2006/2007 Wetlands Research Study

An Evaluation of our Wetland's Condition

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Abstract

During our 2006 – 2007 wetlands program we studied and researched many different things. The first thing we looked at was the water and we tested the water for different chemicals and found many things that weren't suppose to be in it. The next thing we observed was the soil where we were seeing if the soil was hard, clumpy, or loose. After we observed the soil, we tested the water again and put it under the microscope to look at many different microorganisms. The next thing we observed were insects and we found many of them to study. The last activity we did was researching the many different birds in the wetland and filling out charts with information about them.

Introduction

This section provides background information on the sampling site used during the 2006-2007 wetlands program. For starters, some background information on wetlands is needed. Seasonal wetlands are low depressions with slowly permeable soils underneath (examples are the areas by drainage swales where they got into the side of a raised area). The plants found here are not usually native to the area. Drainage swales are areas that contain runoff water. Seeps are where groundwater reaches the surface, encouraging growth of watery plants and soils (Stewart, 2-3).

This wetland is located at an elevation of 1,100 ft. and is comprised of 7.24 acres (according to a previous wetland delineation). It is mostly gently rolling hills, with trees scattered mainly along the fence line (Stewart 1). The sampling site used was the general area behind the C-pod building, which extended roughly 100 yards. It should be noted that the bird sampling proportion of our studies was not restricted to this area, and was around many of the boundaries of our school. The site we sampled also had a small drainage running through it, which contained a much larger percentage of plant and animal (particularly insect) life (Stewart, 1-2).

Study Area and Methods

The site of our studies took place just north of the Pleasant Grove campus, near a drainage pipe. The dates of our studies were in October of 2006, and in April and May of 2007.

The method we used to test for chemicals in water were the same in spring and fall, which was to take five water samples and drop a tablet into each that would change different intensities of different colors to show how much of a chemical was in the water. For soil characterization (fall only), we examined and tested clumps of dirt to find composition, color, and hardness. In the spring and fall we collected water samples to look at under a microscope so we could see and identify different microorganisms. For insect identification (spring only), we caught insects in nets and used identification sheets

to identify them. In both the spring and fall, we went outside with binoculars and identified any birds we saw.

Results

Table 1: Soil Characterization (fall - Oct. 25, 06)

Soil Characterization	Results From Site
Soil Structure	Blocky - granular
Soil Color	5y 2.5/2 - 10yr 3/1
Soil Consistence	Extremely firm - friable
Soil Texture	Loam – clay – sandy
Free Carbonates	None – slight

Table 2: Water Pollution Testing (part 1 – fall - Oct. 11, 06)

Factor	Comparison Chart Results	Possible Pollution Sources	Possible Affects On Water Sources
Chlorine (ppm)=parts per million	0.5 – 5	Tap water, sprinklers, drains	Poisons, fatal affects on organisms
Dissolved Oxygen (ppm)	1 – 2	Natural	Oxygen levels below 2ppm cannot support life
Nitrate (ppm)	0 – 10	Fertilizer, sewage, waste	Overgrowth of algae or undrinkable
Phosphate (ppm)	4	Fertilizer, waste, water	Overgrowth of aquatic plants
pH (scale 4-11)	6.5 – 8	Acidic - natural	0-7 acidic, 7-14 basic

Table 3: Water Pollution Testing (part 2 – spring - April 11, 07)

Factor	Comparison Chart Results	Possible Pollution Sources	Possible Affects On Water Sources
Chlorine (ppm)=parts per million	0.25 - 0.5	Tap water	Safe range
Dissolved Oxygen (ppm)	2 – 3	Increase of aquatic organisms	Stressful to aquatic organisms
Nitrate (ppm)	1 – 2	Decaying vegetation, fertilizer	Safe range
Phosphate (ppm)	1.5 – 4	Fertilizer, animal waste	Overgrowth of aquatic plants
pH (scale 4-11)	7.5 – 8.5	Algae, vegetation	Increase of algae, less aquatic organisms

Table 4: Microorganisms Water Sampling (part 1 – fall Nov. 1, 06)

Name of Organism	Approximate Count	Description
Amoeba	6	Clear
Biting Midge larvae	3	Writhing, large jaws, small antennae, red spots on head
Water mite	3	Red, large mouth parts
Nematode worm	9	Long, transparent
Paramecium	12	Transparent, feeding on algae
Freshwater snail	1	Large, shell, eating
Hairworm	3	Brown, long, cylindrical
Bloodworm	1	Rounded, insect-like head
Euglena	1	Little, green, moving
Springtail	1	Insect, round flat body, long slender antennae
Hydra	2	Green, long slender body with tentacles

Table 5: Microorganisms Water Sampling (part 2 – spring - April 18, 07)

Name of Organism	Approximate Count	Description
Blue green algae	30	Clumped together algae
Paramecium	17	Small, clear, always moving fast
Oscillatoria	25	String-like, yellow-brown
Rotifer	1	Feeding on algae, currently moving, membrane transparent
Nematode worm	1	Long, green, slightly clear
Springtail	1	Eating algae
Desmids	1	Dark green in color, membrane transparent
Mosquito larvae	1	Tube-like body, pincers

Table 6: Bird Identification (part 1 – fall - Nov. 15, 06)

Common Name	Scientific Name
Sage Thrasher	*Oreoscoptes montanus*
Red winged Blackbird	*Agelanius phoenieus*
Turkey Vulture	*Cathartes buru*
Hermit Thrush	*Catharus guttatus*
Red shoulder Hawk	*Buteo janaicensis*
Brewer's Blackbird	*Fuphagus cyanouocpptoalus*
Red tailed Hawk	*Buteo janaicerisis*

Table 7: Bird Identification (part 2 – spring - May 2, 07)

Common Name	Scientific Name
Red winged Blackbird	*Agelanius phoeniceus*
Cliff Swallow	*Patrochelidon pyrrhonota*
Turkey Vulture	*Cathartes aura*
American Crow	*Corvus brachyrhynchos*
Red tailed Hawk	*Buteo jamaicensis*
Acorn Woodpecker	*Melanerpas formicivorus*
Western Kingbird	*Tyrannus verticalis*
Mallard Duck	*Platyrhynchos*

Table 8: Insect Identification (spring – April 25, 07)

Order Name	Approximate Count
Diptera	2
Odanata	9
Hymenoptera	21
Coleoptera	6
Homoptera	30
Hemiptera	10
Trichoptera	1
Orthoptera	1

Discussion

Soil Characterization

The soil in our wetlands the structure was blocky and granular. The color was 5y 2.5/2-10yr 3/1 with a consistence of extremely firm and friable. Texture was loam, clay, and sandy. Free carbohydrates were none or slight. We found no abnormalities in the soil (nasa, 1).

Water Pollution Part 1 Fall

In the fall we found 0.5 –5 ppm chlorine with a possible source from tap water, sprinklers, and drains that could poison and kill organisms in the wetlands. Dissolved oxygen had 1-2 ppm, which is not enough to support life. This could be caused by natural reasons such as algae. Nitrate levels were from 0-10 ppm that could be caused by fertilizer, sewage, or waste. This amount of nitrates could cause an overgrowth of algae choking out other life and would be unfit to drink. Phosphate levels were 4 ppm. This could be caused by fertilizers, wastes, and water. Over 4 ppm phosphates could lead to an overgrowth of plants (Freshwater, 2). With a pH scale the water turned out slightly basic or neutral depending on location.

Water Pollution Part 2 Spring

The chlorine of the spring according to table 3 was from 0.25-0.5, which is at a safe range and considerably lower than fall. Dissolved oxygen was from 2-3 ppm. This could lead to

stress of aquatic life from an increase. Nitrate was from 2-3 ppm which is an safe range for the wetlands. Phosphates were at 2.5-4 ppm, which can lead to an overgrowth of aquatic plants. This could possibly be caused by fertilizer and animal wastes (Freshwater, 2). pH was neutral to slightly basic which can cause more algae and affect animal life.

Microorganisms Part 1 Fall

The organisms seen in the fall were (in order of count): parameciums, nematode worms, amoebas, biting midge larvae, water mites, hairworms, hydras, a freshwater snail, a bloodworm, a euglena, and a springtail. Many of these were worms and protests, and many ate algae. Seeing this amount of life shows that our wetlands have high-quality conditions to support life, and that our waters are probably fairly healthy.

Microorganisms Part 2 Spring

The organisms seen in the spring are (in order of count): blue green algae, oscillatoria, parameciums, a rotifer, a nematode worm, a springtail, a desmid, and a mosquito larva. Though there wasn't as much diversity, there is a higher total species count as compared to the fall. There was clearly a big algal bloom at the time, and 30 total algae were counted. The most common behavior of the species observed was feeding on the algae, which was the food source.

Insect Identification Spring

During insect identification in spring, we found insects in the orders of *Diptera, Odanata, Hymenoptera, Coleoptera, Homoptera, Hemiptera, Trichoptera,* and *Orthoptera.* These were the types of species of insects that we would expect in a wetlands habitat (Insects, 1).

Bird Identification Part 1 Fall

In table 6, we saw *Oreoscoptes montanus, Agelannius phoenieus, Cathartes buru, Catharus guttus, Buteo janaicensis, Fuphagus cyanouocpptoalus,* and *Buteo janaicerisis.* According to the book Birds of North America, our reference, these birds are to be expected in the wetland habitat we researched, and we did not see anything out of the ordinary (Fahey, 1).

Bird Identification Part 2 Spring

In table 7 , we saw *Agelanius phoeniceus, Patrochelidon pyrrhonta, Cathartes aura, Corvus brachyrhynchos, Buteo jamaicensis, Melanerpas formicivorus, Tyrannus verticalis,* and *Platyrhynchos.* According to the book Birds of North America, our reference, these birds are to be expected in the wetland habitat we researched, and we did not see anything out of the ordinary (Fahey, 1).

Conclusion

There are some interesting results of this study. There were been improvements in the water from fall to spring in such areas as dissolved oxygen count, nitrate level, and phosphate level. The pH of the water in the spring was more basic than in the fall. The soil was blocky and granular, very firm, and has a loam-clay-sandy texture. There were 72 recorded living things in the spring, and 48 in the fall. We saw a fair amount of birds of prey and crows and blackbirds in the fall. The spring had a fair amount of such birds as redwings, swallows, and woodpeckers. We sampled many insects, and found a large amount of insects from the orders *Diptera, Odanata, Hymenoptera, and Coleoptera*. There was also a small amount of arachnids. We have learned a lot about what pollutes our wetlands and possibly where pollution comes from. Our school clearly puts out a lot of pollution, probably from chemical run off from the lawns and drainage system, and litter from the students. The noise can also be a factor, as well as the possibility that breeding grounds are being cut off. These studies can help the school make more regulations that reduce these pollutions because the wildlife in the area clearly depends upon it. Next year we would hope that we could do the same tests that we did this year in order to graph our wetland's health over a time period. We could also do such things as expand our research team, examine amphibian populations, do more research on plants, and figure out the range of our school's pollution.

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