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**MEMPHIS
STORM WATER
GREEN CAMP 2018**

**“Water Quality Affect Upon
Wildlife Populations found within
Natural and Man-made Wetlands
Located in the
Memphis and Surrounding Areas”**

**WETLAND Exploration
Week of June 11 - 15**

SUMMER - 2018

“Does pollution and Water Quality Affect the Wildlife Populations found within both Natural, Man-made, and Channelized Wetlands found within the Memphis and Surrounding Areas?”

Types of Wetlands: Natural and Man-made

A wetland is one of several types of biomes found in areas having high humidity, may or may not contain large amounts of animal and plant life that is diverse and expresses characteristics adapted to the dryness and wetness of the habitats. Wetlands occur in depressed land areas called basins that are natural a result of land topography or are designed by man, created to house organisms while working as a greenway for improved human health conditions and pollution controls. Trees grow where the ground is wet part of the year and as the ground dries, new life enters and co-exist within a cycle of seasonal rainfall conditions. All wetlands are imperative for the filtration processes working to decrease toxins and chemical pollution found on both land and in water. Wetlands serve as a pollution interception, toxic residue processing and removal of waste. Wetlands are also used for recreational, aesthetics, and educational purposes and provide homes called habitats for many diverse species of organisms. The flora and fauna thrive and adapt within a wetland environment that consist by seasonal conditions produced by weather conditions of dryness and wetness and are associated with storm and rainwater runoff, drainage, pond, river, and pool overflows, man- induced water channeling, flooding and some processes associated with drainage waste collection and disposal. These wet areas are also fed by overflows of the Mississippi River, such as the Loosahatchie River, Nonconnah Creek, and the Wolf River, the mouth of the aquifer supplying drinking water to Memphis and surrounding states. Within these wet areas consist habitats that support water egg-laying abilities of amphibians such as frogs, salamanders and toads, and where large species of wildflowers bloom in the spring as the grounds become dry. Plant species include water-loving shrubs, cattails, grasses, and trees such as willows and cedars.

Important details of a wetland

In the exploration of the Memphis area wetlands, both rural and urban wet areas are explored to compare the differences among existing life diversity and water quality. Two major types of wetlands exist: That of the rural wet areas resulting from natural basins and low-lying topography sites that are supported by natural streams and the urban constructed canalization as well as the man-made greenway zones. In this study, the sites are observed and the conditions of the water will both seek to determine how the effects of pollution impact the existing wetlands' species of flora and fauna populations, the sites' capacities for sustaining a healthy ecosystem, and the environmental impact of pollution. Measurements are recognized and recorded based on both quantitative and qualitative observations.

Comparison of Urban and Rural Wetlands

Natural Wetland Site: Bateman's Pond

Unpaved hiking trails are located along the Wolf River in clustered zones and begin at the source of the Wolf River, Baker's Pond. Bateman's Pond is recognized as being one of the natural area explored in this study. Qualitative measurement of active insects living both in water and on land were observed. Numerous adapted water-loving life forms were seen living in the water were identified as being Crane fly larva, beetle larva, aquatic sow bugs, and large numbers of adult water striders. Other life forms were noticed at rippling water sites which appeared to be fish or turtles. Large numbers of adult dragonflies and butterflies were witnessed flying both over the dry land, wet low basin areas, and at the pond site. The habitat appeared rich with an abundance of diverse organisms. A few science sleuths were able to catch adult giant water bugs, observe small minnows playing toward the edge of the pond, and multiple types of larva including mosquitoes. Several students confirmed the parasitic insects since many of the explorers experienced female mosquitoes' bites supplying a human-rich, nutrient blood required for reproductive cycles, and seriously aggravating the student explorers. several different tests were conducted and used for analysis of the water quality,

pH readings were taken and found to be slightly acidic at a reading of 6.8. If the pH is too high or too low, organisms living within will die. pH will also affect the solubility and toxicity of chemicals and heavy metals found in the water. Most aquatic creatures living in fresh water require a pH range of 5.5 to 7.5 to maintain survival and reproduction for continuation of species. This pH readings were all within the normal range for supporting a healthy Bateman's Pond

wetland ecosystem.

Dissolved oxygen level is also a very important variable for aquatic life within a stream or pond. The DO variation may exist from 0 to 18 mg/L readings, above this is physically impossible. The Bateman Pond area dissolved oxygen level reading was at 11.07 mg/L and recognized to support large species populations of fish, such as pike, musky, walleye, carp, perch, bluegill and bass. Although oxygen level at 11mg/L is required by some species such as salmon, environmental conditions are not suitable for this type of species' habitat at this site. Furthermore, several additional factors affect the amounts of dissolved oxygen in the water such as water depth, temperature and the amounts of bacteria living in the soil from sources such as sewage, organic discharges, and anoxic discharge. Within wetlands found in this rural area, the amounts of fertilizer runoff from farms and lawns along with sky conditions may affect dissolved oxygen (DO). If cloudy respiring plants use much of the DO by not carrying on photosynthesis, aquatic plants then die causing an increase of bacteria as does human disposal of picnic organic matter when thrown into lakes, rivers, and ponds. The amount of dissolved oxygen is dependent upon factors such as variations of different depths of water, amounts of bacteria, and

temperature readings of water which fluctuate.

Natural sources of copper(Cu) in aquatic systems include geological deposits, volcanic activity, along with the weathering and erosion of rocks and soils. Also copper may enter fresh water sources by mining or digging sites, construction, agriculture, and sludge from publicly-owned treatment works and pesticide use. Although copper is a nutrient when at low concentrations, aquatic life is adversely affected when exposure to aquatic life is in high concentration. Chronic exposure can lead to death by effects on growth, reproduction, body and brain functions, enzyme activity, blood, chemistry, and metabolism. Current copper reading for Bateman's Pond were 0.16 and 0.20 with an average of 0.18. This level of copper indicates a safe range of discharged copper probably resulting from human use of pesticides and copper found within soil containment leaching from nearby farm land.

Included in water testing was a chlorine water sample which indicated two readings of 0.00 and 0.01 with an average reading of 0.005. Chlorine (Cl) is classified as a halogen, composed of a green toxic gas that readily combines with salt. Sources of chlorine water contamination include water treatment, use of tap water, and road applications of salt to de-ice roads. In fish and other invertebrates, chlorine burns the gills and is absorbed into the bloodstream. Taken in by the body surfaces of invertebrates, chlorine is also deadly to these aquatic life forms. Chlorine removes from fish their slime layer of protection, impairs brain functioning causing fish to swim erratically or attempt to jump out of the water and irritation. As pH levels decrease and in

combination with phenols created by organic waste, chlorine levels rise and become more toxic. However, chlorine is relatively unstable in water. When exposed to sun, chlorine breaks down easily escaping into the atmosphere. Water that is circulating is usually chlorine-free within 24 hours or less.

Natural Wetland Site: Wolf River

The 90 mile long Wolf River begins in northern Mississippi and is a spring fed river running west through Shelby and Fayette Counties. The Wolf River and the Mississippi River flow together in Memphis, Tennessee. Early indigenous Indians cherished the Wolf River for its abundance of food source, wildlife diversity, and wetlands. Later many Tennessee towns sprang up along the river such as Rossville, Collierville, Germantown, La Grange, and Raleigh. As most rivers, these towns relied on the river for transportation, food sources and recreational purposes. The Wolf River Conservancy in 1995, helped save 4,000 acres of the Ghost River section found within the Wolf River to which lands are used for recreation. "Businesses for outfitting canoe paddling, hiking, and fishing prepare for individuals to experience beautiful swampland, diverse ecological communities, and boat ramps along with a six mile meandering road through herbaceous and bald cypress dominated wetlands ending in the town of Moscow. About 30 minutes from Baker's Pond is the first of three great boardwalks along the Wolf River in Ghost River State Natural Area, where a 600 foot elevated platform crosses a bottomland hardwood swamp. The Collierville Area or Wolf River Wildlife Area contains 2,000 acres of protected land. Plans for a cycling trail along the Wolf River is anticipated to be completed by the year 2020." (*Complete Guide of the Wolf River, Ryan Hall*)

Man-made Wetland Site: T.O.Fuller

T.O. Fuller State Park is recognized as a diverse green zone initially built by the Civilian Conservation Corps (CCC). The acreage habitat consists of 1138 acres found within the southern part of Memphis, Tennessee. A variety of hardwood trees provide recreational acres for bird watching, picnicking, and hiking. RV spaces providing city amenities as well as sites for tent and primitive camping use, are located in the park and recreational areas along with a public swimming pool and a playground.

Hiking trails buzz with an abundance of insects, contain ground-life consisting of snakes, lizards, small rodents and populations of various mammal species. Snake tracks were observed by students along with squirrels and lizards. The wet areas appeared plush with tall grasses growing thus providing shelter, food, nesting sites, and offering a balanced ecosystem supporting abundant populations of diverse life forms. Fish also existed in the waters and as a result, the park provides a youth fishing rodeo is made available to participate every June.

Although testing of water pH and other water factor contents were not taken at this location, observed was an abundance of life forms found in both terrestrial

and aquatic habitats clearly an evidence that pollutants as well as oxygen and pH levels are within acceptable and normal ranges for successful life and reproduction cycles necessary for maintaining the health of diverse populations of organisms.

Man-made Urban Channelized Stream Site: Cypress Creek

Cypress Creek is a concrete channelized water stream found in Memphis, Tennessee at Tillman and Summer. Observed at this channeled site were swift moving green colored, channeled water contained within a concreted base. Observed in specific locations was trash piles such as plastic, automobile tires, and varieties of paper litter, and a dead, decaying bird. Located within the very edges of the swift water were small fish, insect larvae, and water bugs. A channeled, concrete bottom containing the water was surrounded by land area enclosed in a high fence to form a zone for flood paths or a dry green way with limited areas for supporting smaller life forms such as butterflies, dragonflies, and flying insects. Along the channel were observed grasshoppers while frogs croaking provided evidence that the channeled water could support tadpoles and other smaller aquatic life forms. Much of the larger debris was trapped along the sides of the channel and appeared to be creating small dams as the water headed west to the Mississippi River.

Although no tests were conducted to indicate water factors such as pH, DO, and other life-limiting variables, high levels were assumed to exist since life diversity was very limited and the water source is drainage water from the urban Memphis City.

Conclusion: The Affects of Pollution and Water Quality Upon Wildlife Diversity and Population within Natural and Man-made Wetlands

Based on the qualitative and quantitative results of the exploration data, clearly the type and amount of pollution dictates the abilities for plant and animal survival. Pollution has an adverse effect upon the water quality, which in turn does or does not support the normal ranges required for the health, maintenance, survival of a diverse animal and plant life species and populations.

Further, the results illustrate the differences between man-made and natural wetlands existing are based on locations, the amount of water or rainfall, the source of water whether urban drainage being water subjected to more pollution factors or water received by flooding river and pond spillage or flooding, and other factors affecting the quality such as the establishment of trees, shrubs, grasses, and bushes offering more diversities for animal and plant habitats.

Resources:

Tennessee State Parks; William R. Snodgrass TN Tower; Nashville TN
www.tnstateparks.com

Memphis Storm Water Summer, 2018 Educational Workshop

Ms. Sharonn Gordon and Ms. Sonia Holmes
[Memphis Storm Water.com](http://MemphisStormWater.com)

Museum for Internship Opportunities
<http://memphis.edo/chucalissa/>

Complete Guide to the Wolf River; Ryan Hall
<http://rootsrated.com>

Wikipedia, Wolf River (Tennessee)

The Commercial Appeal(Memphis, Tennessee; "On the 6th Day, Paddlers Rest,
The Wolf Conquered," May 2, 1998