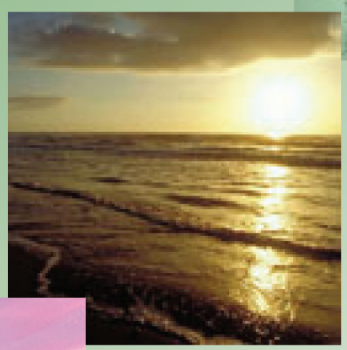

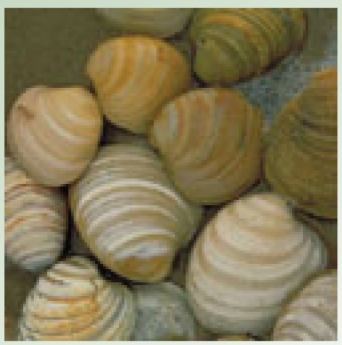

TOWN OF SOUTH PADRE ISLAND
STATE OF THE ENVIRONMENT
ECOTOURISM SUMMIT
APRIL 19, 2007

Board of Aldermen

Mayor
Robert N. Pinkerton Jr.

Mayor Pro Tem
Rick R. Ridolfi

Aldermen
JoAnn Evans
Phillip Money
Dr. Tara Rios-Ybarra

City Manager
Dewey P. Cashwell Jr.

Ecotourism Summit
April 19, 2007

With special thanks to our guest speakers:

UTB/TSC JASON Project Director Mary Jane Shands
UTB/TSC Assistant Professor of Biological Sciences Dr. David Hicks
Cameron County Marine Agent Tony Reisinger

With special thanks to our panelist:

Jeff George, Sea Turtle Rescue Center
Scarlet Colley, SPI Dolphin Research & Sea Life Center
Don Hockaday, UT-Pan Am Coastal Studies Lab
Mike Carlo, U. S. Fish & Wildlife
Darla Lepeyre, SPI Economic Development Corporation
Steve Hathcock, The Beachcomber's Museum
Sam Wells, Bay Area Task Force Committee
Nancy Marsden, Beach and Dune Committee
Mary Ann Tous, Turtle Lady Legacy

Prepared by:

Jason E. Moody
Public Information Coordinator
Town of South Padre Island

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2005 Annual Drinking Water Quality Report

(Consumer Confidence Report)

LAGUNA MADRE WATER DISTRICT

(956) 943-2626

Special Notice for the ELDERLY, INFANTS, CANCER PATIENTS, people with HIV/AIDS or other immune problems: Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. The EPA/Centers for Disease Control and Prevention (CDC) guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (1-800-426-4791).

ALL drinking water may contain contaminants: When drinking water meets federal standards there may not be any health based benefits to purchasing bottled water or point of use devices. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline (1-800-426-4791).

About The Following Pages: The pages that follow list all of the federally regulated or monitored contaminants which have been found in your drinking water. U.S. EPA requires water systems to test for up to 97 contaminants.

Secondary Constituents: Many constituents (such as calcium, sodium, or iron) which are often found in drinking water, can cause taste, color, and odor problems. The taste and odor constituents are called secondary constituents and are regulated by the State of Texas, not EPA. These constituents are not causes for health concerns. Therefore, secondaries are not required to be reported in this document but they may greatly affect the appearance and taste of your water.

WATER SOURCES: The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals, and in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity. Contaminants that may be present in source water before treatment include: microbes, inorganic contaminants, pesticides, herbicides, radioactive contaminents, and organic chemical contaminants.

Our Drinking Water Meets or Exceeds All Federal (EPA) Drinking Water Requirements: This report is a summary of the quality of the water we provide our customers. The analysis was made by using the data from the most recent U.S. Environmental Protection Agency (EPA) required tests and is presented in the attached pages. We hope this information helps you become more knowledgeable about what's in your drinking water.

En espanol

Este informe incluye informacion importante sobre el agua potable. Si tiene preguntas o comentarios sobre este informe en espanol, favor de llamar al tel. (956)943-2626 para hablar con una persona bilingue.

Where do we get our drinking water? Our drinking water is obtained from Surface water sources. It comes from the Rio Grande River. TCEQ completed an assessment of our source water and results indicate that some of our sources are susceptible to certain contaminants. The sampling requirements for our system are based on this susceptibility and previous sample data. Any detections of these contaminants will be found in this report. If we receive or purchase water from another system, their susceptibility is not included in this assessment. For more information on source water assessments and protection efforts at our system, please contact us.

Public Participation Opportunities

Date: Every second and fourth Wednesday of the month
Time: 6:00 pm
Location: Laguna Madre Water District Board Room
Phone No. (956) 943-2626

DEFINITIONS

Maximum Contaminant Level (MCL): The highest permissible level of a contaminant in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.
Maximum Contaminant Level Goal (MCLG): The level of a contaminant in drinking water below which there is no known or expected health risk. MCLGs allow for a margin of safety.
Maximum Residual Disinfectant Level (MRDL): The highest level of disinfectant allowed in drinking water. There is convincing evidence that addition of disinfectant is necessary for control of microbial contaminants.
Maximum Residual Disinfectant Level Goal (MRDLG): The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contamination.
Treatment Technique (TT): A required process intended to reduce the level of a contaminant in drinking water.
Action Level (AL): The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.

ABBREVIATIONS

NTU- Nephelometric Turbidity Units
MFL- million fibers per liter (a measure of asbestos)
pCi/l- picocuries per liter (a measure of radioactivity)
ppm- parts per million, or milligrams per liter (mg/l)
ppb- parts per billion, or micrograms per liter (ug/l)
ppt- parts per trillion, or nanograms per liter
ppq- parts per quadrillion, or picograms per liter

Inorganic Contaminants

Year Range	Contaminant	Average Level	Minimum Level	Maximum Level	MCL	MCLG	Unit of Measure	Source of Constituent
2002	Arsenic	1	0	2	10*	0	ppb	Erosion of natural deposits; Runoff from orchards; Runoff from glass and electronics production wastes.
	*The arsenic value was effective January 23, 2006. In the event of a violation, you will be notified.							
2002	Barium	0.117	0.116	0.118	2	2	ppm	Discharge of drilling wastes; Discharge from metal Refineries; Erosion of natural deposits.
2005	Fluoride	0.53	0.5	0.55	4	4	ppm	Erosion of natural deposits; Water additive which promotes strong teeth; Discharge from fertilizer and aluminum factories.
2005	Nitrate	0.19	0.16	0.22	10	10	ppm	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits.
2002	Selenium	5.6	5.5	5.6	50	50	ppb	Discharge from petroleum and metal refineries; Erosion of natural deposits; Discharge from mines.
2005	Gross beta emitters	4.35	3	5.7	50	0	pCi/L	Decay of natural and man-made deposits.

Organic Contaminants TESTING WAIVED, NOT REPORTED, OR NONE DETECTED

MAXIMUM RESIDUAL DISINFECTANT LEVEL

Year	Disinfectant	Average Level	Minimun Level	Maximun Level	MRDL	MRDLG	Unit / Measure	Source of Chemical
2005	Chloramine	3.1	2.5	3.6	4.0	<4.0	ppm	Disinfectant used to control microbes.

Disinfection Byproducts

Year	Constituent	Average Level	Minimum Level	Maximum Level	MCL	Unit of Measure	Source of Constituent
2005	Total Haloacetic Acids	29.4	13.8	50.2	60	ppb	By-product of drinking water disinfection
2005	Total Trihalomethanes	51.6	37.3	66.6	80	ppb	By-product of drinking water disinfection

Unregulated Contaminants

Bromoform, chloroform, dichlorobromomethane, and dibromochloromethane are byproducts. There is no maximum contaminant level for these chemicals at the entry point to distribution.

Year	Contaminant	Average Level	Minumum Level	Maximum Level	Unit of Measure	Reason for Monitoring
2005	Chloroform	9.34	8.31	10.36	ppb	Byproduct of drinking water disinfectant
2005	Bromoform	19.8	19.56	20.03	ppb	Byproduct of drinking water disinfectant
2005	Bromodichloromethane	18.77	18.47	19.06	ppb	Byproduct of drinking water disinfectant
2005	Dibromochloromethane	21.9	20.82	22.97	ppb	Byproduct of drinking water disinfectant

Lead and Copper

Year	Constituent	The 90th percentile	Number of Site Exceeding Action Level	Action Level	Unit of Measure	Source of Constituent
2004	Lead	3.3	0	15	ppb	Corrosion of household plumbing systems; Erosion of natural deposits.
2004	Copper	0.181	0	1.3	ppm	Corrosion of household plumbing systems; Erosion of natural deposits; Leaching from wood preservatives.

Turbidity

Turbidity has no health effects. However, turbidity can interfere with disinfection and provide a medium for microbial growth. Turbidity may indicate the presence of disease-causing organisms. These organisms include bacteia, viruses, and parasites that can cause symtoms such as nausea, cramps, diarrhea, and associated headaches.

Year	Constituent	Highest Single Measurement	Lowest Monthly % of Samples Meeting Limits	Turbidity Limits	Unit of Measure	Source of Constituent
2005	Turbidity	0.40	98%	0.3	NTU	Soil runoff.

Total Organic Carbon

Total organic carbon (TOC) no health effects. The disinfectant can combine with TOC to form disinfection byproducts. Disinfection is necessary to ensure that water does not have unacceptable levels of pathogens. Byproducts of disinfection include trihalomethanes (THMs) and haloacetic acids (HAA) which are reported elsewhere in this report.

Year	Contaminant	Average Level	Minimum Level	Maximum Level	Unit of Measure	Source of Contaminant
2005	Source of Water	6.17	4.19	7.23	ppm	Naturally present in the environment
2005	Drinking Water	3.97	1.33	5.1	ppm	Naturally present in the environment
2005	Removal Ratio	1.23	0.58	1.83	% removal*	N/A

* Removal ratio is the percent of TOC removed by the treatment process divided by the percent of TOC required by TCEQ to be removed.

Total Coliform REPORTED MONTHLY TESTS FOUND NO COLIFORM BACTERIA.

Fecal Coliform REPORTED MONTHLY TESTS FOUND NO FECAL COLIFORM BACTERIA.

Secondary and Other Constituents Not Regulated (No associated adverse health effects)

Year Range	Constituent	Average Level	Minimum Level	Maximum Level	Secondary Limit	Units of Measure	Source of Constituent
2002	Aluminum	0.034	0	0.067	50	ppm	Abundant naturally occuring element.
2005	Bicarbonate	94	92	95	NA	ppm	Corrosion of carbonate rocks such as lime stone.
2002	Calcium	95.6	95.5	95.6	NA	ppm	Abundant naturally occuring element.
2005	Chloride	197	194	200	300	ppm	Abundant naturally occuring element; used in water purification;byproduct of oil field activity.
2002	Copper	0.025	0.015	0.035	NA	ppm	Corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives.
2005	Hardness as Ca/Mg	285	283	287	NA	ppm	Naturally occuring calcium and magnesium.
2002	Magnesium	25.200	25	25.4	NA	ppm	Abundant naturally occuring element.
2004	pH	7.7	7.6	7.7	7	units	Measure of corrosivity of water.
2002	Sodium	143	141	144	NA	ppm	Erosion of natural deposits; byproduct of oil field activity.
2005	Sulfate	283	282	284	300	ppm	Naturally occuring; common industrial by-product;byproduct of oil field activity.
2005	Total Alkalinity as CaCO3	94	92	95	NA	ppm	Naturally occurring soluble mineral salts.
2003	Total Dissolved Solids	819	800	838	1000	ppm	Total dissolved mineral constituents in water.
2002	Total Hardness as CaCO3	311	310	312	NA	ppm	Naturally occuring calcium.

The State of Water in the Gulf Coast

Coastal wetlands support 60%-90% of the commercial fisheries in the U.S.

Major Water Challenge: “Freshwater inflow” Competing demands for water upriver from bays and estuaries prevents freshwater from flowing into the bays and estuaries and mixing with saltwater, thus affecting the salinity of these areas and the ability of young species to survive.

Water Resource Problems: By 2050, this population is expected to more than double; municipal and manufacturing needs will increase. Additional water sources will be needed.

Water Planning Areas: N, P, H, I, M, L, K map

[top]

The Gulf Coast region is a nearly-level plain, dissected by streams and rivers flowing into the Gulf of Mexico. The 21,000 square mile region includes barrier islands along the coast, salt grass marshes surrounding bays and estuaries, remnant tallgrass prairies, oak parklands and oak mottes scattered along the coast and tall woodlands in the river

bottomlands. Soils are acidic sands and sandy loams, with clays occurring primarily in the river bottoms.

Coastal wetland habitats contain the largest diversity of plants and animals of any Texas aquatic ecosystem. This is due in large part to the diversity of habitats that make up coastal wetlands.

Gulf Coast wetlands are mostly flat and defined by their mix of salty and fresh water although sometimes the water is entirely fresh. Potholes, wet prairies and forested wetlands are found just inland from the tidal zone. Tidal wetlands include barrier islands, tidal flats, bays, estuaries and bayous. Coastal wetlands provide habitat for millions of migrating waterfowl and protection from storms that erode the shoreline. Bays and estuaries are nursery and spawning areas for marine species and habitat for oysters and clams that filter tons of pollutants out of gulf coast waters.

The success of these wetlands depends upon having the right amount of freshwater flowing in to the saltwater. Most major Texas rivers flow to coastal estuaries, and it is through these rivers and streams that the flow of freshwater helps maintain a fragile balance of water chemistry that sustains many specially-adapted plants and animals. These areas are the nurseries for many saltwater fish, crabs, shrimp and shellfish. Their importance can’t be overstated.

Saltwater fishing in Texas generates $2 billion annually.

In addition to aquatic species, coastal wetlands also support a diversity of bird life such as shore birds, wading birds, gulls, terns and pelicans. Songbirds migrating in the spring often travel great distances across the Gulf of Mexico before landing safely on Texas shores. Sadly, coastal wetland habitats are being destroyed at an alarming rate as a result of development, decreases in water quality and other threats. Communities and resource professionals are teaming up to conserve these productive habitats.

The Gulf waters range from beachfront to offshore environments with depths varying from 1 or 2 feet for the beachfront to depths of over 100 feet offshore. The beachfront contains fine shell deposits and sandbars. In the bays, water is salty, but fairly shallow, with seagrass beds providing important cover for fish, crabs, shrimp and shellfish. Sand bars, spoil island and shell reefs also provide structure. Several species of crustaceans, jellyfish, sea turtles and others inhabit inshore and offshore waters supplying food for fish and others of their kind.

[top]

Water Supply and Demand

Supply

Major River: San Jacinto, Trinity, Brazos, Nueces, San Antonio
Major Aquifer: Gulf Coast, Carrizo-Wilcox

Use & Demand

Mid-North Coast: 67% demand met through surface water. 36% demand is municipal, 35% manufacturing, 23% for irrigation.
By 2050, the population of the area is expected to double. The demand for water is expected to change to 50% for irrigation, and 44% for municipal needs.

South Coast: 75% demand met through surface water. 49% for municipal needs; 30% manufacturing.
By 2050, demand expected to change to 54% municipal, 37% manufacturing.

Water supplies may be insufficient to meet demand. (Source: Texas Center for Policy Studies. Texas Environmental Almanac (Austin: U.T. Press, 2002), 24-29.)

[top]

Major Cities - Rainfall / Elevation

Mid-North:
Average Rainfall – 40-60 in./yr
Average Net Evaporation rate: 16-28 inches

South:
Average Rainfall 24-36 in./yr
Average Net Evaporation rate: 40-52 inches

Alvin - 49.44 in / 51 ft
Baytown - 51.85 in / 26 ft
Beaumont - 57.00 in / 24 ft
Corpus Christi - 30.1 in
Galveston - 42.28 in / 20 ft
Houston - 50.83 in / 55 ft
Port Arthur - 42.42 in / 18 ft
Raymondville - 27.57 in / 40 ft
Richmond - 44.34 in / 104 ft
South Padre Island - 21.38 in / 5 ft
Sugar Land - 45.33 in / 82 ft
Victoria - 28.74 in / 93 ft
Wharton - 41.53 in / 111 ft

[top]

Flora and Fauna of the Gulf Coast

Coastal Wetlands

Common Vegetation

Grasses
Tallgrass prairies
Live oak woodlands
Mesquite
Acacias
Sugarberry
Green ash
Sweetgum
Water oak
Willow oak
Southern live oak
American elm

Holly
Yaupon
Red mulberry
Wax myrtle
Cherry-laurel
Sweet bay
Red chokecherry
Short-leaf pine

[top]

Rare Plants & Habitats

Prairie dawn: Poorly drained, sparsely vegetated areas in open grasslands
Slender rush pea/South Texas ambrosia: Grasslands or mesquite invaded grasslands

[top]

Common Wildlife

Mammals:
Muskrat
Coyote
Marsh rice rat
Mink
River otter
Bottlenose dolphin
Reptiles:
Alligator
Diamond back terrapin
Bull frog
Shore birds:
Roseate spoonbill
Black skimmer
Gulls

Terns
Pelicans

Note: Migration route
of many birds. See
Coastal Birding Trails.
Near shore fishes:
Spotted sea trout
Red drum
Southern flounder
Striped mullet
Sheepshead
Shrimp
Blue crab
Off shore fishes:
Snappers
Spadefish
Groupers

[top]

Rare Animals & Habitats

Attwater's prairie chicken: Tall grass coastal prairie
Eastern brown pelican: Offshore islands, spoil islands, mudbanks
Eskimo curlew: Migrates through the grasslands from the Arctic tundra to Pampas grasslands of Argentina
Piping plover: Winters along Gulf Coast; tidal mud flats, sandflats, or algal flats
Whooping crane: Winters on Texas Gulf Coast; marshes and sandflats of Aransas

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TEXAS PARKS AND WILDLIFE

Show navigation

RED TIDE IN TEXAS

Current Status

April 5, 2007

Red tide has not caused any fish kills or respiratory irritation along the Texas coast since October 2006. Bays that were closed to shellfish harvesting due to red tide have reopened. Information about shellfish closures can be obtained by contacting the Seafood and Aquatic Life group of the TDSHS at (800) 685-0361.

February 2, 2007

Red tide has not been present anywhere along the Texas coast since late October. However, shellfish harvesting season is delayed in parts of San Antonio Bay and all of Mesquite, St. Charles, Aransas, Copano and Corpus Christi bays. The bays will be reopened to shellfish harvesting when tests reveal no detectable level of toxin in the shellfish meat. Information about shellfish closures can be obtained by contacting the Seafood and Aquatic Life group of the TDSHS at (800) 685-0361.

November 1, 2006

Red tide has not caused any fish kills or respiratory irritation anywhere on the Texas coast in almost 2 weeks. However, red tides can have lingering effects after the bloom has dissipated. Filter-feeding shellfish (oysters, clams, whelks and mussels) accumulate the red tide toxin in their tissues, where it can remain for weeks. The toxin, which is not destroyed by the cooking process, causes a type of food poisoning called Neurotoxic Shellfish Poisoning. For this reason, shellfish harvesting season is delayed in parts of

San Antonio Bay and all of Mesquite, St. Charles, Aransas, Copano and Corpus Christi bays. The bays will be reopened to shellfish harvesting when tests reveal no detectable level of toxin in the shellfish meat. Information about shellfish closures can be obtained by contacting the Seafood and Aquatic Life group of the TDSHS at (800) 685-0361.

October 31, 2006

Red tide has not caused any fish kills along the Texas coast in over one week and all indications are that it is on the decline. However, the Texas Department of State Health Services (TDSHS) has issued a press release regarding a delay in the molluscan shellfish (oysters, clams, whelks, mussels) harvesting season for parts of San Antonio Bay and all of Mesquite, St. Charles, Aransas, Copano and Corpus Christi bays due to red tide. The public is reminded that these shellfish can be toxic even where no discolored water or other evidence of red tide is seen. Information about shellfish closures can be obtained by contacting the Seafood and Aquatic Life group of the TDSHS at (800) 685-0361.

October 30, 2006

Red tide has not caused any fish kills along the Texas coast in over one week and cell counts continue to decline. Padre Island National Seashore reports only very light aerosol and no discolored water along its Gulf beaches. No red tide is visible in Corpus Christi Bay or in the Corpus Christi Ship Channel at the University of Texas Marine Science Institute.

October 27, 2006

Biologists remain cautiously optimistic that recent rains and cooler temperatures have caused the red tide to dissipate. TPWD has received no reports of fish kills this week. Staff of the Padre Island National Seashore report no new fish kills or aerosol irritation, though hardhead spines from previous fish kills remain a concern along the beaches of the National Seashore. Water samples taken yesterday from Corpus Christi Bay near the Texas A&M University campus were free of red tide.

October 25, 2006

Recent coastal rains might have begun to dissipate the red tide, and more rain is forecast for the middle and lower Texas coast through at least Thursday. The overflight planned for this week has been cancelled and there are no plans to reschedule at this time.

Patches of red tide are likely still present in areas of Corpus Christi and Aransas bays as well as along the Gulf beaches of Mustang and Padre Island, though TPWD has received no new reports of dead fish or respiratory irritation. Rangers at Mustang Island State Park report that aerosol effects have decreased since the weekend. Water samples taken at the University of Texas Marine Science Institute in Port Aransas contain very little red tide. Samples taken along the beaches of South Padre Island and Boca Chica, from the Port Mansfield jetties to the mouth of the Rio Grande, continue to be free of red tide.

October 24, 2006

TPWD has received no new reports of dead fish or respiratory irritation. Patches of red tide persist in areas of Corpus Christi and Aransas bays as well as along the Gulf beaches of Padre Island. Patches of discolored water were seen today in Corpus Christi Bay near Cole Park but no aerosol or dead fish were noted. Water samples taken in Matagorda Bay and Aransas Bay near Cedar Bayou were negative for red tide.

October 23, 2006

TPWD received no reports of dead fish or respiratory irritation over the weekend. However, we believe that patches of red tide persist in areas of Corpus Christi and Aransas bays as well as along the Gulf beaches of Padre Island.

October 20, 2006

Biologists conducted an overflight of the Texas coast today, flying from San Jose Island to south of the Port Mansfield jetties, observing both the Gulf beaches and the bays for signs of red tide. Many dead fish were seen floating throughout the northern half of Corpus Christi Bay and there were slightly visible patches of red tide in the bay, including one occurring east of the causeway between Corpus and Portland. No obvious accumulations of dead fish or red tide were seen in Nueces Bay.

Redfish Bay did not have obvious dead fish or red tide. There were no obvious accumulations of dead fish on the San Jose Island Gulf beach and no obviously discolored water nearshore. Beachgoers and anglers were seen from Port Aransas south to Packery Channel. No obvious red tide or discolored water was seen in the Upper Laguna Madre just south of the JFK Causeway. Dead fish were seen in Oso Bay south of the bridge connecting the university to the naval air station, but it is suspected that these fish floated in from Corpus Christi Bay. No obvious red tide was seen in Oso Bay.

Widely scattered dead fish were observed south of Bob Hall Pier and large dead fish, likely red drum, became common near mile marker 45 of Padre Island National Seashore. The biologists continued to see these large dead fish scattered on the beach as they flew south. No obvious abnormal water color and no dead fish were visible on the Gulf beach south of the south Mansfield jetty. Discolored water and scattered dead fish were seen in some areas of the nearshore Gulf of Mexico.

Biologists at the Rockport Marine Lab noticed dead fish (menhaden, pinfish, hardheads) and aerosol in Aransas Pass' Conn Brown Harbor today. A water sample was collected for red tide analysis.

Yesterday's follow-up of the fish kill and aerosol reported earlier this week near the Port Mansfield jetties showed no signs of a fish kill and no aerosol anywhere along South Padre Island. Water samples were collected along the length of South Padre Island in 5-mile increments, beginning at the Port Mansfield jetties, and no evidence of red tide was found in any of the samples.

Biologists collected red tide data around the Corpus Christi area yesterday and reported mild aerosol effects along the bayfront. A large fish kill occurred on Ward Island at the Texas A&M – Corpus Christi campus and mild aerosol was detected. No dead fish were seen along the north side of the JFK Causeway near the channel connecting the Intracoastal Waterway and Packery Channel.

The Texas Department of State Health Services (TDSHS) has begun monitoring the bays in preparation for the opening of shellfish harvesting season on November 1. On Wednesday DSHS biologists found red tide at numerous locations throughout Corpus Christi Bay, with the highest concentrations occurring along the Portland shoreline. There was an active fish kill in the Intracoastal Waterway on the north side of the Corpus

Christi Ship Channel. Low to moderate red tide concentrations were seen Tuesday in Aransas Bay with the highest occurring on the San Jose shoreline near Allyn's Bight. No red tide was found in Copano Bay or along the Fulton shoreline.

October 19, 2006

Water samples taken this morning at the University of Texas Marine Science Institute are free of red tide and no aerosol irritation is being reported in the area.

Biologists are following up on yesterday's report of aerosol and dead fish south of the Port Mansfield jetties. An overflight is scheduled for Friday which will take TPWD staff from just north of Port Aransas to south of the Port Mansfield jetties, observing both the Gulf beaches and the bays for signs of red tide.

Reports came in this morning of dead fish washing ashore along the Corpus Christi Bayfront and North Beach. Biologists are assessing the fish kills this afternoon.

Padre Island National Seashore continues to experience an ongoing fish kill, with the highest concentrations occurring between mile markers 20 and 26. Large numbers of red snapper are washed up near the 24-mile mark, and other species seen along the beach include ladyfish, little tunny, king mackerel, jack crevalle, Spanish mackerel, large red drum, Atlantic spadefish, mullet, and numerous hardhead catfish. Large concentrations of dead fish have also been reported between mile markers 58 and 62. Aerosol irritation was present yesterday in varying concentrations all along the beaches of the National Seashore. The good news is that tides are returning to normal, making travel along the beaches less difficult.

Mustang Island State Park is also experiencing a fish kill including trout, snook, redfish, menhaden, mullet, and hardheads. Aerosol irritation was moderate yesterday but mild today.

October 18, 2006

TPWD has received a report of fresh dead fish and respiratory irritation on the Padre Island beach just south of the Port Mansfield Jetties. However, high tides are thwarting efforts to obtain water samples for confirmation of red tide.

Water samples taken from Galveston, Matagorda Bay, Port O'Connor and Pass Cavallo continue to be free of red tide, and low levels persist at the University of Texas Marine Science Institute in Port Aransas.

The dark water seen near Port Aransas yesterday was due to a heavy bloom of the diatom *Asterionellopsis glacialis*. Red tide was also present in the water samples, which accounts for the aerosol irritation felt in the vicinity of the diatom bloom. Red tide was the cause of yesterday's fish kill, consisting mainly of mullet, menhaden, and hardheads, at Mustang Island State Park.

TPWD biologists working in the Shamrock Cove area of Corpus Christi Bay (near Mustang Island) yesterday observed visible red tide and respiratory discomfort. Water samples taken at Fish Pass, Shamrock Island, and Wilson's Cut all contained low to moderate levels of red tide.

No red tide was visible yesterday in Corpus Christi Bay, from the Corpus Christi Bayfront across the causeway to the Portland shoreline. Birds were seen feeding near Indian Point, indicating red tide is present but not at visible concentrations. Dead fish, mostly mullet and pigfish, were being washed into Nueces Bay from Corpus Christi Bay. However, there is still no evidence of red tide inside Nueces Bay. Patches of dead fish were observed along the shoreline between Indian Point and Portland. Water samples taken in the area are being analyzed.

Mild aerosol effects were reported at the south jetty of Packery Channel yesterday. No new dead fish were reported on Padre Island and high tides are washing away some of the old fish.

October 17. 2006

It appears that winds have pushed the red tide north onto Mustang Island again. Though cell counts at the University of Texas Marine Science Institute on the Corpus Christi Ship Channel remain low, a patch of red tide has been observed near beach access roads 1 and 2 in Port Aransas causing coughing and respiratory difficulties. Water samples are being analyzed for red tide concentration. At Mustang Island State Park there were reports of mild aerosol effects yesterday. No aerosol irritation has been reported today.

Tides are higher than normal all along the Texas coast this week, at times pushing the water all the way to the dunes and making travel down the beaches difficult at best. Travelers should be aware that, in addition to the high tides, people are having difficulties driving on some beaches due to tire punctures from the spines of dead fish.

TPWD received a report of dead mullet, flounder and stingrays seen over the weekend in the Mud Island area of Aransas Bay. Biologists will survey the area and take water samples.

October 16, 2006

No aerosol effects or dead fish were reported in the Port Aransas area over the weekend, and cell counts taken at the University of Texas Marine Science Institute were free of red tide. Fishermen were having success at the Port Aransas jetties over the weekend, landing large redfish, Spanish mackerel, flounder, mangrove snapper, and sheepshead. No red tide has been reported south of the 30-mile mark of Padre Island National Seashore.

Red tide is expanding along the Corpus Christi Bayfront. Large patches of discolored water have been reported from the Peoples Street T-Head north to the Port of Corpus Christi entrance and east to Indian Point. No discolored water has been seen in Nueces Bay at this point. Birds were observed feeding over the water near Indian Point on Sunday, but no dead fish were seen. Streaks of what appear to be red tide were seen in Corpus Christi Bay this morning near Texas A&M - Corpus Christi.

Red tide and accompanying fish kills continue to be present in the Packery Channel area. Dead fish were seen over the weekend near the seawall and at Padre Balli Park and a significant fish kill was reported along the north shore of the JFK Causeway near the intersection of the Intracoastal Waterway and Packery Channel. The fish kill was primarily composed of pinfish, mullet, hardheads, and some flounder. A local bait stand owner said he'd lost his stock of baitfish on Thursday, and fish began showing up along the shoreline the same day.

Red tide effects, including dead fish and respiratory distress, continue to occur along Padre Island National Seashore to approximately the 20 mile mark. Due to the heavy surf and south wind, respiratory affects are being seen at the park headquarters area approximately a half-mile from the beach. Extraordinarily high tides are occurring in the

area, which will make any fish kill assessment impossible until they recede. The numerous dead fish are causing many park visitors to experience multiple flat tires (due to punctures from fish spines) and stranding some vehicles. Numerous dead fish, including a number of large redfish and one 91-inch tiger shark, washed up along the National Seashore over the weekend.

October 13, 2006

Recent satellite imagery indicates high levels of chlorophyll, which may be indicative of algal blooms, offshore in the Gulf of Mexico. Biologists are investigating to confirm whether or not this is a red tide bloom.

TPWD received a report on Thursday of suspected red tide in the Upper Laguna Madre along the King Ranch shoreline. Weather is hampering follow-up efforts so we ask citizens to please contact TPWD if they see indications of red tide in the Laguna Madre.

Red tide persists near downtown Corpus Christi, where blooms are visible along North Beach and the Corpus Christi Ship Channel, near the USS Lexington and the Aquarium, and along the Corpus Christi Bayfront to Cole Park. The bloom continues along the Gulf side of Padre Island. Winds are projected to be blowing from the east or southeast this weekend, meaning that respiratory irritation is likely to be high since the red tide toxin will be blown onshore.

Patches of red tide continue to be seen in Redfish Bay, where a few dead fish were observed on Thursday near the terminal. A fish kill consisting solely of mullet occurred Thursday in the canals in Pelican Cove area of Aransas Pass. The fish were likely being blown in from the Hampton Channel area. No visible signs of red tide were seen, but low concentrations were found in water samples.

According to the U.S. Centers for Disease Control, scientists know little about how breathing the air near red tides or swimming in red tides may affect human health. People who are near the water during red tide may experience irritation of the eyes, nose, and throat, as well as coughing, wheezing, and shortness of breath. People with existing respiratory illness, such as asthma, may experience these symptoms more severely.

If you have concerns or questions about human health effects of red tide or symptoms you are experiencing, please consult a physician.

Although some travelers may be concerned with how the red tide may affect their vacation plans, there are miles of clean beaches to enjoy on the Texas coast.

To report sightings of red tide during business hours, call your local Texas Parks and Wildlife Department office or the Kills and Spills Team at (512) 912-7055. You may also page Dave Buzan at (800) 299-4099, personal identification number 2366.

October 12, 2006

Weather has forced the cancellation of today's red tide overflight.

Water samples taken today in the South Padre Island area are free of red tide. A bloom has been confirmed in high concentrations at Cole Park near the Corpus Christi bayfront. Large concentrations of seagulls were feeding, likely on fish dying from the red tide, about 100 meters offshore from Cole Park yesterday.

Biologists surveyed Mustang and Padre Islands yesterday for red tide-related fish kills. Very few dead fish, all of which were days old, were noted along Port Aransas beaches. Yesterday afternoon biologists received a call regarding dead fish washing ashore at Beach Marker 42 on Mustang Island but have not been able to follow up on the report.

Numerous dead fish are present along Padre Island due to an ongoing fish kill. Biologists surveyed from the south jetty at Packery Channel to the Kleberg County line yesterday and found that the majority of fish were mullet, menhaden, and whiting. Croaker, eel, ladyfish and hardheads were also seen, along with a small number of large

redfish. Fish kill surveys are continuing today along Padre Island from the county line to the northern boundary of the National Seashore.

Patchy blooms continue to move around in the bays near Aransas Pass and Port Aransas. Aerosol irritation has been reported today near the University of Texas Marine Science Institute on the Corpus Christi Ship Channel, where red tide concentrations are persistent but remain fairly low. Irritation was reported yesterday at the Port Aransas public boat ramp as well as along State Highway 35 between Aransas Pass and Rockport. Discolored water was reported yesterday in the Corpus Christi Ship Channel. Visible bloom and high red tide concentrations were recorded Tuesday in Aransas Bay near Allyn's Bight. Moderate concentrations were recorded Tuesday along the Intracoastal Waterway near the convergence of Aransas and Redfish bays.

October 11, 2006

There is no sign of red tide or impacts from red tide in the water in Lavaca Bay, San Antonio Bay, Ayres Dugout, Copano Bay or Fulton Harbor as of yesterday's reconnaissance by State Department of Health Services personnel.
There was no visible sign of red tide along Mustang Island from Port Aransas south to Mustang Island State Park this morning. Dead fish were scattered and appeared to have been dead for several days. There were no fresh dead fish and no signs of respiratory irritation in this reach.

Red tide was detected in the water in Aransas Bay along the western shore of San Jose Island, in Cedar Bayou in relatively low concentrations (33/ml) and in the Intracoastal Waterway coming out of Redfish Bay based on water samples collected by State Department of Health Services personnel yesterday, Oct. 10.

There are reports of visible red tide in Corpus Christi Bay off of Cole Park from two different sources this afternoon.
There is visible red tide along the Gulf beach from Packery Channel south to about one thousand yards south of Bob Hall Pier. This bloom extends from approximately 50 to 150 meters offshore. There are dead fish along the beach and some fresh dead fish are washing ashore at this time. People on the beach are experiencing moderate respiratory and eye irritation on this stretch of beach.

There has been one citizen report of dead red drum on the bottom and floating, birds feeding and other fish floating near Bundts Hole and the Klondike about one mile north of Terminal Causeway.Our biologists will investigate that report tomorrow. There will be a department overflight tomorrow as planned earlier.

According to the U.S. Centers for Disease Control, scientists know little about how breathing the air near red tides or swimming in red tides may affect human health. People who are near the water during red tide may experience irritation of the eyes, nose, and throat, as well as coughing, wheezing, and shortness of breath. People with existing respiratory illness, such as asthma, may experience these symptoms more severely. If you have concerns or questions about human health effects of red tide or symptoms you are experiencing, please consult a physician.

Although some travelers may be concerned with how the red tide may affect their vacation plans, there are miles of clean beaches to enjoy on the Texas coast.

To report sightings of red tide during business hours, call your local Texas Parks and Wildlife Department office or the Kills and Spills Team at (512) 912-7055. You may also page Dave Buzan at (800) 299-4099, personal identification number 2366.

October 10, 2006

The overflight that was scheduled for today has been cancelled due to weather and has been tentatively rescheduled for Thursday.

Cell counts have dropped significantly in Port Aransas at the Corpus Christi Ship Channel near the University of Texas Marine Science Institute. No aerosol effects have been reported in the Port Aransas area.

Padre Island National Seashore staff were notified on Sunday of severe respiratory effects and dead fish washing ashore along the first few miles of the park. As of this morning reports indicate red tide from the park's northern boundary to approximately 30 miles beyond the end of Park Road 22. The most severe aerosol effects and numbers of dead fish are being seen from the northern boundary to 10 miles south of Park Road 22.

October 9, 2006

The southern movement of the red tide that was reported on Friday continued through the weekend, with anglers reporting discolored water and aerosol irritation along portions of Mustang Island to the 13-mile mark of Padre Island National Seashore. Dead fish, mostly mullet, were seen along the Gulf beaches on Sunday from Port Aransas to the 8-mile mark of the National Seashore.

No reports of irritation or fish kills in the Cedar Bayou area came in over the weekend. In addition, red tide has not been found in Rockport, Port O'Connor, Corpus Christi, the Laguna Madre, Port Mansfield or South Padre Island.

TPWD is conducting another overflight of the coast on Tuesday. Biologists will fly from Mesquite Bay to South Padre Island to get an aerial view of the red tide. Staff from TPWD and Padre Island National Seashore will resume collection of water samples on Tuesday to be analyzed for red tide concentration.

October 6, 2006

TPWD completed an overflight of the Texas coast this morning looking for patches of red tide. A substantial bloom was seen along the north jetty at Port Aransas extending out to the first buoy offshore past the jetties. Also seen was a line of dead fish in the water associated with bloom that included 10 large redfish. A large patch of red tide was noted at the north Matagorda Island jetty that extended from the beach to near the end of the jetty. Patches of red tide were seen 200–300 meters offshore scattered from just south of the Matagorda jetties all along Matagorda and San Jose Islands to the Port Aransas jetties.

Dead fish were seen today on Matagorda Island north of Cedar Bayou, but it is not clear how far north the dead fish extended. There were also dead fish along the entire length of the San Jose Island Gulf beach, and biologists are currently assessing this kill.

A possible bloom was noted in Conn Brown Harbor as well as in Redfish Bay north of the Hwy 361 Causeway extending to Corpus Christi Flats to near the Corpus Christi Ship Channel. Streaks of red tide were also seen in the Redfish Bay State Scientific Area. One other patch of red tide was seen in the area of Shamrock Island, including East Flats to the north and Mustang Island to the east.

No visible red tide was seen along the Gulf of Mexico side of Mustang Island, however, TPWD has begun to receive reports of respiratory irritation occurring at Mustang Island State Park. No red tide was seen along the Intracoastal Waterway from Rockport Marina and Fulton Harbor to Mesquite Bay. Biologists report numerous fishermen catching fish today in Redfish Bay (south of the Causeway) and no respiratory irritation or dead fish in Redfish Bay and Aransas Channel.

Water samples taken yesterday at Padre Island National Seashore show no evidence of red tide on either the Gulf or the Laguna Madre side of the island. Likewise, water samples taken from San Antonio Bay are free of red tide. A sample taken yesterday at the Corpus Christi Ship Channel between channel markers 9 and 10 contained moderate levels of red tide, but the sample taken at Cedar Bayou contained much lower levels compared to earlier this week.

Cell counts taken at the University of Texas Marine Science Institute pier are being posted to this website:
http://www.utmsi.utexas.edu/people/staff/villareal/karenia/index.htm

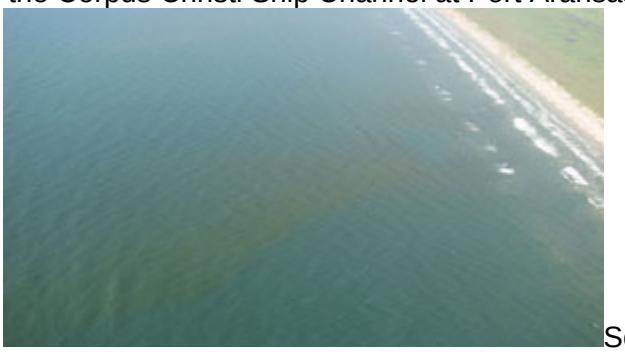
Biologists surveyed the Port Aransas area yesterday and found patches of red tide at various locations within the Corpus Christi Ship Channel, Lydia Ann Channel, Redfish Bay, and the Inner Harbor. A large area of red water was seen in the Corpus Christi Ship Channel stretching out from channel marker 10 past the end of the jetties into the Gulf. Moderate aerosol irritation was reported in the Ship Channel and at San Jose Island, and mild irritation in Lydia Ann Channel and the Inner Harbor.

A number of fish kills have been reported in the past 24 hours. Hardheads were observed dying in the Corpus Christi Ship Channel between markers 9 and 10. A small fish kill was reported on the Port Aransas beach just south of the jetties. A marina in Ransom Channel was the site of another reported fish kill; biologists went to Ransom Channel today but found no discolored water or dead fish.

TPWD biologists came upon 3 dead redfish, all over 3 feet long, in Corpus Christi Channel along the back side of Mustang Island yesterday. In addition, reports came in of about a dozen large redfish dying at the Port Aransas jetties.

The University of Texas Marine Science Institute received an anecdotal report of discolored water and dead flounder in the Laguna Madre yesterday. However, no specific location was given and we have been unable to follow up on this report so far.

October 4, 2006

Red tide continues to persist in the Corpus Christi Ship Channel at Port Aransas near the University of Texas Marine  Science Institute. Low levels of red tide were found yesterday at Pass Cavallo and at the Matagorda Ship Channel jetty. Respiratory irritation was reported yesterday from Conn Brown Harbor in Aransas Pass to Rockport.

TPWD received a report yesterday of a fish kill in Redfish Bay north of the Terminal Causeway consisting mainly of gulf menhaden. Biologists surveyed Redfish Bay today and found no dead fish and no visible sign of red tide.

October 3, 2006

Red tide surveys have been conducted along many portions of the Texas coast. No evidence of red tide has been found in Galveston Bay or the South Padre Island area. In addition, no red tide has been reported along the gulf beaches of Mustang and Padre Islands.

This morning TPWD flew over a portion of the Texas coast, observing a visible but patchy red tide bloom on the gulf side of San Jose Island north to Cedar Bayou.

Red tide has been found at various sites in Corpus Christi Bay and Aransas Bay, including La Quinta Channel, Lydia Ann Channel, and Cedar Bayou. Red tide is also present in the Corpus Christi Ship Channel at Port Aransas near the University of Texas Marine Science Institute. Water samples taken yesterday in the Corpus Christi Marina were free of red tide.

Biologists surveyed the fish kill at Cedar Bayou yesterday and noted that all the dead fish were a few days old. No new dead fish were seen, but aerosol effects were reported at the western shore of Cedar bayou and on the gulf beach of Matagorda Island.

October 2, 2006

Reports of red tide-related fish kills and respiratory irritation came in over the weekend. On Friday night a fisherman observed a fish kill consisting mainly of spot and pinfish, but also including flounder and snook, at Cedar Bayou.

On Saturday morning discolored water and respiratory irritation were reported in Mesquite Bay to Carlos Bay and Spaulding Reef. A second report was received of a small fish kill including trout, redfish, black drum, hardheads, and lots of menhaden along a two-mile stretch from the junction of Cedar Bayou and Mesquite Bay towards the Gulf.

Dead fish were observed on San Jose Island extending north to Cedar Bayou and onto the Matagorda Island shore on Saturday. The fish kill, which was a few days old, included gulf menhaden, mullet, Bermuda chub, ladyfish, and red drum. Aerosol effects were also reported.

TPWD has numerous staff following up on the reported fish kills, as well as sampling the central coast to determine the extent of the red tide bloom. No discolored water and no stressed or dead fish were observed along the north shore of Corpus Christi Bay including La Quinta Channel, the north shore of Redfish Bay, Conn Brown Harbor or the Aransas Channel. Biologists are still conducting their sampling at this time.

Red tide concentrations at the University of Texas Marine Science Institute in Port Aransas dropped significantly over the weekend and today. No aerosol effects have been reported today in Port Aransas.

An overflight of the coast is scheduled for tomorrow morning, which should allow TPWD to get an aerial view of the bloom.

September 29, 2006

A red tide bloom has been confirmed in Port Aransas near the University of Texas Marine Science Institute on the Corpus Christi Ship Channel. No aerosol effects have been reported in Port Aransas. Dead menhaden were found in the university's boat basin, and distressed menhaden have been reported in East Flats. A fish kill has also been reported in La Quinta Channel. There is no evidence at this time that there will be a major bloom impacting Texas beaches. We will continue to monitor the situation.

September 7, 2006

Red tide has not caused any fish kills or respiratory irritation anywhere on the Texas coast since November 2005. Information about shellfish closures can be obtained by contacting the Seafood and Aquatic Life group of the TDSHS at (800) 685-0361.

April 7, 2006

Red tide has not caused any fish kills or respiratory irritation anywhere on the Texas coast since November 2005.

TDSHS has opened the oyster harvesting season in Aransas Bay (including St. Charles Bay and Carlos Bay), Corpus Christi Bay and the Laguna Madre including South Bay. Information about shellfish closures can be obtained by contacting the Seafood and Aquatic Life group of the TDSHS at (800) 685-0361.

March 6, 2006

Red tide has not caused any fish kills or respiratory irritation anywhere on the Texas coast since November 2005.

TDSHS has opened the oyster harvesting season in Aransas Bay (including St. Charles Bay and Carlos Bay), Corpus Christi Bay and the Laguna Madre including South Bay. Information about shellfish closures can be obtained by contacting the Seafood and Aquatic Life group of the TDSHS at (800) 685-0361.

February 6, 2006

Still no red tide, but the Laguna Madre and Corpus Chirsti Bay remain closed.

TDSHS states that the oyster harvesting season is delayed in Aransas Bay, Corpus Christi Bay and all of the Laguna Madre including South Bay. TDSHS reminds the public not to harvest and eat oysters, clams, mussels or whelks from Texas coastal waters while red tide is present. Information about shellfish closures can be obtained by contacting the Seafood and Aquatic Life group of the TDSHS at (800) 685-0361.

January 11, 2006

Red tide has not caused any fish kills or respiratory irritation anywhere on the Texas coast since early November 2005.

TDSHS has opened the oyster harvesting season in Aransas Bay (including St. Charles Bay and Carlos Bay), but the season remains delayed in Corpus Christi Bay and the Laguna Madre including South Bay. TDSHS reminds the public not to harvest and eat oysters, clams, mussels or whelks from Texas coastal waters while red tide is present. Information about shellfish closures can be obtained by contacting the Seafood and Aquatic Life group of the TDSHS at (800) 685-0361.

November 30, 2005

Red tide has not caused any fish kills or respiratory irritation anywhere on the Texas coast since early November. TPWD received a report of discolored water in Corpus Christi Bay on November 30; however, no reports of dead fish or aerosols accompanied the sighting.

TDSHS states that the oyster harvesting season is delayed in Aransas Bay, Corpus Christi Bay and all of the Laguna Madre including South Bay. TDSHS reminds the public not to harvest and eat oysters, clams, mussels or whelks from Texas coastal waters while red tide is present. Information about shellfish closures can be obtained by contacting the Seafood and Aquatic Life group of the TDSHS at (800) 685-0361.

November 15, 2005

Texas gulf beaches continue to be free of red tide, and there are no recent reports of dead fish or respiratory irritation in the Corpus Christi area. Red tide cells are still being found at the intake for the Department’s CCA/CPL Marine Development Center in the upper Laguna Madre.

Recent samples taken at the University of Texas Marine Science Institute on the Corpus Christi Ship Channel showed very low levels of red tide. No aerosol effects have been reported in Port Aransas.

 The presence of red tide in Aransas Bay has delayed the opening of the shellfish harvest season there. However, red tide has not been observed in Mesquite Bay, San Antonio Bay or Matagorda Bay.

TPWD has received no reports of dead fish or respiratory irritation in the South Padre Island area. Recent water samples examined by University of Texas Pan American Coastal Studies Lab and Cameron County Extension Agent Tony Reisinger have contained little to no red tide cells.

November 9, 2005

Texas gulf beaches continue to be free of red tide, and no reports of dead fish or respiratory irritation have come in from the Corpus Christi area this week. Red tide cells are still being found at the intake for the Department's CCA/CPL Marine Development Center in the upper Laguna Madre.

Yesterday's samples taken at the University of Texas Marine Science Institute on the Corpus Christi Ship Channel showed very low levels of red tide. No aerosol effects have been reported in Port Aransas.

Water samples taken near Mud Island on Monday by the Texas Department of State Health Services (TDSHS) contained low levels of red tide cells; TPWD Coastal Fisheries staff were also out that day and did not observe any discolored water. The presence of red tide in Aransas Bay has delayed the opening of the shellfish harvest season there.

However, red tide has not been observed in Mesquite Bay, San Antonio Bay or Matagorda Bay.

TPWD has received no reports of dead fish or respiratory irritation in the South Padre Island area. Recent water samples have contained little to no red tide cells.

November 7, 2005.

Red tide continues to show up at low levels in Port Aransas near the University of Texas Marine Science Institute on the Corpus Christi Ship Channel. No aerosol effects have been reported in Port Aransas. Red tide has also appeared in Aransas Bay, which has delayed the opening of the shellfish harvest season there. Red tide continues to be present in Corpus Christi Bay in low levels, but high levels were measured at the Laguna Shores marina. Red tide cells often occur at higher levels in marinas and canals where water circulation is restricted. Red tide has not been observed in Mesquite Bay, San Antonio Bay or Matagorda Bay, and the gulf beaches also appear to be free of red tide.

In south Texas, water samples contain very few or no red tide cells, according to reports from the University of Texas Pan American Coastal Studies Lab and Cameron County extension agent Tony Reisinger. No aerosol has been detected for two weeks in the South Padre Island area.

Although some travelers may be concerned with how the red tide may affect their vacation plans, there are miles of clean beaches to enjoy on the Texas coast.

November 4, 2005.

Red tide continues to show up at low levels in Port Aransas near the University of Texas Marine Science Institute on the Corpus Christi Ship Channel. No aerosol effects have been reported in Port Aransas. Red tide has also appeared in Aransas Bay, which has delayed the opening of the shellfish harvest season there. Red tide continues to be present in Corpus Christi Bay, and samples taken in the Oso Bay area this week showed low to moderate levels of red tide cells. Red tide cells were detected at the intake for the Department’s CCA/CPL Marine Development Center in the upper Laguna Madre. Red tide has not been observed in Mesquite Bay, San Antonio Bay or Matagorda Bay, and the gulf beaches also appear to be free of red tide.

In south Texas, water samples contain very few or no red tide cells, according to reports from the University of Texas Pan American Coastal Studies Lab and Cameron County extension agent Tony Reisinger. No aerosol has been detected for two weeks in the South Padre Island area.

November 3, 2005.

In Corpus Christi Bay, winds have pushed the red tide back toward downtown Corpus Christi. Dead fish were seen yesterday washed up on the west side of Oso Bay. Water samples taken yesterday from Oso Bay contained low concentrations of red tide. Samples were also taken from the Upper Laguna Madre, showing low to moderate red tide concentrations.

No aerosol effects have been reported in Port Aransas. The gulf beaches also appear to be free of red tide.

The presence of red tide in Aransas Bay has delayed the opening of the shellfish harvest season there. However, red tide has not been observed in Mesquite Bay, San Antonio Bay or Matagorda Bay.

In south Texas, water samples taken this morning contain very few red tide cells, according to reports from the University of Texas Pan American Coastal Studies Lab and Cameron County extension agent Tony Reisinger. No aerosol has been detected for over two weeks in the South Padre Island area.

November 2, 2005

Red tide cells continue to show up at low levels in Port Aransas near the University of Texas Marine Science Center on the Corpus Christi Ship Channel. No aerosol effects have been reported in Port Aransas. Red tide has also appeared in Aransas Bay, which will delay the opening of the shellfish harvest season there. Red tide continues to be present in Corpus Christi Bay, but has not been observed in Mesquite Bay, San Antonio Bay or Matagorda Bay. The gulf beaches also appear to be free of red tide.

In south Texas, water samples contain very few or no red tide cells, according to reports from the University of Texas Pan American Coastal Studies Lab and Cameron County

extension agent Tony Reisinger. No aerosol has been detected for almost two weeks in the South Padre Island area.

November 1, 2005

Red tide cells continue to show up at low levels in Port Aransas near the University of Texas Marine Science Center on the Corpus Christi Ship Channel. No aerosol effects have been reported in Port Aransas. Red tide has also appeared in Aransas Bay, which will delay the opening of the shellfish harvest season there. Red tide continues to be present in Corpus Christi Bay, but has not been observed in Mesquite Bay, San Antonio Bay or Matagorda Bay. The gulf beaches also appear to be free of red tide.

In south Texas, University of Texas Pan American Coastal Studies Lab staff and Cameron County extension agent Tony Reisinger found very low or no red tide cells in water samples. Reisinger reported a minor fish kill of mullet that probably occurred over the weekend in the southwest Lower Laguna Madre near the golf course at Laguna Vista. No aerosol has been detected for almost two weeks in the South Padre Island area.

Last week the Texas Department of State Health Services or TDSHS issued a press release stating that the oyster harvesting season would be delayed in Aransas Bay, Corpus Christi Bay and all of the Laguna Madre including South Bay. The TDSHS reminds the public not to harvest and eat oysters, clams, mussels or whelks from Texas coastal waters while red tide is present. Information about shellfish closures can be obtained by contacting the Seafood and Aquatic Life group of the TDSHS at (800) 685-0361.

October 28, 2005

Red tide cells continue to show up at low levels on the Corpus Christi Ship Channel in Port Aransas near the University of Texas Marine Science Institute. No respiratory irritation has been reported in Port Aransas, and gulf beaches all along the Texas coast appear to be free of red tide.

North winds have caused dead fish to accumulate on the shores of Corpus Christi Bay, resulting in noticeable odors and respiratory irritation along the entire length of Ocean

Drive. In addition, dead fish have been reported along the southwestern shore of Cayo del Oso.

In south Texas, staff of the University of Texas Pan American Coastal Studies Lab and Cameron County extension agent Tony Reisinger found most water samples collected today to be completely free of red tide. A very low concentration of red tide cells persists at the west end of the Queen Isabella Causeway in Port Isabel. No aerosol has been detected for two weeks in the South Padre Island area.

Red tide will prevent some Texas bays from being included in the opening of oyster season on November 1. The Texas Department of State Health Services will issue a press release in the coming days regarding the affected bays. In the meantime, the public is reminded not to harvest and eat oysters, clams, mussels or whelks from Texas coastal waters while red tide is present. All Texas coastal water is currently closed to the harvesting of oysters, clams and mussels, except for the commercial oyster harvesting in Galveston Bay. Information about shellfish closures can be obtained by contacting the Seafood and Aquatic Life group of the Texas Department of State Health Services at (800) 685-0361.

October 27, 2005.

An overflight was conducted yesterday from San Antonio Bay to the upper reaches of the Upper Laguna Madre. Special thanks go out to the Coast Guard who let TPWD Kills and Spills Biologist Jennifer Bronson ride on their HH-65A Dolphin helicopter for the overflight.

No obvious water discoloration was seen in Espiritu Santo Bay, Copano Bay, Lydia Ann Channel or Nueces Bay. Suspicious-looking water was seen in adjacent bays and biologists are following up on the situation.

Red tide cells continue to show up at low levels in Port Aransas near the University of Texas Marine Science Center on the Corpus Christi Ship Channel. No aerosol effects have been reported in Port Aransas. However, the north winds are causing aerosols to be particularly troublesome along the entire length of Ocean Drive in Corpus Christi. The gulf beaches still appear to be free of red tide.

In south Texas, University of Texas Pan American Coastal Studies Lab staff and Cameron County extension agent Tony Reisinger found most water samples collected today to be completely free of red tide. No aerosol has been detected for over a week in the South Padre Island area.

October 26, 2005

Red tide cells are showing up at low levels in Port Aransas near the University of Texas Marine Science Center on the Corpus Christi Ship Channel. Red tide has also appeared in Aransas Bay, near Mud Island and the Lydia Ann Channel. This will delay the opening of the shellfish harvest season in Aransas Bay. Red tide continues to be present in Corpus Christi Bay, and TPWD staff are following up on a report of dead fish and red tide in Nueces Bay. However red tide has not been observed in Mesquite Bay, San Antonio Bay or Matagorda Bay at this time. The gulf beaches also appear to be free of red tide.

In south Texas, University of Texas Pan American Coastal Studies Lab staff and Cameron County extension agent Tony Reisinger found most water samples collected today to be free of red tide. A low concentration of red tide cells persists at the west end of the Queen Isabella Causeway in Port Isabel. No aerosol has been detected for over a week in the South Padre Island area.

October 25, 2005

Red tide continues to be present in Corpus Christi Bay. On Monday a north wind blew dead fish onto the shore near the Texas A&M University Corpus Christi campus. A fish kill suspected to be caused by red tide was reported Monday in a canal near Flint Hills. However red tide has not been observed in Nueces Bay, Mesquite Bay, San Antonio Bay or Matagorda Bay at this time. The gulf beaches also appear to be free of red tide.

In south Texas, University of Texas Pan American Coastal Studies Lab staff and Cameron County extension agent Tony Reisinger found most water samples collected today to be free of red tide. A low concentration of red tide cells persists at the west end of the Queen Isabella Causeway in Port Isabel. No aerosol has been detected for over a week in the South Padre Island area.

October 21, 2005.

Red tide continues to be present in Corpus Christi Bay. As of yesterday, the water was discolored along Ocean Drive, especially near Cole Park, near the USS Lexington, the Port of Corpus Christi, and in Portland cove. A fish kill involving thousands of fish was observed in the La Quinta Channel on Thursday. Dead fish were also reported floating out of the Corpus Christi Ship Channel. TPWD received one report of red tide aerosol in Oso Bay near the Naval Base. However red tide has not been observed in Nueces Bay, Mesquite Bay, San Antonio Bay or Matagorda Bay at this time. The gulf beaches also appear to be free of red tide.

In south Texas, University of Texas Pan American Coastal Studies Lab staff and Cameron County extension agent Tony Reisinger continue to find low concentrations of red tide in water samples collected yesterday and today. No water discoloration, fresh fish kill, or aerosol was noted at any of the sample sites.

Last week the Texas Department of State Health Services issued a reminder to the public not to harvest and eat oysters, clams, mussels or whelks from Texas coastal waters while red tide is present. All Texas coastal water is currently closed to the harvesting of oysters, clams and mussels, except for the commercial oyster harvesting in Galveston Bay. Information about shellfish closures can be obtained by contacting the Seafood and Aquatic Life group of the Texas Department of State Health Services at (800) 685-0361.

If you have concerns or questions about human health effects of red tide or symptoms you are experiencing, consult your physician.

TPWD News Release - September 16, 2005

Additional Information:

The Texas Parks and Wildlife Department and the **Texas Department of State Health Services** investigate reports of possible red tide along the coast and in the bays.

Three common signs of a red tide bloom are:

- discolored water

- dead fish
- breathing difficulty.

From the Centers for Disease Control:
The human health effects associated with eating brevetoxin-tainted shellfish are well documented. However, scientists know little about how other types of environmental exposures to brevetoxin—such as breathing the air near red tides or swimming in red tides—may affect humans. Anecdotal evidence suggests that people who swim among brevetoxins or inhale brevetoxins dispersed in the air may experience irritation of the eyes, nose, and throat, as well as coughing, wheezing, and shortness of breath. Additional evidence suggests that people with existing respiratory illness, such as asthma, may experience these symptoms more severely.

To report sightings of red tide during normal business hours, call your local TPW office or the Kills and Spills Team at (512) 912-7055. To report red tide over the weekend, page Dave Buzan at (800) 299-4099, personal identification number 2366.

Although some travelers may be concerned with how the red tide may affect their vacation plans, there are miles of clean beaches to enjoy on the Texas coast. When making travel plans, heed the advice of the Texas Department of State Health Services : get the current facts and draw your own conclusions.

For more information about red tide and the latest updates, call the TPWD hotline at (800) 792-1112, select fishing, then select red tide.

Current information about shellfish closures can be obtained by contacting the Seafood Safety Division of the Texas Department of State Health Services at (800) 685-0361. The Texas Parks and Wildlife Department and the Texas Department of State Health Services investigate reports of possible red tide along the coast and in the bays.

Improving Water Quality in Oso Bay and Laguna Madre

Assessing Dissolved Oxygen Concentrations

Water Quality in Oso Bay and Laguna Madre

The state of Texas requires that the water quality in Oso Bay (Segment 2485) and Laguna Madre (Segment 2491) be suitable for swimming, wading, fishing, a healthy aquatic ecosystem, and for growing and harvesting clams, mussels, or oysters. However, water quality testing found that dissolved oxygen levels are sometimes lower than the standard established to assure a healthy aquatic ecosystem.

In response to these conditions, the TCEQ is conducting a project to assess the two water bodies. If the results of this project determine that low dissolved oxygen levels continue to be a problem, then the TCEQ will determine whether it is most appropriate to carry out a use attainability analysis (UAA), or to develop a total maximum daily load (TMDL).

Many water bodies are evaluated against a general set of standards that are applied to all water bodies, regardless of local conditions. A UAA establishes the standards that are appropriate for a specific water body, taking into account the unique features of the local ecosystem and watershed. A UAA may result in an adjustment to a more appropriate standard; or the TCEQ may develop a TMDL for the affected water body. The goal of a TMDL is to determine the amount (or load) of a pollutant that a body of water can receive and still support its beneficial uses.

Description of the Watersheds

The Oso Bay watershed drains an area of approximately 255 square miles and is located in the northern-most portion of the Nueces-Rio Grande Coastal Basin. The bay is an enclosed, shallow body of water situated along the southern shore of Corpus Christi Bay, with a surface area of approximately 7 square miles. The bay receives fresh water from Oso Creek, a stream whose flow is dominated by permitted discharges, and exchanges saltwater with Corpus Christi Bay. Ecologically, Oso Bay provides habitat for many plants and animals, and plays an influential role in water purification and storm protection.

Corpus Christi is the only major metropolitan area that lies within the watershed boundaries. The only other large community within the watershed is Robstown. Economic activities in and around the bay include oil and gas refining and production, agriculture, manufacturing, and tourism.

The Laguna Madre drains most of the Nueces-Rio Grande Coastal Basin (10,442 square miles) and is one of only five hypersaline or negative estuaries in the world. The Laguna is a shallow, bar-built coastal

lagoon with limited freshwater inflow and a surface area at mean high tide of 729 square miles. The Arroyo Colorado is primarily responsible for freshwater inflow to the lower Laguna Madre. Freshwater inflow is primarily attributed to municipal or industrial discharges and to runoff from rainfall events. Tides in the Laguna Madre are minimal. Ecologically, the Laguna is characterized as exhibiting hypersaline conditions, barren shorelines with extensive wind-tidal flats, extensive submerged seagrass meadows, and a highly productive finfishery.

Several cities and towns are located along the shoreline adjacent to the Laguna Madre—Corpus Christi, Port Mansfield, Laguna Vista, Laguna Heights Port Isabel and South Padre Island. The shorelines of the Laguna Madre are predominantly inaccessible because of the large tracts of privately owned ranch land and the establishment of two federally protected areas—Padre Island National Seashore and Laguna Atascosa National Wildlife Refuge. Economic activities in and around the lagoon include ranching, oil and gas production, agriculture, fishing, recreation and tourism.

Project Development

Project staff first initiated targeted monitoring to determine if dissolved oxygen measurements collected from Oso Bay and a nearby control site in the upper Laguna Madre exceeded the criteria established by the TCEQ standards. The results verified the low dissolved oxygen levels; however, the data raised many questions about the appropriateness of the criteria for the bay. TCEQ staff determined that additional monitoring data was necessary before a standards adjustment could be considered. This additional monitoring allows for the capture of annual seasonal variability in dissolved oxygen concentrations and extends the project area to include the entire Laguna Madre (upper and lower) as well as Oso Bay.

Public Participation

The Coastal Bend Bays and Estuaries Program (CBBEP) stakeholder committees provide for local participation in this project. These committees include representatives from:

- state and federal agencies
- industries
- citizen groups
- local governments
- universities
- water districts
- agricultural interests
- environmental groups
- other water user groups

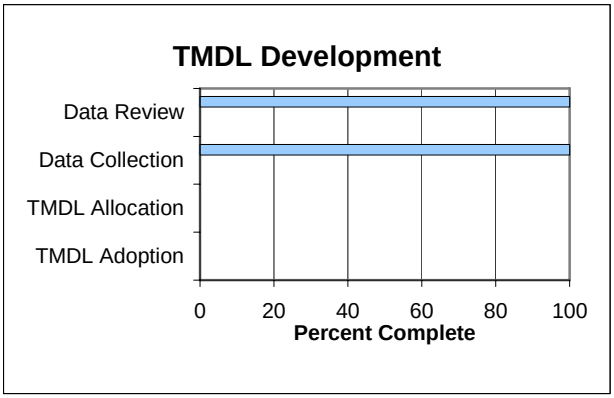
For More Information

For more information on upcoming meetings and documents available for review, contact the TCEQ Contact listed below.

TCEQ Contact:
Jason Leifester, Total Maximum Daily Load Program
Ph. (512) 239-6457, jleifest@tceq.state.tx.us

TMDL Development Status

Start Date: June 2001
Projected End Date: August 2006
TCEQ Adoption:
Submitted to EPA Region 6:
EPA Region 6 Approval:



TMDL Project Highlights

- August 2000-October 2001. A monitoring program to collect 24-hour dissolved oxygen data in accordance with TCEQ guidance was initiated in Oso Bay, with a control site located in the upper Laguna Madre.
- June 2002. The TCEQ determined the need for additional 24-hour dissolved oxygen monitoring to consider whether the oxygen criteria for the bay should be adjusted
- September 2002. Staff presented project results at the CBBEP's TMDL stakeholder forum in Corpus Christi.
- November 2002. A project to initiate additional monitoring began.
- August 2004. Interim project report for year one submitted and approved. Final, 2-year comprehensive report was prepared in August 2005.
- Contractor recommendation is for TCEQ to consider establishing site-specific standards.

Segment ID: 2491 **Water body name:** Laguna Madre

Estuary | Bays and Estuaries | Total size: 347.4 Sq. miles

Assessment Year	Assessment Method	Status of Use Support or Concern	Location	Location size	# of samples	# of exceedances	Mean
Aquatic Life Use							
2002	Dissolved Oxygen grab average	Not Assess-Not Represent	Area around Morano Blanco	8	9	1	
2002	Dissolved Oxygen grab average	No Concern	Area around Port Mansfield	8	20	1	
2002	Dissolved Oxygen grab average	Not Assessed	Area around Rincon de San Jose	8	3	1	
2002	Dissolved Oxygen grab average	Not Assessed	Area around the mouth of Baffin Bay	8	7	0	
2002	Dissolved Oxygen grab average	No Concern	Area around the mouth of the Arroyo Colorado	8	21	1	
2002	Dissolved Oxygen grab average	No Concern	Area near upper end of Padre Island National Seashore	8	21	2	
2002	Dissolved Oxygen grab average	No Concern	Lower Laguna Madre from Andie Bowie Park to Isla Blanca Park to Port Isabel	8	20	0	
2002	Dissolved Oxygen grab average	No Concern	Upper Laguna Madre near Packery Channel Park	8	14	2	
2002	Dissolved Oxygen grab minimum	Not Assess-Not Represent	Area around Morano Blanco	8	9	0	
2002	Dissolved Oxygen grab minimum	Fully Supporting	Area around Port Mansfield	8	20	0	
2002	Dissolved Oxygen grab minimum	Not Assessed	Area around Rincon de San Jose	8	3	0	
2002	Dissolved Oxygen grab minimum	No Concern-Limited Data	Area around the mouth of Baffin Bay	8	7	0	
2002	Dissolved Oxygen grab minimum	Fully Supporting	Area around the mouth of the Arroyo Colorado	8	21	0	
2002	Dissolved Oxygen grab minimum	Fully Supporting	Area near upper end of Padre Island National Seashore	8	21	0	
2002	Dissolved Oxygen grab minimum	Fully Supporting	Lower Laguna Madre from Andie Bowie Park to Isla Blanca Park to Port Isabel	8	20	0	
2002	Dissolved Oxygen grab minimum	Fully Supporting	Upper Laguna Madre near Packery Channel Park	8	14	0	
2002	Dissolved Oxygen 24hr average	Not Assessed	Area around Morano Blanco	8	0		
2002	Dissolved Oxygen 24hr average	Not Assessed	Area around Port Mansfield	8	0		
2002	Dissolved Oxygen 24hr average	Not Assessed	Area around Rincon de San Jose	8	0		
2002	Dissolved Oxygen 24hr average	Not Assessed	Area around the mouth of Baffin Bay	8	0		

Segment ID: 2491 **Water body name:** Laguna Madre

Estuary | Bays and Estuaries | Total size: 347.4 Sq. miles

Aquatic Life Use (continued)

Assessment Year	Assessment Method	Status of Use Support or Concern	Location	Location size	# of samples	# of exceedances	Mean
2002	Dissolved Oxygen 24hr average	Not Assessed	Area around the mouth of the Arroyo Colorado	8	0		
2002	Dissolved Oxygen 24hr average	Not Assessed	Area near upper end of Padre Island National Seashore	8	0		
2002	Dissolved Oxygen 24hr average	Not Assessed	Lower Laguna Madre from Andie Bowie Park to Isla Blanca Park to Port Isabel	8	0		
2002	Dissolved Oxygen 24hr average	Not Assessed	Upper Laguna Madre near Packery Channel Park	8	0		
2002	Dissolved Oxygen 24hr minimum	Not Assessed	Area around Morano Blanco	8	0		
2002	Dissolved Oxygen 24hr minimum	Not Assessed	Area around Port Mansfield	8	0		
2002	Dissolved Oxygen 24hr minimum	Not Assessed	Area around Rincon de San Jose	8	0		
2002	Dissolved Oxygen 24hr minimum	Not Assessed	Area around the mouth of Baffin Bay	8	0		
2002	Dissolved Oxygen 24hr minimum	Not Assessed	Area around the mouth of the Arroyo Colorado	8	0		
2002	Dissolved Oxygen 24hr minimum	Not Assessed	Area near upper end of Padre Island National Seashore	8	0		
2002	Dissolved Oxygen 24hr minimum	Not Assessed	Lower Laguna Madre from Andie Bowie Park to Isla Blanca Park to Port Isabel	8	0		
2002	Dissolved Oxygen 24hr minimum	Not Assessed	Upper Laguna Madre near Packery Channel Park	8	0		
2002	Overall Aquatic Life Use	Not Assessed	Area adjacent to the Laguna Atascosa National Wildlife Refuge	8			
2002	Overall Aquatic Life Use	Not Assessed	Area around Morano Blanco	8			
2002	Overall Aquatic Life Use	Fully Supporting	Area around Port Mansfield	8			
2002	Overall Aquatic Life Use	Not Assessed	Area around Rincon de San Jose	8			
2002	Overall Aquatic Life Use	Not Assessed	Area around the mouth of Baffin Bay	8			
2002	Overall Aquatic Life Use	Fully Supporting	Area around the mouth of the Arroyo Colorado	8			
2002	Overall Aquatic Life Use	Fully Supporting	Area near upper end of Padre Island National Seashore	8			
2002	Overall Aquatic Life Use	Fully Supporting	Lower Laguna Madre from Andie Bowie Park to Isla Blanca Park to Port Isabel	8			

Segment ID: 2491 **Water body name:** Laguna Madre

Estuary | Bays and Estuaries | Total size: 347.4 Sq. miles

Assessment Year	Assessment Method	Status of Use Support or Concern	Location	Location size	# of samples	# of exceedances	Mean
Aquatic Life Use (continued)							
2002	Overall Aquatic Life Use	Not Assessed	Lower Laguna Madre near Laguna Heights and Laguna Vista	8			
2002	Overall Aquatic Life Use	Not Assessed	Remainder of segment	267.4			
2002	Overall Aquatic Life Use	Fully Supporting	Upper Laguna Madre near Packery Channel Park	8			
Contact Recreation Use							
2002	Enterococci single sample	Not Assessed	Area adjacent to the Laguna Atascosa National Wildlife Refuge	8	0		
2002	Enterococci single sample	Not Assessed	Area around Morano Blanco	8	0		
2002	Enterococci single sample	Not Assessed	Area around Port Mansfield	8	0		
2002	Enterococci single sample	Not Assessed	Area around Rincon de San Jose	8	0		
2002	Enterococci single sample	Not Assessed	Area around the mouth of Baffin Bay	8	0		
2002	Enterococci single sample	Not Assessed	Area around the mouth of the Arroyo Colorado	8	0		
2002	Enterococci single sample	Not Assessed	Area near upper end of Padre Island National Seashore	8	0		
2002	Enterococci single sample	Not Assessed	Lower Laguna Madre from Andie Bowie Park to Isla Blanca Park to Port Isabel	8	0		
2002	Enterococci single sample	Not Assessed	Lower Laguna Madre near Laguna Heights and Laguna Vista	8	0		
2002	Enterococci single sample	Not Assessed	Upper Laguna Madre near Packery Channel Park	8	0		
2002	Enterococci geometric mean	Not Assessed	Area adjacent to the Laguna Atascosa National Wildlife Refuge	8	0		
2002	Enterococci geometric mean	Not Assessed	Area around Morano Blanco	8	0		
2002	Enterococci geometric mean	Not Assessed	Area around Port Mansfield	8	0		
2002	Enterococci geometric mean	Not Assessed	Area around Rincon de San Jose	8	0		
2002	Enterococci geometric mean	Not Assessed	Area around the mouth of Baffin Bay	8	0		
2002	Enterococci geometric mean	Not Assessed	Area around the mouth of the Arroyo Colorado	8	0		

Segment ID: 2491 **Water body name:** Laguna Madre

Estuary | Bays and Estuaries | Total size: 347.4 Sq. miles

Assessment Year	Assessment Method	Status of Use Support or Concern	Location	Location size	# of samples	# of exceedances	Mean
Contact Recreation Use (continued)							
2002	Enterococci geometric mean	Not Assessed	Area near upper end of Padre Island National Seashore	8	0		
2002	Enterococci geometric mean	Not Assessed	Lower Laguna Madre from Andie Bowie Park to Isla Blanca Park to Port Isabel	8	0		
2002	Enterococci geometric mean	Not Assessed	Lower Laguna Madre near Laguna Heights and Laguna Vista	8	0		
2002	Enterococci geometric mean	Not Assessed	Upper Laguna Madre near Packery Channel Park	8	0		
2002	Fecal coliform single sample	Fully Supporting	Area adjacent to the Laguna Atascosa National Wildlife Refuge	8	25	0	
2002	Fecal coliform single sample	Fully Supporting	Area around Morano Blanco	8	27	0	
2002	Fecal coliform single sample	Fully Supporting	Area around Port Mansfield	8	44	1	
2002	Fecal coliform single sample	Not Assessed	Area around Rincon de San Jose	8	3	0	
2002	Fecal coliform single sample	No Concern-Limited Data	Area around the mouth of Baffin Bay	8	7	0	
2002	Fecal coliform single sample	Fully Supporting	Area around the mouth of the Arroyo Colorado	8	49	0	
2002	Fecal coliform single sample	Fully Supporting	Area near upper end of Padre Island National Seashore	8	21	0	
2002	Fecal coliform single sample	Fully Supporting	Lower Laguna Madre from Andie Bowie Park to Isla Blanca Park to Port Isabel	8	200	0	
2002	Fecal coliform single sample	Fully Supporting	Lower Laguna Madre near Laguna Heights and Laguna Vista	8	90	0	
2002	Fecal coliform single sample	Fully Supporting	Upper Laguna Madre near Packery Channel Park	8	13	0	
2002	Fecal coliform geometric mean	Fully Supporting	Area adjacent to the Laguna Atascosa National Wildlife Refuge	8	25		2
2002	Fecal coliform geometric mean	Fully Supporting	Area around Morano Blanco	8	27		2
2002	Fecal coliform geometric mean	Fully Supporting	Area around Port Mansfield	8	44		3.4
2002	Fecal coliform geometric mean	Not Assessed	Area around Rincon de San Jose	8	3		2

Segment ID: 2491 **Water body name:** Laguna Madre

Estuary | Bays and Estuaries | Total size: 347.4 Sq. miles

Assessment Year	Assessment Method	Status of Use Support or Concern	Location	Location size	# of samples	# of exceedances	Mean
Contact Recreation Use (continued)							
2002	Fecal coliform geometric mean	No Concern-Limited Data	Area around the mouth of Baffin Bay	8	7		2
2002	Fecal coliform geometric mean	Fully Supporting	Area around the mouth of the Arroyo Colorado	8	49		3
2002	Fecal coliform geometric mean	Fully Supporting	Area near upper end of Padre Island National Seashore	8	21		3
2002	Fecal coliform geometric mean	Fully Supporting	Lower Laguna Madre from Andie Bowie Park to Isla Blanca Park to Port Isabel	8	200		2.7
2002	Fecal coliform geometric mean	Fully Supporting	Lower Laguna Madre near Laguna Heights and Laguna Vista	8	90		2.4
2002	Fecal coliform geometric mean	Fully Supporting	Upper Laguna Madre near Packery Channel Park	8	13		2
2002	Overall Recreation Use	Fully Supporting	Area adjacent to the Laguna Atascosa National Wildlife Refuge	8			
2002	Overall Recreation Use	Fully Supporting	Area around Morano Blanco	8			
2002	Overall Recreation Use	Fully Supporting	Area around Port Mansfield	8			
2002	Overall Recreation Use	Not Assessed	Area around Rincon de San Jose	8			
2002	Overall Recreation Use	Not Assessed	Area around the mouth of Baffin Bay	8			
2002	Overall Recreation Use	Fully Supporting	Area around the mouth of the Arroyo Colorado	8			
2002	Overall Recreation Use	Fully Supporting	Area near upper end of Padre Island National Seashore	8			
2002	Overall Recreation Use	Fully Supporting	Lower Laguna Madre from Andie Bowie Park to Isla Blanca Park to Port Isabel	8			
2002	Overall Recreation Use	Fully Supporting	Lower Laguna Madre near Laguna Heights and Laguna Vista	8			
2002	Overall Recreation Use	Not Assessed	Remainder of segment	267.4			
2002	Overall Recreation Use	Fully Supporting	Upper Laguna Madre near Packery Channel Park	8			

Segment ID: 2491 **Water body name:** Laguna Madre

Estuary | Bays and Estuaries | Total size: 347.4 Sq. miles

Assessment Year	Assessment Method	Status of Use Support or Concern	Location	Location size	# of samples	# of exceedances	Mean
General Use							
2002	Water Temperature	Not Assess-Not Represent	Area around Morano Blanco	8	9	0	
2002	Water Temperature	Fully Supporting	Area around Port Mansfield	8	20	0	
2002	Water Temperature	Not Assessed	Area around Rincon de San Jose	8	3	0	
2002	Water Temperature	No Concern-Limited Data	Area around the mouth of Baffin Bay	8	7	0	
2002	Water Temperature	Fully Supporting	Area around the mouth of the Arroyo Colorado	8	22	0	
2002	Water Temperature	Fully Supporting	Area near upper end of Padre Island National Seashore	8	21	0	
2002	Water Temperature	Fully Supporting	Lower Laguna Madre from Andie Bowie Park to Isla Blanca Park to Port Isabel	8	20	0	
2002	Water Temperature	Fully Supporting	Upper Laguna Madre near Packery Channel Park	8	14	0	
2002	pH	Not Assess-Not Represent	Area around Morano Blanco	8	9	0	
2002	pH	Fully Supporting	Area around Port Mansfield	8	20	0	
2002	pH	Not Assessed	Area around Rincon de San Jose	8	3	0	
2002	pH	No Concern-Limited Data	Area around the mouth of Baffin Bay	8	7	0	
2002	pH	Fully Supporting	Area around the mouth of the Arroyo Colorado	8	21	0	
2002	pH	Fully Supporting	Area near upper end of Padre Island National Seashore	8	21	0	
2002	pH	Fully Supporting	Lower Laguna Madre from Andie Bowie Park to Isla Blanca Park to Port Isabel	8	20	0	
2002	pH	Fully Supporting	Upper Laguna Madre near Packery Channel Park	8	14	0	
2002	Overall General Use	Not Assessed	Area adjacent to the Laguna Atascosa National Wildlife Refuge	8			
2002	Overall General Use	Not Assessed	Area around Morano Blanco	8			
2002	Overall General Use	Fully Supporting	Area around Port Mansfield	8			

Segment ID: 2491 Water body name: Laguna Madre

Estuary | Bays and Estuaries | Total size: 347.4 Sq. miles

Assessment Year	Assessment Method	Status of Use Support or Concern	Location	Location size	# of samples	# of exceedances	Mean
General Use (continued)							
2002	Overall General Use	Not Assessed	Area around Rincon de San Jose	8			
2002	Overall General Use	Not Assessed	Area around the mouth of Baffin Bay	8			
2002	Overall General Use	Fully Supporting	Area around the mouth of the Arroyo Colorado	8			
2002	Overall General Use	Fully Supporting	Area near upper end of Padre Island National Seashore	8			
2002	Overall General Use	Fully Supporting	Lower Laguna Madre from Andie Bowie Park to Isla Blanca Park to Port Isabel	8			
2002	Overall General Use	Not Assessed	Lower Laguna Madre near Laguna Heights and Laguna Vista	8			
2002	Overall General Use	Not Assessed	Remainder of segment	267.4			
2002	Overall General Use	Fully Supporting	Upper Laguna Madre near Packery Channel Park	8			
Fish Consumption Use							
2002	Overall Fish Consumption Use	Not Assessed	Area adjacent to the Laguna Atascosa National Wildlife Refuge	8			
2002	Overall Fish Consumption Use	Not Assessed	Area around Morano Blanco	8			
2002	Overall Fish Consumption Use	Not Assessed	Area around Port Mansfield	8			
2002	Overall Fish Consumption Use	Not Assessed	Area around Rincon de San Jose	8			
2002	Overall Fish Consumption Use	Not Assessed	Area around the mouth of Baffin Bay	8			
2002	Overall Fish Consumption Use	Not Assessed	Area around the mouth of the Arroyo Colorado	8			
2002	Overall Fish Consumption Use	Not Assessed	Area near upper end of Padre Island National Seashore	8			
2002	Overall Fish Consumption Use	Not Assessed	Lower Laguna Madre from Andie Bowie Park to Isla Blanca Park to Port Isabel	8			
2002	Overall Fish Consumption Use	Not Assessed	Lower Laguna Madre near Laguna Heights and Laguna Vista	8			
2002	Overall Fish Consumption Use	Not Assessed	Remainder of segment	267.4			
2002	Overall Fish Consumption Use	Not Assessed	Upper Laguna Madre near Packery Channel Park	8			

Segment ID: 2491 Water body name: Laguna Madre

Estuary | Bays and Estuaries | Total size: 347.4 Sq. miles

Assessment Year	Assessment Method	Status of Use Support or Concern	Location	Location size	# of samples	# of exceedances	Mean
Oyster Waters Use							
2002	TDH Maps	Use Concern	18.1 square miles near the Arroyo Colorado and along the ICWW	18.1			
2002	TDH Maps	Not Assessed	Area around Rincon de San Jose	8			
2002	TDH Maps	Not Assessed	Area around the mouth of Baffin Bay	8			
2002	TDH Maps	Not Assessed	Area near upper end of Padre Island National Seashore	8			
2002	TDH Maps	Fully Supporting	Main portion of the Laguna Madre south of Port Mansfield	134.8			
2002	TDH Maps	Not Assessed	Remainder of the Laguna Madre north of Port Mansfield	162.5			
2002	TDH Maps	Not Assessed	Upper Laguna Madre near Packery Channel Park	8			
Overall Use Support							
2002		Fully Supporting	18.1 square miles near the Arroyo Colorado and along the ICWW	18.1			
2002		Not Assessed	Area around Rincon de San Jose	8			
2002		Not Assessed	Area around the mouth of Baffin Bay	8			
2002		Fully Supporting	Area near upper end of Padre Island National Seashore	8			
2002		Fully Supporting	Main portion of the Laguna Madre south of Port Mansfield	134.8			
2002		Not Assessed	Remainder of the Laguna Madre north of Port Mansfield	162.5			
2002		Fully Supporting	Upper Laguna Madre near Packery Channel Park	8			
Nutrient Enrichment Concern							
2002	Ammonia Nitrogen	Not Assessed	Area around Morano Blanco	8	3	0	
2002	Ammonia Nitrogen	No Concern	Area around Port Mansfield	8	19	1	
2002	Ammonia Nitrogen	Not Assessed	Area around Rincon de San Jose	8	3	0	

Segment ID: 2491 **Water body name:** Laguna Madre

Estuary | Bays and Estuaries | Total size: 347.4 Sq. miles

Assessment Year	Assessment Method	Status of Use Support or Concern	Location	Location size	# of samples	# of exceedances	Mean
Nutrient Enrichment Concern (continued)							
2002	Ammonia Nitrogen	No Concern	Area around the mouth of Baffin Bay	8	10	1	
2002	Ammonia Nitrogen	Concern	Area around the mouth of the Arroyo Colorado	8	21	6	
2002	Ammonia Nitrogen	No Concern	Area near upper end of Padre Island National Seashore	8	19	3	
2002	Ammonia Nitrogen	No Concern	Lower Laguna Madre from Andie Bowie Park to Isla Blanca Park to Port Isabel	8	19	1	
2002	Ammonia Nitrogen	No Concern	Upper Laguna Madre near Packery Channel Park	8	16	0	
2002	Nitrite + Nitrate Nitrogen	Not Assessed	Area around Morano Blanco	8	3	0	
2002	Nitrite + Nitrate Nitrogen	No Concern	Area around Port Mansfield	8	19	1	
2002	Nitrite + Nitrate Nitrogen	Not Assessed	Area around Rincon de San Jose	8	3	0	
2002	Nitrite + Nitrate Nitrogen	No Concern	Area around the mouth of Baffin Bay	8	10	0	
2002	Nitrite + Nitrate Nitrogen	Concern	Area around the mouth of the Arroyo Colorado	8	17	9	
2002	Nitrite + Nitrate Nitrogen	No Concern	Area near upper end of Padre Island National Seashore	8	19	1	
2002	Nitrite + Nitrate Nitrogen	No Concern	Lower Laguna Madre from Andie Bowie Park to Isla Blanca Park to Port Isabel	8	17	0	
2002	Nitrite + Nitrate Nitrogen	No Concern	Upper Laguna Madre near Packery Channel Park	8	16	0	
2002	Orthophosphorus	Not Assessed	Area around Morano Blanco	8	3	0	
2002	Orthophosphorus	No Concern	Area around Port Mansfield	8	16	0	
2002	Orthophosphorus	Not Assessed	Area around Rincon de San Jose	8	3	0	
2002	Orthophosphorus	No Concern	Area around the mouth of Baffin Bay	8	10	0	
2002	Orthophosphorus	Concern	Area around the mouth of the Arroyo Colorado	8	16	5	
2002	Orthophosphorus	No Concern	Area near upper end of Padre Island National Seashore	8	17	0	
2002	Orthophosphorus	No Concern	Lower Laguna Madre from Andie Bowie Park to Isla Blanca Park to Port Isabel	8	16	0	
2002	Orthophosphorus	No Concern	Upper Laguna Madre near Packery Channel Park	8	16	0	

Segment ID: 2491 **Water body name:** Laguna Madre

Estuary | Bays and Estuaries | Total size: 347.4 Sq. miles

Nutrient Enrichment Concern (continued)

Assessment Year	Assessment Method	Status of Use Support or Concern	Location	Location size	# of samples	# of exceedances	Mean
2002	Total Phosphorus	Not Assessed	Area around Morano Blanco	8	3	0	
2002	Total Phosphorus	No Concern	Area around Port Mansfield	8	19	0	
2002	Total Phosphorus	Not Assessed	Area around Rincon de San Jose	8	3	0	
2002	Total Phosphorus	No Concern	Area around the mouth of Baffin Bay	8	10	0	
2002	Total Phosphorus	Concern	Area around the mouth of the Arroyo Colorado	8	21	7	
2002	Total Phosphorus	No Concern	Area near upper end of Padre Island National Seashore	8	19	0	
2002	Total Phosphorus	No Concern	Lower Laguna Madre from Andie Bowie Park to Isla Blanca Park to Port Isabel	8	19	0	
2002	Total Phosphorus	No Concern	Upper Laguna Madre near Packery Channel Park	8	15	0	
2002	Overall Nutrient Enrichment Concerns	Not Assessed	Area adjacent to the Laguna Atascosa National Wildlife Refuge	8			
2002	Overall Nutrient Enrichment Concerns	Not Assessed	Area around Morano Blanco	8			
2002	Overall Nutrient Enrichment Concerns	No Concern	Area around Port Mansfield	8			
2002	Overall Nutrient Enrichment Concerns	Not Assessed	Area around Rincon de San Jose	8			
2002	Overall Nutrient Enrichment Concerns	No Concern	Area around the mouth of Baffin Bay	8			
2002	Overall Nutrient Enrichment Concerns	Concern	Area around the mouth of the Arroyo Colorado	8			
2002	Overall Nutrient Enrichment Concerns	No Concern	Area near upper end of Padre Island National Seashore	8			
2002	Overall Nutrient Enrichment Concerns	No Concern	Lower Laguna Madre from Andie Bowie Park to Isla Blanca Park to Port Isabel	8			
2002	Overall Nutrient Enrichment Concerns	Not Assessed	Lower Laguna Madre near Laguna Heights and Laguna Vista	8			

Segment ID: 2491 **Water body name:** Laguna Madre

Estuary | Bays and Estuaries | Total size: 347.4 Sq. miles

Assessment Year	Assessment Method	Status of Use Support or Concern	Location	Location size	# of samples	# of exceedances	Mean
Nutrient Enrichment Concern (continued)							
2002	Overall Nutrient Enrichment Concerns	Not Assessed	Remainder of segment	267.4			
2002	Overall Nutrient Enrichment Concerns	No Concern	Upper Laguna Madre near Packery Channel Park	8			
Algal Growth Concern							
2002	Chlorophyll a	Not Assessed	Area adjacent to the Laguna Atascosa National Wildlife Refuge	8			
2002	Chlorophyll a	Not Assessed	Area around Morano Blanco	8	3	0	
2002	Chlorophyll a	No Concern	Area around Port Mansfield	8	19	3	
2002	Chlorophyll a	Not Assessed	Area around Rincon de San Jose	8	3	0	
2002	Chlorophyll a	Concern	Area around the mouth of Baffin Bay	8	10	5	
2002	Chlorophyll a	No Concern	Area around the mouth of the Arroyo Colorado	8	21	4	
2002	Chlorophyll a	No Concern	Area near upper end of Padre Island National Seashore	8	19	3	
2002	Chlorophyll a	No Concern	Lower Laguna Madre from Andie Bowie Park to Isla Blanca Park to Port Isabel	8	19	0	
2002	Chlorophyll a	Not Assessed	Lower Laguna Madre near Laguna Heights and Laguna Vista	8			
2002	Chlorophyll a	Not Assessed	Remainder of segment	267.4			
2002	Chlorophyll a	No Concern	Upper Laguna Madre near Packery Channel Park	8	17	1	
Sediment Contaminants Concern							
2002	Metals in sediment	Not Assessed	Area around the mouth of Baffin Bay	8	2		
2002	Metals in sediment	Not Assessed	Area near upper end of Padre Island National Seashore	8	1		
2002	Organics in sediment	Not Assessed	Area around Morano Blanco	8	2		

Segment ID: 2491 Water body name: Laguna Madre

Estuary | Bays and Estuaries | Total size: 347.4 Sq. miles

Assessment Year	Assessment Method	Status of Use Support or Concern	Location	Location size	# of samples	# of exceedances	Mean
Sediment Contaminants Concern (continued)							
2002	Overall Sediment Contaminant Concerns	Not Assessed	Area adjacent to the Laguna Atascosa National Wildlife Refuge	8			
2002	Overall Sediment Contaminant Concerns	Not Assessed	Area around Morano Blanco	8			
2002	Overall Sediment Contaminant Concerns	Not Assessed	Area around Port Mansfield	8			
2002	Overall Sediment Contaminant Concerns	Not Assessed	Area around Rincon de San Jose	8			
2002	Overall Sediment Contaminant Concerns	Not Assessed	Area around the mouth of Baffin Bay	8			
2002	Overall Sediment Contaminant Concerns	Not Assessed	Area around the mouth of the Arroyo Colorado	8			
2002	Overall Sediment Contaminant Concerns	Not Assessed	Area near upper end of Padre Island National Seashore	8			
2002	Overall Sediment Contaminant Concerns	Not Assessed	Lower Laguna Madre from Andie Bowie Park to Isla Blanca Park to Port Isabel	8			
2002	Overall Sediment Contaminant Concerns	Not Assessed	Lower Laguna Madre near Laguna Heights and Laguna Vista	8			
2002	Overall Sediment Contaminant Concerns	Not Assessed	Remainder of segment	267.4			
2002	Overall Sediment Contaminant Concerns	Not Assessed	Upper Laguna Madre near Packery Channel Park	8			
Fish Tissue Contaminants Concern							
2002	Overall Fish Tissue Contaminant Concerns	Not Assessed	Area adjacent to the Laguna Atascosa National Wildlife Refuge	8			
2002	Overall Fish Tissue Contaminant Concerns	Not Assessed	Area around Morano Blanco	8			
2002	Overall Fish Tissue Contaminant Concerns	Not Assessed	Area around Port Mansfield	8			

Segment ID: 2491 **Water body name:** Laguna Madre

Estuary | Bays and Estuaries | Total size: 347.4 Sq. miles

Assessment Year	Assessment Method	Status of Use Support or Concern	Location	Location size	# of samples	# of exceedances	Mean
Fish Tissue Contaminants Concern (continued)							
2002	Overall Fish Tissue Contaminant Concerns	Not Assessed	Area around Rincon de San Jose	8			
2002	Overall Fish Tissue Contaminant Concerns	Not Assessed	Area around the mouth of Baffin Bay	8			
2002	Overall Fish Tissue Contaminant Concerns	Not Assessed	Area around the mouth of the Arroyo Colorado	8			
2002	Overall Fish Tissue Contaminant Concerns	Not Assessed	Area near upper end of Padre Island National Seashore	8			
2002	Overall Fish Tissue Contaminant Concerns	Not Assessed	Lower Laguna Madre from Andie Bowie Park to Isla Blanca Park to Port Isabel	8			
2002	Overall Fish Tissue Contaminant Concerns	Not Assessed	Lower Laguna Madre near Laguna Heights and Laguna Vista	8			
2002	Overall Fish Tissue Contaminant Concerns	Not Assessed	Remainder of segment	267.4			
2002	Overall Fish Tissue Contaminant Concerns	Not Assessed	Upper Laguna Madre near Packery Channel Park	8			
Narrative Criteria Concern							
2002	Overall Narrative Criteria Concerns	No Concern	Area adjacent to the Laguna Atascosa National Wildlife Refuge	8			
2002	Overall Narrative Criteria Concerns	No Concern	Area around Morano Blanco	8			
2002	Overall Narrative Criteria Concerns	No Concern	Area around Port Mansfield	8			
2002	Overall Narrative Criteria Concerns	No Concern	Area around Rincon de San Jose	8			
2002	Overall Narrative Criteria Concerns	No Concern	Area around the mouth of Baffin Bay	8			
2002	Overall Narrative Criteria Concerns	No Concern	Area around the mouth of the Arroyo Colorado	8			

Segment ID: 2491 **Water body name:** Laguna Madre

Estuary | Bays and Estuaries | Total size: 347.4 Sq. miles

Assessment Year	Assessment Method	Status of Use Support or Concern	Location	Location size	# of samples	# of exceedances	Mean
Narrative Criteria Concern (continued)							
2002	Overall Narrative Criteria Concerns	No Concern	Area near upper end of Padre Island National Seashore	8			
2002	Overall Narrative Criteria Concerns	No Concern	Lower Laguna Madre from Andie Bowie Park to Isla Blanca Park to Port Isabel	8			
2002	Overall Narrative Criteria Concerns	No Concern	Lower Laguna Madre near Laguna Heights and Laguna Vista	8			
2002	Overall Narrative Criteria Concerns	No Concern	Remainder of segment	267.4			
2002	Overall Narrative Criteria Concerns	No Concern	Upper Laguna Madre near Packery Channel Park	8			
Overall Secondary Concern							
2002		No Concern	Area adjacent to the Laguna Atascosa National Wildlife Refuge	8			
2002		No Concern	Area around Morano Blanco	8			
2002		No Concern	Area around Port Mansfield	8			
2002		No Concern	Area around Rincon de San Jose	8			
2002		Concern	Area around the mouth of Baffin Bay	8			
2002		Concern	Area around the mouth of the Arroyo Colorado	8			
2002		No Concern	Area near upper end of Padre Island National Seashore	8			
2002		No Concern	Lower Laguna Madre from Andie Bowie Park to Isla Blanca Park to Port Isabel	8			
2002		No Concern	Lower Laguna Madre near Laguna Heights and Laguna Vista	8			
2002		No Concern	Remainder of segment	267.4			
2002		No Concern	Upper Laguna Madre near Packery Channel Park	8			

Section 2:
Air Quality

United States
Environmental Protection
Agency

Air Quality Index

A Guide to Air Quality and Your Health

AQI

Recycled/Recyclable. Printed with vegetable oil-based inks on 100% postconsumer process, chlorine-free recycled paper.

"Local air quality is unhealthy today."

"It's a code red air quality day for ozone."

Increasingly, radio, TV, and newspapers are providing information like this to local communities. But what does it mean to you ...if you are planning outdoor activities that day? ...if you have children who play outdoors? ...if you are an older adult? ...if you have asthma? This booklet can help you understand what you can do to protect yourself from air pollution.

"Today's Air Quality Index is 105, which is unhealthy for sensitive groups."

Air Quality Index

A Guide to Air Quality and Your Health

Local air quality affects how you live and breathe. Like the weather, it can change from day to day or even hour to hour. The U.S. Environmental Protection Agency (EPA) and others are working to make information about outdoor air quality as easy to understand as the weather forecast. A key tool in this effort is the Air Quality Index, or AQI. EPA and local officials use the AQI to provide you with simple information on local air quality, the health concerns for different levels of air pollution, and how you can protect your health when pollutants reach unhealthy levels.

What is the AQI?

The AQI is an index for reporting daily air quality. It tells you how clean or polluted your air is, and what associated health effects might be a concern for you. The AQI focuses on health effects you may experience within a few hours or days after breathing polluted air. EPA calculates the AQI for five major air pollutants regulated by the Clean Air Act: ground-level ozone, particle pollution (also known as particulate matter), carbon monoxide, sulfur dioxide, and nitrogen dioxide. For each of these pollutants, EPA has established national air quality standards to protect public health.

Air quality directly affects our quality of life.

How does the AQI work?

Think of the AQI as a yardstick that runs from 0 to 500. The higher the AQI value, the greater the level of air pollution and the greater the health concern. For example, an AQI value of 50 represents good air quality with little potential to affect public health, while an AQI value over 300 represents hazardous air quality.

An AQI value of 100 generally corresponds to the national air quality standard for the pollutant, which is the level EPA has set to protect public health. AQI values below 100 are generally thought of as satisfactory. When AQI values are above 100, air quality is considered to be unhealthy—at first for certain sensitive groups of people, then for everyone as AQI values get higher.

Understanding the AQI

The purpose of the AQI is to help you understand what local air quality means to your health. To make it easier to understand, the AQI is divided into six categories:

Air Quality Index (AQI) Values	Levels of Health Concern	Colors
When the AQI is in this range:	*...air quality conditions are:*	*...as symbolized by this color:*
0 to 50	Good	Green
51 to 100	Moderate	Yellow
101 to 150	Unhealthy for Sensitive Groups	Orange
151 to 200	Unhealthy	Red
201 to 300	Very Unhealthy	Purple
301 to 500	Hazardous	Maroon

Each category corresponds to a different level of health concern. The six levels of health concern and what they mean are:

- **"Good"** The AQI value for your community is between 0 and 50. Air quality is considered satisfactory, and air pollution poses little or no risk.
- **"Moderate"** The AQI for your community is between 51 and 100. Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people. For example, people who are unusually sensitive to ozone may experience respiratory symptoms.

- **"Unhealthy for Sensitive Groups"** When AQI values are between 101 and 150, members of sensitive groups may experience health effects. This means they are likely to be affected at lower levels than the general public. For example, people with lung disease are at greater risk from exposure to ozone, while people with either lung disease or heart disease are at greater risk from exposure to particle pollution. The general public is not likely to be affected when the AQI is in this range.
- **"Unhealthy"** Everyone may begin to experience health effects when AQI values are between 151 and 200. Members of sensitive groups may experience more serious health effects.
- **"Very Unhealthy"** AQI values between 201 and 300 trigger a health alert, meaning everyone may experience more serious health effects.
- **"Hazardous"** AQI values over 300 trigger health warnings of emergency conditions. The entire population is more likely to be affected.

AQI colors

A specific color is assigned to each AQI category to make it easier for you to understand quickly whether air pollution is reaching unhealthy levels in your community. For example, the color orange means that conditions are "unhealthy for sensitive groups," while red means that conditions may be "unhealthy for everyone," and so on.

How is a community's AQI calculated?

Air quality is measured by monitors that record the concentrations of the major pollutants each day at more than a thousand locations across the country. These raw measurements are then converted into AQI values using standard formulas developed by EPA. An AQI value is calculated for each pollutant in an area (ground-level ozone, particle pollution, carbon monoxide, sulfur dioxide, and nitrogen dioxide). The highest AQI value for the individual pollutants is the AQI value for that day.

For example, if on July 12 a certain area had AQI values of 90 for ozone and 88 for sulfur dioxide, the AQI value would be 90 for the pollutant ozone on that day.

When and how is the AQI reported to the public?

In large cities (more than 350,000 people), state and local agencies are required to report the AQI to the public daily. When the AQI is above 100, agencies must also report which groups, such as children or people with asthma or heart disease, may be sensitive to the specific pollutant. If two or more pollutants have AQI values above 100 on a given day, agencies must report all the groups that are sensitive to those pollutants. Many smaller communities also report the AQI as a public health service.

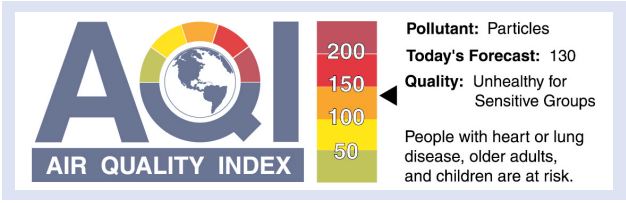
Children active outdoors can be sensitive to some air pollutants.

Many cities also provide forecasts for the next day's AQI. These forecasts help local residents protect their health by alerting them to plan their strenuous activities for a time when air quality is better.

The AQI is a national index, so the values and colors used to show local air quality and the levels of health concern will be the same everywhere you go in the United States. Look for the AQI to be reported in your local newspaper, on television and radio, on the Internet, and on many state and local telephone hotlines.

AQI in the Newspaper

Newspapers in many U.S. cities, and some national newspapers, carry AQI reports each day. Here is one example:



AQI in Television and Radio Weather Reports

Many local television or radio weathercasters use the AQI to provide air quality information in your area. Here's the type of report you might hear:

> *Tomorrow will be a code red air quality day for Center City. The cold winter air, morning traffic, and wood smoke are expected to cause particle pollution to rise to unhealthy levels. People with heart or lung disease, older adults, and children should avoid strenuous activities.*

AQI on the Internet

EPA's AIRNow web site (**www.epa.gov/airnow**) contains general information about air pollution plus real-time and forecast air quality data. It also contains facts about the health and environmental effects of air pollution, steps you can take to protect your health and to reduce pollution, and links to state and local air pollution agency web sites.

What are typical AQI values in most communities?

In many U.S. communities, AQI values are usually below 100, with values greater than 100 occurring just several times a year. Typically, larger cities have more severe air pollution problems, and the AQI in these areas may exceed 100 more often than in smaller cities. AQI values higher than 200 are infrequent, and AQI values above 300 are extremely rare.

AQI values can vary from one season to another. In winter, for example, carbon monoxide may be high in some areas because the cold weather makes it difficult for car emission control systems to operate effectively. In summer, ozone may be a significant air pollutant because it forms in the presence of heat and sunlight. Particle pollution can be elevated at any time of the year.

AQI values also can vary depending on the time of day. For example, ozone levels often peak in the afternoon, while carbon monoxide is usually a problem during morning or evening rush hours. Particle pollution can be high at any time of day.

How can I avoid being exposed to harmful air pollutants?

The following AQI charts tell you how to protect your health from air pollution. Each chart contains cautionary language to help you when air quality levels are unhealthy. In general, you can reduce your risk by "reducing prolonged or heavy exertion." Prolonged exertion is an activity that occurs over several hours and makes you breathe slightly harder than normal. Reducing prolonged exertion could mean reducing the time you spend on this type of activity. You can also reduce your risk by cutting back on heavy exertion—more intense activities that cause you to breathe hard. This might mean walking instead of jogging, or jogging for half your usual time. Your breathing rate is a guide to how hard you are exerting yourself. If you experience any unusual coughing, chest discomfort, wheezing, or breathing difficulty, you should reduce your activity level.

Charts are provided for four pollutants: ozone, particle pollution, carbon monoxide, and sulfur dioxide. Another common pollutant, nitrogen dioxide, can cause respiratory symptoms such as coughing, wheezing, and shortness of breath in children and adults who have respiratory diseases, such as asthma. The AQI for nitrogen dioxide is not included in this booklet because nitrogen dioxide levels across the country have been below the national air quality standard for the past several years. Nitrogen dioxide levels are usually so low that they pose little direct threat to human health. Nitrogen dioxide, however, is a concern because it plays a significant role in the formation of ozone, particle pollution, haze, and acid rain.

Air Quality Index (AQI): Ozone

Index Values	Levels of Health Concern	Cautionary Statements
0 - 50	Good	None
51 - 100*	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion outdoors.
101 - 150	Unhealthy for Sensitive Groups	Active children and adults, and people with lung disease, such as asthma, should reduce prolonged or heavy exertion outdoors.
151 - 200	Unhealthy	Active children and adults, and people with lung disease, such as asthma, should avoid prolonged or heavy exertion outdoors. Everyone else, especially children, should reduce prolonged or heavy exertion outdoors.
201 - 300	Very Unhealthy	Active children and adults, and people with lung disease, such as asthma, should avoid all outdoor exertion. Everyone else, especially children, should avoid prolonged or heavy exertion outdoors.
301 - 500	Hazardous	Everyone should avoid all physical activity outdoors.

*An AQI of 100 for ozone corresponds to an ozone level of 0.08 parts per million (averaged over 8 hours).

What is ozone?

Ozone is a gas composed of three atoms of oxygen. Ozone occurs both in the Earth's upper atmosphere and at ground level. Ozone can be good or bad, depending on where it is found:

- **Good Ozone.** Ozone occurs naturally in the Earth's upper atmosphere—6 to 30 miles above the Earth's surface—where it forms a protective layer that shields us from the sun's harmful ultraviolet rays. This beneficial ozone is gradually being destroyed by manmade chemicals.

An area where the protective "ozone layer" has been significantly depleted—for example, over the North or South pole—is sometimes called "the ozone hole."

- **Bad Ozone.** In the Earth's lower atmosphere, near ground level, ozone is formed when pollutants emitted by cars, power plants, industrial boilers, refineries, chemical plants, and other sources react chemically in the presence of sunlight. Ozone at ground level is a harmful air pollutant.

The risk of exposure to unhealthy levels of ground-level ozone is greatest during summer months.

What are the health effects and who is most at risk?

Roughly one out of every three people in the United States is at a higher risk of experiencing problems from ground-level ozone.

- One group at high risk is active children because they often spend a large part of the summer playing outdoors.
- People of all ages who are active outdoors are at increased risk because, during physical activity, ozone penetrates deeper into the parts of the lungs that are more vulnerable to injury.

- People with respiratory diseases, including asthma, that make their lungs more vulnerable to ozone may experience health effects earlier and at lower ozone levels than other people.
- Though scientists don't yet know why, some healthy people are unusually sensitive to ozone. They may experience health effects at more moderate levels of outdoor exertion or at lower ozone levels than the average person.
- Ozone can irritate the respiratory system, causing coughing, throat irritation, and/or an uncomfortable sensation in the chest.
- Ozone can reduce lung function and make it more difficult to breathe deeply and vigorously. Breathing may become more rapid and shallow than normal. This may limit a person's ability to engage in vigorous activities.
- Ozone can aggravate asthma. When ozone levels are high, more people with asthma have attacks that require a doctor's attention or use of medication. One reason this happens is that ozone makes people more sensitive to allergens such as pets, pollen, and dust mites, which are common triggers of asthma attacks.
- Ozone can increase susceptibility to respiratory infections.
- Ozone can inflame and damage the lining of the lungs. Within a few days, the damaged cells are shed and replaced—much like the skin peels after a sunburn. Studies suggest that if this type of inflammation happens repeatedly over a long time period (months, years, a lifetime), lung tissue may become permanently scarred, resulting in permanent loss of lung function and a lower quality of life.

Air Quality Index (AQI): Particle Pollution

Index Values	Levels of Health Concern	Cautionary Statements
0 - 50	Good	None
51 - 100*	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion.
101 - 150	Unhealthy for Sensitive Groups	People with heart or lung disease, older adults, and children should reduce prolonged or heavy exertion.
151 - 200	Unhealthy	People with heart or lung disease, older adults, and children should avoid prolonged or heavy exertion. Everyone else should reduce prolonged or heavy exertion.
201 - 300	Very Unhealthy	People with heart or lung disease, older adults, and children should avoid all physical activity outdoors. Everyone else should avoid prolonged or heavy exertion.
301 - 500	Hazardous	People with heart or lung disease, older adults, and children should remain indoors and keep activity levels low. Everyone else should avoid all physical activity outdoors.

*An AQI of 100 for particles up to 2.5 micrometers in diameter corresponds to a level of 40 micrograms per cubic meter (averaged over 24 hours). An AQI of 100 for particles up to 10 micrometers in diameter corresponds to a level of 150 micrograms per cubic meter (averaged over 24 hours).

What is particle pollution?

Particle pollution (also known as "particulate matter") in the air includes a mixture of solids and liquid droplets. Some particles are emitted directly; others are formed in the atmosphere when other pollutants react. Particles come in a wide range of sizes. Those less than 10 micrometers in diameter are so small that they can get into the lungs, potentially causing serious health problems. Ten micrometers is smaller than the width of a single human hair.

- **Fine particles.** Particles less than 2.5 micrometers in diameter are called "fine" particles. These particles are so small they can be detected only with an electron microscope. Sources of fine particles include all types of combustion, including motor vehicles, power plants, residential wood burning, forest fires, agricultural burning, and some industrial processes.
- **Coarse dust particles.** Particles between 2.5 and 10 micrometers in diameter are referred to as "coarse." Sources of coarse particles include crushing or grinding operations, and dust stirred up by vehicles traveling on roads.

What are the health effects and who is most at risk?

Particles smaller than 10 micrometers in diameter can cause or aggravate a number of health problems and have been linked with illnesses and deaths from heart or lung diseases. These effects have been associated with both short-term exposures (usually over a 24-hour period, but possibly as short as one hour) and long-term exposures (years).

- Sensitive groups for particle pollution include people with heart or lung disease, older adults (who may have undiagnosed heart or lung disease), and children.
- People with heart or lung diseases—such as congestive heart failure, coronary artery disease, asthma, or chronic obstructive pulmonary disease—and older adults are more likely to visit emergency rooms, be admitted to hospitals, or in some cases, even die. When exposed to particle pollution, people with heart disease may experience chest pain, palpitations, shortness of breath, and fatigue. Particle pollution has also been associated with cardiac arrhythmias and heart attacks.
- When exposed to particles, people with existing lung disease may not be able to breathe as deeply or vigorously as they normally would. They may experience symptoms such as coughing and shortness of breath. Healthy people also may experience these effects, although they are unlikely to experience more serious effects.
- Particle pollution also can increase susceptibility to respiratory infections and can aggravate existing respiratory diseases, such as asthma and chronic bronchitis, causing more use of medication and more doctor visits.

Air Quality Index (AQI): Carbon Monoxide (CO)

Index Values	Levels of Health Concern	Cautionary Statements
0 - 50	Good	None
51 - 100*	Moderate	None
101 - 150	Unhealthy for Sensitive Groups	People with heart disease, such as angina, should reduce heavy exertion and avoid sources of CO, such as heavy traffic.
151 - 200	Unhealthy	People with heart disease, such as angina, should reduce moderate exertion and avoid sources of CO, such as heavy traffic.
201 - 300	Very Unhealthy	People with heart disease, such as angina, should avoid exertion and sources of CO, such as heavy traffic.
301 - 500	Hazardous	People with heart disease, such as angina, should avoid exertion and sources of CO, such as heavy traffic. Everyone else should reduce heavy exertion.

* An AQI of 100 for carbon monoxide corresponds to a CO level of 9 parts per million (averaged over 8 hours).

What is carbon monoxide?

Carbon monoxide (CO) is an odorless, colorless gas. It forms when the carbon in fuels does not completely burn. Vehicle exhaust contributes roughly 60 percent of all carbon monoxide emissions nationwide, and up to 95 percent in cities. Other sources include fuel combustion in industrial processes and natural sources such as wildfires. Carbon monoxide levels typically are highest during cold weather, because cold temperatures make combustion less complete and cause inversions that trap pollutants close to the ground.

What are the health effects and who is most at risk?

Carbon monoxide enters the bloodstream through the lungs and binds to hemoglobin, the substance in blood that carries oxygen to cells. It actually reduces the amount of oxygen reaching the body's organs and tissues.

- People with cardiovascular disease, such as angina, are most at risk. They may experience chest pain and other cardiovascular symptoms if they are exposed to carbon monoxide, particularly while exercising.
- People with marginal or compromised cardiovascular and respiratory systems (for example, individuals with congestive heart failure, cerebrovascular disease, anemia, chronic obstructive lung disease), and possibly young infants and fetuses, also may be at greater risk from carbon monoxide pollution.
- In healthy individuals, exposure to higher levels of carbon monoxide can affect mental alertness and vision.

Vehicle exhaust contributes roughly 60 percent of all carbon monoxide emissions nationwide.

Air Quality Index (AQI): Sulfur Dioxide (SO_2)

Index Values	Levels of Health Concern	Cautionary Statements
0 - 50	Good	None
51 - 100*	Moderate	None
101 - 150	Unhealthy for Sensitive Groups	People with asthma should consider reducing exertion outdoors.
151 - 200	Unhealthy	Children, asthmatics, and people with heart or lung disease should reduce exertion outdoors.
201 - 300	Very Unhealthy	Children, asthmatics, and people with heart or lung disease should avoid outdoor exertion. Everyone else should reduce exertion outdoors.
301 - 500	Hazardous	Children, asthmatics, and people with heart or lung disease should remain indoors. Everyone else should avoid exertion outdoors.

* An AQI of 100 for sulfur dioxide corresponds to an SO_2 level of 0.14 parts per million (averaged over 24 hours).

What is sulfur dioxide?

Sulfur dioxide (SO_2), a colorless, reactive gas, is produced when sulfur-containing fuels such as coal and oil are burned. Major sources include power plants and industrial boilers. Generally, the highest levels of sulfur dioxide are near large industrial complexes.

What are the health effects and who is most at risk?

Sulfur dioxide is an irritant gas that is removed by the nasal passages. Moderate activity levels that trigger mouth breathing, such as a brisk walk, are needed for sulfur dioxide to cause health effects.

- People with asthma who are physically active outdoors are most likely to experience the health effects of sulfur dioxide. The main effect, even with brief exposure, is a narrowing of the airways (called bronchoconstriction). This may cause wheezing, chest tightness, and shortness of breath. Symptoms increase as sulfur dioxide levels and/or breathing rates increase. When exposure to sulfur dioxide ceases, lung function typically returns to normal within an hour.
- At very high levels, sulfur dioxide may cause wheezing, chest tightness, and shortness of breath even in healthy people who do not have asthma.

Children and adults with asthma who are active outdoors are most vulnerable to the health effects of sulfur dioxide.

- Long-term exposure to sulfur dioxide can cause respiratory illness, alter the lung's defense mechanisms, and aggravate existing cardiovascular disease. People with cardiovascular disease or chronic lung disease, as well as children and older adults, may be most susceptible to these effects.

Where can I get more information?

For information on air quality in your area, visit EPA's AIRNow web site at **www.epa.gov/airnow.**

For information on programs under way to improve air quality, visit **www.epa.gov/air.**

The AQI focuses on outdoor air quality. For information on indoor air quality, contact EPA's Indoor Air Quality Information Hotline at (800) 438-4318 or visit **www.epa.gov/iaq.**

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Air and Radiation Washington, DC 20460
EPA-456/F-99-002 July 1999 http://www.epa.gov/airnow

Air Quality Guide for Ozone

Air Quality	Air Quality Index	Protect Your Health
Good	**0-50**	No health impacts are expected when air quality is in this range.
Moderate	**51-100**	Unusually sensitive people should consider limiting prolonged outdoor exertion.
Unhealthy for Sensitive Groups	**101-150**	Active children and adults, and people with respiratory disease, such as asthma, should limit prolonged outdoor exertion.
Unhealthy	**151-200**	Active children and adults, and people with respiratory disease, such as asthma, should avoid prolonged outdoor exertion; everyone else, especially children, should limit prolonged outdoor exertion.
Very Unhealthy (Alert)	**201-300**	Active children and adults, and people with respiratory disease, such as asthma, should avoid all outdoor exertion; everyone else, especially children, should limit outdoor exertion.

For more information visit EPA's web site at: **www.epa.gov/airnow**

What You Should Know About Ozone

- *Ozone is a major element of urban smog. Ozone can limit the ability to take a deep breath, and it can cause coughing, throat irritation, and breathing discomfort. There is also evidence that ozone can lower resistance to respiratory disease (such as pneumonia), damage lung tissue, and aggravate chronic lung disease (such as asthma or bronchitis).*
- *Children and those with pre-existing lung problems (such as asthma) are sensitive to the health effects of ozone. Even healthy adults involved in moderate or strenuous outdoor activities can experience the unhealthy effects of ozone.*

What is ozone?

Ozone is a colorless gas that can be found in the air we breathe. Each molecule of ozone is composed of three atoms of oxygen, one more than the oxygen molecule which we need to breathe to sustain life. The additional oxygen atom makes ozone extremely reactive. Ozone exists naturally in the Earth's upper atmosphere, known as the stratosphere, where it shields the Earth from the sun's ultraviolet rays. However, ozone is also found close to the Earth's surface. This ground-level ozone is a harmful air pollutant.

Where does ground-level ozone come from?

Ground-level ozone is formed by a chemical reaction between volatile organic compounds (VOCs) and oxides of nitrogen in the presence of sunlight. Sources of VOCs and oxides of nitrogen include:

- automobiles, trucks, and buses
- large industry and fuel combustion sources such as utilities
- small industry such as gasoline dispensing stations and print shops
- consumer products such as some paints and cleaners
- emissions from aircraft, locomotives, construction equipment, and lawn and garden equipment.

Ozone concentrations can reach unhealthy levels when the weather is hot and sunny with relatively light winds.

How does ozone affect human health?

Even at relatively low levels, ozone may cause inflammation and irritation of the respiratory tract, particularly during physical activity. The resulting symptoms can include breathing difficulty, coughing, and throat irritation. Breathing ozone can affect lung function and worsen asthma attacks. Ozone can increase the susceptibility of the lungs to infections, allergens, and other air pollutants. Medical studies have shown that ozone damages lung tissue and complete recovery may take several days after exposure has ended.

Who is sensitive to ozone?

Groups that are sensitive to ozone include children and adults who are active outdoors, and people with respiratory disease, such as asthma. Sensitive people who experience effects at lower ozone concentrations are likely to experience more serious effects at higher concentrations.

What is an Ozone Action Day?

An Ozone Action Day may be called by your State or local air quality agency when ozone levels are forecast to reach unhealthy levels. These programs, often in partnership with local businesses, encourage voluntary actions to reduce emissions of pollutants that contribute to ground-level ozone formation.

How You Can Keep the Air Cleaner

Every day tips:

- Conserve energy—at home, at work, everywhere.
- Follow gasoline refueling instructions for efficient vapor recovery. Be careful not to spill fuel and always tighten your gas cap securely.
- Keep car, boat, and other engines tuned up according to manufacturers' specifications.
- Be sure your tires are properly inflated.
- Car pool, use public transportation, bike, or walk whenever possible.
- Use environmentally safe paints and cleaning products whenever possible.
- Some products that you use at your home or office are made with smog-forming chemicals that can evaporate into the air when you use them. Follow manufacturers' recommendations for use and properly seal cleaners, paints, and other chemicals to prevent evaporation into the air.

Ozone Action Day tips:

- Conserve electricity and set your air conditioner at a higher temperature.
- Choose a cleaner commute—share a ride to work or use public transportation. Bicycle or walk to errands when possible.
- Defer use of gasoline-powered lawn and garden equipment.
- Refuel cars and trucks after dusk.
- Combine errands and reduce trips.
- Limit engine idling.
- Use household, workshop, and garden chemicals in ways that keep evaporation to a minimum, or try to delay using them when poor air quality is forecast.

EPA United States Environmental Protection Agency

Air Quality Guide for Particle Pollution

Air Quality	Air Quality Index	Health Advisory
Good	0-50	None.
Moderate	51-100	Unusually sensitive people should consider reducing prolonged or heavy exertion.
Unhealthy for Sensitive Groups	101-150	People with heart or lung disease, older adults, and children should reduce prolonged or heavy exertion.
Unhealthy	151-200	People with heart or lung disease, older adults, and children should avoid prolonged or heavy exertion. Everyone else should reduce prolonged or heavy exertion.
Very Unhealthy	201-300	People with heart or lung disease, older adults, and children should avoid all physical activity outdoors. Everyone else should avoid prolonged or heavy exertion.

Key Facts You Should Know About Particle Pollution

- Particles in the air can cause or aggravate a number of health problems and have been linked with illnesses and deaths from heart or lung diseases.
- At highest risk from particle pollution are people with heart or lung disease, older adults (possibly because they may have undiagnosed heart or lung disease), and children (because their lungs are still developing, they are more likely to have asthma, and they are more active outdoors).
- Particles of concern include both “fine" particles (that are so small they can only be seen through an electron microscope) and somewhat larger "coarse" dust particles. Fine particles have been more clearly linked to the most serious health problems.

What are particles? Where do they come from?

Particles in the air are a mixture of solids and liquid droplets that vary in size and are often referred to as "particulate matter." Some particles - those less than 10 micrometers in diameter - tend to pose the greatest health concern because they can pass through the nose and throat and get deep into the lungs. Ten micrometers in diameter is just a fraction of the diameter of a single human hair. Particles larger than 10 micrometers do not usually reach your lungs, but they can irritate your eyes, nose and throat.

Very small particles with diameters less than 2.5 micrometers are called "fine particles." They are produced any time fuels such as coal, oil, diesel or wood are burned. Fine particles come from fuel used in everything from power plants to wood stoves and motor vehicles (e.g., cars, trucks, buses and marine engines). These particles are even produced from construction equipment, agricultural burning and forest fires.

"Coarse" dust particles range in size from 2.5 to 10 micrometers in diameter. Particles of this size are produced during crushing or grinding and from vehicles traveling on paved or unpaved roads.

How can particle pollution affect you?

Fine and coarse particles can cause a variety of serious health problems. When exposed to these small particles, people with heart or lung diseases and older adults are more at risk of hospital and emergency room visits or, in some cases, even death. These effects have been associated with short-term exposures lasting 24 hours or less. Health effects, such as the onset of respiratory disease, also have been linked with prolonged exposures of a year or more.

Particles can aggravate heart diseases such as congestive heart failure and coronary artery disease. If you have heart disease, particles may cause you to experience chest pain, palpitations, shortness of breath and fatigue. Particles have also been associated with cardiac arrhythmias and heart attacks.

Particles can aggravate lung diseases such as asthma and bronchitis, causing increased medication use and doctor visits. If you have lung disease, and you are exposed to particles, you may not be able to breathe as deeply or vigorously as normal. You may have respiratory symptoms including coughing, phlegm, chest discomfort, wheezing and shortness of breath. You also may experience these symptoms even if you're healthy, although you are unlikely to experience more serious effects. Particles can also increase your susceptibility to respiratory infections.

How can you reduce your exposure to particles?

Air pollution levels can vary throughout the day. Your local air quality forecast can tell you when particle levels are high in your area. You can reduce your exposure to particles by 1) planning strenuous activity when particle levels are forecast to be lower, 2) reducing the amount of time spent at vigorous activity, or 3) choosing a less strenuous activity (e.g., going for a walk instead of a jog).

When particle levels are high outdoors, they also can be high indoors. Certain filters and room air cleaners are available that can help reduce particles indoors. You also can reduce particles indoors by eliminating tobacco smoke and reducing your use of candles, wood-burning stoves and fireplaces. For more information on indoor air pollution and filter devices, visit www.epa.gov/iaq.

You Can Help Keep the Air Cleaner!

Everyday tips:

- Conserve electricity. Consider setting your thermostat a little higher in the summer and lower in winter. Participate in local energy conservation programs. Look for the ENERGY STAR label when buying home or office equipment.
- Keep car, boat and other engines properly tuned, and avoid engines that smoke.
- Car pool, use public transportation, bike or walk when possible.
- Combine errands to reduce "cold starts" of your car and avoid extended idling.
- Consider using gas logs instead of wood. If you use a wood-burning stove or fireplace insert, make sure it meets EPA design specifications. Burn only dry, seasoned wood.
- Mulch or compost leaves and yard waste.

Tips for days when particle pollution is expected to be high:

- Reduce the number of trips you take in your car.
- Reduce or eliminate fireplace and wood stove use.
- Avoid using gas-powered lawn and garden equipment.
- Avoid burning leaves, trash and other materials.

AQI AIR QUALITY INDEX

For your local forecast visit EPA's Web site at: www.epa.gov/airnow

Office of Air and Radiation (6301A)
EPA 452/F-03-002
www.epa.gov/airnow
August 2003

EPA United States Environmental Protection Agency

Summertime Safety

Keeping Kids Safe from Sun and Smog

If you spend time with kids in the summer, you want to keep them safe while providing fun outdoor experiences. Did you know that over-exposure to the sun and air pollution can pose serious health effects, especially to children? You can take several simple actions to protect kids—and yourself.

Ozone:
"Good up high, bad nearby."

What's the Problem?

Ozone can be protective or harmful, depending on where it is found in the atmosphere. Ozone is a naturally occurring gas in the upper atmosphere (the stratosphere) that protects us from the sun's ultraviolet (UV) radiation. Several chemicals released over time, however, have reduced the amount of stratospheric ozone left to protect us. *Paying attention to the summer sun is more important than ever.*

Ozone at ground level (the troposphere) is formed from pollutants emitted by cars, power plants, refineries, and other sources. Ground-level ozone is a primary component of a chemical soup known as "smog." Smog can be particularly high in the summer. *Your chances of being affected by ground-level ozone increase the longer you are active outdoors or the more strenuous the activity.*

Health Effects

Overexposure to UV radiation can cause sunburns now, but also can lead to skin cancer, cataracts, and premature aging of the skin. Because kids spend so much time in the summer sun, and unprotected exposure during youth puts them at increased lifetime risk for skin cancer, protecting kids from the sun is especially important.

Kids and teenagers who are active outdoors—especially those with asthma or other respiratory problems—are particularly sensitive to ground-level ozone. Ozone can cause coughing, throat irritation, and pain when taking a deep breath. It also can reduce lung function, inflame the linings of the lungs, and even trigger asthma attacks the day after ozone levels are high. Repeated inflammation over time may permanently scar lung tissue.

Check your daily UV Index and Air Quality Index (below), and follow the simple steps on the back of this fact sheet to protect kids' health.

UV Index*

Exposure Category	UVI Range
Low	< 2
Moderate	3 to 5
High	6 to 7
Very high	8 to 10
Extreme	11+

*Reflects adoption of the Global Solar UV Index (effective May 2004).

Air Quality Index (AQI)*

AQI Number	Health Concern	Color Code
0 to 50	Good	Green
51 to 100	Moderate	Yellow
101 to 150	Unhealthy for sensitive groups	Orange
151 to 200	Unhealthy	Red
201 to 300	Very unhealthy	Purple

* Although ozone reports are primarily made for metropolitan areas, ozone can be carried by the wind to rural areas, where it can cause health problems.

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The UV Index

Developed in partnership with the National Weather Service, the UV Index provides a daily forecast of the expected risk of overexposure to the sun. The Index predicts UV intensity levels on a scale of <2 to 11+, where <2 indicates a low risk of overexposure, and 11+ means an extreme risk.

Actions You Can Take

- **Do not burn.** Five or more sunburns can double your chance of getting skin cancer.
- ***When the UV Index is "high," "very high," or "extreme"*: Limit outdoor activities between 10 am and 4 pm,** when the sun is most intense.
- **Seek shade.** When possible, conduct activities in a shaded area. Rotate players to allow breaks in the shade.
- **Generously apply sunscreen.** Twenty minutes before going outside, liberally apply a broad-spectrum sunscreen with a Sun Protection Factor (SPF) of at least 15. Reapply every two hours or after swimming or sweating.
- **Require hats and sunglasses.** Encourage kids to find a hat they like and wear it. Wide brim hats offer the most sun protection. Teach kids to wear sunglasses with 99 to 100 percent UV-A and UV-B protection.
- **Encourage t-shirts or full-length clothing instead of tank tops.**

The Air Quality Index

The Air Quality Index (AQI) is a scale used by state and local air agencies to report how clean or polluted the air is. Ground-level ozone is one pollutant reported. An AQI of 100 or less (green or yellow) is considered satisfactory for most people. Air quality values above 100 (orange, red, and purple) are considered unhealthy, first for sensitive groups, but then for everyone as the AQI gets higher.

Actions You Can Take

- ***When the AQI reports unhealthy levels,* limit physical exertion outdoors.** In many places, ozone peaks in mid-afternoon to early evening. Change the time of day of strenuous outdoor activity to avoid these hours, or reduce the intensity of the activity.
- **Pay attention to symptoms.** Know how to recognize symptoms of respiratory discomfort, such as coughing, wheezing, and breathing difficulty, and reduce exposure if these occur.
- **Rotate players in physically exerting games.** Rest players to reduce exertion.
- **Provide alternative activities.** Allow kids that have asthma or other respiratory problems to participate in activities that are less physical when pollution levels are high. If pollution levels are particularly high, move physical activities indoors where the air is filtered by an air conditioning system.
- **Be vigilant about asthma management.** People with asthma should have adequate medication on hand and follow their asthma management plans.

>> To find the UV Index...

Visit EPA's UV Index Web Page
www.epa.gov/sunwise/uvindex.html
Search by ZIP code for your local UV Index. View a daily UV Index color-coded map of the United States or a daily Index map of 58 specific monitoring locations.

Check local newspapers or listen to local radio and TV weather forecasts.

>> To find the Air Quality Index...

Visit EPA's AIRNOW Web Page
www.epa.gov/airnow/
Choose your state and local area for real-time animated maps, forecasts, and previous day's peak ozone level.

Check local newspapers or listen to local radio and TV weather forecasts.

Visit EPA's EnviroFlash Web Page
<https://enviroflash.epa.gov>
Sign up to receive the daily UV Index, Air Quality Index, and occasional UV Alerts directly by e-mail.

Office of Air and Radiation (6205J)
EPA430-F-06-012
www.epa.gov
July 2006

Section 3:
Fishing Report for South Padre Island

TEXAS PARKS AND WILDLIFE

Show navigation

Fishing Report for SOUTH PADRE

Return to search page

Date	Report
Dec 27, 2006	Redfish are fair to good in South Bay on plum Bass Assassins, Hogies, Trout Killers, Sand Eels, live shrimp and gold spoons. Sand trout and whiting are fair at the jetty on dead shrimp.
Dec 20, 2006	Redfish are fair to good in the potholes on live finger mullet. Trout are fair to good on the drop-offs near the Intracoastal on live shrimp and DOA Shrimp under a popping cork.
Dec 13, 2006	Redfish are fair to good in South Bay on gold spoons and finger mullet. Trout are fair for jiggers working the drop-offs near the Intracoastal.
Dec 6, 2006	Redfish are fair to good in the potholes on live finger mullet. Trout are fair to good on the drop-offs near the Intracoastal on live shrimp and DOA Shrimp under a popping cork.
Nov 30, 2006	Trout are fair to good at Airport Cove on plum and black Bass Assassins, Trout Killers and Sand Eels. Mangrove snapper, black drum, redfish and croaker are fair good in the Ship Channel on fresh dead shrimp.
Nov 22, 2006	Trout are fair to good on the spoil banks on live shrimp and plum Sand Eels, Bass Assassins and Trout Killers. Redfish are fair to good on the spoils and in the channel on finger mullet and shrimp.
Nov 15, 2006	Trout are fair to good on the spoil banks on plum Sand Eels, Bass Assassins and Trout Killers. Redfish are fair to good on the spoils and in the channel on finger mullet and shrimp.
Nov 8, 2006	Trout, redfish and snook are good in South Bay on live shrimp under a popping cork. Trout and redfish are good on live shrimp at Laguna Vista.
Nov 1, 2006	Redfish are good on the flats on live shrimp and piggy perch. Trout and redfish are fair to good at the jetty on live bait. Trout, sand trout, croaker and flounder are fair to good on shrimp in South Bay.
Oct 25, 2006	Trout, redfish and flounder are fair to good at Un-Necessary Island and Laguna Vista on plum, black and glow Bass Assassins, Trout Killers, Sand Eels and live shrimp under a popping cork. Redfish are good at the jetty on crabs and mullet.
Oct 18,	Trout, redfish and flounder are fair to good at Un-Necessary Island and Laguna Vista on plum, black and glow Bass Assassins, Trout Killers,

2006	Sand Eels and live shrimp under a popping cork. Redfish are good at the jetty on crabs and mullet.
Oct 11, 2006	Trout, redfish and flounder are fair to good at Three Islands and Laguna Vista on red shad, glow and electric blue Trout Killers, Bass Assassins, Sand Eels and live shrimp under a popping cork. Redfish are beginning to school on the flats.
Oct 4, 2006	Trout and redfish are good on gold spoons and live shrimp under a popping cork at Three Islands. Redfish are schooling on the flats. Trout are fair to good on the grass beds next to the Intracoastal on bone-colored soft plastics and live shrimp.
Sep 27, 2006	Redfish are fair to good at the jetty on mullet and crabs. Tarpon are fair to good on the beachfront on pogies and crabs. Trout are fair to good in South Bay on live shrimp.
Sep 20, 2006	Trout are fair to good from Holly Beach to Laguna Vista on plum Bass Assassins, Trout Killers and Sand Eels. Trout and redfish are good on topwaters at the Gas-Well Flats.
Sep 13, 2006	Redfish are good on topwaters and soft plastics around Three Islands. Trout are good on live shrimp while drifting grass flats.
Sep 6, 2006	Redfish and black drum are good on finger mullet and live shrimp under a popping cork on the Gas-Well Flats. Trout and redfish are good at Three Island on chrome She Dogs and live shrimp.
Aug 30, 2006	Redfish and black drum are good on finger mullet and live shrimp under a popping cork on the Gas-Well Flats. Trout and redfish are good at Three Island on chrome She Dogs and live shrimp.
Aug 23, 2006	Trout and redfish are good while drifting grass beds on morning glory and plum Bass Assassins, Trout Killers and Sand Eels. Trout are fair to good the Gas-Well Flats on live shrimp under a popping cork and gold spoons.
Aug 16, 2006	Trout are fair to good at Twin Bar on red shad and plum Bass Assassins, Red Killers, Trout Killers, Hogies, Sand Eels and live shrimp under a popping cork. Redfish and black drum are good at Airport Cove on live shrimp.
Aug 9, 2006	Trout are fair at Long Bar on plum and bone Bass Assassins, Sand Eels, Trout Killers and live shrimp under a popping cork. Redfish and black drum are good at Airport Cove on live shrimp.
Aug 2, 2006	Trout, redfish and snook are fair to good in South Bay on finger mullet and topwaters. Trout and redfish are good at Laguna Vista on finger mullet, shrimp, Super Spook Jrs. and She Dogs.
Jul 26, 2006	Trout and redfish are good while drifting Twin Bars on limetreuse and plum Bass Assassins, Trout Killers and Sand Eels. Trout are fair to good the Gas-Well Flats on live shrimp under a popping cork and gold spoons.
Jul 19,	Trout, redfish and snook are fair to good in South Bay on finger mullet

2006	and topwaters. Trout and redfish are good at Laguna Vista on finger mullet and She Dogs.
Jul 12, 2006	Trout and redfish are good while drifting Twin Bars on limetreuse and plum Bass Assassins, Trout Killers and Sand Eels. Trout are fair to good the Gas-Well Flats on live shrimp under a popping cork and gold spoons.
Jul 5, 2006	Trout and redfish are good on pumpkinseed/chartreuse and plum Hogies, Sand Eels, Trout Killers and Bass Assassins at Three Island. Trout are good at the Gas-Well Flats on She Dogs and live shrimp under a popping cork.
Jun 28, 2006	Trout and redfish are fair to good on plum and black Hogies, Sand Eels, Bass Assassins and live shrimp at Three Island. Trout and redfish are good while drifting the flats on morning glory Bass Assassins, Trout Killers, Hogies and Super Spook Jrs.
Jun 21, 2006	Trout and redfish are fair to good at Laguna Vista on finger mullet, live shrimp and bone She Dogs and Super Spooks. Trout, redfish and black drum are good at Un-Necessary Island on live shrimp under a popping cork.
Jun 14, 2006	Trout and redfish are fair to good at Holly Beach on black/chartreuse Hogies, Gamblers and topwaters. Trout and redfish are good at Laguna Vista and Airport Cove on chartreuse Top Dogs, live shrimp and bone Trout Killers, Sand Eels and Bass Assassins.
Jun 7, 2006	Trout and redfish are fair to good at Holly Beach on black/chartreuse Hogies, Gamblers and topwaters. Trout and redfish are good at Laguna Vista and Airport Cove on chartreuse Top Dogs, live shrimp and bone Trout Killers, Sand Eels and Bass Assassins.
May 31, 2006	Trout and redfish are good on pumpkinseed/chartreuse and plum Hogies, Sand Eels, Trout Killers and Bass Assassins at Three Island. Trout are good at the Gas-Well Flats on She Dogs and live shrimp under a popping cork.
May 24, 2006	Trout and redfish are fair to good on plum and black Hogies, Sand Eels Jrs., Bass Assassins and live shrimp at Three Island. Trout and redfish are good while drifting the flats on pumpkinseed/chartreuse Bass Assassins, Trout Killers, Hogies and Super Spook Jrs.
May 17, 2006	Redfish are good on Top Dog Jr's and Super Spook Jr's along the grassy shorelines. Trout and mangrove snapper are good in the channel on live bait. Trout are good on live shrimp in the Ship Channel.
May 10, 2006	Trout, redfish and black drum are fair to good on gold spoons around Airport Cove. Trout and redfish are fair to good on topwaters at Holly Beach.
May 3, 2006	Trout are fair to good at Twin Bars on live shrimp under a popping cork and bone Trout Killers. Trout are fair to good in Airport Cove on black Sand Eels, Bass Assassins and topwaters. Redfish are good on live shrimp and Top Dogs on the flats and along the shorelines.

Apr 26, 2006	Trout and redfish are fair to good in South Bay and the Ship Channel on live shrimp and red shad Trout Killers, Sand Eels, Stanley Wedgetails and Bass Assassins. Trout are good on topwaters at Holly Beach. Mangrove snapper and black drum are good in the Ship Channel on shrimp.
Apr 19, 2006	Trout are fair in the channels on live shrimp and black/chartreuse plastics. Redfish are fair to good around Three Islands on squid, mullet, and shrimp. Trout and redfish are good at Un-necessary Island on live shrimp under a popping cork.
Apr 12, 2006	Trout and redfish are fair to good around Airport Cove on live shrimp and Super Spooks. Redfish are good while drifting the flats on live shrimp and gold spoons.
Apr 5, 2006	Trout, black drum and mangrove snapper are fair in the Ship Channel on fresh dead shrimp and live bait. Trout are fair at Laguna Vista and Holly Beach on red shad plastics and She Dogs.
Mar 29, 2006	Trout are fair to good at Laguna Vista on live shrimp and black Bass Assassins, Trout Killers, Hogies and Sand Eels. Trout, redfish and black drum are fair to good on live mullet and shrimp in South Bay. Redfish are good on topwaters and live shrimp in Airport Cove.
Mar 22, 2006	Trout, redfish and black drum are fair to good along the Intracoastal on live shrimp and mullet. Trout are fair to good on Top Dogs at Stover Point. Trout and redfish are fair to good on live shrimp at Holly Beach.
Mar 15, 2006	Trout and redfish are fair on topwaters from Laguna Vista to Holly Beach. Black drum, sheepshead and mangrove snapper are fair at the jetty on sea lice and shrimp.
Mar 8, 2006	Trout are fair on topwaters and live shrimp at Laguna Vista and Holly Beach. Redfish are fair to good on gold spoons and live shrimp at Unnecessary Island and the jetty.
Mar 1, 2006	Trout and redfish are fair on the Gas-Well Flats on live shrimp under a popping cork. Trout, redfish, sheepshead and black drum are fair in the Intracoastal on live shrimp.
Feb 22, 2006	Trout are fair in the guts on fire tiger and glow Trout Killers, Bass Assassins and Sand Eels. Mangrove snapper, sheepshead and black drum are fair to good in the Brownsville Ship Channel on live shrimp and squid.
Feb 15, 2006	Black drum are good in the Intracoastal on shrimp and blue crabs. Trout, redfish and black drum are fair to good on live shrimp at Un-necessary Island.
Feb 8, 2006	Trout and redfish are fair to good in the channels on live shrimp and finger mullet. Redfish and black drum are good at the jetty on finger mullet and crabs.
Feb 1,	Trout and redfish are fair to good in the channels on live shrimp and

2006	finger mullet. Fish are moving to the flats in the afternoon as the water warms. Redfish and black drum are good at the jetty on finger mullet and crabs.
Jan 25, 2006	Redfish are fair to good on gold spoons over grass beds adjacent to the Intracoastal. Trout are fair on the ledges of the Intracoastal on live shrimp and DOA Shrimp.
Jan 18, 2006	Trout, redfish and black drum are fair on dead shrimp under a popping cork on the flats adjacent to the Intracoastal Trout, redfish, black drum and whiting are fair in the Intracoastal on dead shrimp.
Jan 11, 2006	Trout and redfish are fair to good in the Intracoastal on red/white and morning glory soft plastics and live shrimp. Whiting are good at the jetty on shrimp.
Jan 4, 2006	Trout and redfish are fair to good at the jetty and the Intracoastal on live shrimp and glow, plum and morning glory Bass Assassins, Trout Killers, Stanley Wedgetails and Sand Eels. Flounder are fair around the cuts on white or pink jigs tipped with shrimp.

Section 4:
Sea Turtle Season 2006

Nesting season for 2006
- from Sea Turtle, Inc.

Nest No.------Date of Nest----- No. of eggs-------Expected hatch date
SPI 01----------April 28----------89----------Released
SPI 02----------April 28----------112----------Released
BC 03----------April 28----------122----------Released
BC 04----------May 2----------106----------Released
BC 05----------May 9----------97----------Released
SPI 06----------May 11----------100----------Released
SPI 07----------May 11----------103----------Released
SPI 08----------May 11----------77----------Released
UN 01----------May 11----------??----------IN SITU
SPI 09----------May 14----------111----------Released
SPI 10----------May 18----------119----------Released
SPI 11----------May 19----------82----------Released
SPI 12----------June 11----------93----------Released
SPI 13----------June 14----------100----------Released
SPI 14----------June 15----------118----------Released
SPI 15----------June 15----------113----------Released
BC 16----------June 16----------96----------Released
BC 17----------JUne 16----------71----------Released
SPI 18----------June 22----------124----------Released
SPI 19----------Found October 9 with eggshells in town.

Section 5:
Nature Tourism in the Lone Star State

Nature Tourism in the Lone Star State

Economic Opportunities in Nature

A report from the State Task Force on Texas Nature Tourism.

C O N T E N T S

☆ ☆ ☆

The Republic of Texas, 1836.

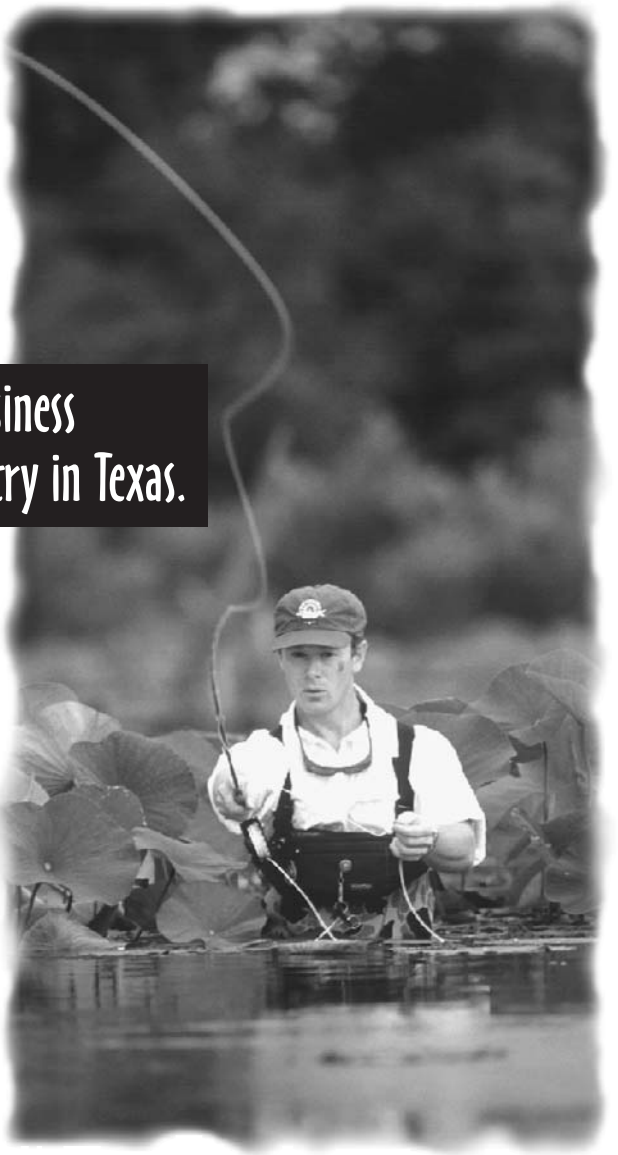
EXECUTIVE SUMMARY

Experts agree that, by the turn of the century, the largest industry in Texas may not be manufacturing, oil and gas, or agriculture. Chances are that it will be tourism, today a $23 billion business in Texas and rapidly expanding.[1] An important component of this burgeoning industry is nature tourism, itself one of the fastest growing segments of global travel. This increasing interest in nature tourism offers new economic opportunities for private landowners, rural communities, cities and others interested in making tourism their business.

Tourism is a $23 billion business and the 3rd largest industry in Texas.

Nature tourism, as defined by this task force, is "discretionary travel to natural areas that conserves the environmental, social and cultural values while generating an economic benefit to the local community." In other words, nature tourists are travelers who spend their time and money enjoying and appreciating a broad range of outdoor activities that have a minimum impact on the environment.

Hunting and fishing are the traditional mainstays of nature tourism in Texas. A report in *Field & Stream* magazine puts Texas far ahead of any other state in retail hunting spending — $1.07 billion compared to second-place California's $536 million. Yet, in recent years, the most significant market growth has been in "non-consumptive" activities, in this report to be termed outdoor appreciation. This includes wildlife and bird watching, nature study and photography, backpacking, hiking, boating, camping, rafting, biking, climbing and a variety of similar pursuits.



Fly fishing for black bass on Purtis Creek. © David Sams

The task force was given the following mission:

- **Examine the potential for nature tourism in Texas.**
- **Recommend opportunities for developing and promoting it.**
- **Build upon local efforts already underway.**
- **Preserve local, social and cultural values.**
- **Promote sustainable economic growth, restorative economic development and environmental conservation through nature tourism.**



EXECUTIVE SUMMARY

Texas is internationally known as a destination for nature tourists. Throngs of hunters, anglers, campers, bird watchers and other outdoor enthusiasts travel to Texas every year in pursuit of their favorite outdoor activity. Texas ranks first in the number of hunting days provided annually, and second in fishing. Texas is also the premier bird watching destination in the U.S., according to an American Birding Association survey in 1993. Yet to date no comprehensive state policy or program to coordinate and promote nature tourism in Texas has been formulated.

Recognizing this need, a special State Task Force appointed by the governor convened in Austin on November 9, 1993, to develop a report on the economic opportunities on nature tourism in Texas. The State Task Force has been co-chaired by Andrew Sansom, Executive Director of the Texas Parks and Wildlife Department, and Deborah Kastrin, Executive Director of the Texas Department of Commerce.

Membership has included a broad range of Texas interests, reflecting the viewpoint of cities, rural communities, the tourism industry, private landholders, state agencies, non-profit and educational institutions, various ethnic groups, businesses and conservationists.

Since its appointment, the State Task Force on Texas Nature Tourism and its committees have met more than a dozen times, gathering information from experts and citizens and discussing ways to improve nature tourism in Texas. The results of these investigations and discussions are incorporated in this report. The report is a thorough look at nature tourism as it exists today, and a recommended plan of action for increasing its economic and conservation potential for Texas.

The report is intended for the governor's office, state legislators, landowners, cities, rural communities and citizens interested in increasing nature tourism.

Bird watching on the Upper Texas Coast. Photo TPWD



The recommendations of the task force fall into four categories: Conservation, Education, Legislation and Promotion. The recommendations briefly presented here will be discussed in full detail in later sections of this report.

EIGHT OF THE TOP TWENTY REASONS NON-TEXANS VACATION IN TEXAS

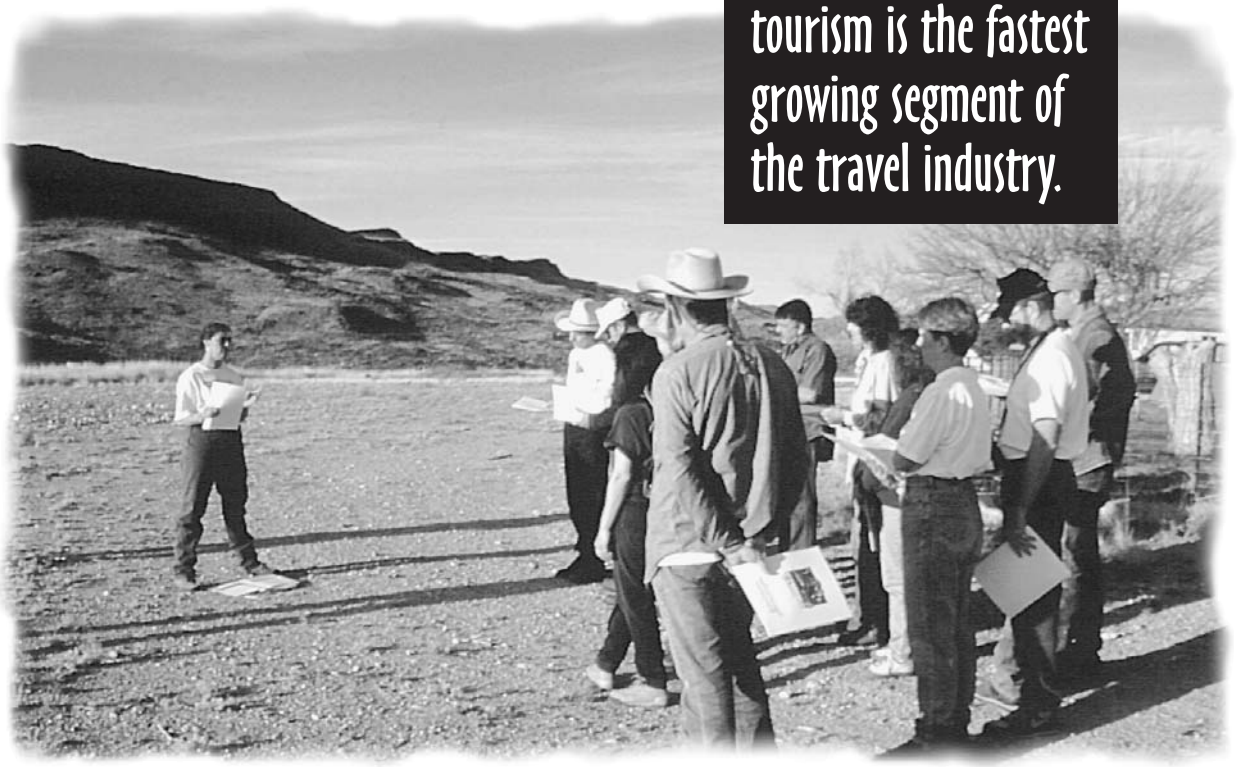
- **Beautiful scenery**
- **Attractive beaches**
- **State parks**
- **Lakes and boating**
- **Fresh and saltwater fishing**
- **Good campgrounds**
- **Good hiking trails**
- **Dude ranches**

Source: TDOC/GSD&M study, McNabb.

CONSERVATION:

- Provide incentives to private landowners to preserve natural habitats.
- Manage public land, such as state parks and wildlife management areas, for the enrichment and continuance of wildlife diversity.
- Acquire additional recreational lands with unique nature tourism elements, but only from willing sellers.
- Develop resource conservation programs to restore diminished resources such as native grasslands and reintroduce native fauna such as bighorn sheep, pronghorn antelope and bison that attract nature tourists.
- Identify and categorize existing and potential nature tourism resources, and assess and monitor the impacts of nature tourism.

Seminole Canyon State Park. © Stephan Meyers



Black Gap Wildlife Management Area. Photo TPWD

EDUCATION:

• Create a training program for rural community leaders, tourism-related business managers and prospective business persons.

• Develop a nature tourism handbook for communities and landowners.

• Facilitate the development of local tourism infrastructures to support consumer needs.

• Communicate the importance of preserving and managing Texas' natural resources to communities, landowners and the public and inform them, through public awareness efforts, of the state's programs to conserve wildlife and habitat.

NATURE-BASED RECREATION GROWTH TRENDS THROUGH THE YEAR 2000

• Backpacking	up 34%
• Day hiking	up 31%
• Bicycling	up 25%
• Outdoor photography	up 23%
• Wildlife watching	up 16%
• Camping	up 16%
• Canoeing / Kayaking	up 13%
• Rafting / Tubing	up 11%

National Average.
Sources: Recreation Executive Report, May 1994, from U.S. Forest Service data.

LEGISLATION:

• Seek legislation, a joint resolution or a constitutional amendment to allow rural landowners to manage their property solely for wildlife without losing their agricultural exemption from ad valorem taxation.

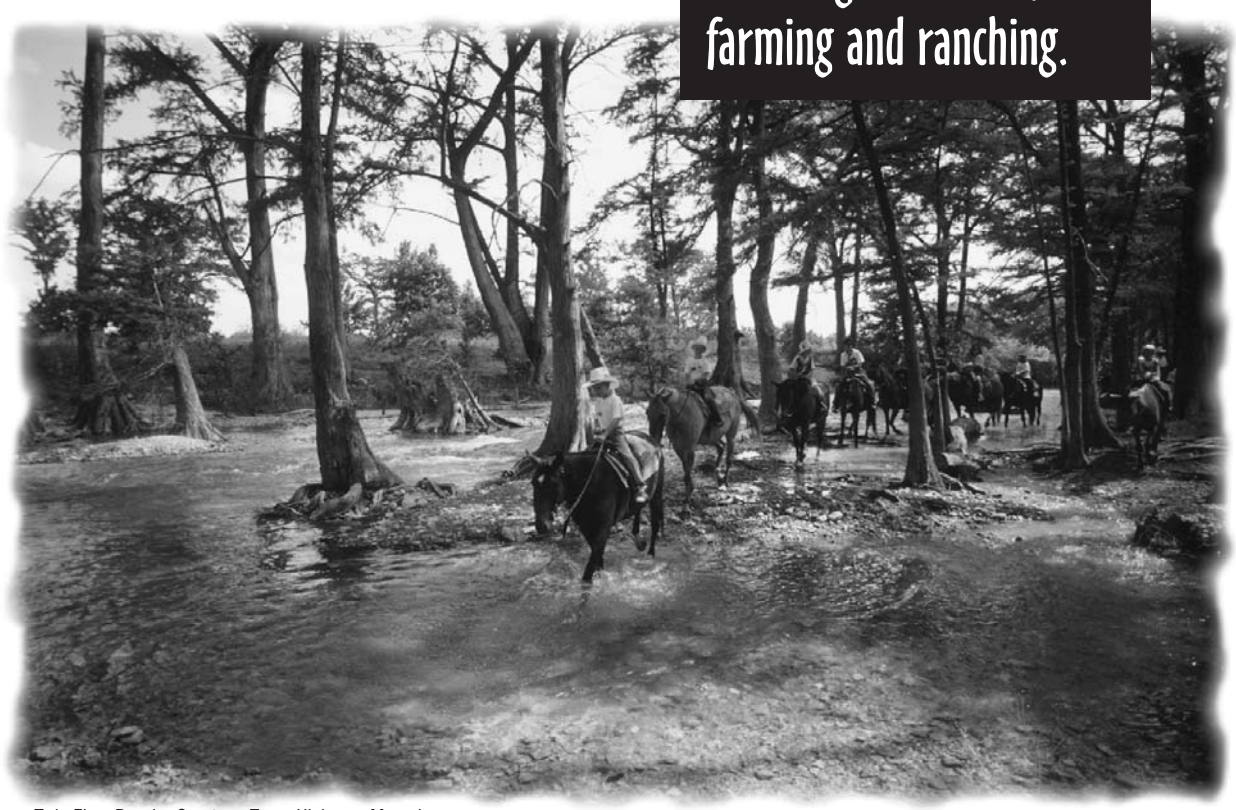
• Amend Texas transportation laws so that chauffeur and bus companies transporting tourists to and from rural Texas communities can operate as common carriers and broker freight to increase profitability and efficiencies.

• Support probate relief for landowners who obligate themselves to manage their land as wildlife habitat. As an example, explore federal probate tax credits in exchange for conservation easements.

• Develop an insurance program for landowners who are interested in providing for nature tourism on their lands.

• Landowners presently are granted a limitation from liability regarding recreational activities as long as revenues received do not exceed twice the previous calender year's ad valorem tax. Remove this cap.

Rural landowners engaged in Nature Tourism should have the same tax advantages allowed for farming and ranching.



Twin Elms Ranch. Courtesy *Texas Highways* Magazine.

Hikers on the Mesa De Anguila, Big Bend National Park. © Tracy Lynch

Wildlife viewing is the number one outdoor activity in the U.S.

PROMOTION:

• Facilitate the establishment of a non-profit industry organization, the Texas Nature Tourism Association (TNTA), with membership to include landowners, tourism managers, regulatory agencies, tour operators, guides, conservation groups, chambers of commerce, convention and visitors bureaus and service providers.

Texas Horned Lizard. Photo TPWD

The TNTA would:

1. Develop voluntary guidelines for nature tourism sites and providers.
2. Assist in the promotion of nature tourism in Texas.
3. Assist in developing and coordinating an overall marketing strategy and individual marketing elements for nature tourism in Texas.
4. Establish a Texas Nature Tourism Information Center to provide centralized access for those seeking nature tourism and travel information.
5. Conduct demonstration programs in various regions of the state to show the benefits of nature tourism.

Texas Gulf Coast. Photo TPWD

Texans, like all Americans, are turning more and more to outdoor recreational activities. Nationally, outdoor recreation has more participants than the combined total of those who own a pet, tend a garden or attend professional sports events, according to the Sporting Goods Manufacturers Association. More people photograph wildlife than play golf.

Nature tourism is the fastest growing segment of the travel industry, averaging a 30 percent annual increase each year since 1987.[2] Worldwide, nature tourism sales were expected to total $238 billion in 1994.[3]

A record 157 million domestic visitors traveled to Texas last year, solidifying the state's ranking as the second-most visited state in the nation after California, according to the Texas Department of Commerce. California had 258 million visitors, while Florida ranked third with 133 million visitors. Leisure travel accounted for 67 percent of all travel to Texas, with business travel accounting for 33 percent.

TOP TEN OUTDOOR RECREATIONAL SPORTS IN THE U.S.

Activity	Participants in (millions)
1. Wildlife viewing	76.5
2. Fitness walking	69.6
3. Camping	47.1
4. Fishing	35.6
5. Hiking	22.7
6. Hunting	14.1
7. Canoeing, Kayaking, Rafting	14.0
8. Backpacking	10.4
9. Mountain biking	5.0
10. Rock climbing, Mountaineering	4.1

Sources: *Recreation Executive Report*, May 1994.

The potential for nature tourism in Texas is immeasurable. Texas is blessed with an unparalleled diversity of wildlife and habitats. We have deserts and bayous, forests and grasslands, mountains and canyons. We have rare species of birds and animals, many found nowhere else in the United States. Game is plentiful, and Texas has more white-tailed deer than any other state. Our saltwater and freshwater fishing ranks among the very best. All of these resources create opportunities for nature tourism.

Already, nature tourism is establishing itself as a major economic force in Texas. Tourism itself is a $23 billion industry—the third largest industry in the state. Tourism in Texas supports 419,000 jobs and a $7.5 billion payroll. Tourists make more than 162 million trips to Texas each year.[4]

The U.S. Travel Data Center reports that, in tax dollars alone, tourism brings $856 million to the state coffers each year, and $630 million in local tax receipts.

According to a Texas Parks and Wildlife Department study, visitors to Texas state parks spent $179 million in 1993, and the estimated total economic impact was $477 million.[5] An estimated $3.6 billion was spent on fishing, hunting and wildlife associated recreation in Texas in 1993.[6]

In 1991, hunting activities in Texas generated an estimated $1 billion.[7] Sales included hunting supplies, travel and other expenses.

Hunting expenditures in turn generated $474.5 million in salaries and wages, 23,370 jobs, and $104.9 million in state and federal taxes.

While hunting and fishing remain a substantial part of the picture, the rapid growth is expected in other areas of outdoor recreation. Regionally, the number of hunters has been holding steady since 1980, and the number of anglers has increased 27 percent since 1980. But the number of wildlife appreciation participants has increased 61 percent in the same period.

In Texas, hunting license sales increased 5 percent from 1992 to 1993, but are down 12 percent since 1983. Texas sport fishing license sales increased 3 percent from 1992 to 1993, but are down 11 percent since 1983. However, there were 25 million visits to state parks in 1993, up 40 percent since 1983.

Lease hunting for quail. © Robert Liles

"Say hello to the Great Texas Coastal Birding Trail".

WEDNESDAY, AUGUST 31, 1994

ECONOMIC FOCUS

Birding Trail Takes Aim At Affluent Eco-Tourist

Nature tourism clearly helps fuel urban, rural and regional economies in Texas. Some smaller communities rely on these dollars for their very survival.

The Wall Street Journal reported last August that bird watchers are "some of the most affluent travelers around," and they're bringing a lot of their money to Texas. The article reported state plans for a 500-mile automobile touring route, known as The Great Texas Coastal Birding Trail, which will stretch from Port Arthur to Brownsville and direct nature tourists to more than 50 popular bird watching sites.

According to the newspaper article, the revenue generated by this trail alone could prove significant. The newspaper reported the following examples of economic benefits from nature tourism:

• About 6,000 bird watchers poured into tiny High Island during a six-week period in the spring of 1992, spending some $2.5 million in lodging and other travel-related activities.[8] The total economic impact was estimated at between $4 million and $6 million in a two-month period. This coastal woodland near Houston is known internationally as a bird watching site.

• Between 75,000 and 100,000 tourists visit Aransas each year to view vast flocks of migratory birds, providing at least a $5 million boost to the local economy, according to Diane Probst, executive director of the Rockport-Fulton Area Chamber of Commerce.

• Captain Ted's Whooping Crane Tours reported the number of its annual customers has grown to between 8,000 and 10,000 from less than 1,000 a decade ago. At $28 a head, the tours generate enough income to let the owners take off half the year.

• Six years ago, Rockport inaugurated its first HummerBird Celebration in honor of the hummingbirds which migrate through the area. In 1994, this festival attracted approximately 4,000 visitors, who spent well over $1 million, according to the Chamber of Commerce.

Whooping Crane tour along the Central Texas Coast. © Bill Reaves

Are there other "Opportunities in Nature" in Texas? The opportunities are as diverse as our flora and fauna.

In Texas, the number of Texans participating in nature study is expected to grow to 18 million people by the year 2000, an increase of 17 percent from 1990.[9]

The Big Bend area offers a unique look at the nature tourism phenomenon; few people go there for any other reason. Big Bend National Park estimates that visitors add $23.5 million a year to the area economy. Chief Naturalist Dennis Vasquez reports that 312,140 visitors were drawn to the park in 1992. About 40 percent of them spent more than $250 during a typical two-day visit, with an average spending-per-visitor of $43. This spending on lodging (40%), food (25%), travel (20%) and other items (15%) benefited the regional economy within a 100-mile radius of the park. The top three visitor drawing cards cited were scenic views and drives, the desert experience and viewing park wildlife, and the wilderness environment.

Nature tourism in Big Bend is not, however, limited to the National Park. For example, Texas Parks and Wildlife Department acquired the 269,000-acre Big Bend Ranch State Natural Area in 1988, and recently adopted a management plan to increase public access. It has added bus tours, nature programs, primitive camping, hiking trails and other activities, and plans to seek proposals from private guide services for backpacking, educational workshops, hiking, horseback riding, mountain biking, instructional services, photography, seminars, sightseeing, vehicular tours and other ideas to increase public use of the land, which is just west of the national park.

Studies are now underway to document the economic impact of nature tourism in the South Texas/Rio Grande Valley region. Meanwhile, nature preserve managers and scientists estimate that nature tourism, especially bird watching, pumps tens of millions of dollars into the Valley economy each year.

For example, *Texas Wildlife Viewing Guide* author Dr. Gary Graham says one Valley bird—the yellow-green vireo—generates an estimated $100,000 per year in local spending.

In 1992, bird watchers generated $4-6 million economic impact along the Upper Texas Coast.

The Laguna Atascosa National Wildlife Refuge near Brownsville has the only confirmed nesting record of this species in the nation. The vireos have returned every year since 1988, and with them the bird watchers. "People fly in from all over the U.S. just to see this one bird," says Graham. "They land at the airport, rent a car, drive out to see the bird, go back to spend the night in Brownsville and then fly back to New York or wherever they live." Melvin Maxwell of the refuge staff says car counters show the site draws about 200,000 visitors per year. Of these, he says about 75% come from outside the Valley, drawn mainly by the chance to see high wildlife diversity in a relatively small area. The refuge has documented 393 species of birds—to their knowledge more than any other national refuge in the U.S.



PROFILE OF THE NATURE TOURIST

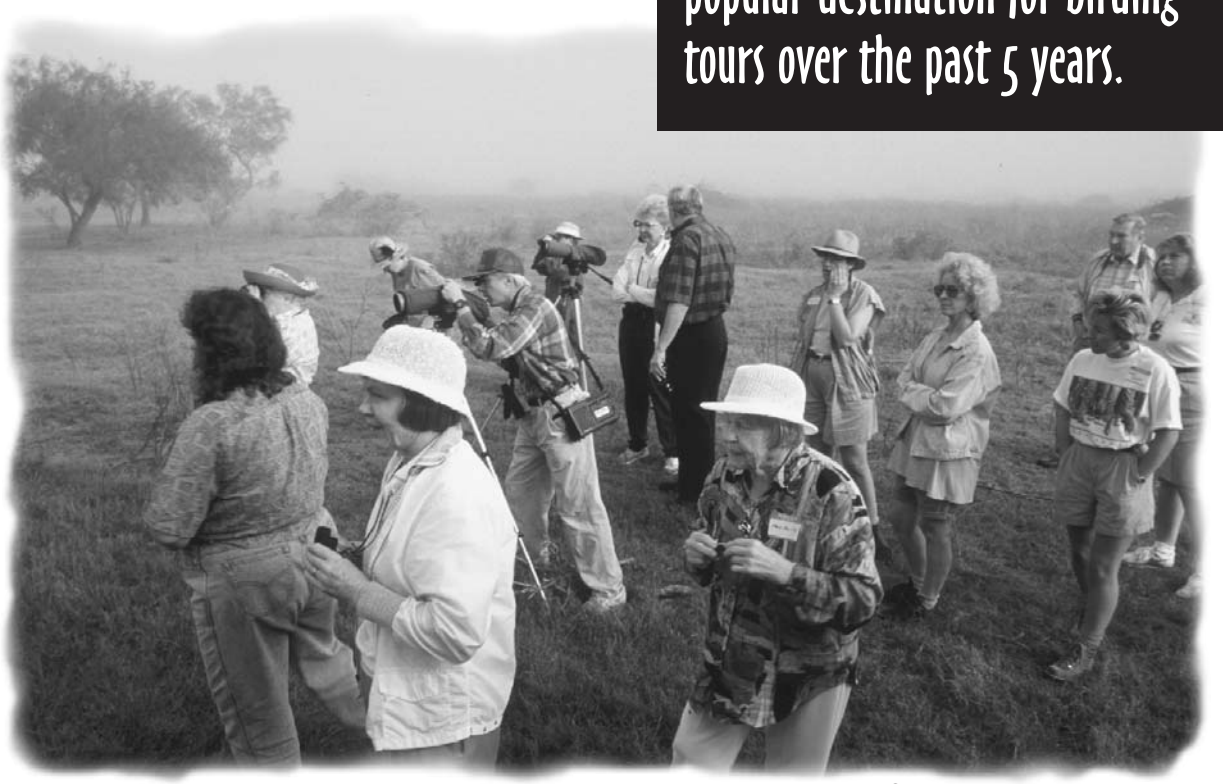
Who are these nature tourists? A variety of studies presents a picture of the nature tourism consumer. The general consensus is that there are several types of nature-based tourists, depending on the activity.

Hunters and anglers tend to be Anglo males who live in urban areas and are high school graduates or above.[10] Nature tourists involved in outdoor appreciation are more evenly divided between male and female (60 percent male, 40 percent female).[11] Texans who use state parks are almost evenly divided between male and female. They have annual household incomes of $25,000 to $75,000, range from 25 to 54 years of age, and are generally Anglo or Hispanic.[12]

Texas birders are generally middle-aged, well-educated and financially successful. Sixty percent are men and 40 percent are women.[8]

Nature tourists want to be involved in the tourism experience, according to a 1992 survey by Clemson University.[14] They're not just passive observers. Nature tourists travel to: (1) experience natural phenomena, (2) learn about nature, (3) be physically active, and (4) meet people with similar interests. They are attracted to mountains and oceansides, wilderness and undisturbed nature, birds, trees and wildflowers, lakes and streams, wildlife, parks and rural areas.[15]

American Birding Association members list Texas as the most popular destination for birding tours over the past 5 years.



Bird watching at King Ranch. © Barton Wilder custom images

PROFILE OF THE NATURE TOURIST

In a survey contracted by the Texas Department of Commerce in 1994, non-Texans were asked to identify top vacation attributes. The survey showed that two of the top ten attributes–pretty scenery and beautiful beaches–are nature based. Other nature-related activities which scored high are state parks, lakes and boating, fresh/saltwater fishing, good campgrounds, good hiking trails and dude ranches.[15]

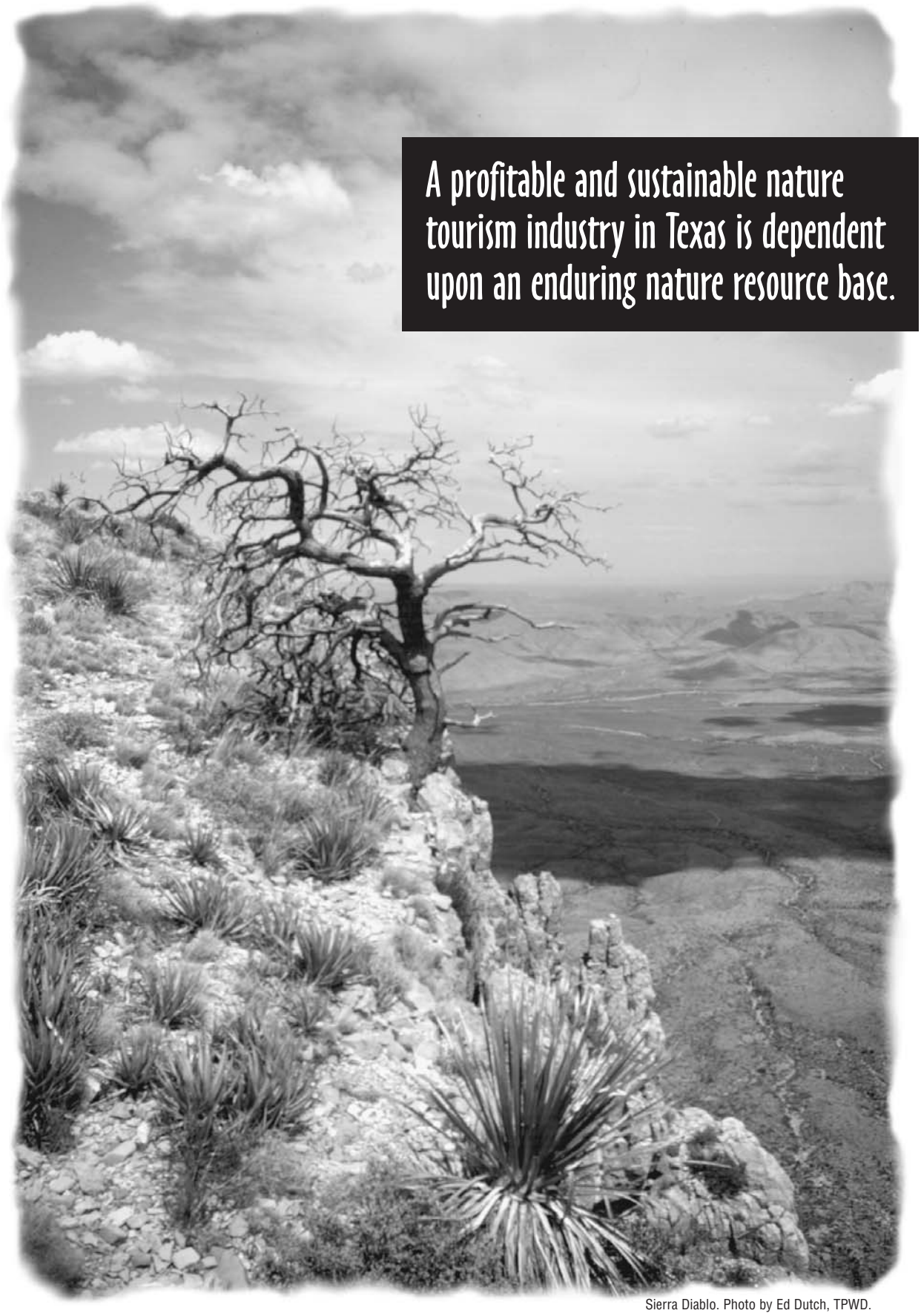
Texas State Parks received 25 million visitors in 1993. That's a 40 percent increase since 1983.

A 1992 Clemson University survey showed that at least six dimensions of nature-based tourists exist: Education and history travelers, social travelers, relaxation travelers, nature travelers, economic and weekend travelers and camping travelers.[16]

It is important to know, however, that a segment of nature-based tourists desire condominiums and not campgrounds as their lodging type. This suggests that tourism planners and developers must offer a mix of accommodation types if they are to attract the nature-based tourism market.

Fishing on Caddo Lake. © Photo TDOC





A profitable and sustainable nature tourism industry in Texas is dependent upon an enduring nature resource base.

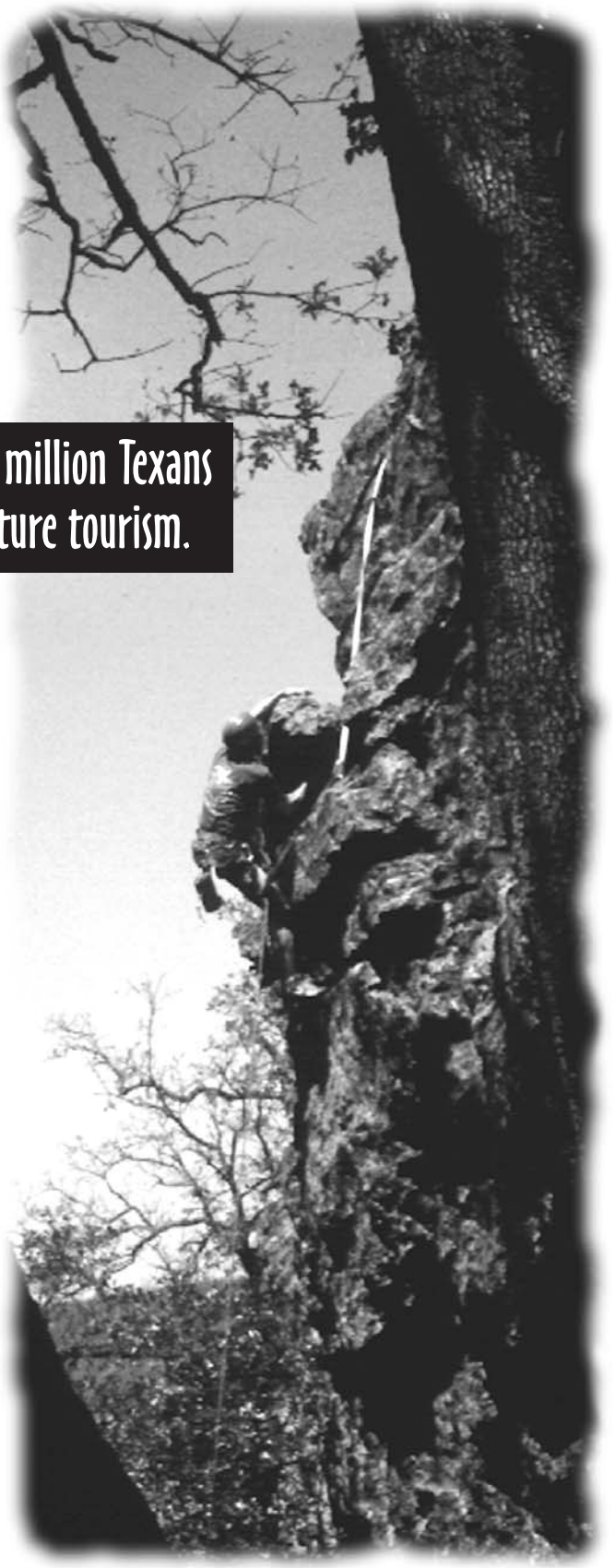
Sierra Diablo. Photo by Ed Dutch, TPWD.

It is going to take the combined talents, creativity and resources of government, landowners, representatives of cities and rural areas, the travel industry, the conservation community and other interested parties to position Texas to take advantage of the growing interest in nature travel.

The state must devote its resources and talents to identify and coordinate marketing activities among public and private sectors to develop nature tourism. In addition, the state should develop effective integrated nature, cultural and heritage tourism programs and policies. The programs should be developed across all social and economic levels.

By the year 2000, 18 million Texans will participate in nature tourism.

A profitable and sustainable nature tourism industry in Texas is dependent upon an enduring nature resource base. Conservation, education, legislation and promotion must be intrinsically linked if Texas is to succeed in competing globally as a nature tourism destination. To this end, the State Task Force on Texas Nature Tourism is recommending a number of specific actions.



Rock climbing at Lake Mineral Wells State Park. © Ed Arrington

Central Texas Coast. Photo TPWD

Conservation of nature resources in Texas should be based generally upon a three-pronged strategy:

• Provide incentives to private landowners to preserve natural habitats.

• Manage public lands, such as state parks and wildlife management areas, for the enrichment and continuance of wildlife diversity.

• Lease or acquire additional lands from willing sellers where TPWD is able to manage, enhance and conserve habitats for all wildlife diversity to provide for a wide range of recreational opportunities.

• In addition, better utilize mitigation funds for aquiring and enhancing lands that may additionally function as nature tourism destinations.

Compared to other states and countries that are promoting nature tourism, the amount of publicly-owned land per capita in Texas is low (97 percent of Texas land is privately held). Thus, developing a close working relationship with landowners, and providing more recreational land for Texas, are critical.

The state should pursue a broad-based strategy to secure consistent, sustainable funding for an enhanced natural resource base. This responsibility lies with many governmental agencies, non-governmental organizations (NGOs), landowners and private individuals.

Bighorn sheep. Photo TPWD

We recommend therefore that private and public sector efforts in nature tourism and resource conservation activities be coordinated. Local, state, federal and private sector organizations and companies should be identified according to current areas of responsibility and potential needs. In this way, we can avoid duplication of effort.

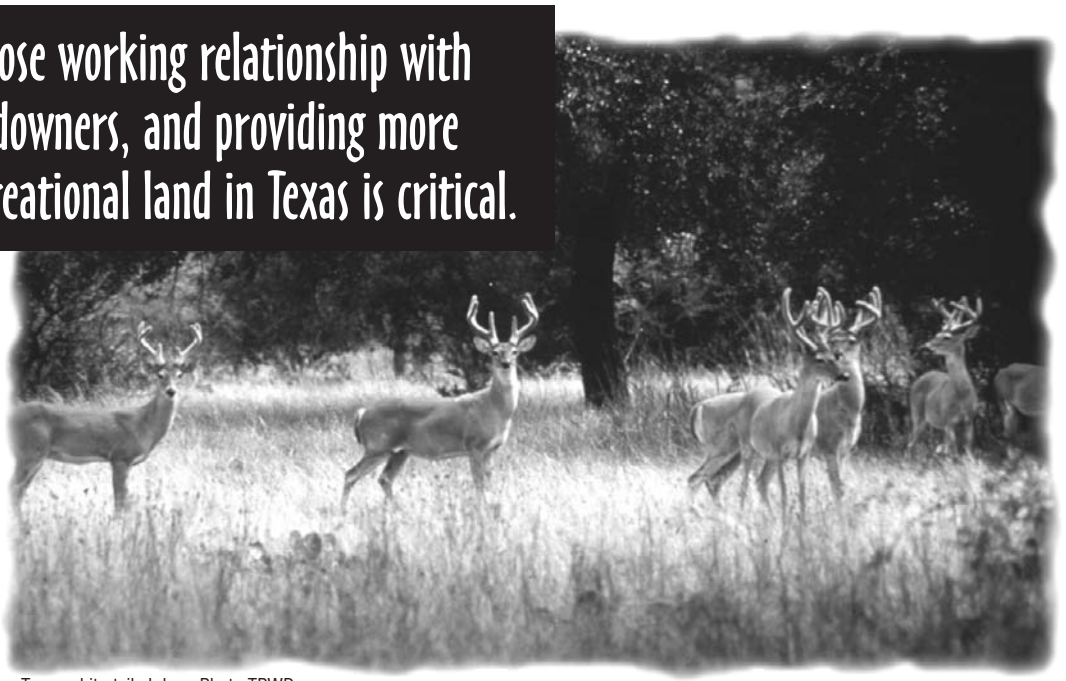
A memorandum of understanding or inter-agency agreement should be developed between related agencies, and an inter-agency/private sector task force should be established to facilitate nature tourism conservation activities. The nature tourism component within the current Strategic Travel and Tourism Plan should be enhanced and expanded.

Although historically present in the state, such "charismatic megafauna" as buffalo, elk and bear that attracts many nature tourists are lacking in Texas. However, rare species such as the whooping crane and large flocks of birds such as the snow geese and sandhill cranes wintering in Texas are sensual equivalents.

The state needs to develop resource restoration programs to recover diminished assets such as native grasslands and reintroduce appropriate native fauna such as bighorn sheep, pronghorn antelope and bison that could function as attractions for nature tourists. Sites that exemplify and exhibit pre-colonial Texas nature resources should be identified and protected.

Nature tourists traveling to Texas desire to experience the essence of natural Texas. Yet, even the agencies charged with protecting these assets rarely agree on the definition and delineation of these resources. The state needs to identify and categorize the existing and potential nature tourism resources, and assess and monitor the impacts of nature tourism.

A close working relationship with landowners, and providing more recreational land in Texas is critical.



Texas white-tailed deer. Photo TPWD



Texas is undergoing a fundamental economic restructuring, with populations moving from rural communities to urban centers. According to a report from Texas Rural Communities Incorporated, only 18 percent of the state's population resides in 204 rural counties. Those rural counties west of Interstate 35 have experienced dramatic population losses, with many communities losing up to one third of their population in the last ten years.

62 percent of rural communities say they would like to implement tourism programs.

According to this report, 62 percent of rural communities have indicated they would like to implement programs that would increase visitation in their communities. They believe that visitors bring additional dollars to a community without using costly services such as schools and jails.

In fact, the Texas Agricultural Extension Service recently conducted a state-wide needs assessment at the county level resulting in 213 counties of 254 expressing overwhelming need for outreach and educational programs focused on economic development, tourism development, leadership training, capacity building and quality of life. In excess of 700 requests were received.

Training rural community leaders to develop strategies to attract tourism is critical. State agencies, organizations and educational facilities serving rural Texas should be used to create these training programs. In particular, trained nature tourism interpreters and guides are needed to staff nature tourism sites and facilities in rural Texas.

Canoeing in the Trans Pecos. Photo TPWD

The educational programs should, at a minimum include the following:

• Develop a step-by-step nature tourism handbook targeted to communities and private landowners.

• Provide training and outreach for local communities, individuals and companies to nurture and enhance nature tourism in their areas.

• Enable the development of local tourism infrastructures to support the nature consumer's needs.

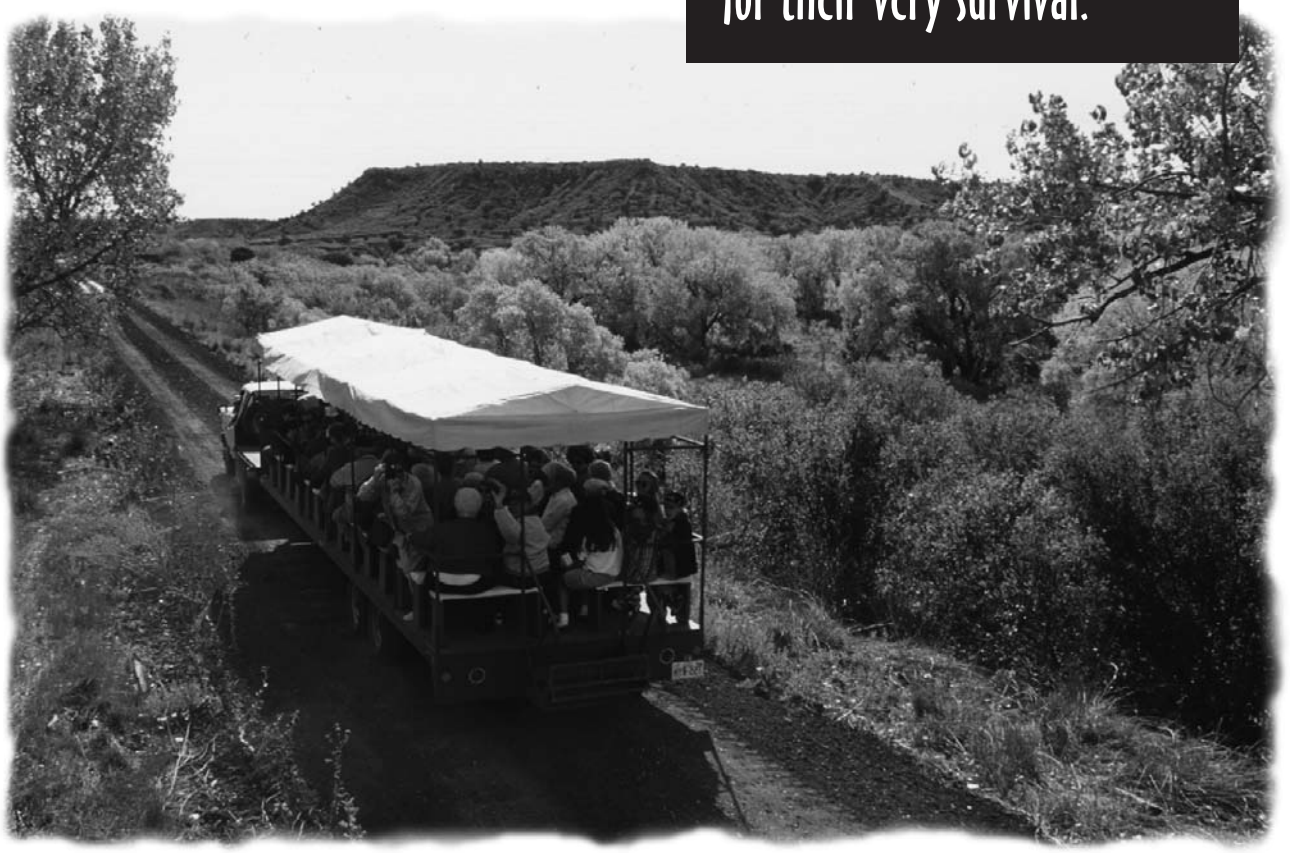
• Provide training for public and private sector employees who interact with the public concerning basic hospitality skills and nature tourism opportunities in their areas.

• Identify and coordinate public and private organizations with the financial resources and expertise to help communities and individuals in their nature tourism efforts.

• Identify nature tourism products and infrastructure which are both available and needed to promote sustainable growth and environmental conservation.

• Develop programs to communicate the importance of protecting and managing Texas' nature resources.

Some smaller communities rely on nature tourism dollars for their very survival.



Caprock Canyon State Park tour, Quitaque Texas. © Wyman Meinzer.



Legislation is needed in four areas to promote nature tourism: 1) property tax relief for lands devoted to wildlife management and nature tourism; 2) incentives for transportation companies serving rural areas; 3) limitation of liability, and 4) federal probate relief for landowners who manage their land for wildlife habitat and out-door recreation. The four are discussed in detail below:

• In order to receive relief from ad valorem property taxes, Texas landowners now must operate their farms and ranches for agricultural purposes. Some would prefer to manage their property solely for wildlife, but cannot afford to lose their agricultural exemption. With this situation in mind, the task force is recommending that the state seek legislation, a joint resolution, or a constitutional amendment to ensure tax relief for rural landowners engaged in wildlife management.

• Transportation of tourists to and from rural Texas communities is logistically difficult and, at times, marginally profitable for the chauffeur, taxi or bus company. Texas transportation laws should be amended to allow such companies to operate as common carriers and broker freight, thus increasing efficiencies and profit margins. This would entice more operators into these rural Texas regions.

Effective January 1, 1995, federal legislation will largely preempt state regulations of trucking. The new federal law reads: "a State... may not enact or enforce a law... related to a price, route or service of any motor carrier... with respect to the transportation of property."

Although the law does not affect bus operators, the ability of these operators to transport property may be allowed. Guidance is needed from the Texas Railroad Commission.

• Many Texas landowners are hesitant to allow public access to their lands because of liability exposure. Under the current codes, landowners who wish to allow public access for recreational purposes have limited liability unless the owner has "acted with malicious intent or in bad faith." Current law also allows the landowner to charge for entry to the premises, "but the total charges collected in the previous calendar year for all recreational use... may not be more than twice the total amount of ad valorem taxes..." This revenue cap needs to be removed.

In addition, an insurance program needs to be developed for recreational users and landowners engaged in nature tourism.

• The average age of rural Texas residents is ten years older than the mean for the state, and the average age of farmers and ranchers, which constitute the largest land-asset base, is nearly 60. As the descendants of the farmers and ranchers inherit the land, many are forced to sell or subdivide the property. Such fragmentation has lessened the contiguous wildlife acreage in the state.

One form of relief would be to offer federal probate tax credits in exchange for conservation easements.



Quality control, a centralized source of information, demonstration programs, promotional materials, a coordinated advertising campaign and targeted marketing are some of the promotional needs. They are discussed in detail below:

• It is in the best interests of the nature tourism industry to develop voluntary guidelines for operators, providers and sites that wish to be certified for quality nature tourism. The state should encourage the establishment of a not-for-profit industry organization which could be known as the Texas Nature Tourism Association (TNTA).

This association would promote quality control and would attract members from the entire nature tourism spectrum: site managers, regulatory agencies, tour operators, conservation organizations, chambers of commerce, convention and visitors bureaus, lodging, food service and other providers.

The TNTA would develop voluntary guidelines to promote quality sites and providers. In addition, the TNTA would assist in marketing and development of nature tourism in Texas.

• Texas must facilitate nature tourist visitation to remain competitive with other states and countries. To that end, the TNTA should establish a Texas Nature Tourism Information Center, and adopt and promote technologies allowing tourists and the industry to directly access the center. Callers would be able to obtain information directly, or receive a source where information might be obtained.

• Because nature tourism has been recognized only recently as an economic force, few models exist to demonstrate its potential. Pilot programs should be conducted in various regions of the state to document the benefits of nature tourism. Texas Parks and Wildlife Department sites could be included in these pilot programs. Information gleaned from these test cases should be presented in reports and made available to the public. In addition, case studies should be conducted at existing destinations outside the TPWD system.

Austin Nature Center. Photo TPWD

• The TNTA should assist in developing an overall marketing strategy and individual marketing elements for nature tourism in Texas. This would include a generic "rack" brochure for statewide use. The publication would highlight the Texas Nature Tourism Center's telephone number and data link. Distribution would be made through the Texas Department of Transportation's Travel Information Centers, Texas state parks, convention and visitors bureaus, gateway airports and other venues.

In addition, the Texas Nature Tourism Center's telephone number and data link should be prominently displayed in promotional materials produced by state agencies. A common theme line and logo should be developed, as well as advertising templates that can be used by communities, private landowners and governmental agencies to promote nature tourism destinations. Advertising should include print ad slicks and radio scripts. A Public Service Announcement for television should be considered.

• Texas is competing in the nature tourism market with states and countries that have developed sophisticated and well-funded marketing programs. The state needs to develop a marketing campaign targeted to the trade, including the international tourist. Specific market research should be conducted to identify and prioritize both present and potential Texas nature tourists and the activities and experiences they desire

View from the South Rim, Chisos Mountains. Photo TPWD

CONCLUSION

One concept separates Texans from all other people of the world and that is an extraordinary sense of place.

Our lands and waters comprise the richest nature heritage of all the states and this diverse resource base has given rise to a unique identity and pride which is the basis of our culture. These magnificent natural assets and our individuality itself combine to make Texas one of the world's most intriguing destinations today.

Texas is a place where adventure is literally at our fingertips because it is as accessible as it is vast. Texas is a place of exploration because many of its most exciting outdoor opportunities are little known and challenging to reach. Texas is a place of learning as its natural wonders include many of the earth's rarest plants and creatures. Texas is a place of unparalleled outdoor sportsmanship because of its tradition of private land stewardship. And thus, Texas is once again positioned to realize a new and exciting prosperity from our abundant natural resources.

In developing our future economy, however, we needn't exhaust our natural treasure in order to profit from it. In fact, the full measure of Texas in the next century will only be realized if our vision is inclusive of sustainability along with profitability.

That is the essence of the Nature Tourism challenge, and we firmly believe that Nature Tourism is an exciting economic opportunity for our great state. Equally important, it is by its very definition, an affirmation of our determination to protect, to enjoy and to share a marvelous place of unique resources and lasting values.

The big catch. © Robert Liles



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Section 6:
The Economic Benefits of Wildlife Watching in Texas

The Economic Benefits of Wildlife Watching in Texas

According to a recent report to Texas Parks and Wildlife Department by Southwick Associates, in 2001, there were 1 million residents and non-residents of Texas who travel to observe, photograph or feed wildlife. These people spent 7.7 million recreation days pursuing these activities. Of those traveling to observe wildlife, 851,044 people were viewing birds and 600,712 were observing mammals (and a lot of people were looking at both). These travelers spent $228,779,736 on travel-related expenses. Texas residents and nonresidents spent $1.28 billion in Texas on equipment and services related to their wildlife watching activities.

Then there are those who watch wildlife at home. There are 2.9 million Texans who observe, photograph, or feed wildlife within 1 mile of their home (nearly 3 times more than those who travel). More than 84 percent feed birds at home and 70 percent say they observe wildlife near their home. Feeding wildlife was the most common activity of those who stay close to home, whereas observation is the most common activity for those who travel. Texas residents spent approximately 221 million man-days observing wildlife around their home.

It is interesting to look at the demographics of those who enjoy wildlife-related recreation. According to the Southwick report, wildlife watchers in Texas are 97 percent white, middle-aged (50-51 years), with an average household income of $50,000 to $60,000. About 45 percent are male. In comparison, hunters in Texas are 92 percent white, slightly younger (40.5 years), 90 percent male, with average household income of about $63,000. Anglers (both freshwater and saltwater) are also mostly white (94 percent), average age of 40-45 years, mostly male (70-80 percent), with an average household income of about $47,000 to $63,000.

What does all this mean to the economy of Texas? It means Texas would be a lot poorer if it weren't for the economic activity generated by wildlife watching and other types of wildlife-associated recreation. Let's look at what economists call Total Economic Effect

(Output) for example. Original expenditures by wildlife recreationists generate rounds of additional spending throughout the economy. Retailers buy more inventory and pay bills, wholesalers buy more from manufacturers, and all these people pay employees who then spend their paychecks. The sum of all this activity is the total economic impact resulting from the original expenditures. The total economic effect from 2001 fish and wildlife-related recreation in Texas was estimated by Southwick Associates to be $10.9 billion. In other words, if hunters, anglers, and wildlife watchers stopped spending money in Texas and did not spend these dollars on other items in state, the Texas economy would shrink by $10.9 billion. Of this total, sport fishing accounted for $4.6 billion, with $3.6 billion and $2.7 billion from hunting and wildlife watching, respectively.

A big part of economic impact can be measured in the number of jobs supported by the activity. Expenditures for wildlife-related recreation support jobs throughout Texas. Some businesses serve recreationists directly, such as retailers and restaurants. Other businesses, such as wholesalers, utilities, manufacturers, and grocers support the direct service providers. Total jobs, full and part time, supported in Texas in 2001 from fish and wildlife related activities were estimated at 96,700, with 41,300, 31,700, and 23,700 from hunting, fishing and wildlife watching, respectively.

Tax revenue generated by an activity is another way to look at overall impact to the local and state economy. According to the Southwick report, state sales tax generated from 2001 fish and wildlife-related recreation in Texas was estimated at $298 million ($278 million by residents and $20 million by non-residents). Wildlife watchers accounted for $80.3 million of the total, while anglers and hunters generated $124.8 million and $93.0 million, respectively. The federal government ultimately earns $453 million from fish and wildlife recreation in Texas via income tax revenues.

Tourism is the third largest industry in Texas according to the Texas Travel Industry Association, and nature-based tourism is one of the fastest growing segments of this industry. Nature related tourism offers Texans the opportunity to build and diversify economies based on conserving the natural resources and rural lifestyles important today and for future generations.

For more information, see: Nature Tourism or contact Nature Tourism Coordinator at 512-389-4396.

Reference: Southwick, Robert and Thomas Allen. 2003. The 2001 Economic Benefits of Hunting, Fishing and Wildlife Watching in Texas. Southwick Associates, Fernandina Beach, Florida. TPWD Contract No. 116470.