

SEDIMENTATION AFFECTING WETLAND SOILS AND VEGETATION WITHIN THE DOG RIVER WATERSHED

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In this paper I will discuss how sedimentation has changed or affected the profile of wetland soils and how excessive sedimentation affects native species. Also I determined what invasive species are occupying the affected areas within the Dog River Watershed. My study area is the major tributaries of the Dog River Watershed. Sedimentation affects the vegetation by suffocating the native species and allowing invasive species to come in and dominate the area. Sedimentation also affects the soil profiles. Accumulation of sediments in wetlands from upland erosion may decrease wetland volume, decrease the duration wetlands retain water, and change plant community structure. I identified problem areas where sedimentation has affected wetland soils and the native vegetation. Allowing the dominant invasive species to propagate and replace the native plant species is a characteristic of the majority of the major tributaries of the Dog River Watershed. Once these invasive species establish, their seeds travel downstream to colonize new areas. Using auger cores, sharp shooter shovel and the Munsell Color Chart, soil profiles were examined and described. Soil profiles of affected areas were compared to the native soils profiles described in the Mobile County Soil Atlas. Photographs were taken of the soils and the invasive species that were encountered and explained in detail. Downstream sedimentation can cause severe problems to soils, vegetation and water quality. The Dog River Watershed community wants to reduce the run-off of sedimentation load that is being carried into the watershed.

Keyword: invasive species, sedimentation, wetland (hydric) soils

Introduction:

The city of Mobile, AL is growing very rapidly and will continue to grow over the years. The Mobile area is an expanding urban area, and has already enveloped the (DRW) Dog River Watershed (City of Mobile). As a result of this growth, excessive run-off and sedimentation have become major problems in this drainage due to the increase of disturbed land and paved surfaces in the area. As development takes place, many sites do not have stable BMP's (Best Management Practices) in place to prevent sediment traveling downstream. BMP's may consist of hay-bales, silt fencing, rip-rap, gabions and

detention ponds. As a result of this downstream sedimentation, the effects on wetland soils as well as the vegetation can be severe. Sedimentation affects the vegetation by suffocating the native species and allowing invasive species to come in and dominate the area. Invasive species often form large monotypic stands replacing beneficial native species (Radford, et al. 1964). Plant invasions are limited primarily by dispersal of propagules or by a number of propagules entering a community. In the absence of dispersal limitations, the ability of exotic species to successfully invade, that is, to persist and spread in a community may be influenced in part by the susceptibility of a community to invasion (Lonsdale 1999). Invasions by exotic plant species are occurring at unprecedented rates as a result of human activities that have increased the number of introductions and the rate of spread of many species. Thus, identifying the factors that influence the invasions of exotic plant species is of critical importance (Lodge 1993, Chaplin et al 2000).

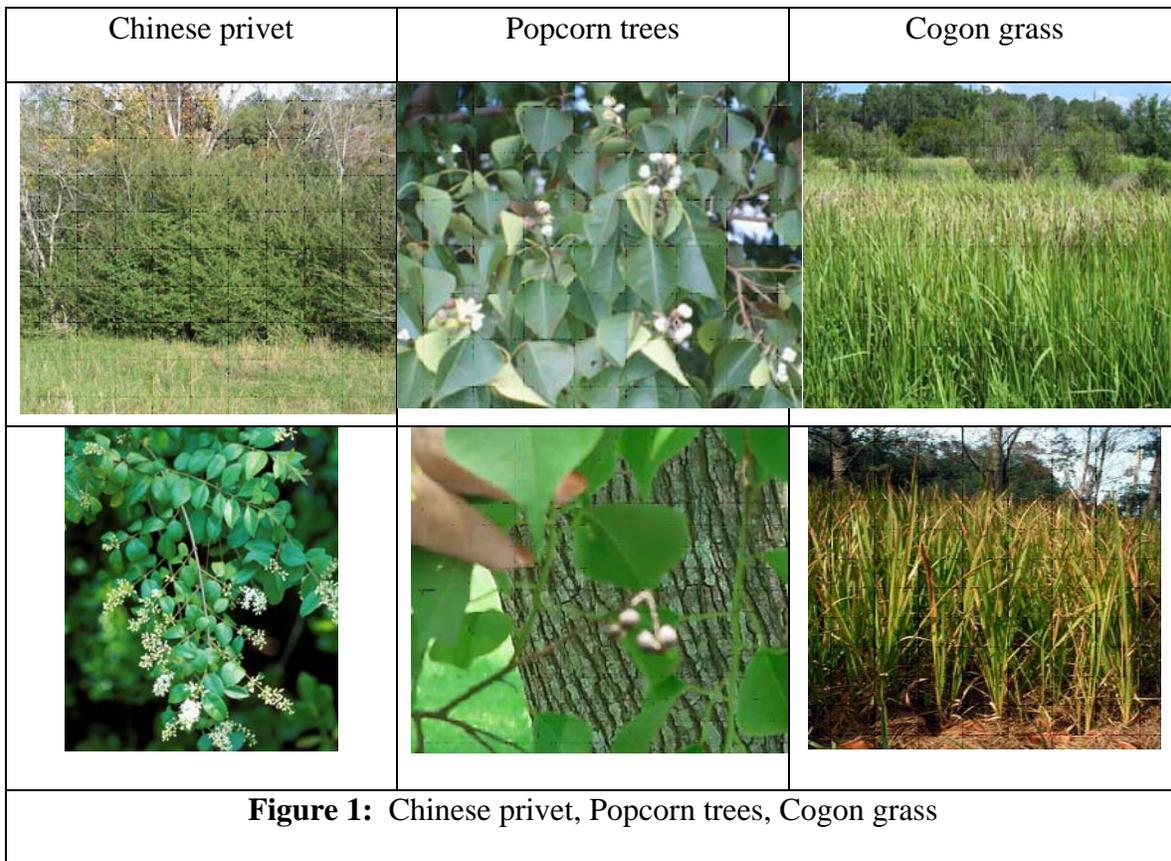
Sedimentation also affects the wetland soil's profile. Native macro invertebrates suffer as soil profile changes from native to layers of sedimentation. Accumulation of sediments in wetlands from upland erosion may decrease wetland volume, decrease the duration wetlands retain water, and change plant community structure (Jurik, et al 1994). This sedimentation problem is having a severe affect on vegetation, soils and water quality. The DRW community wants to reduce the sediment load that is being carried into the river. The evidence that shows this need is the reduction of water quality, invasive species coming in and dominating the area, and the changing of the soil profile. I hope this research will help the DRW community and strengthen public awareness about the problems that excessive sedimentation can cause.

Research Question:

How has sedimentation changed or affected the profile of wetland soils in the DRW. Has excessive siltation affected native species and if so what invasive species are occupying the affected areas within the study area?

Methods:

Before going into the field, I researched the Mobile County Soil Survey as to types of native soils that I would encounter. Physical characteristics were analyzed. Also, I researched the Wetland Inventory Plant List to see which types of invasive species might be encountered. Suspect sedimentation problem areas were located in the field. When the problem areas were selected the next step was analyzing the soils and vegetation. Using auger cores, sharp shooter shovel and the Munsell Color Chart, soil profiles were examined and described. The Munsell soil color chart measures soil's chroma and value. When sedimentation was observed in the sample I recorded the depth in inches until it reached native soils. Using the Munsell Color Chart I recorded the color of the sediment and compared to the native soils using the Mobile County Soil Survey. I selected three invasive species to monitor in these problem sedimentation areas. The three invasive plant species that were the focus of my research are cogon grass (*Imperata cylindrical*), popcorn trees (*Sapium sebiferum*) and Chinese privet (*Ligustrm sinense*). I documented and took pictures of the three invasive species that I encountered in the problem areas.



Results:

This data represents the information that I collected regarding the 11 study sites or problem areas that were chosen and how the soils and vegetation have been affected by excessive sedimentation.

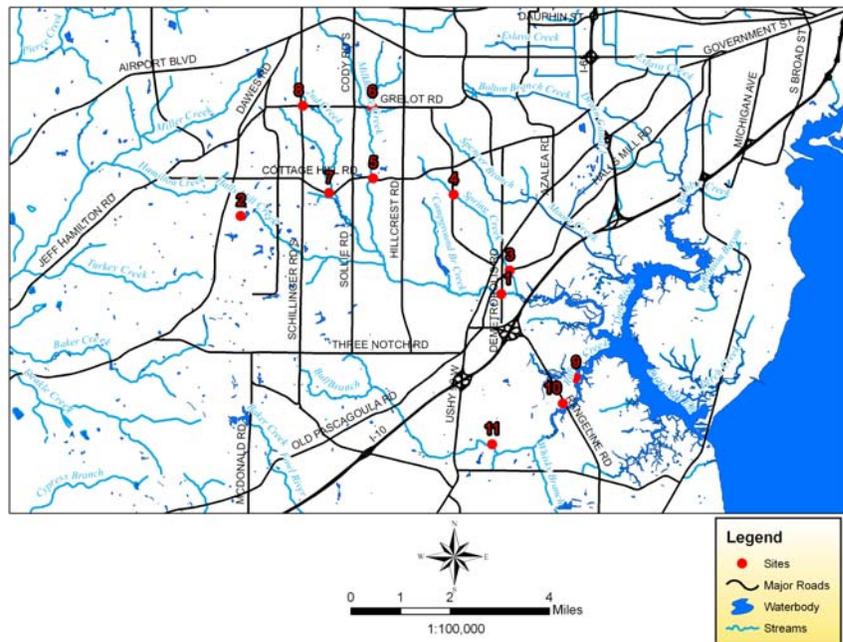


Figure 2: Map showing 11 study sites

Site 1:

(Halls Mill Creek- Demotropolis; N 30 36.338 W 88 09.426) The native wetland soils in the Halls Mill drainage are Smithton and Johnston-Pamlico. Smithton soils have a dark grayish brown sandy loam about 7 inches thick. The subsurface layer, to a depth of 17 inches, is gray sandy loam that has mottles in shades of brown and yellow. The Smithton soils had a 10YR 5/2 Munsell color. Johnston soils have a black mucky loam surface layer about 6 inches thick. The Johnston soils had a 10YR 2/2 Munsell color.



Figure 3: Halls Mill Creek Sedimentation

The subsurface layer is very dark grey mucky loam to a depth of 36 inches. Pamlico soils have a black muck surface layer about 5 inches thick. The Pamlico soils had a 10YR 2/2 Munsell color. The next layers are black and very dark brown muck that extend to a depth of 38 inches (Soil Survey of Mobile County). This site had 2 inches of sedimentation present. The sedimentation had a 10YR 7/6 Munsell color. Chinese privet was present. Chinese privet was dominant on this site.

Site 2:

(Halls Mill Creek- Nugget Drive; N 30 37.738 W 88 14.728) The native wetland soils in the Halls Mill drainage are Smithton and Johnston-Pamlico. (See soil description- Site 1) This site had 4 inches of sedimentation. The sedimentation had a 10YR 6/8 Munsell color. This site has been affected by an upstream eroding dam that has been

sending sediment downstream.

No invasive species were found even though the understory has been killed off due to excessive sedimentation.

Site 3:

(Spring Creek-Halls Mill

Road; N 30 36.789 W 88

09.244) The native wetland

soils for the Spring Creek

drainage are Pamlico-Bibb.

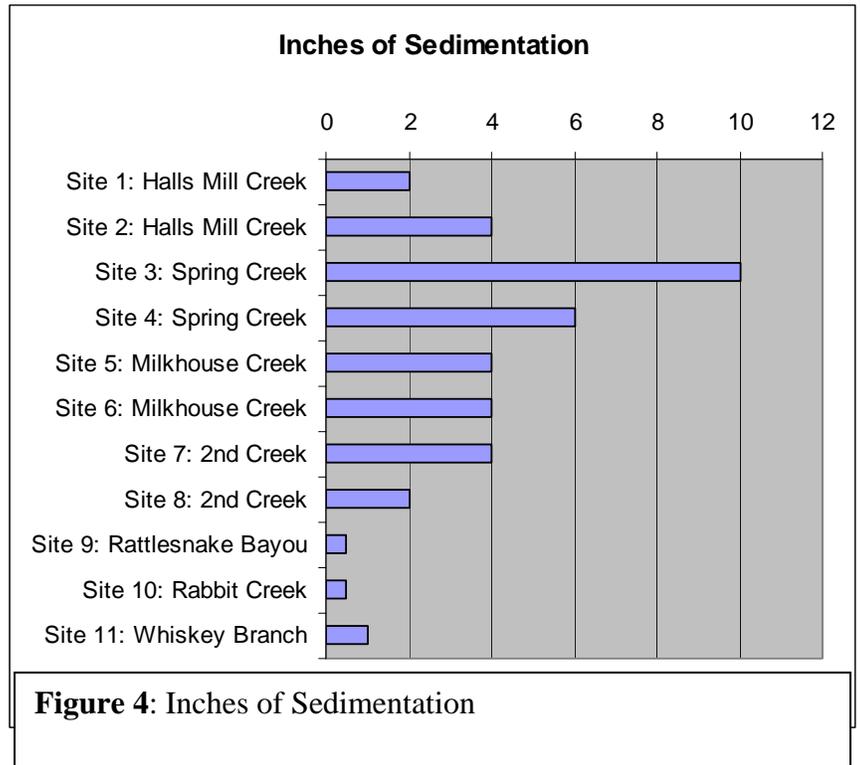
Pamlico has a black surface

layer about 5 inches thick. The Pamlico soils had a 10YR 2/2 Munsell color. The next layers are black and very dark brown that extend to a depth of 38 inches. The Bibb soils have a dark grey sandy loam surface layer about 5 inches thick. The Bibb soils had a 10YR 4/1 Munsell color. The underlying material to a depth of 21 inches is dark grayish brown sandy loam (Soil Survey of Mobile County). This site had 10 inches of sedimentation present. The sedimentation had a 10YR 7/2 Munsell color. There was Cogon grass and Chinese privet present. This site had a lot of sedimentation and an abundance of Chinese privet and Cogon grass.

Site 4:

(Spring Creek-Knollwood Road; N 30 38.137 W 88 10.406) The native wetland

soils for the Spring Creek drainage are Pamlico-Bibb (See soil description-Site 3). This



site had 6 inches of sedimentation present. The sedimentation had a 10YR 7/4 Munsell color. There was Chinese privet, Cogon grass and Popcorn trees present at this site. This site was probably the worst problem area that I encountered with over 6 inches of sedimentation and having all three invasive species present.

Site 5:

(Milkhouse Creek-Cottage Hill Road; N 30 38.415 W 88 12.047) The native wetland soils in the Milkhouse Creek drainage are Pamlico-Bibb (See soil description-Site 3). This site had 4 inches of sedimentation. The sedimentation had a 10YR 7/6 Munsell color. Chinese privet was present along creek.

Site 6:

(Milkhouse Creek- Grelot Road; N 30 39.686 W 88 12.048) The native wetland soils in the Milkhouse Creek drainage are Pamlico-Bibb (See soil description-Site 3). This site had 4 inches of sedimentation. The sedimentation had a 10YR 7/6 Munsell color. Popcorn trees and Chinese privet were present. The BMP's on this site are very well maintained and the invasive species are growing on the berm.

Site 7:

(2nd Creek-Cottage Hill Road; N 30 38.152 W 88 12.927) The native wetland soils in the 2nd Creek drainage are Pamlico-Bibb (See soil description- Site 3). This site had 4 inches of sedimentation. The sedimentation had a 10YR 7/3 Munsell color. Cogon grass and Chinese privet were present.

Site 8:

(2nd Creek- Grelot Road; N 30 39.670 W 88 12.048) The native wetland soils in the 2nd Creek drainage are Pamlico-Bibb (See soil description- Site 3). This site had 2

inches of sedimentation. The sedimentation had a 10YR 7/4 Munsell color. Popcorn trees and Chinese privet were present.

Site 9:

(Rattlesnake Bayou- Dawson Drive; N 30 34.919 W 88 07.907) The native wetland soils in Rattlesnake Bayou drainage are Johnston-Pamlico and Lafitte muck (See Johnston-Pamlico soil description- Site 1). Lafitte muck has a dark grayish brown muck surface layer about 7 inches thick (Soil Survey of Mobile County). Lafitte muck had a 10YR 4/2 Munsell color. This site had .5 inches of sedimentation. The sedimentation had a 10YR 7/3 Munsell color. No Chinese privet, no popcorn trees and no cogon grass were present. Not much development going on in this area which has reduced the amount of sediment in this area.

Site 10:

(Rabbit Creek- Rangeline Road; N 30 33.705 W 88 09.636) The native wetland soils in Rabbit Creek drainage Pamlico-Bibb (See soil description- Site 3). This site had .5 inches of sediment. The sedimentation had a 10YR 7/4 Munsell color. Cogon grass was present on an old fill area under the bridge. Not much development going on in this area which has reduced the amount of sediment in this area.

Site 11:

(Whiskey Branch- Todd Acres Drive; N 30 33.684 W 88 09.592) The native wetland soils in the Whiskey Branch drainage are Pamlico-Bibb (See soil description-Site 3). This site had 1 inch of sedimentation. The sedimentation had a 10YR 7/4 Munsell color. Cogon grass and Chinese privet present. Majority of the sediment is coming off a spoil pile next to the creek.

In summary, human activities have increased the amount of sedimentation being carried downstream increasing the number of introductions and the rate of spread of invasive species. Due to the susceptibility of a community to invasion, exotic and invasive species have increased in their numbers in disturbed areas. Sites 1-8 had more sedimentation present than compared to sites 9-11 because there is more construction and development going on in north of the DRW compared to south DRW. Invasive species were found in all sites except two. Sedimentation has a direct affect on the spread of invasive species into a community and eliminates beneficial native species. Figure 5 shows the presence of invasive species ranked on a low to high scale. Figure 6 shows the native soil types and the color of sedimentation using the Munsell color chart.

Conclusion:

In conclusion, downstream sedimentation can cause severe problems to soils, vegetation and water quality. Excessive sedimentation is a major problem for the DRW community. The DRW community is ready to make a stand against inadequate developers who are not controlling their sediment runoff with proper BMP's. Hopefully, the contribution of this research will help the DRW community in reducing the downstream sedimentation load by identifying problem areas and educating the community raising public awareness to on-going problems. Also, this research will strengthen the importance of proper BMP's in place so that sedimentation runoff is mitigated. This sedimentation problem is having a severe affect on vegetation, soils and water quality.

Chinese Privet

Cogon Grass

Popcorn Trees



Site	Chinese Privet	Cogon Grass	Popcorn Trees
Site 1: Halls Mill Creek	High	Low	Low
Site 2: Halls Mill Creek	Low	Low	Low
Site 3: Spring Creek	High	High	Low
Site 4: Spring Creek	High	High	High
Site 5: Milkhouse Creek	Medium	Low	Low
Site 6: Milkhouse Creek	Medium	Low	Medium
Site 7: 2nd Creek	High	High	Low
Site 8: 2nd Creek	High	Low	High
Site 9: Rattlesnake Bayou	Low	Low	Low
Site 10: Rabbit Creek	Low	Medium	Low
Site 11: Whiskey Branch	Medium	High	Low

Figure 5: Presence of Invasive species

Site	Smithton Soils	Johnston Soils	PamlicoSoils	Bibb Soils	Lafitte Soils	Color of Sedimentation
Site 1: Halls Mill Creek	X	X	X			10YR 7/6
Site 2: Halls Mill Creek	X	X	X			10YR 6/8
Site 3: Spring Creek			X	X		10YR 7/2
Site 4: Spring Creek			X	X		10YR 7/4
Site 5: Milkhouse Creek			X	X		10YR 7/6
Site 6: Milkhouse Creek			X	X		10YR 7/6
Site 7: 2nd Creek			X	X		10YR 7/3
Site 8: 2nd Creek			X	X		10YR 7/4
Site 9: Rattlesnake Bayou		X	X		X	10YR 7/3
Site 10: Rabbit Creek			X	X		10YR 7/4
Site 11: Whiskey Branch			X	X		10YR 7/4

Figure 6: Soil types and Munsell color of sedimentation

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