1.4 BENEFITS OF SUSTAINABLE AND RESILIENT DRAINAGE DESIGN

More than 6 million people live in the 18 Texas coastal counties; by 2050 the population in these counties is expected to reach 8.5 million (TWDB 2014a). Future land development in urbanized and rural areas will continue to create challenges for maintaining and restoring water quality in Texas' coastal watersheds. Sustainable stormwater management approaches can alleviate some of the challenges posed by development. The following section provides a brief discussion of some of the benefits of sustainable drainage practices.

1.4.1 ENVIRONMENTAL BENEFITS AND HYDROMODIFICATION AVOIDANCE

POLLUTION ABATEMENT

The key to successful sustainable development practices is the reduction of both the volume of runoff and the amount of pollutants discharged into receiving waters. Sustainable development practices result in pollutant removal by using multiple strategies to mimic natural processes such as settling, filtration, adsorption, and biological uptake. The International BMP Database (www.bmpdatabase.org) is a good resource for examining pollutant removal data derived from multiple monitoring sites across the country. Reductions in stormwater pollutant discharges to receiving waters improve habitat for aquatic and terrestrial wildlife and enhance recreational uses.

PROTECTION OF DOWNSTREAM WATER RESOURCES AND RIPARIAN AREAS

Sustainable development practices can be used to protect water resources that are downstream. These practices can help to prevent or reduce hydrologic impacts on receiving waters, reduce stream channel degradation from erosion and sedimentation, improve water quality, increase water supply, and enhance the recreational and aesthetic value of the natural resources.

GROUNDWATER RECHARGE

Sustainable development practices can be used to infiltrate runoff and recharge groundwater. Growing water shortages throughout Texas increasingly indicate the need for water resource management strategies designed to integrate stormwater, drinking water, and wastewater programs to maximize benefits and minimize costs. Development pressures typically result in increases in the amount of impervious surface and volume of runoff. Infiltration practices can be used to replenish groundwater and increase stream flow during dry periods. Adequate flow to streams during dry weather is important because low groundwater levels can lead to greater fluctuations in stream depth, flows, and temperatures, all of which can be detrimental to aquatic life.

HABITAT IMPROVEMENTS

Innovative stormwater management techniques like sustainable development or conservation design can be used to improve natural resources and wildlife habitat or avoid expensive mitigation costs. Aquatic habitat improvements can be seen from sustainable development practices as the quality, volume, rate, and temperature of stormwater runoff entering receiving water bodies is more closely associated with pre-development conditions.

HYDROMODIFICATION AVOIDANCE

Sustainable development practices such as stream and shoreline buffer zones that significantly limit disturbance of natural streams and wetlands protect water quality, slow and absorb flood flows, reduce stream velocities, and protect wildlife and aquatic habitats. Sustainable planning that encourages the design of development and roads beyond the floodplain and/or with limited stream crossings also preserves natural water body function and allows natural process to manage water quality and floods. At the same time, this preservation of natural resources to manage stormwater can reduce development costs and help mitigate long-term maintenance costs since infrastructure and other constructed measures are located outside of "harms way".

1.4.2 LAND VALUE AND PUBLIC SAFETY BENEFITS

Many direct and indirect benefits of sustainable development derive from improved land value through improved aesthetics, additional lot yield, or property protection, and quality of life benefits. When used correctly, sustainable development techniques can enhance the quality of life within a community in many ways, from providing multiple amenities to creating improved landscapes with a strong sense of place.

REDUCED DOWNSTREAM FLOODING AND PROPERTY DAMAGE

Sustainable development practices can be used to reduce downstream flooding through the reduction of peak flows and the total amount or volume of runoff. Flood prevention reduces property damage and can reduce the initial capital costs, long-term operation and maintenance costs of stormwater infrastructure. As a result, costs for cleanups and stream bank restoration can be reduced or avoided altogether. The use of sustainable development techniques at a regional and neighborhood scale can help protect or restore floodplains, which can then be used as park space or wildlife habitat (Trust for Public Land 2007).

LOT YIELD

Strategies designed to manage runoff on-site or as close as possible to its point of generation can reduce the need for large detention areas and easements for stormwater conveyance infrastructure. In cases where sustainable development practices are incorporated on individual house lots and along roadsides as part of the landscaping, land that would normally be dedicated for a stormwater pond or other large structural control can be developed with additional housing lots. The BMPs listed in Chapter 4 illustrate the various measures that can be used to reduce the stormwater footprint as in the case of pervious pavement where runoff can be stored below the surface and negate the requirement for a stormwater basin.

AESTHETIC VALUE

Sustainable development techniques can be attractive features when using landscaping as an integral part of the designs. Designs that enhance a property's aesthetics using trees, shrubs, and flowering plants that complement other landscaping features can be selected.

PUBLIC SPACES/QUALITY OF LIFE/PUBLIC PARTICIPATION

Placing water quality practices on individual lots provides opportunities to involve homeowners in stormwater management and enhances public awareness of water quality issues. An American Lives, Inc. real estate study found that 77.7% of potential homeowners rated natural open space as "essential" or "very important" in planned communities (National Park Service 1995).

1.4.3 OTHER ECONOMIC BENEFITS

In addition to economic benefits from sustainable stormwater management such as erosion control, flood mitigation, or water quality improvements that reduce the cost of treating drinking water, there are a variety of economic benefits that are directly dependent on the quality and quantity of the water resources in the coastal zone. Examples of activities critical to the Texas economy and that are tied to the health of its bays and estuaries include:

- Coastal tourism provides $5.4 billion in Texas economic activity annually. Nature lovers from all over the world visit the Texas coast to see rare species. Numerous activities contribute to making tourism the third largest industry in Texas, after oil and gas production and agriculture. Tourism for the whooping crane alone results in over $6 million to Texas' coastal economy.
- Texas estuaries annually produce over 100 million pounds of seafood valued at $150-to-$250 million per year.
- Saltwater recreational fishing generates an estimated $2 billion (TPWD 2014). Sport fishing is popular among both residents and nonresidents in Texas, producing significant economic benefits for many individuals and businesses. Because fishing dollars are often spent in rural or sparsely populated areas, the economic contributions of these activities can be especially important to the rural economic base (Southwick Associates 2013).

Economic benefits are derived from preserving and restoring natural features and open space. Public and private investments in natural systems—through environmental conservation and sustainable development actions—have a stimulating effect on economic output and employment. Restoration efforts offer localized benefits that can be attributed to the tendency for projects to employ local labor and materials. Restoration investments have economic and employment stimulus effects as a result of the ripple or multiplier effect on suppliers and related industries. These can be direct economic effects from the initial investment; indirect effects from increased demand in other industries for goods and services; and induced effects from changes in household spending by workers. While there is considerable variability, one study found that restoration investments have beneficial effects on state or local economies comparable to those from investments in other industries (BenDor et al. 2014).

In addition, environmental conservation and sustainable development practices provide economic benefits by avoiding the costs of construction and maintenance associated with conventional infrastructure. Sustainable stormwater management can provide long-term benefits to property owners and businesses, increase tourism and recreation activity, increase yields for fisheries, and provide cost savings for local governments and State and Federal agencies.

Figure 1-3: Whooping cranes in Aransas County. (Photo courtesy of TPWD)