

II. VISION

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Environmental Restoration and Management



Newly planted wetlands at Sydney's Olympic Park.

In a balanced vision, the Trinity River will become a source of pride for Dallas and the Metroplex, with a new sustainable park environment that reveals the now hidden treasures of the Great Trinity Forest and the Trinity River. The City of Dallas can be a national leader through its ecological restoration of the Trinity River and its smarter use of the water resources of the Trinity River. By using stormwater in more ecologically sound ways, Dallas can set a standard for responsible ecological practices. This vision can be realized through action at all levels of government, in the business community and by individuals that affirms an environmental ethic valuing the long term sustainability of natural resources.

A New Environmental Ethic: Sustainability

A primary global issue for the new century will be the management of fresh water as a scarce resource. In the semiarid west, water is a limited, but renewable, natural resource. Dallas' and the Metroplex's growing population will need to cooperatively manage water as a limited resource and address the issue of water quality. Scarcity requires that we both conserve and improve the quality of water as we intervene and interrupt the natural systems and cycles of water. Any responsible water management program must include enhancement of ecosystems and habitats that are both dependent upon and enhance water quality.



Environments nurturing wildlife and enriching human life.

As a community, Dallas and the Metroplex have a unique opportunity to lead by example. The challenges facing the Trinity River and its watershed are substantial and changes will only happen incrementally. As Dallas leads in more responsible practices, it can urge its neighbors in the watershed to join in embracing a new ethic of responsible water use. Among the ways Dallas can lead is by using treated effluent - rather than fresh water - in its design of the water features and amenities that will add distinction to the city.

Dallas' leadership should increase regional awareness of the critical need for sustainable environments within an urban context. The Trinity River offers endless educational opportunities for the residents of Dallas and the region. If well done, on a sufficient scale, the Trinity Central Park should be recognized at a national level; it should establish the Trinity River as a primary destination for visitors to Dallas. In much the way that visionary development of the Turtle Creek Parkway has stabilized the Turtle Creek area for well over 75 years, so too can a Trinity Central Park provide a substantial asset and amenity for Greater Dallas.

Building from this new river-based amenity, Dallas can address the broadest aspects of urban sustainability. The centers of developed urban areas must be continually revitalized so they remain attractive places for people to live, work and visit. Without such efforts, urban development will sprawl outward from historic

city centers, consuming land and energy resources and increasing urban growth's effects on its natural environment. For Dallas, the best way to reduce or reverse these trends is to invest in a revitalized Trinity River Corridor. The actions proposed in the plan, by creating places for vital urban life in the center of Dallas, support a new ethic of urban sustainability for this community.

Restoring the River's Sinuosity

In urban areas, most waterways in need of restoration have problems that originated with harmful alteration of channel form or other physical characteristics, which in turn lead to problems such as habitat degradation, changes in flow regimes, and siltation (EPA 2000). This



Conceptual diagram illustrating how the sinuosity of the Trinity River may be partially restored. A remnant of the original river alignment, "The Meanders", is clearly visible in the right side of the photo.

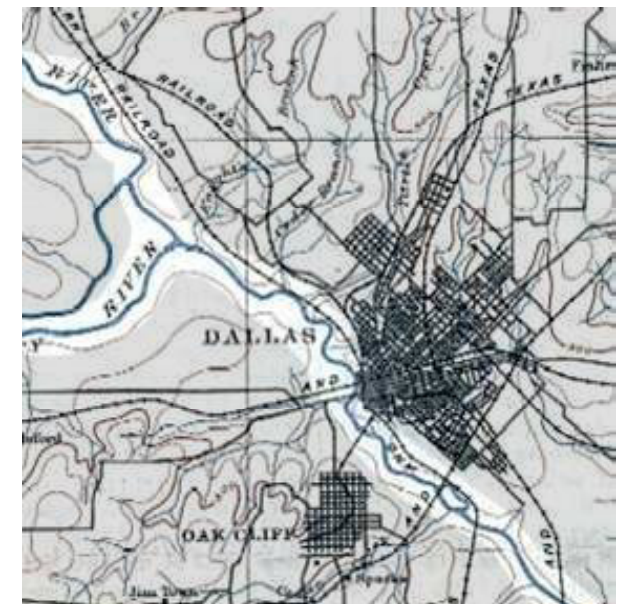
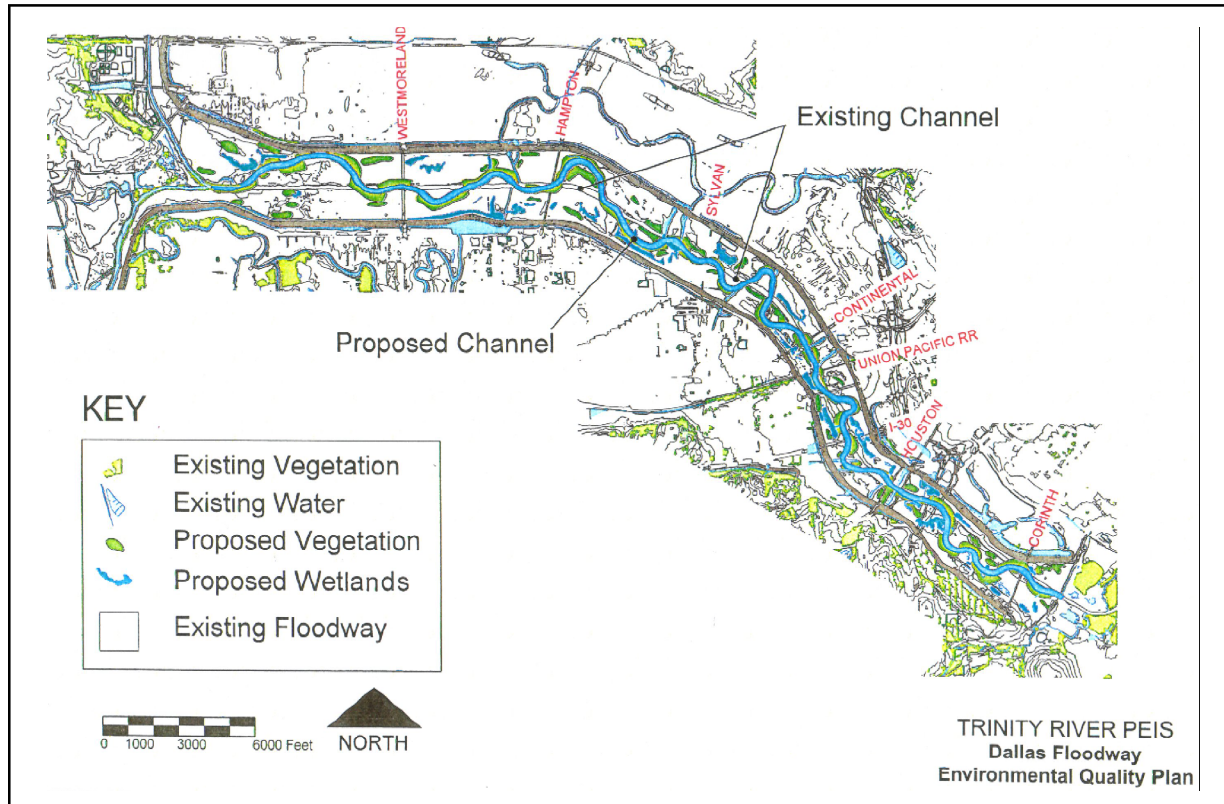
is certainly the case with the Trinity River within the Dallas Floodway. Prior to the establishment of a floodway in the 1920's, the Trinity River's morphology at downtown Dallas included significant meandering consistent with a stream of its geological age. The establishment of the floodway essentially eliminated these meanders as a part of the river itself although

many of the original meanders remain outside the levee system to facilitate stormwater drainage.

The development of the Dallas Floodway in the 1920's resulted in the stream channelization, removal of wetlands, and disconnection of the river from adjacent ecosystems - alterations that need to be addressed as a part of the

environmental restoration aspects of this project. Restoring the original site morphology and other physical attributes of a river is essential to improving water quality and bringing back native biota (Brookes & Shields 1996).

In the June 2000 Programmatic Environmental Impact Statement (USACE 2000), the USACE developed and analyzed what was termed the Environmental Quality (EQ) Plan. The EQ Plan proposed to reestablish meanders to the Trinity in a manner analogous to the historic meanders, but within the current floodway. That plan, and subsequent discussions with USACE

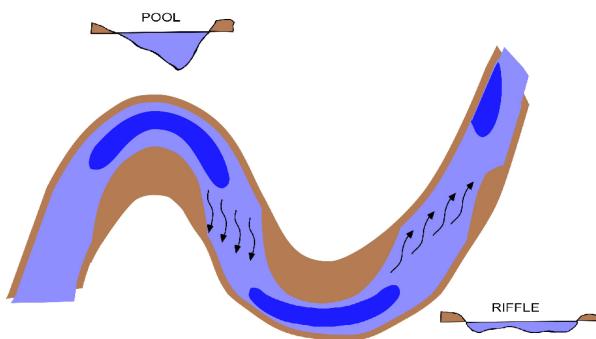


USACE Environmental Quality Plan from June 2000 Preliminary Environmental Impact Statement on the Dallas Floodway. (USACE 2000)

Pre-floodway Map shows the meandering Trinity River.

staff, give strong indications that restoring the Trinity's sinuosity within the floodway will be viewed as critical to establishing meaningful environmental restoration within the floodway. This level of restoration will likely garner federal cost-sharing for the project.

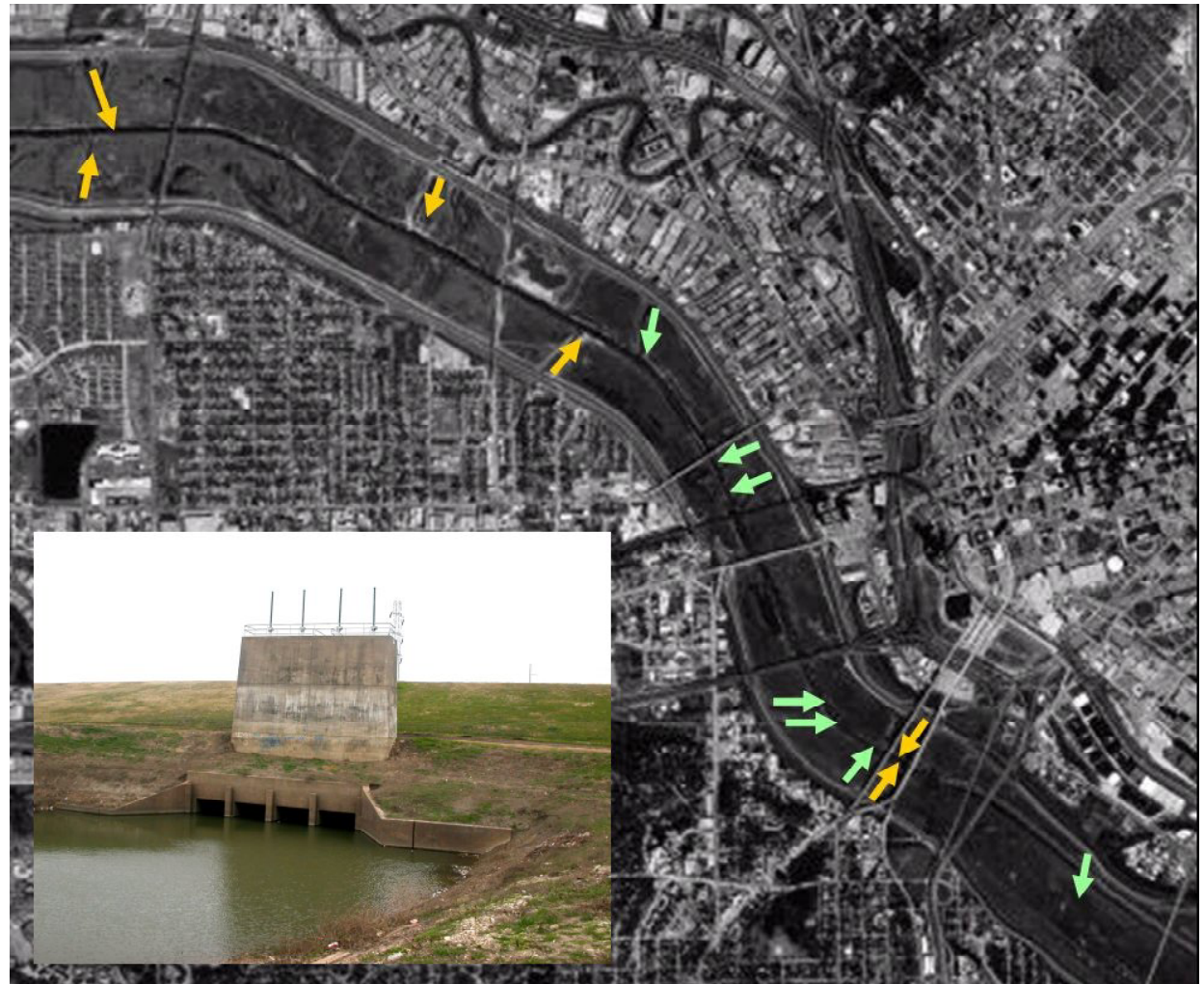
The importance of sinuosity (or meandering) to streams is characterized in the schematic illustration below. River flow around a set of curves creates different flow regimes, often characterized by faster riffle sections and slower pool sequences. These different flow regimes in turn provide different kinds of aquatic habitat and diversity. Quality and diversity of habitat is the fundamental measurement of the significance of an environmental restoration effort.



Schematic Illustration showing the principal flow regimes imparted by meandering streams - faster moving and shallower sections (riffles) and slower moving and deeper sections (pools). (Brookes & Shields 1996)

While adding sinuosity to the Trinity will enhance aquatic habitat significantly and provide the foundation from which other environmental improvements arise, sinuosity

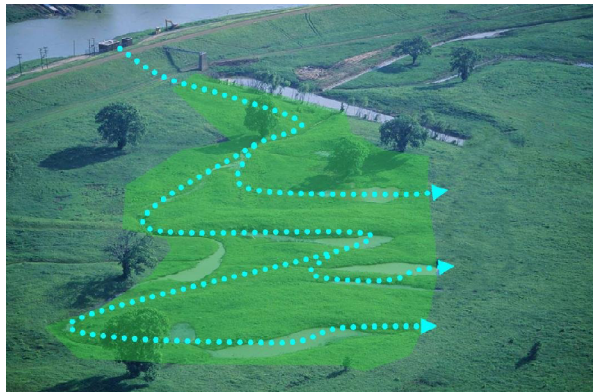
also provides significant improvements to the aesthetic and the recreational characteristics of the stream.



Interior drainage/stormwater outfall points along the Dallas Floodway.

Stormwater Wetlands

While the vast majority of storm flows in the Dallas Floodway come from the over 6,000 square mile drainage area upstream of the floodway, significant stormwater flows also are generated from developed areas immediately outside the levee system and these flows must be conveyed into the floodway. These stormwater outfalls - also known as interior drainage points - enter the Dallas Floodway either through pumping stations or under their own pressure (i.e., require no pumping). There are several pressure outfalls and six pumped outfalls. The amount of flow at capacity for these interior drainage points range from 500 to nearly 6,000 cubic feet per second (cfs). To put this in perspective, summer low flow in the Trinity River is usually around 500 cfs, so these stormwater outfalls into the floodway can create flows



Pumped stormwater outfall (Delta Pump Station) with view of wetlands that exist within the floodway and how they may be enhanced.

several times the flow of the river itself.

Passage of these flows into the floodway in an unhindered fashion is critical to maintain flood protection in the areas served by these interior drainage points (Downtown Dallas, Oak Cliff, etc.); it is also essential to minimize the operating costs of the stormwater drainage system. Since the amount of water coming into the floodway from the interior drainage points can be quite large, major modifications to these

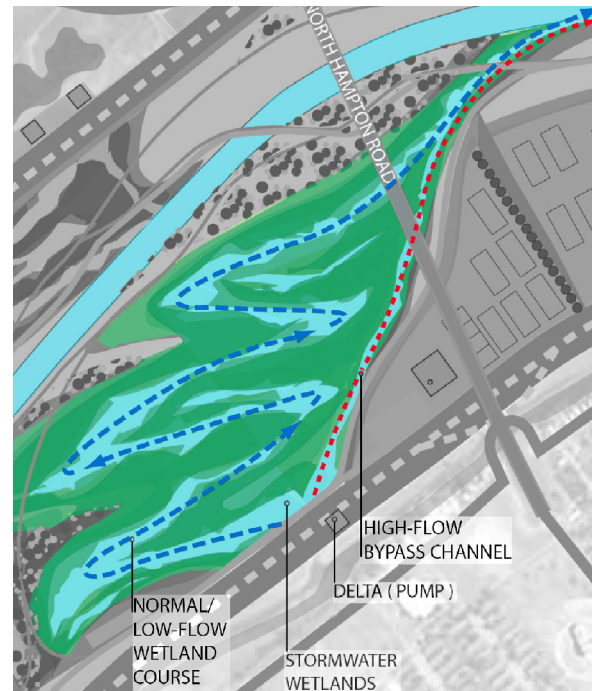


Diagram showing concept of stormwater flow through created wetlands at Delta Pump.

systems are generally precluded because of the cost or impacts to operation and maintenance. This is particularly true of the pressure systems, which have the largest flow rates. Despite this, there are significant opportunities to improve the function of the interior drainage points/stormwater outfalls that are pumped. These points generally have lower flows and can be controlled through the use of pumps and gates to achieve two significant benefits:

- Capture and removal of stormwater floatables, debris, and pollutants in the sump areas associated with each of the pump stations;
- Enhancement and reconstruction of wetland areas in the Floodway.

The strategy for enhancement and construction of nearly 300 acres of wetlands at Pavaho, Baker, Hampton and Delta sumps include raising the wetlands slightly above the base of the floodway and/or providing protection from low level inundation, debris and sediment via the use of berms. The stormwater wetlands will be designed to provide a high flow channel for larger storm events that can be easily accessed for periodic maintenance by rubber tire equipment. Only minor modifications to the floodway are necessary to facilitate additional wetland areas associated with the pumped stormwater outfalls. Indeed, most of the floodway already contains significant areas

where wetlands exist for extended periods after being inundated. By facilitating flow through these areas, the wetlands can be enhanced and made viable even during extended dry periods. The enhancement of the wetlands represents a substantial improvement and expansion of valuable and diverse habitat and strengthening of the ecosystem.

In addition to the ecosystem restoration benefits associated with these stormwater wetlands, additional benefits accrue from the improvement of stormwater quality entering the floodway through these points. The bulk of this benefit will derive from the pollutant removal capabilities inherent in the sump areas - screening of floatable material and settling of particulates. Some additional benefit is derived from uptake of nutrients and additional filtering in the wetlands during low flow (non storm) periods. It is anticipated this treatment will provide measurable benefits for the flows passing through these sump areas.

Headwaters Wetlands

In addition to improving and constructing wetlands areas within the floodway, a unique opportunity presents itself to integrate wetland habitat with the Trinity Lakes proposed for the floodway near Downtown Dallas. Wetlands here would be in the form of “headwaters” wetlands - wetlands that receive a portion of the water

source intended for the lakes. Such a continuously fed wetland system will provide a unique wetland habitat that differs from the other intermittently fed wetlands in the Dallas Floodway. The headwaters wetlands will be used when reclaimed water is used as a water source for the lakes. Reclaimed water, such as that produced by the Central Wastewater Treatment Plant, has sufficient nutrients to support plant growth. By comparison, if groundwater were used as the lake water source, it is doubtful that effective headwaters wetlands could be maintained without adding nutrients.

The headwaters wetlands could remove/uptake some of the nutrients flowing into the lake and would provide an aesthetic and educational resource next to the urban lake. It is anticipated that approximately 5 MGD of reuse water (out

of a total of 50 MGD for the lakes) will be routed through the headwaters wetland.

Habitat Creation, Restoration and Management

In contrast to today’s utilitarian floodway, the Trinity Central Park will provide a more complex and hospitable mosaic of unique aquatic and terrestrial habitats. By significantly increasing environmental contrasts within the landscape (i.e. hydrology, climate, and vegetation density) multiple habitats will be created to foster the return of a diverse community of wildlife and plant species. Such habitats include: upland and riverine forests, grasslands, successional meadows, seasonal wetlands, shallow water riverbanks, fast moving river channels, slowly meandering watercourses, turbulent rapids and eddies, and lake waters.

The contrast amongst aquatic habitats, for example, will be increased through restoration of diverse hydrological conditions. The construction of white water rapids and waterfalls will create high turbulence oxygenation zones, upon which many fish species rely. Aquatic plants will take root within these nutrient rich, sunlit waters, and will provide food and shelter for an endless array of aquatic life. Reconfiguration of the river channel and upland infiltration zones will help to protect sensitive aquatic fish and insect populations by lowering detrimental urban run-off temperatures.

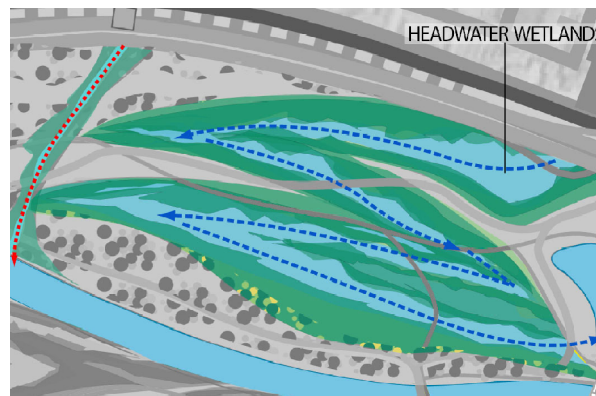


Diagram showing concept of “headwaters” flow through created wetlands above the urban lake.

Within the terrestrial zone of the Trinity River corridor, increasing contrasts in vegetation cover will assist in differentiating habitats. Creating alternating open and dense upland vegetation zones will provide both protective cover for prey and diverse food sources for predator. Multiple vegetation zones will also ensure a diverse, annual food supply for wildlife. Grasslands will provide seasonal forage and penetrable soils for burrowing, while forests provide secure tree canopies for nesting and woody vegetation for year round feeding. Collectively these diverse vegetation communities will serve as a unified migration corridor between the Trinity Forest and the Elm and West Forks of the Trinity River.



Forested habitat within the floodway will be expanded.

Leveraging the Trinity Environmental Assets

A 2,000 acre Trinity Central Park within the Dallas Floodway will link a growing system of regional open spaces now in various stages of development. The park will provide unprecedented access to the Trinity River for residents of Downtown, Oak Cliff, South Dallas and will create a western gateway to the Great Trinity Forest. The ability to access the Great Trinity Forest and the Elm Fork and West Forks of the Trinity River from a central - and highly visible - location will extend the assets of all these parks to regional residents.

The Elm Fork of the Trinity River has a variety of existing and planned public investments including an interpretive center, wetlands, wildlife habitat, recreational facilities and trails. A whitewater canoe and kayak course has been planned for the lower reaches. Linking the Elm Fork trail system to the Dallas Floodway trails will allow for completion of loop trails through the Old Meanders Trail and make possible river trips that combine segments of the Elm Fork and main fork of the Trinity River. Other trails are also proposed, with the ultimate plan having a tie to the Dalhoma Trail into Oklahoma. A series of whitewater courses, in combination with Fort Worth, would create a critical mass of recreational offerings for boaters in the Metroplex.

The Great Trinity Forest is a vast (6,000 acres)

resource in early stages of development. An interpretive center and equestrian facilities are in planning stages; they will feature 31 miles of hard and soft surface trails. An equestrian trail would extend from the Great Trinity Forest through the Dallas Floodway near downtown, creating equestrian assets seldom found in the center of a major city. The Master Plan approved by City Council in 1997 also calls for trailheads and boat launch facilities.

Proper reconstruction of the Dallas Floodway will protect the investments in the Great Trinity Forest. Several hundred acres of new wetlands at the pumped stormwater outfalls and additional screening of stormwater will provide additional water quality improvements, stormwater cleaning and removal of floating trash and sediment. The habitat created by new wetlands in the Floodway will expand the ecosystem of the Trinity Forest and reconnect it to the West and Elm Forks. Inclusion of two off-channel lakes will create additional diversity for natural habitat and recreational choices within the floodway, potentially including fishing and other outdoor activities.

By creating a diverse variety of natural habitats and water resources, this plan for the Trinity will transform the floodway into an area for environmental enjoyment and education for Dallas’ residents and visitors. This education can in turn promote an enhanced environmental ethic of sustainability for this major American metropolitan area.



TRINITY RIVER FACTS

- Length of Trinity River: 715 miles
- Length of Trinity River within Dallas city limits: 36 miles (including Elm Fork)
- Driving distance between Dallas and Fort Worth: 31 miles
- River distance between Dallas and Fort Worth: 54 miles

EXISTING STORMWATER OUTFALLS

- Number of Stormwater outfalls within the Dallas Floodway: 12
- Number of those outfalls that use pumps during high water periods in the Trinity River: 6
- Number of those outfalls that have trash screens to remove floatable trash: 5

PROPOSED STORMWATER WETLANDS

- Area of proposed sump-fed wetlands:
Pavaho: 70 acres
Baker: 50 acres
Hampton: 50 acres
Delta: 50 acres

TOTAL: 220 acres

PROPOSED HEADWATER WETLANDS

- Size of proposed headwater wetland: 70 acres
- Quantity of CWWTP water to move through the headwater wetlands: 5 million gallons/day
- Total quantity of CWWTP water to be used to supply lakes: 50 million gallons/day

PROPOSED HABITAT FOR WILDLIFE

- Total acres within the Dallas Floodway: approximately 2,000 acres
- Amount of proposed wetlands within Trinity Floodway: 495 acres
- Amount of open water for aquatic species and bird sanctuary: 205 acres