literature provides some insight in the valuation of water as an input in production, and tourism economics provides additional insight into the nature of the tourism production function and product, new methodology must be developed in order to rigorously examine the value of water in ecotourism production. Ultimately, if the unique ecosystems of the rapidly growing Lower Rio Grande are to survive, they must be recognized as a valuable natural asset as well as an economically important water user.

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