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Restoring the Ecosystem

The Society for Ecological Restoration defines ecological restoration as an: Intentional activity that initiates or accelerates the recovery of an ecosystem with respect to its health, integrity and sustainability.



The Mission Reach Ecosystem Restoration and Recreation Project has increased the quality, quantity and diversity of plants and animals (flora and fauna) along the eight miles of the San Antonio River Mission Reach area. The ecosystem restoration process will be accomplished over many years through several steps including construction on the river to reconfigure the channel and create improved aquatic habitat, reestablishing hundreds of acres of native grasses and wildflowers and finally the planting of over 20,000 native trees and shrubs. The culmination of these steps will result in the transformation of the river into a more natural state.

The Mission Reach looks much different than the historic San Antonio River Walk and the Museum Reach area of the river north of downtown. The native landscape looks wild rather than manicured. Grasses and wildflowers are allowed to grow to their natural heights rather than mowed. Boat traffic on the river is limited to canoes and kayaks rather than barges. The result is a serene, natural landscape where visitors can enjoy the inherent beauty of the river.

It will take many years for the trees and vegetation to fully mature. So much of the landscape is still in its infancy. It will take approximately 50 years for the entire ecosystem restoration process to be completed.

The Mission Reach project restores two types of habitats: riparian woodland habitat and aquatic habitat.



Riparian Woodland Restoration

The Mission Reach project includes the restoration of approximately 334 acres of riparian woodland habitat. This includes the planting of over 20,000 young trees and shrubs, 39 native tree and shrub species and over 60 native grass and wildlife species.



Native plants are used on the Mission Reach not only for their beauty, but also because they play a crucial role in ecosystem restoration. They do this in several ways. First, native plants provide food and habitat for native wildlife, which will lead to increased wildlife in the area. Native plants also have long root systems that hold soil in place which helps to control erosion on the banks of the river. Last, but not least, native plants aid in improving water quality by filtering out storm water runoff before it enters the river.

Nurturing an ecosystem comprised of native plants requires the regular extermination of non-native invasive plant species. Long-term operations and maintenance are critical to the success of the project. The San Antonio River Authority (SARA) is committed to the operations and maintenance of the project. The

first years have required significant manual labor to keep the invasive species out of the project as best as possible. For example, during one week in August 2010, over 3 tons of weeds and weed seeds were hand pulled from the area.

Trees were planted approximately two years after each phase of the Mission Reach was open to give the vegetation time to become established. Young, small trees were planted because these trees are more resistant to flooding. As young trees grow in the flood plain, they will grow deep roots and adapt to periodic flooding. If older, taller trees were planted, their roots would be shallower and more prone to being uprooted during flooding.



Restoring a healthy ecosystem, within the Mission Reach of the San Antonio River, is a delicate balance of planting appropriate native plants and maintaining efficient flood water conveyance. The Mission Reach vegetation plan was designed to mimic the diversity and density of native riparian woodlands that exist naturally under both drought and flood conditions. To achieve this balance, four main vegetation cover types, varying in tree and shrub density, were incorporated into the design.

Aquatic Habitat Restoration

A healthy river contains a variety of aquatic features that combine to create a healthy habitat for the fish, insect and plant species that inhabit the river. The Mission Reach project has restored approximately 113 acres of aquatic habitat. This included the creation of riffle-run-pool sequences and approximately 13 acres of embayments in



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ecosystem restoration using a technique known as fluvial geomorphology, which is the study of the processes and pressures operating on river systems. This technique has transformed the straightened river by adding sinuosity where possible while maintaining flood control, reducing erosion, re-introducing native vegetation and creating an environment more suitable for recreation and wildlife. Over three million cubic yards of soil were removed in order to restore and recreate a more natural riverine environment.

When it comes to river channels, diversity is a good thing. Most healthy rivers have an alternating sequence of three river channel habitat types: riffle, pools and runs. The past channelization of the river created a river channel that did not contain much aquatic diversity. The following aquatic features have been restored through the Mission Reach project:



Riffles – A riffle is a shallow area of river with a substrate (bottom) consisting of rocks. Water usually runs quickly over these areas, creating a choppy surface. Riffles help oxygenate the water, serve as an area to protect fish from predators and are a place where many insect species reproduce or grow to maturity. Some fish species for which riffles are particularly important include the central stoneroller, red shiner, speckled chub, channel catfish, orangthroat darter and the Texas logperch.

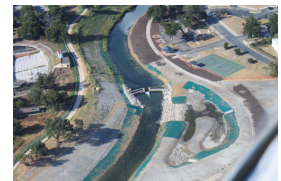
Runs – Runs are areas of the river that are of average depth and velocity. Runs generally connect riffles and pools. While most of a river usually consists of runs, a healthy river does not consist entirely of runs, as the San Antonio River did after flood control channelization. The Mission Reach has restored the structural diversity of the river to support a variety of ecosystem functions and aquatic wildlife.



Pools – Pools are deep areas of water where currents move slowly. Pools generally occur after a run structure, and sediment tends to accumulate at the far end of a pool. Overtime, this will lead to the creation of a new riffle. Pools play a critical role in maintaining water quality in the river by removing impurities from the water, such as sediments. Reducing sediment content of the water benefits a variety of aquatic organisms because suspended sediment can cause the water to be turbid or murky and obstruct fish visibility.

Pools also provide great habitat for different aquatic animals than those found in riffle structures. Larger species, like fish, prefer to live in pools. During drought conditions when the water level drops, pools provide important refuges for fish until the water level rises. Some species of fish prefer cool water conditions, and the deeper areas provided by pools moderate the temperature during high temperature months.

Embayments- an embayment is a still, crescent-shaped body of water that is formed when a meander (curve) in the river becomes separated from the river. Other names for an embayment are oxbow lakes, billabongs and bayous. Embayments were once a natural part of the San Antonio River system and were commonly found on the river's floodplain. Embayments diversify the types of aquatic habitat found within one geographical area. Because the water in embayments does not flow, it can support myriad species of aquatic plants and animals that are adapted to still water bodies. Aquatic and emergent plant species that can easily be uprooted by fast-moving water are capable of living in the shallow, protected embayments.



Embayments also help to improve water quality. When water is directed from stormwater inflows to these areas it is forced to remain in the embayment for a period of time due to the low flow velocity in these areas. During its stay in the embayment, water is processed and cleaned. Sediment (dirt and rocks) that was carried by the stormwater settles out of the water and into the bottom of the embayment. While the water continues to sit in this water body, some of the impurities, like nutrients and bacteria, are processed by the aquatic vegetation and the bacteria that live in the soil of the embayment.

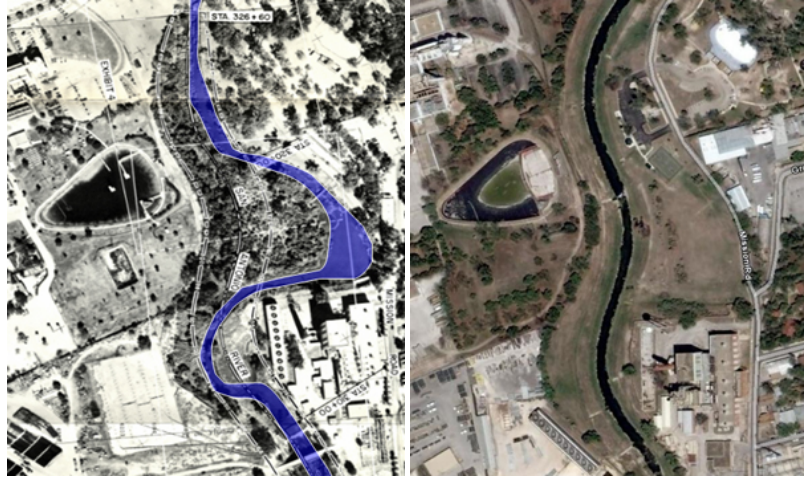
A restored habitat makes a better home for fish species that already inhabit the San Antonio River. Fish native to the San Antonio River include:

- Bluegill
- Channel Catfish
- Red Shiner
- Yellow Bullhead
- Largemouth Bass
- Green Sunfish
- Texas Shiner
- Gizzard Shad

- Central Stoneroller

Flood Management

The San Antonio River was authorized for channelization by the U.S. Army Corps of Engineers in the 1954 to provide better conveyance of flood water. Although the channelization of the river is an effective way of managing flood water, it has damaged the ecosystem of the river and is visually unappealing. The Mission Reach project has corrected damage done to the ecosystem by the channelization and restored the river's natural beauty while providing the same level of flood management that was attained by the channelized river.



Above left: Pre-channelization at Roosevelt Park near the Lonestar Brewery (circa 1955)
Above right: Post-channelization at Roosevelt Park near the Lonestar Brewery (circa 2007)