Watershed Land Use Survey

Blucher Creek

Corpus Christi, Nueces County, Texas

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Introduction

Blucher Creek runs through the 3.65 acre arroyo, Blucher Park, in downtown Corpus Christi, Nueces County, Texas, USA (27 ° north latitute, 97 ° west longitude). It is located just blocks from Corpus Christi Bay and approximately 20 miles from the Gulf of Mexico. Relative humidities in Corpus Christi tend to be quite high, and the mean temperature ranges from 57°F winter to 85°F summer (Hickman, ed. 1995). The yearly average precipitation is ~29 inches, but the area is subject to both drought and flooding as well as to occasional tropical storms or hurricanes.

Blucher Park was donated to the city of Corpus Christi by the Blucher family in 1942, and in the deed strict limitations for land use were specified. It is intended as a nature preserve for birds and birdwatchers, and indeed the tiny park is a famous site on The Great Texas Coastal Birding Trail. The park lies between Blucher St. and the downtown Public Library on the north, Carrizo St. and the Blucher Mansion Museum on the west, Kinney St. on the south, and Tancahua St. on the east.

The park slopes steeply down from street level to the perennial creek. The city of Corpus Christi incorporated the creek bed into its storm water drainage system when it was first designed, and it remains as such today. Gullying, erosion, and stream bed widening occur from the swift surge of waters, and litter is carried and deposited by storm waters. Three drainage pipes enter under Kinney St., another from Blucher St., and there is an eroded outfall from Carrizo St. which causes storm waters to gully and strip the slope below.

Natural History and Soil

Nueces County is situated along the southern coast line where Texas meets the Gulf of Mexico. Blucher Creek is a small, almost seasonal, creek in Corpus Christi, Nueces County, that empties into Corpus Christi Bay. During the Triassic, when North and South America were pulling apart, large portions of the continent began to slump along lystric normal faults, and this region was flooded. The Luann Salt Formation was deposited throughout the Jurassic and maximum flooding occurred some time during the Cretaceous. The Luann Salt Formation was mobilized to form large salt domes throughout the Gulf Coast area, some of which are still active. Much of the Gulf Coast oil and gas comes from traps associated with these domes. After the Cretaceous, sea level dropped below the continental shelf during the Pleistocene Ice Age. The rivers emptying into the Gulf of Mexico eroded valleys, the remanents of which can be seen in the presence of the bluffs around Corpus Christi Bay. As the Glaciers melted, sea level rose and flooded the river valleys resulting in the formation of the bays found along the current Gulf Coast.

The Blucher Creek is a small, tributary of the Nueces River that now drains into Corpus Christi Bay. Its entire drainage area has been urbanized and is now fed by storm water runoff. Storm drains collect water that falls between Interstate 37, the Cross Town Express Way, Hancock Street, Tancahua Street. All water flows by gravity into the bay, unlike many other drainage areas that require pump stations. This means that pollutants flow unrestricted into the bay. Blucher Park is the only point at which the water is exposed to the surface, and much of the trash is entangled in the vegetation. A construction site down stream from the park has nominal impact on the ecology of the area.

Blucher Park sits on the Victoria Soil Series which makes up more than 60% of Nueces county (Soil, 1960). The first three feet of soil is heavy, dark-grey, granular, and contains lime. It then grades into a light brown parent material with lumps of lime (Soil, 1960). The soil takes on water slowly with moderate swelling and is prone to cracking when dried. The Victoria Series can be broken down into four major subgroups. Victoria clay with less than or equal to 1% covers 94% of the area occupied by the Victoria Series. Water often accumulates on the surface due to the low slope angle. The second type of soil has a slope of greater than 1%. It is found in the northern region of Nueces County and along river banks. The surface layer is about two feet thick with a subsoil thickness near 18 inches thick. The steeper slope results in a greater potential for erosion. Eroded Victoria Clay is prone to moderately severe erosion due to the relatively unconsolidated nature of the soil. The surface layer rarely exceeds 11 inches thick and often leaves the lighter colored subsoil exposed. Low lying Victoria Clay is prone to flooding and is distinguished from the first category by its lighter color, longer flooding period, and poor drainage.

Farming of Victoria Clay requires especially powerful equipment and good timing to avoid too wet or dry soil conditions. Its moderate ability to swell and erode could require special precautions when used for construction.

Historical Background

Hans Helmuth Anton Felix von Blucher, an educated civil engineer, arrived in America in 1845 at the age of 25. From that time until his death in 1879, von Blucher had a lasting effect on Texas and Corpus Christi. Soon after he landed, Felix assisted Prince Solms Braunfels in laying out city lots for the community of New Braunfels. While working for the U. S. Army as an interpreter, he met Colonel H.L. Kinney, a founder of Corpus Christi. On November 15, 1849, Felix and his new wife from Berlin purchased 8 acres with a running stream on a bluff overlooking the city from Kinney (The Texas Surveyor 1996). Due to the increasing pressure of growth and urbanization, Corpus Christi incorporated the stream, known as Chatham's Ravine, into its stormwater runoff drainage system. According to an 1887 map of the city, Chatham's Ravine once ran through the park and emptied into the bay south of what is now Water Street (Walraven 1978). Interestingly, Blucher Street was also formerly known as Chatham Street. It is not known who Chatham was but it is apparent that the Bluchers are remembered more!

South Texas was prime for development at that time and von Blucher became involved in many of the most important projects contributing to the growth of the area. By request of Richard King, he did the original survey for the King Ranch complete with 2 maps. Using his engineering skills as well, von Blucher proposed the specifications for the Corpus Christi - Aransas Pass Ship Channel and designed and built the city reservoir. Felix was also surveyor and consulting engineer on the Texas Mexican Railway, employing his 2 sons, Charles and Richard, as assistants (The Texas Surveyor 1996).

Before his death, Felix von Blucher deeded the 8 acre tract to his 5 children who all built stately mansions on the property. Known as Blucherville, the families lived a life of relative

luxury and notoriety in Colonel Kinney's " Little Naples" area of Corpus Christi. One son, George, founded the Lone Star Ice Company on the western edge of the property and purchased the first automobile (an Olds) in Corpus Christi in 1901. Charles followed his father as County Surveyor and held that office for 52 years. Coincidentally, his son, Conrad Blucher, was involved in the engineering of the city's 26 miles of storm and sanitary sewers which today heavily influence Blucher Park! In 1942, descendants of Charles Frederick Harvey von Blucher, deeded the property to the city in his memory. Two of the original houses and a cottage were donated to the Junior League who maintains them today (personal communication 1997). The area known as Blucher Park was given to the city with certain conditions. " The property shall be used to provide a wooded park of natural beauty for the conservation and collection of native shrubs, trees, and plants; to provide a bird sanctuary where birds may find refuge and thrive; and to provide a place where city dwellers may commune with nature in an atmosphere of quiet and relaxation. The name shall be and always will be Blucher Park. In general, landscaping of the area shall follow the natural topography of the land, avoiding artificiality or formality of design.....and in further plantings especial attention shall be given to the cultivation of native plants and wildflowers. Provisions shall be made for a place where birds may drink and bathe. Benches and resting places may be provided." Other provisions include the city's responsibility to maintain the storm sewer and surrounding roads, light the park, and discourage disorderly conduct (Walraven 1978). While most of the conditions are being followed to the letter, it is obvious on any visit to the park that not all the conditions are being met fully.

Vegetation

In 1990 Conoco donated $5000.00 to the Audubon Outdoor Club of Corpus Christi, Inc. to partially finance their stewardship of Blucher Park. In accordance with the terms of the 1942 contract between the Blucher family and the City of Corpus Christi which states in part, "...in further plantings especial attention shall be given to the cultivation of native plants and wild flowers." (Deed 1942), the Audubon Outdoor Club began planting native shrubs, trees and flowers which provide shelter and/or food-source for birds and insects, especially butterflies.

The following vegetation was already present when this program began:

Ground covers: Horseherb, Pink evening primrose, Frogfruit.

Perennials: Celestial and Violet ruella.

Shrubs: Barbados cherry

Trees: Huisache, Mexican olive, Prickly ash, Hackberry, Anacua, Texas ebony, Mesquite, Red mulberry, Ash, Chinese tallow, Chinaberry.

The revegetation program has added the following:

Vines: Crossvine, Trumpet vine, Virginia creeper.

Trees: Sabal palm, Soapberry, Cedar elm, Bur oak, Acacia berlandieri (Guajillo), Caesalpinia, Texas redbud, Desert willow, Fiddlewood, Texas persimmon, Retama, Paloverde, Texas pistachio, Cherry laurel, Texas mountain laurel, Mexican plum and buckeye, and others.

Shrubs: Indian mallow, Texas torchwood, Colima, Agarito, Chile pequin, Texas snakewood, Coyotillo, Coralbean, Red yucca, Texas lantana, Cenizo, Turk's cap (a hummingbird favorite), Pavonia, and others.

Perennials: Butterfly weed, Heartleaf hibiscus, Spider lily, Gayfeather, Scarlet sage, Manfreda, Fall obedient plant, and Tube tongue.

Indian Blanket wildflowers have been planted.

Ground covers: Widow's tears, Creeping wolfberry, Pigeonberry, Coralberry, Cherisse, Spiderwort, and Missouri violet (Payne and Pummill 1997).

Wildlife

Insects observed in the survey area include: several species of dragonflies, mosquitoes (adult and larvae), and butterflies (Cloudless Sulphur, Viceroy, and an unidentified dark-colored species). A Gulf coast toad was observed one evening. Sciurus niger (Eastern fox squirrel) lives in the trees of the park. After the recent flooding event a decomposing oppossum was observed in the streambed. Living in the stream are one species of a minnow type fish ranging in size from 1-4 cm, a few small (5-8 mm) snails and a small population of very thin worms (3-4 cm in length) living on the underwater rocks. The creek bottom is heavily covered in algal mats. A juvenile pied-billed grebe waterfowl was observed on two separate occasions swimming in the creek where a stagnant pool forms near the drains underlying Tancahua street. But Blucher Park is world-famous for its birds.

Due to its location on the migratory flight path Blucher Park is a welcome resting spot for many species of birds, especially migrating passerines, and it is known as a bird-watcher's paradise. Occasional bad weather will cause "fallout" when thousands of migrant birds seem to fall from the sky and occupy every niche in the park. Every weekend in April since 1962 the Audubon Outdoor Club sponsors early morning Spring Bird Walks. Bird sitings

include: orioles, tanagers, rose-breasted and blue grosbeaks, painted and indigo buntings, cat birds, warblers (maybe 26 species), northern and Louisiana water thrushes, Lincoln sparrows, chuck-will's-widows, and vireos. Summer nesting residents are ~~often~~ ruby-throated hummingbirds, cardinals, mockingbirds, Inca and mourning doves, and golden-fronted woodpeckers ~~(Caller-Times Interactive)~~. Occasionally even shore birds and cormorants are sited in the park. Great-tailed grackles are common. An interesting note is that not once on our team's many visits to the park did we ever see a bird actually drink from the creek.

Other Wildlife

There are two other forms of wildlife currently inhabiting Blucher Park, namely the homeless and teenage gangs. It is common to see the homeless lying prostrate in the park or ranting in loud voices about the "state of the world" and leaving empty bottles of alcoholic beverages littering the grounds and creek. Jimmy Schwatz of the Audubon Outdoor Club related seeing a man bathing in the less than pristine creek waters one day (Schwatz 1997). The drainage pipes which supported the old Tex-Mex Railroad are fouled with gang graffiti and human excrement. The homeless have been there for years, but the gang activity is new. One member of the survey team passed 15 or so teenagers all wearing blue bandanas at their waists and marching through the park. Three days later the team worked side by side with the Audubon Outdoor Club surrounded by the Corpus Christi police and gang units. The police had "word" that a major gang event was to take place in the park that evening. The police advised us to never enter the park alone or after dark and to always carry a cellular phone for emergencies. The Auduboners placidly continued their work of trash patrol, watering and tree planting long after sundown

seemingly heedless of the dangers involved. The Audubon Outdoor Club is comprised of highly knowledgeable, dedicated, kind and fearless individuals. They shared much valuable information with our survey team.

Trash and Debris

On October 18, 1997, the survey team conducted a collection and survey of trash and debris. It is obvious from the debris trail in the trees overhead that a strong rain event will raise the water level of the creek by four to six feet. The most common trash was plastic grocery bags, food wrappers, and beverage containers (plastic, glass, metal). Also found were items of clothing, shoes, inner tubes, cups, styrofoam, broken glass, egg cartons, lawn trash bags, and cigarette packages. Where the three storm drains converge just northeast of Kinney Street is a thick mass of debris containing everything from a football to hub caps. It appears that most of the trash invading both Blucher Creek and Park comes via the storm drains except for the afore-mentioned alcoholic beverage containers which are carried in by person. The debris is a massive problem which could possibly be solved by grates on the storm drains which would have to be regularly cleaned. The city of Corpus Christi has always used the creek for stormwater runoff.

Water Quality

Blucher Park lies deep in the heart of Corpus Christi surrounded on all four sides by paved streets. The arroyo, built up by the Texas Mexican Railway, is cut almost in half by a stream which flows year around. Fed mostly from urban stormwater runoff, the stream is also said to be supplied by groundwater seepage according to one source (Payne 1997). Another source states that the stream bed apparently intersects the water table allowing the stream to run during periods of no runoff (Bridges etal. 1996). Water flow may be only a trickle during dry periods but after heavy rains, such as in early October, a torrent of water rushes through the park up to 5 feet above bank level. These infrequent flood events contribute heavily to an already serious erosion problem in the park.

Visual assessments of water quality were taken on multiple visits to the park. Water depth in the main stream bed varied from approximately 2 inches to 2 feet. Clarity also varied from clear to cloudy. Except for a pool where the stream empties into a drainage pipe under Tancahua Street, Blucher Creek maintains a modest flow throughout its length. Of course during rain events, even small ones, flow increases dramatically with the influx of stormwater.

After a recent rain event, water samples were taken from the stream near where the drain below Blucher Street empties into the creek. Standard methods for the examination of water and wastewater were used to perform common water quality tests on the samples with the results listed below.

* Total Suspended Solids (TSS) (SM#2540) 16 ppm (avg.)
* Oil and Grease (SM#5520-B) 30 ppm (avg.)

* Ammonia (SM#4500-NH3) .334 ppm

* Phosphates (Hach Procedure 485) 1.6 ppm (avg.)

* Chloride (SM#4500-Cl) 230 ppm

* Metals (SM#3111):

Zinc	0 ppm
Iron	0.3 ppm
Copper	0.01 ppm
Chromium	0.01 ppm
Nickel	0 ppm
Sodium	24.45+ ppm

While none of these results would be considered wastewater violations by the Environmental Protection Agency (EPA) or Texas Natural Resource Conservation Commission (TNRCC) standards, they do reflect the many influences on the general water quality of Blucher Creek.

TSS is a measure of particulate matter in the water column. In the case of Blucher Park, sources of particulates include windblown dust particles, stormwater runoff, anthropogenic debris, grass clippings, and erosion. A visual assessment of the park shows why erosion is the major contributor, particularly along the west side of the park. Heavy rains lead to street wash over the curb and down the hillside causing gullying in some areas. In addition, severe undercutting of the stream bank by fast flowing stormwater also contributes to suspended solids in the stream.

Oil and grease generally refers to the presence of hydrocarbons or fatty matter in the water. On several occasions, a visible sheen was observed on the surface of Blucher Creek. However, although this may be a violation, it does not necessarily mean a problem exists in the park. Realistically, since stormwater consists mainly of water running off of

the surrounding asphalt streets and parking lots, some oil in the stream is to expected. Oil occurs naturally in the environment and is broken down by microbes already present in the soil or water. Metals present in the samples can also be introduced to the waterway from the same source. Airborne particle fallout could also be another source of metals and other contaminants, particularly sodium and chloride from the nearby bay.

Ammonia is naturally present in surface and wastewaters with concentrations generally low in groundwater due to easy adsorption to soil particles and clays. Produced largely by deamination of organic compounds and by the hydrolysis of urea, ammonia is an important part of the nitrogen cycle (Greenberg etal. 1992). Since gang and vagrant activity is common in the park, the presence of ammonia in the water samples is no surprise.

Phosphate present in the water is generally an indication of pollution. Detergents and grey water are common components of urban stormwater which is the most likely source of phosphates in Blucher Creek.

The results of water quality tests performed on samples from Blucher Creek do not indicate a particular problem in the stream. However, these samples were taken after a substantial rainfall in the area which tends to flush the water system. The test results do reflect the urban influences on the stream including transient and gang activity along with stormwater runoff.

Construction

On the East side of Blucher Park, across Tancahua St., is a new construction site expanding the existing Trinity Towers of the Coastal Bend. Trinity Towers is a community retirement center which also offers assisted-living facilities. The addition will provide 115 additional residential units ranging from independent living to skilled nursing suites and an Alzheimer's unit. It is scheduled for completion April, 1998, and the estimated cost is $15.4 million (CC Caller-Times 1997). This project is indicative of the burgeoning market in senior housing as the U.S. population boom ages.

The general contractor is Fulton Construction Co. The construction site is actually down-gradient from the storm-water flow, and it is unlikely that excavated soils would enter Blucher Creek in the park except perhaps in the case of the massive flooding of early October, 1997. There appears to be adequate erosion control in place (fences, barriers, etc.) for normal rainfalls. We visited the site soon after a rain of 1-2 inches, and there appeared to be no soil run-off. We were unable to approach the area during the flooding, but it is very likely that the flood waters carried off soil via stormwater drains to Corpus Christi Bay at that time.

Adjacent Junior League Project

On the West side of Blucher Park across Carrizo St. are two surviving Blucher houses now owned and restored by the Junior League of Corpus Christi. They have contracted Sally Wasowski, a nationally known native plant landscaper, to design an ambitious layout for the yards. Plans include multiple gardens including an ethnobotanical Native American section. It is indeed beautiful on the drawing board, but the potential for impact on Blucher Creek may be greater at this site than at Trinity Towers due to the fact that this site drains directly into the creek. Already a poorly designed outfall structure draining storm water from Carrizo St. has caused rapid erosional undercutting of the slope beneath the concrete reinforcement and the street itself (Bridges etal. 1996). The subsequent overwash and gullying are discussed in the Water Quality section. Heavy traffic on this street bringing in landscaping materials could exacerbate this serious problem.

Summary of Findings and Recommendations

Erosion Control:

The eroded concrete spillway from Carrizo Street into the park must be repaired or reconstructed not only to protect the street from cave-in, but to help reduce the overland sediment deposition into the stream. Bare areas of the park and stream banks need to be revegetated with hardy ground cover to reduce erosion as well.

Mowing problem:

The city mows the park so infrequently that when it does mow, vast clumps of clippings are left in place to be washed into the creek during the next rain event. This influx of grass increases the biological oxygen demand in the water as the grass is decomposed. More frequent mowings and the use of a mulching mower could eliminate this problem.

Mosquitoes:

The standing water pool at the Tancahua Street discharge needs to somehow be reduced as this is a major breeding ground for encephalitis carrying mosquitoes.

Litter and Debris:

In a sense the massive amount of debris trapped by Blucher Creek benefits the Corpus Christi Bay system as it prevents the trash from entering the Bay. But it destroys much of the aesthetic value of the park. This is important to Corpus Christi because the income from tourism and birders plays a major role in the local economy. Since Blucher Park is such an important bird-watching site which draws visitors from around the world, the city would be wise to invest in litter control. We have already suggested that grates might be used to trap debris at the stormwater drains. The Audubon Outdoor Club does an excellent job of controlling litter in the park, but the daunting mass of debris in the

creekbed is beyond even the energies and resources of these tireless volunteers. We recommend that the City clean up the creek and install measures to prevent debris build-up in the future. The only way the litter problems will be truly solved is by educating people to change their habits, and this is no easy task. A city-wide campaign focusing the public's attention on litter prevention coupled with increased public school education programs could perhaps improve the situation. An improved city stormwater policy and stringent ordinances re: littering are recommended.

In addition, the vagrant and gang presence in the park seriously degrades the park's value for tourism. Increased patrol by city police and improved lighting might lessen this problem.

In a telephone conversation on November 21, 1997, Leah Pummill, President of the Audubon Outdoor Club, relayed the news of a $150K grant from the Texas General Land Office Coastal Management Plan being given to the City of Corpus Christi (under the guidance of the Audubon Club) for Blucher Park improvements. Ms. Pummill has high hopes that some of this grant money will be used to extend the park boundaries on the SSE side all the way to the corner of Tancahua and Kinney Streets. At present the park boundary only extends approximately 30 feet beyond that side of Blucher Creek. The Audubon Club plans also include clearing the dense area of the old Tex-Mex Railroad trestle to leave only open areas under the standing trees because this area is currently a favored hiding place for vagrants. If all goes as planned, not only will the park's size be enlarged, but the aesthetic value and safety of the park will be enhanced as well.

Tourism:

To enhance the tourism and educational value of the park, more paths of gravel or bark chips could be established with a number of viewing points. A guidebook with historical and wildlife information would be an excellent reference for visitors.

In summary, this unique little wildlife oasis, preserved and given as a gift by the Blucher Family to the City of Corpus Christi, deserves greater appreciation, protection and care by this city and its inhabitants. It serves as irreplaceable and critical habitat for migratory neo-tropical birds.

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