

# **Evaluation of Marsh Restoration Progress at Blackwater National Wildlife Reserve**

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GEOL 394

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## Abstract

Blackwater National Wildlife Preserve has undergone rapid marsh loss in the past 70 years. In preparation for a large proposed wetland restoration of 11,000 acres at Blackwater, two small plots were restored in 1983 and 2003 respectively. The goal of this study was to evaluate these restoration plots by measuring and comparing marsh characteristics between a site restored in 2003 and a natural marsh at Blackwater. 40 core samples were taken at each site and bulk density, carbon content, and accumulation above marker beds were compared to one another and to literature values. Core samples show bulk density increases with depth at both sites but the higher bulk density layer appears at much shallower depths in the cores taken at the restored marsh. In addition net accretion only appeared in a small group of cores taken from the restored site. These data suggest that possibility of 50 cm of either non-deposition or removal of marsh sediment from the site prior to the restoration effort. Sites where non-accretion and erosion are taking place are at the edges of the marsh. This is a complete reversal from most studies of marsh accretion in places as varied as coastal marshes in England and Louisiana with very different rates of relative sea level rise. If this erosion persists, the marshes at Blackwater will eventually disappear despite any high levels of organic accumulation and/or trapping found in the interior of the marshes.

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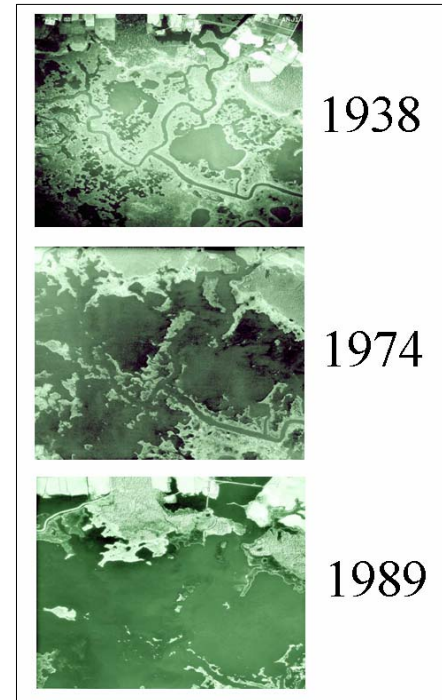
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## I. Introduction

Blackwater National Wildlife Preserve is a 27,000 acre refuge on Maryland's Eastern Shore. The area is composed mainly of tidal marsh that plays home to a vast number of migratory birds and endangered species. Unfortunately Blackwater Refuge has lost nearly 8,000 acres of tidal wetlands since it was established in 1933 (Blankenship, 2005).

The U.S. Fish and Wildlife Service and the Army Corps of Engineers are currently developing a long-term project to use dredged material from Baltimore Harbor to restore 11,000 acres of tidal marsh at Blackwater. In preparation for this massive project, a "test" restoration project was commenced in 2003, creating a small plot of tidal marsh from dredged material and hand-planted vegetation (Blankenship, 2005).

The aim of my project was to evaluate the progress and potential for success of these restored areas. To address our approach was to determine net marsh accumulation rates at Blackwater and compare them with local net sea level rise rates.



**Figure 1-** Blackwater Marsh Loss  
(U.S. Fish and Wildlife Service)

## II. Background

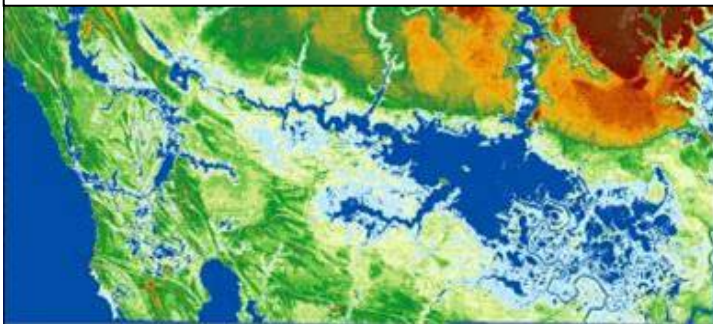
### A. Blackwater National Wildlife Reserve and Marsh Loss

Blackwater NWR has been named one of six priority wetlands identified by the North American Waterfowl Management Plan (Blankenship, 2006). The Intergovernmental Panel on Climate Change has sited Blackwater as a "key example of wetland loss attributable to rising sea level due to global temperature rise. But in the past several other factors have contributed to Blackwater's rapid marsh loss. A canal built in the 1800s connected Blackwater to the salty Little Choptank River, increasing Blackwater's salinity and devastated freshwater plants (Blankenship, 2006). In response a barricade was recently constructed to once again separating

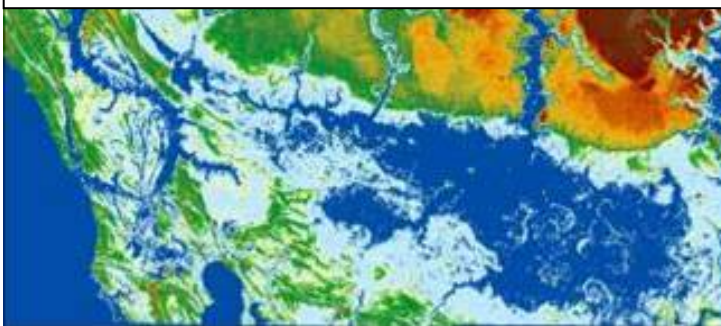
Blackwater from the Little Choptank River. The most damaging thing other than sea-level rise has been the infestation of nutria, an exotic rodent released in the area after a failed fur-farming business in the 1930s. Nutria feed on marsh plants, chewing off the entire root disabling plants to re-grow. They are especially damaging because they have no natural predators in Maryland and have a very high reproduction rate (Nutria breed year-around and can have 3 liters a year, averaging 5 young per liter). The U.S. Fish and Wildlife Service initiated the Nutria Project in 1998 to study and eliminate the animals. Blackwater was declared Nutria-free by 2004 (Nutria Control, 2006). With these problems eliminated, the government is now only focused on sea-level rise as a factor in Blackwater's marsh loss.

The USGS developed an inundation model for the rising sea-level at Blackwater. This project required a detailed topographic map, which was created with LIDAR mapping techniques

**Figure 2:** Blackwater Present Day Topography (2002)



**Figure 3:** USGS Predicted Blackwater Topography (2050)



(Larsen, 2004). This map (figure 2) shows areas of high marsh, low marsh, and open water. Using these data and the rate of local sea-level rise (3mm/year) the USGS predicted what the area would be like in 50 years (figure 3). When comparing the two images you see very dramatic marsh loss, but the 2050 projection was created considering only sea-level rise. Though sea-level rise does in fact play a large role in marsh loss, there are also several other factors that affect marsh elevation that were not considered in this model.

### *B. Marsh Elevation*

Marsh elevation is controlled by at least four parameters: relative sea level, compaction, net plant productivity, and net sedimentation. Relative sea-level includes both the rise in sea-level and local subsidence. For Blackwater this rate is 3mm/yr (Hoffman, 1998). A rise in

relative sea-level results in a decrease of marsh elevation. Compaction is another factor that decreases elevation. Compaction is the result of increasing pressure on material caused by the weight of added sediment and water above, which squishes the lower layers. In marshes, compaction is particularly significant because of the abundance of organic material, which has a high compressibility potential. Clay-sized sediment is also very compressible, but sand and silt are less compressible (Pizzuto and Schwendt, 1997). Conversely, sedimentation adds to the elevation of a marsh. Marsh grasses trap sediment from the water, adding new layers and building up the land. Similarly net plant productivity, which is defined as plant productivity minus decomposition and/or erosion adds biomass, further increasing marsh elevation. For a marsh to remain in equilibrium, marsh sedimentation and biomass accumulation must exceed net sea-level rise and compaction. If one overwhelms the others, like sea-level rise is feared to do, this balance will be lost.

### *C. Previous Studies*

Marsh loss due to sea level rise and other factors is a concern in many regions. Studies of marsh accretion rates have been conducted along the U.S. Coasts and in Europe. In many of these studies Cs-137 or Pb-210 is used to date marsh accretion rates. Cs-137 results from nuclear bomb tests and more recently from the Chernobyl accident, which has been used to date marsh samples in N. Europe.

Studies performed in Northern Europe indicate that low marshes (similar to the *Spartina* dominated low marshes at Blackwater National Wildlife Reserve) are accreting at a rate of 4-7 mm/year; higher than the net rate of sea-level rise observed at Blackwater and high enough to keep pace with local sea level rise. In Louisiana high rates of marsh accretion are not always able to keep pace with the extreme rates of subsidence in that region. Unlike the San Francisco Bay region, marsh sediments in Louisiana have from 30-50% mineral sediments and the rest peat. Measurements of marsh accretion in subsiding San Francisco Bay marshes indicate that sedimentation and peat accumulation can easily keep pace with subsidence and sea level rise (Patrick and Delaune, 1990). In the three San Francisco Bay Marshes studied, organic carbon was normally less than 10% of the marsh material by dry weight. This, and the high bulk densities of the accreted marsh material, indicates most of the accretion is due to sedimentation of mineral sediments.

Data by Hatton et al, 1983 indicate accretion in many regions can keep pace with the rates of net sea level rise similar to those measured in the Chesapeake Bay region. These observations suggest that it is not the rate of sea level rise by itself that is creating the marsh loss at Blackwater, but rather low sedimentation rates, high sediment re-suspension rates, or low biomass net accumulation rates are significantly lower than what is required to keep pace with sea level rise.

Research on marsh accretion and biomass accretion rates in restored marshes indicates that some restoration projects have significantly increased the amount of biomass and marsh accretion. In some of these cases however, most of the marsh accretion has been through organic matter accretion (Cahoon, 1994) and it is not known whether these rates can be sustained over time.

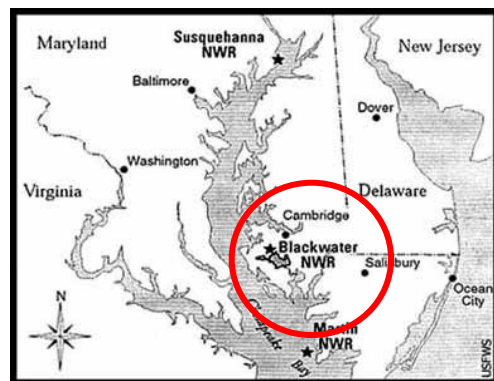
### III. Hypotheses

- Blackwater marsh accumulation rates have dropped below sea-level rise rates due to both low net biomass accumulation and low sedimentation rates.
- Restored sites have higher plant productivity and more efficient trapping of sediment than non-restored sites.

### IV. Method of Analysis

#### A. Study Sites

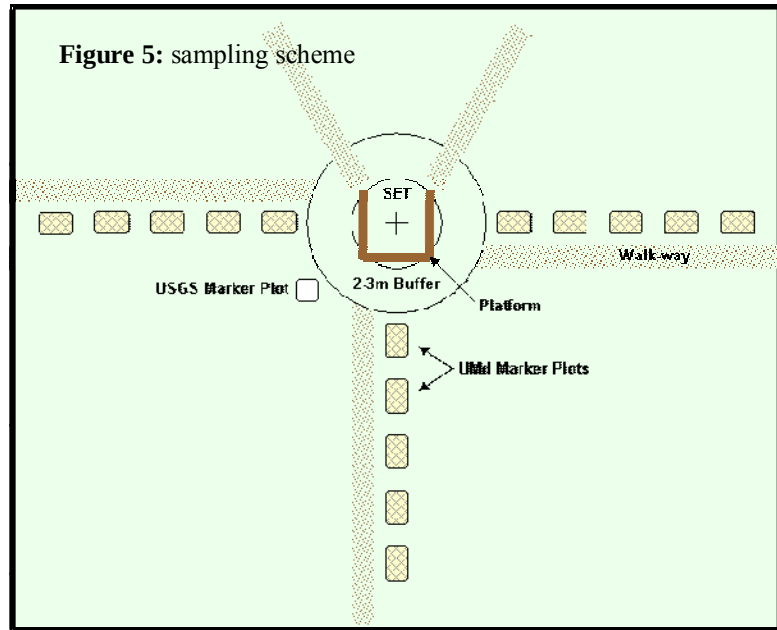
Blackwater National Wildlife Reserve is located just outside of Cambridge, MD (figure 4). There are two sites at Blackwater National Wildlife Reserve that were examined in this study: a natural marsh named “Barbados” and the 2003 restored site named “Wildlife Dive”.



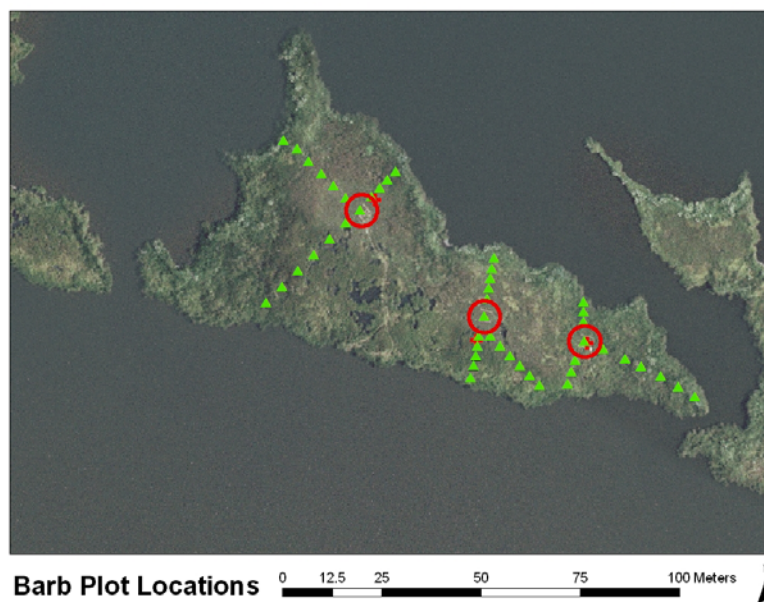
**Figure 4-** Location of Blackwater NWR (USFWS)

### B. Sampling Scheme

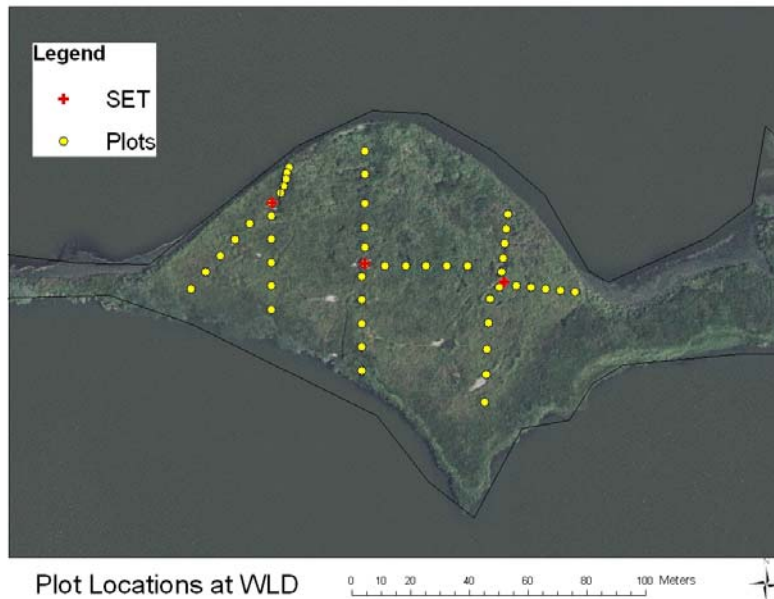
To ensure variation of sampling we established a radial sampling scheme at each marsh site to include points near the marsh edge, inward from the edge, and in the center of the marsh plot, as well as to include differences in vegetation. At both marsh sites three sediment elevation tables (SETs) have been installed by the United States Geologic Survey (Morris et al, 2002). A SET is a mechanical leveling device used to determine relative elevation above a benchmark in wetland sediments. Around each SET three sampling transects were laid out in a radial pattern (figure 5). Each transect begins two meters from the SET and runs to the edge of the marsh. Each of the 4-6 sample points was marked with PVC pipe and the location was determined using a Trimble GPS unit. A schematic of this sampling scheme is shown in figures 6 and 7 for both of the study plots.



**Figure 6-** Sampling Points for the Natural Marsh Site *Barbados*



**Figure 7-** Sampling Points for the Restored Marsh Site *Wildlife Dr.*



### *C. Marker Beds*

To calculate marsh accretion, there must be age constraints. Accordingly marker beds are used in many studies. Marker beds are strata with a known date, used as a “time zero”. If you know the data of a particular layer, you can assume that everything above that layer was deposited between that time and the present and use the depth to the known time and the amount of time that has past to calculate accretion rates. As mention earlier Cs-137 peaks have been used in many marsh accretion studies while in others man-made layers of feldspar were deposited (Morrison et al., 2002, Cahoon and Turner, 1989). In the studies that use feldspar as a marker bed, study site were periodically sampled to find accumulation. The idea of using a feldspar marker bed was introduce in my initial project proposal and since has been incorporated in the long term study.

In June 2006 a 128.3 cm by 62.2 cm area of feldspar was placed down at each sample point according to the scheme describe above. Two opposite corners of the rectangular were

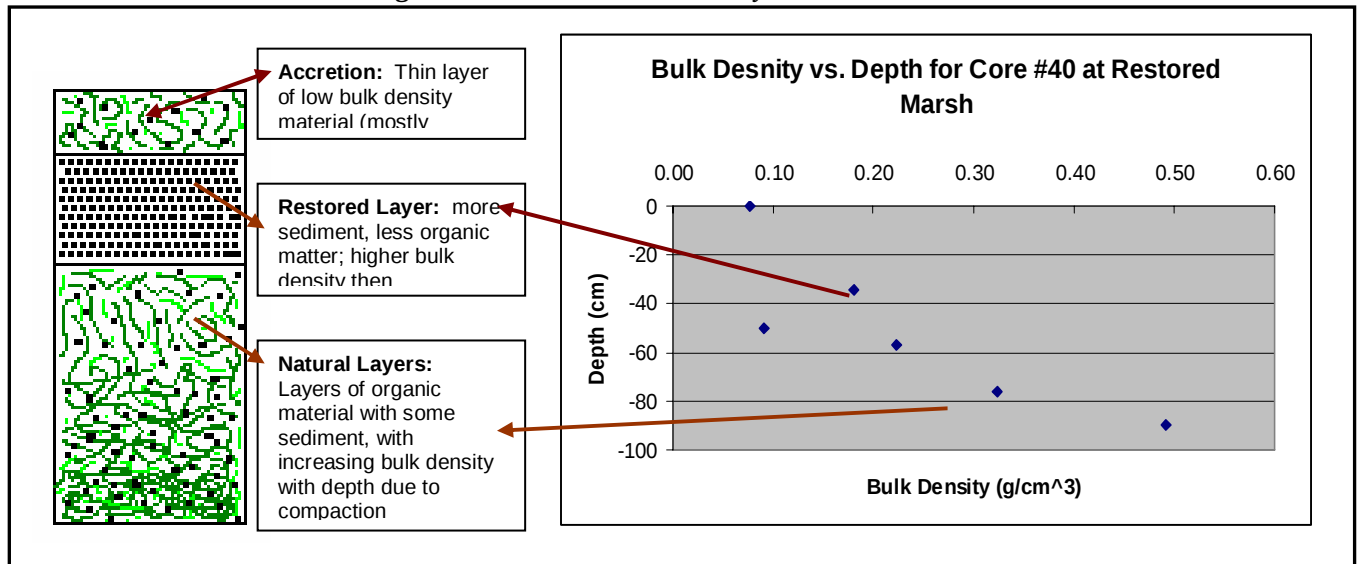


**Figure 8:** laying feldspar beds

marked by PVC pipe (figure 8). Marker beds were positioned parallel to one another in each transect, allowing for a walk way on one side for future sampling trips and to avoid excess of trampled areas.

Because the date of restoration of the *Wildlife Drive* plot is known (May 2002), the layer of restored sediment layer can be used as a marker bed as well. The restored sediment layer can be identified in sediment cores because it mostly sediment and has a much higher bulk density than surrounding strata. A schematic of this can be seen in figure 9, compared to a sediment core taken earlier in the year.

**Figure 9:** Restoration sediment layer as a marker bed



#### D. Sediment Core Sampling

Two methods were tested and compared; the coring device mentioned in my 393 proposal and a McCauley peat auger. The coring device, which consists of a piece of PVC piping one meter in length with large metal teeth attached to the bottom of the one end, delivers a full cylinder core whereas samplings taken with the peat auger are one half of a cylinder. In July preliminary sediment cores were obtained at both marsh sites, taken outside the marked transects. Samples were separated into horizons and frozen. 5 gram sub-samples were taken from each of the samples and oven dried at 105°C. The dry weight was recorded and divided by the volume of the core to find bulk density. The bulk densities of the coring device and the peat sampler were comparable at similar depths.

Because it was more easy to use, the peat auger was chosen as the method for core sampling. In July and September of 2006 cores were taken from each sample point marked according to the sampling scheme. Once collected the cores were stratified and taken back to the laboratory for analysis.

#### *E. Laboratory Analysis of Sediment Core Samples*

Each stratum of each core was tested for moisture content, bulk density and a selection was tested for organic carbon. Moisture content was determined oven-drying approximately 5g of the wet sample at 105°C, and dividing the amount of water (wet weight minus dry weight) by the dry weight.

Bulk Density was found by dividing the dry bulk weight by the bulk volume of the sample. Given that calculated value for moisture content is a ratio of grams of water per one gram of dry sediment, the dry bulk weight was found by dividing the bulk wet weight by one plus the moisture content. Because the core samples taken by the peat sampler are a semi circle, the volume of the sample was found by the equation  $[\frac{1}{2} \pi r^2 d]$  where r is the radius of the core (2.5 cm) and d is the height of the sample (lower depth-upper depth).

Approximately 15 cores taken from the restored marsh site, *Wildlife Drive*, were tested for organic carbon. Organic carbon was measured by high temperature combustion using a Leco CHN2000 (Leco Corp., St. Jospheh, MI). A subsample of each stratum was fine ground to <0.15mm and packed in to tin capsules and processed in the machine. The output data included total carbon, nitrogen, and hydrogen. Only the carbon measurements were used in this study.

## V. Data

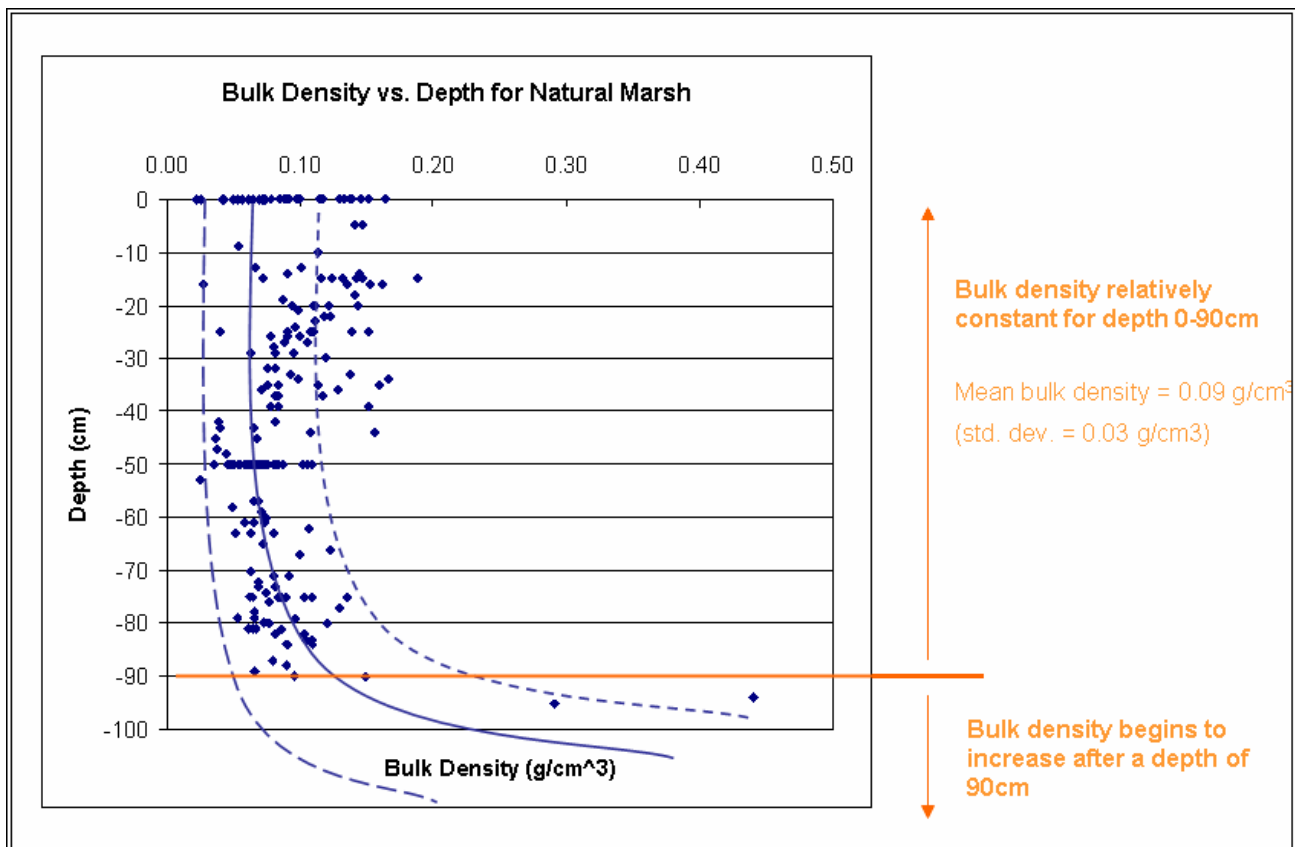
### *A. Bulk Density vs. Depth*

#### Bulk Density for non restored marsh

The bulk density data for the non-restored marsh was obtained from 40 cores. Instead of plotting bulk density versus depth for each core, I have presented the data for all of the cores. Thus, the variability in bulk density measurements among the various cores is presented in figure 10. The majority of the bulk densities found for the non-restored site were below 0.2g/cm<sup>3</sup>. In a plot of the bulk density against the depth of each sample (figure 10), we see that from 0-90 cm,

the bulk densities are very low, representing primarily organic matter accretion, and they vary over a small range (solid blue line represents average relationship; dotted lines represent upper and lower limit). The average bulk density for this interval is  $0.09 \text{ g/cm}^3$  with a standard deviation of  $0.03 \text{ g/cm}^3$ . The interval from 0-45 cm does have slightly higher values of bulk density, which given that these samples are from near surface sites, suggests that these samples have more mineral sediment than the other samples. From 90-100 cm in depth we see an increase in bulk density. This suggests for the natural marsh at Blackwater autocompaction starts to play a roll in the sediment and organic matter at about 90cm below the surface. An alternate explanation is that marsh material at greater depths contains higher proportions of mineral sediment.

**Figure 10:** Bulk density vs. depth for non-restoed marsh



### Bulk Density for restored site

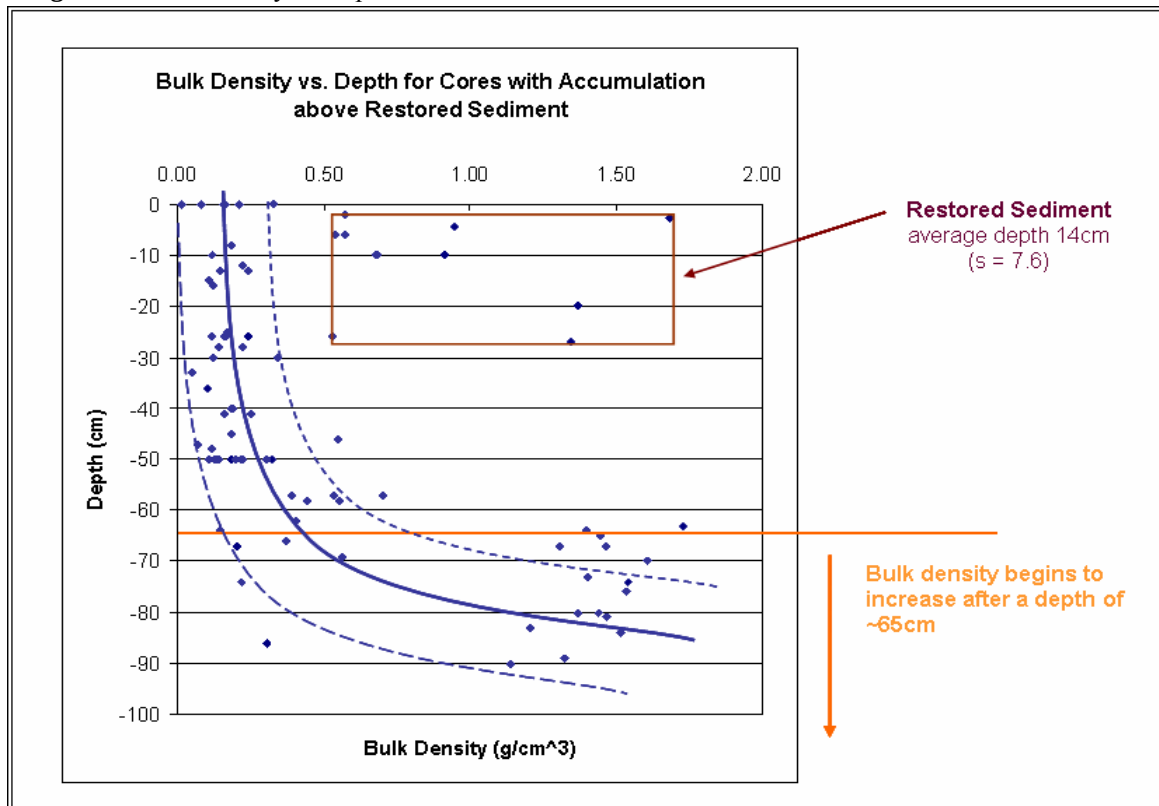
The bulk density data for the restored marsh plot was obtained from 43 cores. The cores taken from this site show three different distributions of bulk density versus depth profiles. These different distributions are described below.

- Cores with applied sediment at surface. The first category of sediment cores contains the restored sediment layer at the surface of the core. The bulk density versus depth profiles for these samples show a sediment horizon with a higher bulk density for the top ~15cm, then several organic layers below it with smaller densities. These cores contain only the lower two layers in the schematic diagram (figure 9).
- Cores with no applied sediment at surface. The second category groups the cores that show no sign of the restoration sediment layer. Instead you see cores similar to those of the non-restored marsh with many layers of low bulk density organic matter or varying decay. At these sites, either the sediment layer was never applied, or it was lost due to erosion. These cores contain only the bottom layer shown in the schematic diagram (figure 9).
- Cores with applied sediment and organic accumulation above the sediment layer. The final category of cores taken from the restored marsh show accretion above the restoration sediment layer. These cores are similar to the schematic shown in figure 9; the topmost horizon is a thin layer of low density organic matter which sits atop a higher density layer (average size ~15 cm) that contains less organic matter. Below that bulk densities are low again but begin to rise at around a depth of 65 cm. 12 cores showed a layer of accumulation above the restored sediment. The cores are Wildlife Drive core # 2, 10, 14, 16, 18, 27, 30, 32, 33, 38, 43, 44. The Location of these points shown on Appendix 1a.

Bulk density versus depth was composited from all of the core samples with applied sediment and organic accumulation (figure 11). When we plot the bulk density of the all the samples, we see the following: a) low bulk densities versus depth for the upper part of the profile (to 65 cm);

b) a number of samples that indicate the higher bulk densities associated with the sediment applied as part of the restoration effort, and c) at depths of greater than 65 cm, we see a rapid increase in bulk density values for all of the core samples (in figure 1 the solid blue line is average curve and dashed lines so upper and lower limits). If we compare the depth at which compaction starts (orange line on figure 11) for the restored marsh to that of the natural marsh (orange line on figure 10) we see they are offset by 25cm. I propose that a large amount of material was eroded away from the top of this site prior to the restoration, causing a truncated version of the bulk density vs. depth profile seen in the non-restored marsh cores. If this is so, then the depth of the erosion would be offset from the depth where higher bulk density values begins, plus the average depth of the restoration sediment layer (15cm) which was not deposited until after this hypothetical erosion; this equals 50cm of material. Assuming the average bulk density of  $0.09\text{g/cm}^3$ , this would indicate an erosion rate of  $4.5\text{g/cm}^2$  over the time span the erosion occurred.

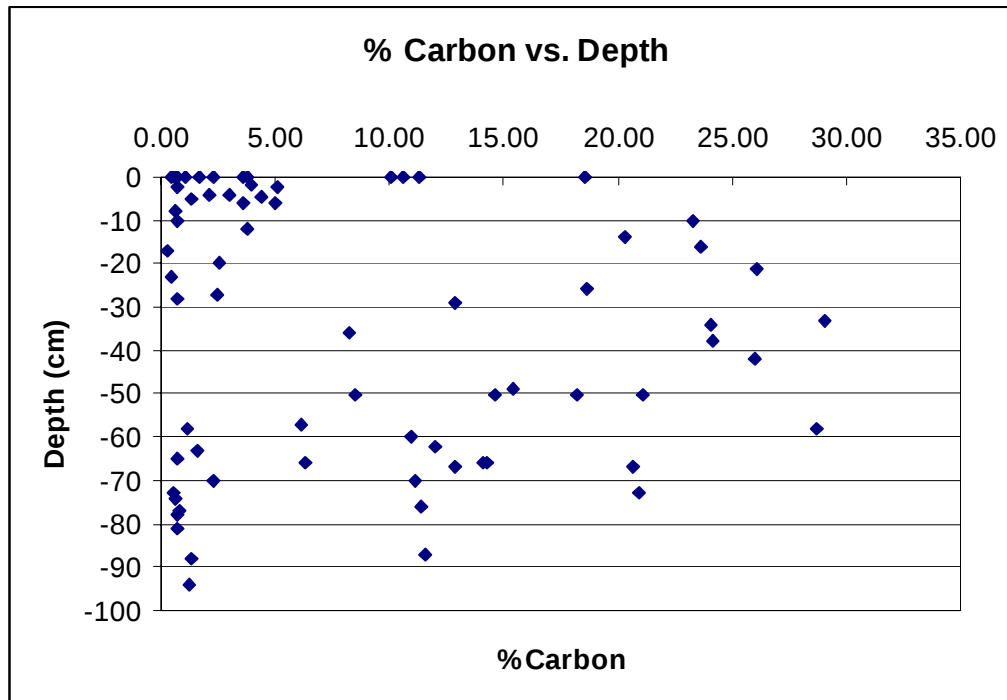
**Figure 11:** Bulk density vs. depth for restored marsh site



### B. Carbon

Some core samples from the restored marsh site were analyzed for organic carbon. Data range from 0.3% to 29%, with an average of about 8.7%. The graph of this data (figure 12) shows no systematic change in organic carbon with depth, although there is a hint at lower organic carbon at the surface (consistent with the applied sediment layer) and lower organic carbon at depth, which might imply higher amounts of mineral sediment at these sites as well. These results are similar to previous studies done in the area. Data from the study performed by Angiler et al. in 2005 showed no pattern between %C and depth. The range of %C in the study was similar to our data as well, though over a depth twice as long.

**Figure 12:** Organic carbon vs. depth for a selection of restored marsh samples



### C. Marsh Accumulation Depths and Rates

#### Accumulation depth and rate above feldspar marker horizon

Feldspar marker layer was disturbed in some areas by heavy rainfall in the end of the summer and core samples were taken on edge of rectangular area feldspar was originally places;

therefore not many cores taken contained a defined layer of feldspar. Those cores that did had an average of about 2mm of accretion above the white layer.

Accretion occurred over a 3 month period giving a rate of approximately 8mm/year. Feldspar marker layer was disturbed in some areas by heavy rainfall in the end of the summer and core samples were taken on edge of rectangular area feldspar was originally places; therefore not many cores taken contained a defined layer of feldspar.

#### Accumulation depth and rate above restored sediment

12 cores showed a layer of accumulation above the restored sediment. The cores are Wildlife Drive core # 2, 10, 14, 16, 18, 27, 30, 32, 33, 38, 43, 44. The Location of these points shown on Appendix 1a.

| Depth of accumulation above restored sediment |         |
|-----------------------------------------------|---------|
| mean depth                                    | 7.08 cm |
| standard deviation                            | 4.29 cm |

| Accumulation rate above restored sediment |              |
|-------------------------------------------|--------------|
| mean rate                                 | 2.36 cm/year |
| standard deviation                        | 1.43 cm/year |

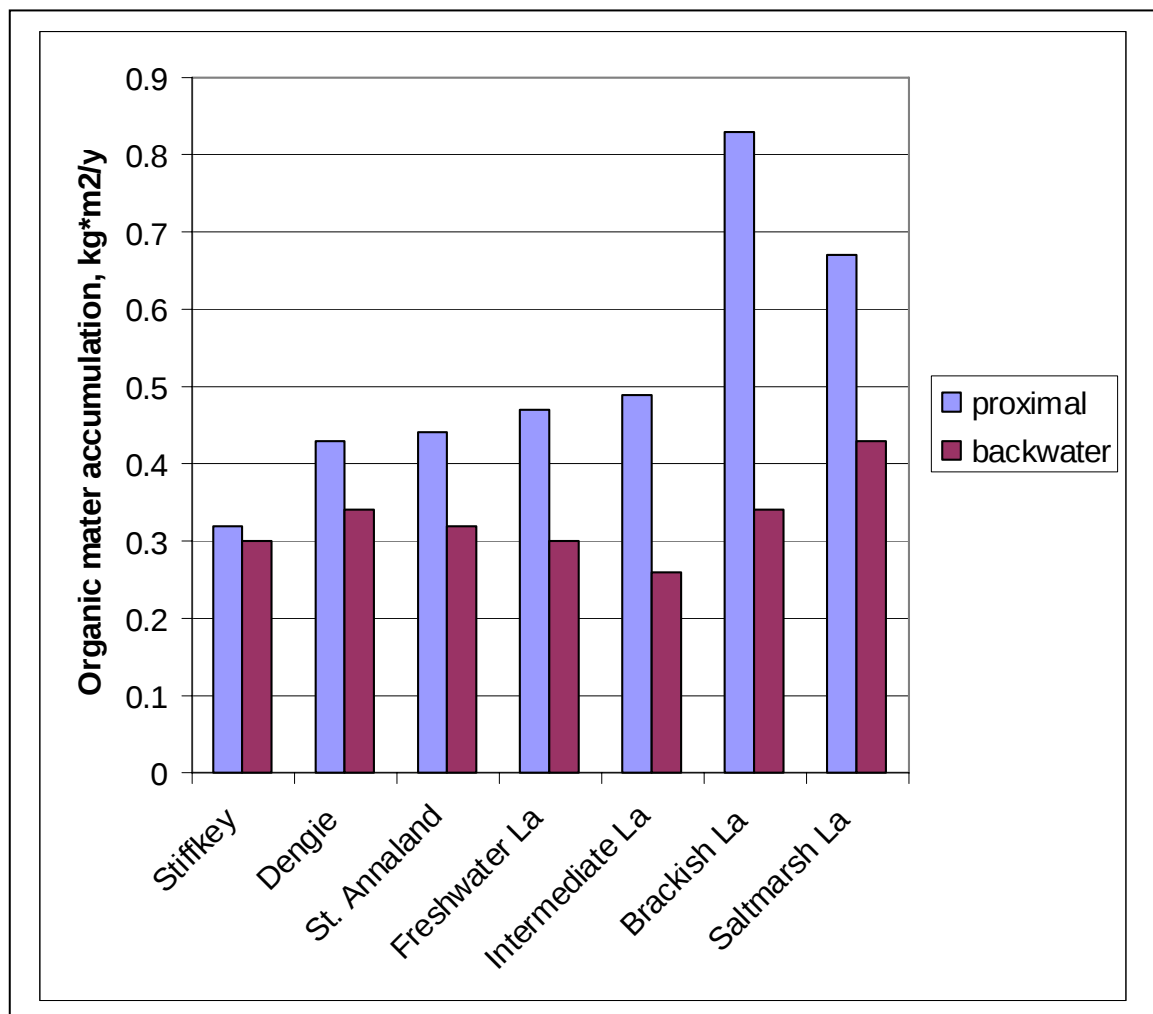
These cores tend to be towards the interior of the island (none are on the marsh edge) and generally located on the north half, whereas the two cores taken from the south edge of the marsh island (W-23 and W-40) are missing the restored sediment layer completely. These cores are composed of layers of organic material with low bulk densities that increase with depth. The south edge faces open water whereas the North faces the interior of the reserve with the main road, Wildlife Drive, less than 100m away.

## VI. Discussion

Before the data for this study was collected we examined the results of several other previous studies on marsh accretion. In these studies we found organic matter accumulation is relatively uniform, with an average accumulation rate of 6mm/year. Various rates of accumulation compiled from previous studies have been compiled in the graph in figure 13. In this graph we see proximal samples have a higher organic matter accumulation rate than

backwater sites. The data collected in this study show something very different. While backwater cores contained rather high depths of accretion, the core samples taken from the edge of the restored marsh show zero accumulation. Moreover the cores are missing the restored sediment completely, and have bulk density increasing with depth starting near the surface unlike cores from the non-restored site which have a steady bulk density until a depth of 90cm. This suggests the points these restored marsh cores were taken from have not only failed to accrete matter, they have in fact lost a substantially amount material.

**Figure 13:** Accumulation data from previous studies



## VII. Conclusions

A comparison of the bulk density data versus depth data for the restored and reference marsh sites indicates that the bulk density increases at depth. This higher bulk density layer appears at much shallower depths in the core taken at the restored site than in the reference core. These data suggest the possibility of 50 cm of either non-deposition or removal of marsh sediment from the site prior to the restoration effort. The core data from the restoration site indicated three groups of cores: ones without the applied sediment layer, ones with the sediment, but no marsh accretion, and ones with significant marsh accretion. The net marsh accretion only occurred at a small percentage of these sites, indicating that net accretion is not a significant process. In addition, the sites where marsh accretion is actively taking place are sites in the interior of the marsh. Sites where non-accretion and erosion are taking place are at the edges of the marsh. This is a complete reversal from most studies of marsh accretion in places as varied as coastal marshes in England and Louisiana with very different rates of relative sea level rise. In all of these sites, the highest rates of marsh accretion are on the edges of the marsh, where the marsh receives sediment from the adjacent waters. In this system, the sediment is not being added to the site on the edges, it is being removed. If this erosion persists, the marshes at Blackwater will eventually disappear despite any high levels of organic accumulation and/or trapping found in the interior of the marshes.

## VIII. Acknowledgments

I would like to thank Dr. Prestegaard for all of her help, support, and knowledge; Dr. Needelman for allowing me to participate in this project; Skye Wills for her guidance in the sample collection; and Joshua Potts for his assistance and good humor during the fieldwork process.

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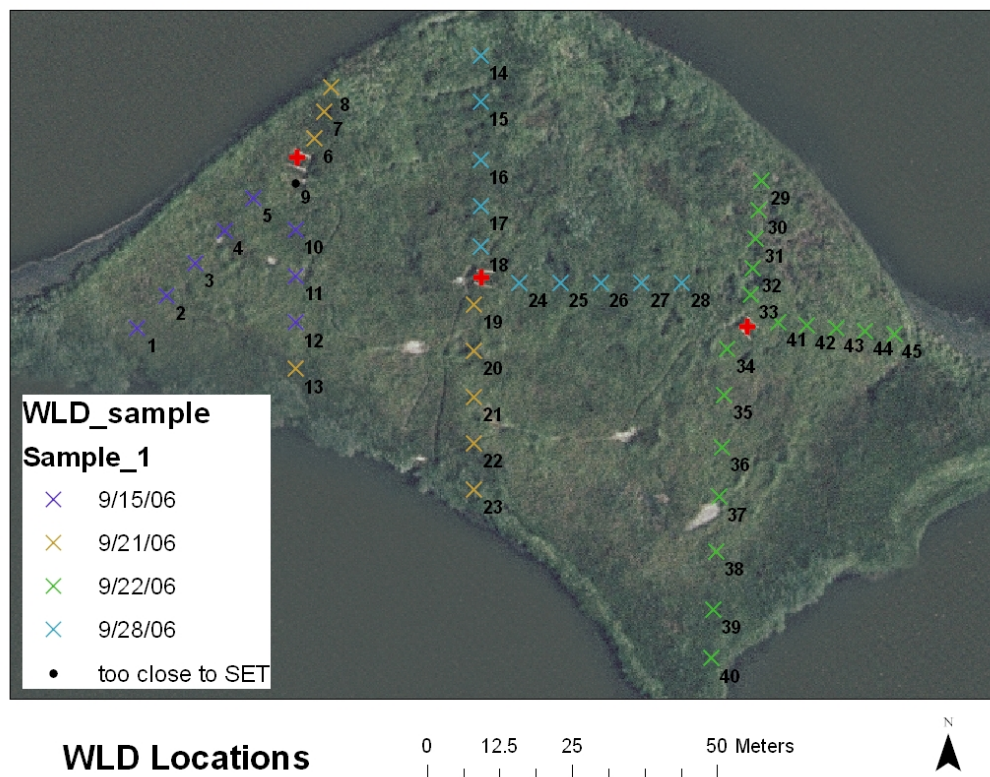
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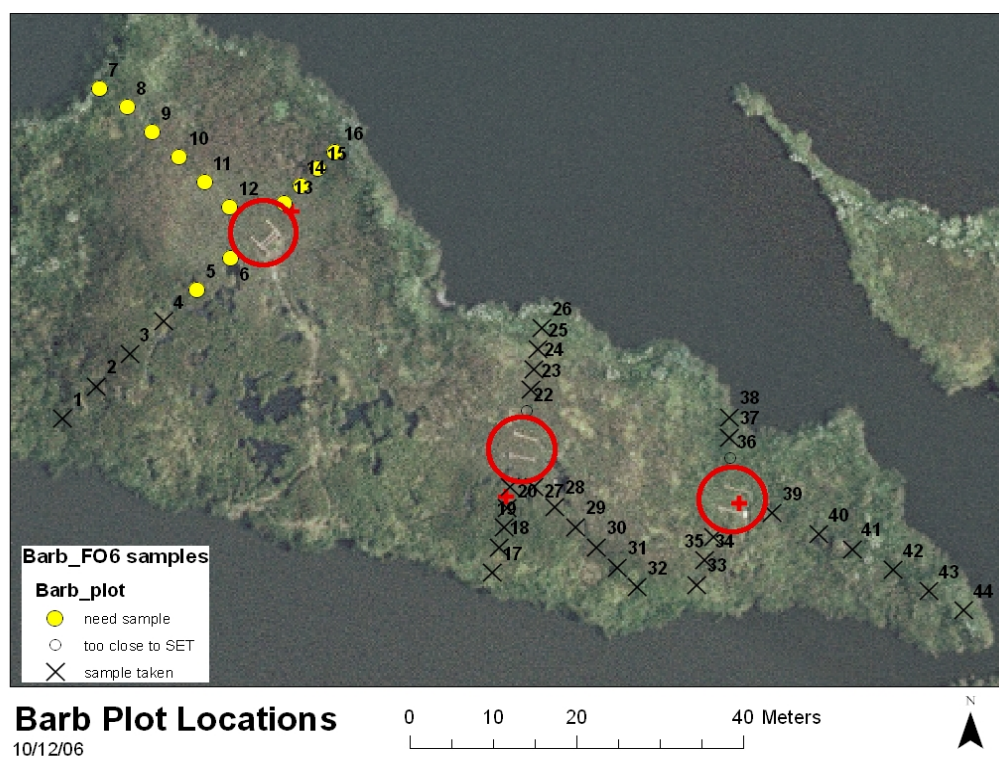
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## X. Appendices

### Appendix 1a: Core sample locations for restored marsh



### Appendix 1b: Core sample locations for non-restored marsh



Appendix 2: Bulk density and water content data from non-restored marsh (*Barbados*)

| Sample ID | Upper Depth (cm) | Lower Depth (cm) | Designation | Empty beaker (g) | Bulk Sample Wet Weight (g) | sub-sample + beaker wet wt (g) | sub-sample + beaker dry wt (g) | grams of Water | Moisture content (%) | Bulk Dry wt (g) | Bulk Soil Volume (cm <sup>3</sup> ) | Bulk Density (g/cm <sup>3</sup> ) |
|-----------|------------------|------------------|-------------|------------------|----------------------------|--------------------------------|--------------------------------|----------------|----------------------|-----------------|-------------------------------------|-----------------------------------|
| B-1-1     | 0                | 26               | Oi          | 30.23            | 88.59                      | 43.46                          | 32.23                          | 11.23          | 561.5%               | 13.392          | 255.254                             | 0.05                              |
| B-1-2     | 26               | 39               | Oi          | 30.2             | 73.88                      | 36.67                          | 31.31                          | 5.36           | 482.9%               | 12.675          | 127.627                             | 0.10                              |
| B-1-3     | 39               | 50               | Oe          | 29.85            | 84.73                      | 46.28                          | 33.02                          | 13.26          | 418.3%               | 16.348          | 107.992                             | 0.15                              |
| B-1-4     | 50               | 75               | Oe          | 30.16            | 179.9                      | 56.12                          | 33.9                           | 22.22          | 594.1%               | 25.918          | 245.437                             | 0.11                              |
| B-1-5     | 75               | 100              | Oe          | 32.38            | 197.13                     | 58.21                          | 35.09                          | 23.12          | 853.1%               | 20.682          | 245.437                             | 0.08                              |
|           |                  |                  |             |                  |                            |                                |                                |                |                      |                 |                                     |                                   |
| B-2-1     | 0                | 15               | Oe          | 30.6             | 71.6                       | 42.98                          | 32.75                          | 10.23          | 475.8%               | 12.435          | 147.262                             | 0.08                              |
| B-2-2     | 15               | 34               | Oa          | 22.76            | 128.27                     | 36                             | 25.14                          | 10.86          | 456.3%               | 23.058          | 186.532                             | 0.12                              |
| B-2-3     | 34               | 50               | Oe          | 31.59            | 125.81                     | 46.46                          | 33.42                          | 13.04          | 712.6%               | 15.483          | 157.08                              | 0.10                              |
| B-2-4     | 50               | 67               | Oe          | 23.39            | 94.06                      | 38.97                          | 25.7                           | 13.27          | 574.5%               | 13.946          | 166.897                             | 0.08                              |
| B-2-5     | 67               | 84               | Oe          | 29.74            | 127.96                     | 42.73                          | 31.44                          | 11.29          | 664.1%               | 16.746          | 166.897                             | 0.10                              |
| B-2-6     | 84               | 100              | Oi          | 29.42            | 136.01                     | 42.67                          | 30.79                          | 11.88          | 867.2%               | 14.063          | 157.08                              | 0.09                              |
|           |                  |                  |             |                  |                            |                                |                                |                |                      |                 |                                     |                                   |
| B-3-1     | 0                | 21               | Oe          | 23.13            | 66.94                      | 30.25                          | 24.37                          | 5.88           | 474.2%               | 11.658          | 206.167                             | 0.06                              |
| B-3-2     | 21               | 32               | Oe          | 30.17            | 65.23                      | 42.36                          | 32.15                          | 10.21          | 515.7%               | 10.595          | 107.992                             | 0.10                              |
| B-3-3     | 32               | 50               | Oi          | 30.13            | 122.33                     | 42.76                          | 31.62                          | 11.14          | 747.7%               | 14.432          | 176.715                             | 0.08                              |
| B-3-4     | 50               | 81               | Oe          | 23.04            | 214.93                     | 33.34                          | 24.1                           | 9.24           | 871.7%               | 22.119          | 304.342                             | 0.07                              |
| B-3-5     | 81               | 100              | Oe          | 30.29            | 157.65                     | 43.21                          | 31.27                          | 11.94          | 1218.4%              | 11.958          | 186.532                             | 0.06                              |
|           |                  |                  |             |                  |                            |                                |                                |                |                      |                 |                                     |                                   |
| B-4-1     | 0                | 20               | Oi          | 2.37             | 109.01                     | 19.11                          | 4.59                           | 14.52          | 654.1%               | 14.457          | 196.35                              | 0.07                              |
| B-4-2     | 20               | 43               | Oi          | 2.35             | 169.73                     | 22.45                          | 5.59                           | 16.86          | 520.4%               | 27.359          | 225.802                             | 0.12                              |
| B-4-3     | 43               | 50               | Oe          | 2.37             | 54.74                      | 9.26                           | 2.94                           | 6.32           | 1108.8%              | 4.5286          | 68.7223                             | 0.07                              |
| B-4-4     | 50               | 61               | Oe          | 30.24            | 73.91                      | 45                             | 31.96                          | 13.04          | 758.1%               | 8.6128          | 107.992                             | 0.08                              |
| B-4-5     | 61               | 80               | Oe          | 30.18            | 134.97                     | 42.46                          | 31.43                          | 11.03          | 882.4%               | 13.739          | 186.532                             | 0.07                              |
| B-4-6     | 80               | 100              | Oe          | 23.55            | 167.99                     | 32.33                          | 24.29                          | 8.04           | 1086.5%              | 14.159          | 196.35                              | 0.07                              |
|           |                  |                  |             |                  |                            |                                |                                |                |                      |                 |                                     |                                   |
| B-5-1     | 0                | 29               | Oe          | 142.36           | 143.77                     | 284.79                         | 166.43                         | 118.4          | 491.7%               | 24.296          | 284.707                             | 0.09                              |
| B-5-2     | 29               | 50               | Oe          | 140.25           | 137.99                     | 276.64                         | 153.08                         | 123.6          | 963.1%               | 12.981          | 206.167                             | 0.06                              |
| B-5-3     | 50               | 71               | Oe          | 147.81           | 154.55                     | 301.43                         | 168.61                         | 132.8          | 638.6%               | 20.926          | 206.167                             | 0.10                              |
| B-5-4     | 71               | 100              | Oa          | 152.01           | 249.03                     | 399.2                          | 177.97                         | 221.2          | 852.2%               | 26.153          | 284.707                             | 0.09                              |
|           |                  |                  |             |                  |                            |                                |                                |                |                      |                 |                                     |                                   |
| B-6-1     | 0                | 25               | Oe          | 31.35            | 76.78                      | 46.17                          | 32.38                          | 13.79          | 1338.8%              | 5.3363          | 245.437                             | 0.02                              |
| B-6-2     | 25               | 48               | Oe          | 30.34            | 109.06                     | 39.45                          | 31.09                          | 8.36           | 1114.7%              | 8.9786          | 225.802                             | 0.04                              |
| B-6-3     | 48               | 76               | Oa          | 29.21            | 189.61                     | 42.89                          | 30.09                          | 12.8           | 1454.5%              | 12.197          | 274.889                             | 0.04                              |
| B-6-4     | 76               | 98               | Oe          | 30.77            | 188.81                     | 45.06                          | 32.03                          | 13.03          | 1034.1%              | 16.648          | 215.984                             | 0.08                              |
|           |                  |                  |             |                  |                            |                                |                                |                |                      |                 |                                     |                                   |
| B-7-1     | 0                | 15               | Oa          | 30.17            | 28.63                      | 35.51                          | 31.29                          | 4.22           | 376.8%               | 6.0048          | 147.262                             | 0.04                              |
| B-7-2     | 15               | 37               | Oe          | 31.03            | 126.41                     | 45.39                          | 33.88                          | 11.51          | 403.9%               | 25.088          | 215.984                             | 0.12                              |
| B-7-3     | 37               | 50               | Oi          | 30.6             | 136.11                     | 52.89                          | 32.29                          | 20.6           | 1218.9%              | 10.32           | 127.627                             | 0.08                              |
| B-7-4     | 50               | 81               | Oi          | 30.6             | 196.24                     | 55.16                          | 33.01                          | 22.15          | 919.1%               | 19.256          | 304.342                             | 0.06                              |
| B-7-5     | 81               | 100              | Oe          | 30.28            | 120.37                     | 48.32                          | 32.68                          | 15.64          | 651.7%               | 16.014          | 186.532                             | 0.09                              |

| Sample ID | Upper Depth (cm) | Lower Depth (cm) | Designation | Empty beaker (g) | Bulk Sample Wet Weight (g) | sub-sample + beaker wet wt (g) | sub-sample + beaker dry wt (g) | grams of Water | Moisture content (%) | Bulk Dry wt (g) | Bulk Soil Volume (cm <sup>3</sup> ) | Bulk Density (g/cm <sup>3</sup> ) |
|-----------|------------------|------------------|-------------|------------------|----------------------------|--------------------------------|--------------------------------|----------------|----------------------|-----------------|-------------------------------------|-----------------------------------|
| B-8-1     | 0                | 29               | Oe          | 141.41           | 154.22                     | 270.84                         | 162.58                         | 108.3          | 511.4%               | 25.225          | 284.707                             | 0.09                              |
| B-8-2     | 29               | 50               | Oi          | 140.52           | 128.52                     | 258.09                         | 155.82                         | 102.3          | 668.4%               | 16.725          | 206.167                             | 0.08                              |
| B-8-3     | 50               | 75               | Oi          | 161.74           | 150.31                     | 302.18                         | 177.48                         | 124.7          | 792.2%               | 16.846          | 245.437                             | 0.07                              |
| B-8-4     | 75               | 100              | Oe          | 148.55           | 161.66                     | 292.38                         | 162.62                         | 129.8          | 922.2%               | 15.814          | 245.437                             | 0.06                              |
|           |                  |                  |             |                  |                            |                                |                                |                |                      |                 |                                     |                                   |
| B-9-1     | 0                | 15               | Oi          | 30.17            | 40.63                      | 36.09                          | 31.08                          | 5.01           | 550.5%               | 6.2455          | 147.262                             | 0.04                              |
| B-9-2     | 15               | 35               | Oe          | 29.71            | 143.36                     | 47.94                          | 33.37                          | 14.57          | 398.1%               | 28.782          | 196.35                              | 0.15                              |
| B-9-3     | 35               | 50               | Oi          | 30.17            | 101.22                     | 39.91                          | 31.24                          | 8.67           | 810.3%               | 11.12           | 147.262                             | 0.08                              |
| B-9-4     | 50               | 75               | Oi          | 30.34            | 150.48                     | 50.18                          | 32.29                          | 17.89          | 917.4%               | 14.79           | 245.437                             | 0.06                              |
| B-9-5     | 75               | 100              | Oe          | 31.81            | 195                        | 49.62                          | 33.81                          | 15.81          | 790.5%               | 21.898          | 245.437                             | 0.09                              |
|           |                  |                  |             |                  |                            |                                |                                |                |                      |                 |                                     |                                   |
| B-10-1    | 0                | 26               | Oe          | 29.96            | 151.23                     | 47.73                          | 32.88                          | 14.85          | 508.6%               | 24.85           | 255.254                             | 0.10                              |
| B-10-2    | 26               | 50               | Oe          | 30.01            | 142.65                     | 50.69                          | 33.09                          | 17.6           | 571.4%               | 21.246          | 235.619                             | 0.09                              |
| B-10-3    | 50               | 73               | Oi          | 30.06            | 131.91                     | 47.61                          | 32.1                           | 15.51          | 760.3%               | 15.333          | 225.802                             | 0.07                              |
| B-10-4    | 73               | 100              | Oe          | 30.21            | 203.01                     | 49.24                          | 31.92                          | 17.32          | 1012.9%              | 18.242          | 265.072                             | 0.07                              |
|           |                  |                  |             |                  |                            |                                |                                |                |                      |                 |                                     |                                   |
| B-11-1    | 0                | 22               | Oe          | 30.17            | 148.01                     | 42.52                          | 32.67                          | 9.85           | 394.0%               | 29.962          | 215.984                             | 0.14                              |
| B-11-2    | 22               | 50               | Oi          | 30.83            | 300.75                     | 41.62                          | 32                             | 9.62           | 822.2%               | 32.611          | 274.889                             | 0.12                              |
| B-11-3    | 50               | 72               | Oe          | 30.06            | 127.93                     | 49.86                          | 32.21                          | 17.65          | 820.9%               | 13.891          | 215.984                             | 0.06                              |
| B-11-4    | 72               | 100              | Oe          | 30.22            | 219.12                     | 49.8                           | 31.92                          | 17.88          | 1051.8%              | 19.025          | 274.889                             | 0.07                              |
|           |                  |                  |             |                  |                            |                                |                                |                |                      |                 |                                     |                                   |
| B-12-1    | 0                | 25               | Oe          | 29.8             | 118.53                     | 52.65                          | 33.14                          | 19.51          | 584.1%               | 17.326          | 245.437                             | 0.07                              |
| B-12-2    | 25               | 50               | Oi          | 29.94            | 156.34                     | 43.54                          | 31.88                          | 11.66          | 601.0%               | 22.301          | 245.437                             | 0.09                              |
| B-12-3    | 50               | 75               | Oe          | 29.85            | 162.86                     | 50.17                          | 32.06                          | 18.11          | 819.5%               | 17.713          | 245.437                             | 0.07                              |
| B-12-4    | 75               | 95               | Oa          | 28.32            | 179.6                      | 43.44                          | 30.02                          | 13.42          | 789.4%               | 20.193          | 196.35                              | 0.10                              |
| B-12-5    | 95               | 100              | A           | 30.04            | 48.1                       | 41.77                          | 33.53                          | 8.24           | 236.1%               | 14.311          | 49.0874                             | 0.29                              |
|           |                  |                  |             |                  |                            |                                |                                |                |                      |                 |                                     |                                   |
| B-14-1    | 0                | 26               | Oi          | 23.39            | 156.46                     | 42.05                          | 26.96                          | 15.09          | 422.7%               | 29.934          | 255.254                             | 0.12                              |
| B-14-2    | 26               | 50               | Oi          | 22.98            | 162.41                     | 43.43                          | 25.31                          | 18.12          | 777.7%               | 18.504          | 235.619                             | 0.08                              |
| B-14-3    | 50               | 75               | Oe          | 23.03            | 164.22                     | 35.76                          | 24.26                          | 11.5           | 935.0%               | 15.867          | 245.437                             | 0.06                              |
| B-14-4    | 75               | 94               | Oa          | 22.67            | 148.1                      | 42.21                          | 24.79                          | 17.42          | 821.7%               | 16.068          | 186.532                             | 0.09                              |
| B-14-5    | 94               | 100              | A           | 30.11            | 63.55                      | 42.1                           | 35                             | 7.1            | 145.2%               | 25.918          | 58.9049                             | 0.44                              |
|           |                  |                  |             |                  |                            |                                |                                |                |                      |                 |                                     |                                   |
| B-15-1    | 0                | 19               | Oe          | 23.39            | 90.03                      | 40.41                          | 25.81                          | 14.6           | 603.3%               | 12.801          | 186.532                             | 0.07                              |
| B-15-2    | 19               | 45               | Oe          | 23.26            | 177.19                     | 41.83                          | 25.58                          | 16.25          | 700.4%               | 22.137          | 255.254                             | 0.09                              |
| B-15-3    | 45               | 71               | Oi          | 23.41            | 159.15                     | 45.19                          | 25.76                          | 19.43          | 826.8%               | 17.172          | 255.254                             | 0.07                              |
| B-15-4    | 71               | 94               | Oe          | 29.43            | 185.76                     | 45.17                          | 30.97                          | 14.2           | 922.1%               | 18.175          | 225.802                             | 0.08                              |
|           |                  |                  |             |                  |                            |                                |                                |                |                      |                 |                                     |                                   |
| B-16-1    | 0                | 5                | Oi          | 22.94            | 28.43                      | 28.35                          | 24.35                          | 4              | 283.7%               | 7.4097          | 49.0874                             | 0.15                              |
| B-16-2    | 5                | 32               | Oe          | 23.75            | 200.2                      | 37.78                          | 26.38                          | 11.4           | 433.5%               | 37.529          | 265.072                             | 0.14                              |
| B-16-3    | 32               | 50               | Oe          | 23.43            | 130.21                     | 36.99                          | 24.82                          | 12.17          | 875.5%               | 13.347          | 176.715                             | 0.08                              |
| B-16-4    | 50               | 77               | Oe          | 23.46            | 159.71                     | 40.96                          | 25.52                          | 15.44          | 749.5%               | 18.8            | 265.072                             | 0.07                              |
| B-16-5    | 77               | 100              | Oa          | 23.37            | 195.55                     | 39.54                          | 25.78                          | 13.76          | 571.0%               | 29.145          | 225.802                             | 0.13                              |

| Sample ID | Upper Depth (cm) | Lower Depth (cm) | Designation | Empty beaker (g) | Bulk Sample Wet Weight (g) | sub-sample + beaker wet wt (g) | sub-sample + beaker dry wt (g) | grams of Water | Moisture content (%) | Bulk Dry wt (g) | Bulk Soil Volume (cm <sup>3</sup> ) | Bulk Density (g/cm <sup>3</sup> ) |
|-----------|------------------|------------------|-------------|------------------|----------------------------|--------------------------------|--------------------------------|----------------|----------------------|-----------------|-------------------------------------|-----------------------------------|
| B-18-1    | 0                | 25               | Oe          | 27.82            | 165.05                     | 46.17                          | 31.45                          | 14.72          | 405.5%               | 32.65           | 245.437                             | 0.13                              |
| B-18-2    | 25               | 50               | Oe          | 29.9             | 191.16                     | 54.64                          | 34.3                           | 20.34          | 462.3%               | 33.998          | 245.437                             | 0.14                              |
| B-18-3    | 50               | 62               | Oi          | 22.99            | 79.5                       | 36.2                           | 25.13                          | 11.07          | 517.3%               | 12.879          | 117.81                              | 0.11                              |
| B-18-4    | 62               | 80               | Oe          | 28.31            | 136.32                     | 43.02                          | 30.34                          | 12.68          | 624.6%               | 18.812          | 176.715                             | 0.11                              |
| B-18-5    | 80               | 100              | Oe          | 30.37            | 167.99                     | 40.76                          | 31.83                          | 8.93           | 611.6%               | 23.606          | 196.35                              | 0.12                              |
|           |                  |                  |             |                  |                            |                                |                                |                |                      |                 |                                     |                                   |
| B-19-1    | 0                | 18               | Oi          | 27.89            | 105.29                     | 35.74                          | 29.21                          | 6.53           | 494.7%               | 17.705          | 176.715                             | 0.10                              |
| B-19-2    | 18               | 44               | Oe          | 30.27            | 186.83                     | 55.21                          | 35.09                          | 20.12          | 417.4%               | 36.107          | 255.254                             | 0.14                              |
| B-19-3    | 44               | 50               | Oe          | 30.11            | 48.86                      | 41.07                          | 32.17                          | 8.9            | 432.0%               | 9.1835          | 58.9049                             | 0.16                              |
| B-19-4    | 50               | 63               | Oa          | 31.28            | 78.17                      | 37.81                          | 31.95                          | 5.86           | 874.6%               | 8.0205          | 127.627                             | 0.06                              |
| B-19-5    | 63               | 88               | Oe          | 30.3             | 188.38                     | 42.38                          | 31.56                          | 10.82          | 858.7%               | 19.649          | 245.437                             | 0.08                              |
| B-19-6    | 88               | 100              | Oe          | 23.34            | 104.78                     | 34.34                          | 24.45                          | 9.89           | 891.0%               | 10.573          | 117.81                              | 0.09                              |
|           |                  |                  |             |                  |                            |                                |                                |                |                      |                 |                                     |                                   |
| B-20-1    | 0                | 25               | Oa          | 31.5             | 206.84                     | 39.95                          | 32.8                           | 7.15           | 550.0%               | 31.822          | 245.437                             | 0.13                              |
| B-20-2    | 25               | 39               | Oa          | 30.83            | 147.15                     | 38.75                          | 31.95                          | 6.8            | 607.1%               | 20.809          | 137.445                             | 0.15                              |
| B-20-3    | 39               | 50               | Oe          | 30.17            | 77.42                      | 41.59                          | 31.51                          | 10.08          | 752.2%               | 9.0843          | 107.992                             | 0.08                              |
| B-20-4    | 50               | 75               | Oe          | 31.29            | 124.35                     | 48.17                          | 33.81                          | 14.36          | 569.8%               | 18.564          | 245.437                             | 0.08                              |
| B-20-5    | 75               | 100              | Oe          | 29.85            | 185.77                     | 46.23                          | 32.78                          | 13.45          | 459.0%               | 33.23           | 245.437                             | 0.14                              |
|           |                  |                  |             |                  |                            |                                |                                |                |                      |                 |                                     |                                   |
| B-21-1    | 0                | 20               | Oi          | 29.98            | 73.25                      | 44.97                          | 32.12                          | 12.85          | 600.5%               | 10.457          | 196.35                              | 0.05                              |
| B-21-2    | 20               | 33               | Oe          | 30.05            | 90.96                      | 38.99                          | 31.45                          | 7.54           | 538.6%               | 14.244          | 127.627                             | 0.11                              |
| B-21-3    | 33               | 50               | Oa          | 23.55            | 127.95                     | 42.91                          | 25.91                          | 17             | 720.3%               | 15.597          | 166.897                             | 0.09                              |
| B-21-4    | 50               | 59               | Oe          | 29.49            | 58.94                      | 35.39                          | 30.1                           | 5.29           | 867.2%               | 6.0938          | 88.3573                             | 0.07                              |
| B-21-5    | 59               | 79               | Oe          | 30.22            | 142.52                     | 47.91                          | 31.94                          | 15.97          | 928.5%               | 13.857          | 196.35                              | 0.07                              |
| B-21-6    | 79               | 100              | Oe          | 31.9             | 167.76                     | 40.13                          | 32.88                          | 7.25           | 739.8%               | 19.976          | 206.167                             | 0.10                              |
|           |                  |                  |             |                  |                            |                                |                                |                |                      |                 |                                     |                                   |
| B-23-1    | 0                | 13               | Oe          | 2.33             | 47.56                      | 10.49                          | 3.66                           | 6.83           | 513.5%               | 7.7518          | 127.627                             | 0.06                              |
| B-23-2    | 13               | 27               | Oe          | 2.36             | 59.5                       | 12.82                          | 3.97                           | 8.85           | 549.7%               | 9.1582          | 137.445                             | 0.07                              |
| B-23-3    | 27               | 50               | Oe          | 2.35             | 168.59                     | 29.13                          | 5.5                            | 23.63          | 750.2%               | 19.83           | 225.802                             | 0.09                              |
| B-23-4    | 50               | 63               | Oi          | 2.38             | 63.99                      | 17.09                          | 3.99                           | 13.1           | 813.7%               | 7.0037          | 127.627                             | 0.05                              |
| B-23-5    | 63               | 81               | Oi          | 2.38             | 94.75                      | 13.08                          | 3.42                           | 9.66           | 928.8%               | 9.2093          | 176.715                             | 0.05                              |
| B-23-6    | 81               | 100              | Oi          | 2.38             | 142.25                     | 19.26                          | 3.85                           | 15.41          | 1048.3%              | 12.388          | 186.532                             | 0.07                              |
|           |                  |                  |             |                  |                            |                                |                                |                |                      |                 |                                     |                                   |
| B-24-1    | 0                | 9                |             |                  |                            |                                |                                |                |                      |                 |                                     |                                   |
| B-24-2    | 9                | 36               | Oe          | 2.37             | 109.68                     | 14.16                          | 3.9                            | 10.26          | 670.6%               | 14.233          | 265.072                             | 0.05                              |
| B-24-3    | 36               | 50               | Oe          | 2.36             | 97.94                      | 19.68                          | 4.08                           | 15.6           | 907.0%               | 9.7261          | 137.445                             | 0.07                              |
| B-24-4    | 50               | 57               | Oe          | 2.35             | 33.32                      | 10.61                          | 3.18                           | 7.43           | 895.2%               | 3.3481          | 68.7223                             | 0.05                              |
| B-24-5    | 57               | 80               | Oe          | 2.35             | 145.59                     | 17.26                          | 3.86                           | 13.4           | 887.4%               | 14.745          | 225.802                             | 0.07                              |
| B-24-6    | 80               | 100              | Oe          | 2.34             | 155.43                     | 9.87                           | 3.03                           | 6.84           | 991.3%               | 14.243          | 196.35                              | 0.07                              |

| Sample ID | Upper Depth (cm) | Lower Depth (cm) | Designation | Empty beaker (g) | Bulk Sample Wet Weight (g) | sub-sample + beaker wet wt (g) | sub-sample + beaker dry wt (g) | grams of Water | Moisture content (%) | Bulk Dry wt (g) | Bulk Soil Volume (cm3) | Bulk Density (g/cm3) |
|-----------|------------------|------------------|-------------|------------------|----------------------------|--------------------------------|--------------------------------|----------------|----------------------|-----------------|------------------------|----------------------|
| B-25-1    | 0                | 25               | Oi          | 2.34             | 146.05                     | 17.55                          | 4.82                           | 12.73          | 513.3%               | 23.814          | 245.437                | 0.10                 |
| B-25-2    | 25               | 50               | Oe          | 2.37             | 176.98                     | 11.49                          | 3.74                           | 7.75           | 565.7%               | 26.586          | 245.437                | 0.11                 |
| B-25-3    | 50               | 80               | Oi          | 2.34             | 161.56                     | 12.49                          | 3.22                           | 9.27           | 1053.4%              | 14.007          | 294.524                | 0.05                 |
| B-25-4    | 80               | 100              | Oe          | 2.34             | 145.76                     | 19.32                          | 4.07                           | 15.25          | 881.5%               | 14.851          | 196.35                 | 0.08                 |
|           |                  |                  |             |                  |                            |                                |                                |                |                      |                 |                        |                      |
| B-26-1    | 0                | 15               | Oi          | 30.16            | 69.82                      | 40.55                          | 31.87                          | 8.68           | 507.6%               | 11.491          | 147.262                | 0.08                 |
| B-26-2    | 15               | 39               | Oe          | 23.17            | 183.73                     | 34.33                          | 25.05                          | 9.28           | 493.6%               | 30.951          | 235.619                | 0.13                 |
| B-26-3    | 39               | 50               | Oe          | 2.39             | 76.66                      | 15.32                          | 3.82                           | 11.5           | 804.2%               | 8.4783          | 107.992                | 0.08                 |
| B-26-4    | 50               | 80               | Oe          | 2.42             | 175.7                      | 9.22                           | 3.12                           | 6.1            | 871.4%               | 18.087          | 294.524                | 0.06                 |
| B-26-5    | 80               | 100              | Oe          | 2.3              | 162.19                     | 11.6                           | 3.17                           | 8.43           | 969.0%               | 15.173          | 196.35                 | 0.08                 |
|           |                  |                  |             |                  |                            |                                |                                |                |                      |                 |                        |                      |
| B-27-1    | 0                | 5                | Oi          |                  | 24.33                      |                                |                                | 0              |                      |                 |                        |                      |
| B-27-2    | 5                | 24               | Oe          | 30.23            | 128.94                     | 43.89                          | 33.12                          | 10.77          | 372.7%               | 27.279          | 186.532                | 0.15                 |
| B-27-3    | 24               | 37               | Oe          | 30.23            | 76.56                      | 42.17                          | 32.14                          | 10.03          | 525.1%               | 12.247          | 127.627                | 0.10                 |
| B-27-4    | 37               | 50               | Oe          | 30.34            | 111.42                     | 43.56                          | 31.61                          | 11.95          | 940.9%               | 10.704          | 127.627                | 0.08                 |
| B-27-5    | 50               | 63               | Oe          | 23.4             | 58.34                      | 32.07                          | 24.26                          | 7.81           | 908.1%               | 5.7869          | 127.627                | 0.05                 |
| B-27-6    | 63               | 84               | Oe          | 32.38            | 117.5                      | 42.46                          | 33.49                          | 8.97           | 808.1%               | 12.939          | 206.167                | 0.06                 |
| B-27-7    | 84               | 100              | Oa          | 30.29            | 142.62                     | 44.57                          | 32                             | 12.57          | 735.1%               | 17.078          | 157.08                 | 0.11                 |
|           |                  |                  |             |                  |                            |                                |                                |                |                      |                 |                        |                      |
| B-28-1    | 0                | 16               | Oi          | 2.3              | 101.48                     | 14.68                          | 5.44                           | 9.24           | 294.3%               | 25.739          | 157.08                 | 0.16                 |
| B-28-2    | 16               | 30               | Oe          | 2.4              | 96.36                      | 9.89                           | 4.13                           | 5.76           | 332.9%               | 22.257          | 137.445                | 0.16                 |
| B-28-3    | 30               | 50               | Oe          | 2.32             | 154.05                     | 9.34                           | 3.39                           | 5.95           | 556.1%               | 23.481          | 196.35                 | 0.12                 |
| B-28-4    | 50               | 60               | Oe          | 2.29             | 63.37                      | 15.03                          | 3.91                           | 11.12          | 686.4%               | 8.058           | 98.1748                | 0.08                 |
| B-28-5    | 60               | 82               | Oe          | 2.37             | 123.61                     | 10.48                          | 3.43                           | 7.05           | 665.1%               | 16.156          | 215.984                | 0.07                 |
| B-28-6    | 82               | 100              | Oe          | 2.35             | 142.61                     | 18.24                          | 3.95                           | 14.29          | 893.1%               | 14.36           | 176.715                | 0.08                 |
|           |                  |                  |             |                  |                            |                                |                                |                |                      |                 |                        |                      |
| B-29-1    | 0                | 16               | Oe          | 30.79            | 103.79                     | 48.41                          | 33.84                          | 14.57          | 477.7%               | 17.966          | 157.08                 | 0.11                 |
| B-29-2    | 16               | 34               | Oe          | 23.27            | 47.32                      | 25.45                          | 23.49                          | 1.96           | 890.9%               | 4.7754          | 176.715                | 0.03                 |
| B-29-3    | 34               | 50               | Oe          | 30.2             | 131.63                     | 45.05                          | 33.14                          | 11.91          | 405.1%               | 26.06           | 157.08                 | 0.17                 |
| B-29-4    | 50               | 79               | Oe          | 30.04            | 146.26                     | 38.5                           | 31.08                          | 7.42           | 713.5%               | 17.98           | 284.707                | 0.06                 |
| B-29-5    | 79               | 100              | Oe          | 23.37            | 113.46                     | 39.64                          | 24.92                          | 14.72          | 949.7%               | 10.809          | 206.167                | 0.05                 |
|           |                  |                  |             |                  |                            |                                |                                |                |                      |                 |                        |                      |
| B-30-1    | 0                | 20               | Oi          | 29.72            | 95.64                      | 30.34                          | 33.35                          | -3.01          | -82.9%               | 559.96          | 196.35                 | 2.85                 |
| B-30-2    | 20               | 35               | Oe          | 28.21            | 116.17                     | 47.6                           | 31.72                          | 15.88          | 452.4%               | 21.029          | 147.262                | 0.14                 |
| B-30-3    | 35               | 50               | Oe          | 30.15            | 147.12                     | 54.85                          | 34.09                          | 20.76          | 526.9%               | 23.468          | 147.262                | 0.16                 |
| B-30-4    | 50               | 75               | Oe          | 31.03            | 172.74                     | 43.47                          | 32.19                          | 11.28          | 972.4%               | 16.108          | 245.437                | 0.07                 |
| B-30-5    | 75               | 100              | Oe          | 30.83            | 230.23                     | 46.65                          | 32.66                          | 13.99          | 764.5%               | 26.632          | 245.437                | 0.11                 |
|           |                  |                  |             |                  |                            |                                |                                |                |                      |                 |                        |                      |
| B-31-1    | 0                | 16               | Oi          | 30.26            | 98.65                      | 47.31                          | 33.87                          | 13.44          | 372.3%               | 20.887          | 157.08                 | 0.13                 |
| B-31-2    | 16               | 44               | Oi          | 23.71            | 219.75                     | 34.81                          | 25.59                          | 9.22           | 490.4%               | 37.219          | 274.889                | 0.14                 |
| B-31-3    | 44               | 50               | Oe          | 28.54            | 49.26                      | 34.74                          | 29.34                          | 5.4            | 675.0%               | 6.3561          | 58.9049                | 0.11                 |
| B-31-4    | 50               | 63               | Oe          | 30.2             | 66.24                      | 44.67                          | 31.82                          | 12.85          | 793.2%               | 7.416           | 127.627                | 0.06                 |
| B-31-5    | 63               | 83               | Oi          | 30.19            | 130.89                     | 40.4                           | 31.42                          | 8.98           | 730.1%               | 15.768          | 196.35                 | 0.08                 |
| B-31-6    | 83               | 100              | Oe          | 31.32            | 163.74                     | 47.83                          | 33.15                          | 14.68          | 802.2%               | 18.149          | 166.897                | 0.11                 |

| Sample ID | Upper Depth (cm) | Lower Depth (cm) | Designation | Empty beaker (g) | Bulk Sample Wet Weight (g) | sub-sample + beaker wet wt (g) | sub-sample + beaker dry wt (g) | grams of Water | Moisture content (%) | Bulk Dry wt (g) | Bulk Soil Volume (cm3) | Bulk Density (g/cm3) |
|-----------|------------------|------------------|-------------|------------------|----------------------------|--------------------------------|--------------------------------|----------------|----------------------|-----------------|------------------------|----------------------|
| B-32-1    | 0                | 15               | Oi          | 30.22            | 88.13                      | 47.21                          | 34.12                          | 13.09          | 335.6%               | 20.23           | 147.262                | 0.14                 |
| B-32-2    | 15               | 29               | Oi          | 30.37            | 109.33                     | 42.02                          | 33.12                          | 8.9            | 323.6%               | 25.808          | 137.445                | 0.19                 |
| B-32-3    | 29               | 50               | Oi          | 30.13            | 138.82                     | 42.63                          | 31.89                          | 10.74          | 610.2%               | 19.546          | 206.167                | 0.09                 |
| B-32-4    | 50               | 73               | Oi          | 30.71            | 93.71                      | 48.98                          | 32.93                          | 16.05          | 723.0%               | 11.387          | 225.802                | 0.05                 |
| B-32-5    | 73               | 90               | Oe          | 29.45            | 135.35                     | 49.28                          | 31.43                          | 17.85          | 901.5%               | 13.515          | 166.897                | 0.08                 |
| B-32-6    | 90               | 100              | Oe          | 30.23            | 135.61                     | 42.81                          | 31.59                          | 11.22          | 825.0%               | 14.661          | 98.1748                | 0.15                 |
|           |                  |                  |             |                  |                            |                                |                                |                |                      |                 |                        |                      |
| B-33-1    | 0                | 20               | Oe          | 23.41            | 30.38                      | 29.54                          | 24.4                           | 5.14           | 519.2%               | 4.9064          | 196.35                 | 0.02                 |
| B-33-2    | 20               | 37               | Oe          | 30.33            | 109.01                     | 43.87                          | 32.61                          | 11.26          | 493.9%               | 18.356          | 166.897                | 0.11                 |
| B-33-3    | 37               | 53               | Oe          | 31.8             | 111.86                     | 43.62                          | 33.75                          | 9.87           | 506.2%               | 18.454          | 157.08                 | 0.12                 |
| B-33-4    | 53               | 82               | Oi          | 23.99            | 144.19                     | 34.13                          | 24.5                           | 9.63           | 1888.2%              | 7.2522          | 284.707                | 0.03                 |
| B-33-5    | 82               | 100              | Oi          | 30.05            | 140.24                     | 42.19                          | 31.63                          | 10.56          | 668.4%               | 18.252          | 176.715                | 0.10                 |
|           |                  |                  |             |                  |                            |                                |                                |                |                      |                 |                        |                      |
| B-34-1    | 0                | 20               | Oi          | 30.8             | 92.5                       | 38.93                          | 32.37                          | 6.56           | 417.8%               | 17.863          | 196.35                 | 0.09                 |
| B-34-2    | 20               | 35               | Oi          | 30.17            | 87.77                      | 41.21                          | 31.92                          | 9.29           | 530.9%               | 13.913          | 147.262                | 0.09                 |
| B-34-3    | 35               | 61               | Oe          | 30.83            | 152.28                     | 49.59                          | 33.48                          | 16.11          | 607.9%               | 21.511          | 255.254                | 0.08                 |
| B-34-4    | 61               | 84               | Oi          | 30.29            | 126.77                     | 48.91                          | 32.45                          | 16.46          | 762.0%               | 14.706          | 225.802                | 0.07                 |
| B-34-5    | 84               | 100              | Oi          | 23.27            | 126.4                      | 37.8                           | 24.9                           | 12.9           | 791.4%               | 14.18           | 157.08                 | 0.09                 |
|           |                  |                  |             |                  |                            |                                |                                |                |                      |                 |                        |                      |
| B-35-1    | 0                | 15               | Oi          | 28.53            | 57.39                      | 44.46                          | 30.82                          | 13.64          | 595.6%               | 8.25            | 147.262                | 0.06                 |
| B-35-2    | 15               | 43               | Oe          | 28.42            | 178.7                      | 41.48                          | 29.87                          | 11.61          | 800.7%               | 19.84           | 274.889                | 0.07                 |
| B-35-3    | 43               | 58               | Oe          | 31.84            | 81.01                      | 43.05                          | 32.65                          | 10.4           | 1284.0%              | 5.8535          | 147.262                | 0.04                 |
| B-35-4    | 58               | 90               | Oi          | 30.77            | 173.65                     | 43.98                          | 31.96                          | 12.02          | 1010.1%              | 15.643          | 314.159                | 0.05                 |
| B-35-5    | 90               | 100              | Oi          | 29.65            | 86.91                      | 46.49                          | 31.45                          | 15.04          | 835.6%               | 9.2897          | 98.1748                | 0.09                 |
|           |                  |                  |             |                  |                            |                                |                                |                |                      |                 |                        |                      |
| B-37-1    | 0                | 14               | Oe          | 28.08            | 63.24                      | 36.46                          | 29.34                          | 7.12           | 565.1%               | 9.5086          | 137.445                | 0.07                 |
| B-37-2    | 14               | 33               | Oe          | 28.83            | 159.39                     | 45.17                          | 31.6                           | 13.57          | 489.9%               | 27.02           | 186.532                | 0.14                 |
| B-37-3    | 33               | 50               | Oa          | 30.3             | 141.49                     | 43.03                          | 32.36                          | 10.67          | 518.0%               | 22.896          | 166.897                | 0.14                 |
| B-37-4    | 50               | 61               | Oe          | 29.76            | 62.55                      | 40.99                          | 30.93                          | 10.06          | 859.8%               | 6.5168          | 107.992                | 0.06                 |
| B-37-5    | 61               | 81               | Oe          | 30.5             | 119.93                     | 45.1                           | 31.89                          | 13.21          | 950.4%               | 11.418          | 196.35                 | 0.06                 |
| B-37-6    | 81               | 100              | Oe          | 30.39            | 141.74                     | 44.97                          | 31.55                          | 13.42          | 1156.9%              | 11.277          | 186.532                | 0.06                 |
|           |                  |                  |             |                  |                            |                                |                                |                |                      |                 |                        |                      |
| B-38-1    | 0                | 14               | Oi          |                  | 16.84                      |                                |                                |                |                      |                 |                        |                      |
| B-38-2    | 14               | 36               | Oi          | 23.45            | 135.63                     | 42.12                          | 26.14                          | 15.98          | 594.1%               | 19.542          | 215.984                | 0.09                 |
| B-38-3    | 36               | 50               | Oe          | 23.14            | 108.13                     | 37.38                          | 25.46                          | 11.92          | 513.8%               | 17.617          | 137.445                | 0.13                 |
| B-38-4    | 50               | 70               | Oe          | 30.46            | 132.68                     | 54.83                          | 32.69                          | 22.14          | 992.8%               | 12.141          | 196.35                 | 0.06                 |
| B-38-5    | 70               | 100              | Oe          | 23.83            | 219.14                     | 35.92                          | 24.86                          | 11.06          | 1073.8%              | 18.669          | 294.524                | 0.06                 |
|           |                  |                  |             |                  |                            |                                |                                |                |                      |                 |                        |                      |
| B-39-1    | 0                | 23               | Oe          | 30               | 163.08                     | 47.2                           | 33.47                          | 13.73          | 395.7%               | 32.9            | 225.802                | 0.15                 |
| B-39-2    | 23               | 47               | Oe          | 30.45            | 175.45                     | 44.91                          | 32.61                          | 12.3           | 569.4%               | 26.208          | 235.619                | 0.11                 |
| B-39-3    | 47               | 87               | Oi          | 22.85            | 171.23                     | 42.41                          | 24.56                          | 17.85          | 1043.9%              | 14.969          | 392.699                | 0.04                 |
| B-39-4    | 87               | 100              | Oe          | 30.21            | 148.28                     | 45.96                          | 31.29                          | 14.67          | 1358.3%              | 10.168          | 127.627                | 0.08                 |

| Sample ID | Upper Depth (cm) | Lower Depth (cm) | Designation | Empty beaker (g) | Bulk Sample Wet Weight (g) | sub-sample + beaker wet wt (g) | sub-sample + beaker dry wt (g) | grams of Water | Moisture content (%) | Bulk Dry wt (g) | Bulk Soil Volume (cm <sup>3</sup> ) | Bulk Density (g/cm <sup>3</sup> ) |
|-----------|------------------|------------------|-------------|------------------|----------------------------|--------------------------------|--------------------------------|----------------|----------------------|-----------------|-------------------------------------|-----------------------------------|
|           |                  |                  |             |                  |                            |                                |                                |                |                      |                 |                                     |                                   |
| B-40-1    | 0                | 24               | Oi          | 30.02            | 52.16                      | 36.32                          | 30.74                          | 5.58           | 775.0%               | 5.9611          | 235.619                             | 0.03                              |
| B-40-2    | 24               | 42               | Oe          | 31.25            | 158.58                     | 30.46                          | 33.98                          |                |                      |                 | 176.715                             |                                   |
| B-40-3    | 42               | 50               | Oe          | 31.03            | 60.45                      | 42.6                           | 32.26                          | 10.34          | 840.7%               | 6.4264          | 78.5398                             | 0.08                              |
| B-40-4    | 50               | 65               | Oe          | 30.17            | 51.45                      | 42.05                          | 31.38                          | 10.67          | 881.8%               | 5.2403          | 147.262                             | 0.04                              |
| B-40-5    | 65               | 89               | Oi          | 30.23            | 136.71                     | 47.26                          | 32.34                          | 14.92          | 707.1%               | 16.938          | 235.619                             | 0.07                              |
| B-40-6    | 89               | 100              | Oi          | 30.17            | 83.99                      | 40.72                          | 31.05                          | 9.67           | 1098.9%              | 7.0058          | 107.992                             | 0.06                              |
|           |                  |                  |             |                  |                            |                                |                                |                |                      |                 |                                     |                                   |
| B-41-1    | 0                | 16               | Oe          | 30.45            | 93.9                       | 45.53                          | 32.9                           | 12.63          | 515.5%               | 15.256          | 157.08                              | 0.10                              |
| B-41-2    | 16               | 28               | Oe          | 23.49            | 97.14                      | 38.9                           | 26.33                          | 12.57          | 442.6%               | 17.903          | 117.81                              | 0.15                              |
| B-41-3    | 28               | 50               | Oe          | 23.12            | 154.3                      | 37.72                          | 24.77                          | 12.95          | 784.8%               | 17.438          | 215.984                             | 0.08                              |
| B-41-4    | 50               | 75               | Oi          | 29.98            | 160.19                     | 45.07                          | 31.22                          | 13.85          | 1116.9%              | 13.163          | 245.437                             | 0.05                              |
| B-41-5    | 75               | 100              | Oi          | 30.4             | 182.4                      | 48.39                          | 31.9                           | 16.49          | 1099.3%              | 15.208          | 245.437                             | 0.06                              |
|           |                  |                  |             |                  |                            |                                |                                |                |                      |                 |                                     |                                   |
| B-42-1    | 0                | 10               | Oi          | 29.74            | 51.69                      | 40.72                          | 31.25                          | 9.47           | 627.2%               | 7.1086          | 98.1748                             | 0.07                              |
| B-42-2    | 10               | 22               | Oe          | 30.47            | 83.59                      | 39.86                          | 31.97                          | 7.89           | 526.0%               | 13.353          | 117.81                              | 0.11                              |
| B-42-3    | 22               | 45               | Oa          | 30.25            | 186.52                     | 42.69                          | 32.09                          | 10.6           | 576.1%               | 27.588          | 225.802                             | 0.12                              |
| B-42-4    | 45               | 58               | Oe          | 30.38            | 64.79                      | 38.14                          | 30.94                          | 7.2            | 1285.7%              | 4.6756          | 127.627                             | 0.04                              |
| B-42-5    | 58               | 79               | Oi          | 31.57            | 113.56                     | 42.88                          | 32.59                          | 10.29          | 1008.8%              | 10.241          | 206.167                             | 0.05                              |
| B-42-6    | 79               | 100              | Oi          | 30.14            | 169.32                     | 46.89                          | 31.47                          | 15.42          | 1159.4%              | 13.445          | 206.167                             | 0.07                              |
|           |                  |                  |             |                  |                            |                                |                                |                |                      |                 |                                     |                                   |
| B-43-1    | 0                | 13               | Oe          | 28.06            | 57.02                      | 39.68                          | 29.74                          | 9.94           | 591.7%               | 8.2439          | 127.627                             | 0.06                              |
| B-43-2    | 13               | 35               | Oe          | 30.9             | 144.73                     | 45.38                          | 33.07                          | 12.31          | 567.3%               | 21.69           | 215.984                             | 0.10                              |
| B-43-3    | 35               | 50               | Oe          | 30.29            | 114.68                     | 40.87                          | 31.84                          | 9.03           | 582.6%               | 16.801          | 147.262                             | 0.11                              |
| B-43-4    | 50               | 74               | Oi          | 23.19            | 160.95                     | 35.65                          | 24.54                          | 11.11          | 823.0%               | 17.438          | 235.619                             | 0.07                              |
| B-43-5    | 74               | 100              | Oe          | 30.36            | 208.72                     | 53.5                           | 32.47                          | 21.03          | 996.7%               | 19.032          | 255.254                             | 0.07                              |
|           |                  |                  |             |                  |                            |                                |                                |                |                      |                 |                                     |                                   |
| B-44-1    | 0                | 15               | Oi          | 23.46            | 43.09                      | 31.83                          | 24.88                          | 6.95           | 489.4%               | 7.3104          | 147.262                             | 0.05                              |
| B-44-2    | 15               | 25               | Oe          | 30.47            | 75.49                      | 40.71                          | 32.36                          | 8.35           | 441.8%               | 13.933          | 98.1748                             | 0.14                              |
| B-44-3    | 25               | 42               | Oe          | 31.48            | 135.38                     | 40.81                          | 32.74                          | 8.07           | 640.5%               | 18.283          | 166.897                             | 0.11                              |
| B-44-4    | 42               | 57               | Oe          | 29.11            | 65.33                      | 37.52                          | 29.84                          | 7.68           | 1052.1%              | 5.6707          | 147.262                             | 0.04                              |
| B-44-5    | 57               | 78               | Oi          | 30.35            | 142.68                     | 48.7                           | 32.17                          | 16.53          | 908.2%               | 14.151          | 206.167                             | 0.07                              |
| B-44-6    | 78               | 100              | Oi          | 28.92            | 188.36                     | 41.38                          | 29.85                          | 11.53          | 1239.8%              | 14.059          | 215.984                             | 0.07                              |

Appendix 3: Bulk density and water content data from restored marsh (*Wildlife Drive*)

| Sample ID | Upper Depth (cm) | Lower Depth (cm) | Designation | Empty beaker (g) | Bulk Sample Wet Weight (g) | sub-sample +beaker wet wt (g) | sub-sample+ beaker dry wt (g) | grams of water | Moisture content (%) | Bulk Dry wt (g) | Bulk Soil Volume (cm3) | Bulk Density (g/cm3) |
|-----------|------------------|------------------|-------------|------------------|----------------------------|-------------------------------|-------------------------------|----------------|----------------------|-----------------|------------------------|----------------------|
| W-1-1     | 0                | 2.5              |             |                  | 13.95                      |                               |                               |                |                      |                 |                        |                      |
| W-1-2     | 2.5              | 10               |             | 30.17            | 114.35                     | 35.59                         | 31.01                         | 4.58           | 545.24%              | 17.72           | 73.6311                | 0.24                 |
| W-1-3     | 10               | 38               |             | 30.16            | 297.92                     | 44.66                         | 32.47                         | 12.19          | 527.71%              | 47.46           | 274.889                | 0.17                 |
| W-1-4     | 38               | 58               |             | 30.6             | 261.94                     | 45.64                         | 32.97                         | 12.67          | 534.60%              | 41.28           | 196.35                 | 0.21                 |
| W-1-5     | 58               | 70               |             | 30.05            | 130.3                      | 35.7                          | 31.15                         | 4.55           | 413.64%              | 25.37           | 117.81                 | 0.22                 |
| W-1-6     | 70               | 100              |             | 30.28            | 143.28                     | 41.64                         | 37.32                         | 4.32           | 61.36%               | 88.79           | 294.524                | 0.30                 |
|           |                  |                  |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-2-1     | 0                | 2.5              |             |                  | 47.48                      |                               |                               |                |                      |                 |                        |                      |
| W-2-2     | 2.5              | 10               |             | 30.83            | 157.01                     | 43.88                         | 41.13                         | 2.75           | 26.70%               | 123.9           | 73.6311                | 1.68                 |
| W-2-3     | 10               | 20               | C           | 28.99            | 142.38                     | 40.38                         | 36.15                         | 4.23           | 59.08%               | 89.5            | 98.1748                | 0.91                 |
| W-2-4     | 20               | 26               |             | 30.17            | 110.64                     | 43.73                         | 40.04                         | 3.69           | 37.39%               | 80.53           | 58.9049                | 1.37                 |
| W-2-5     | 26               | 50               | Oe          | 30.22            | 294.92                     | 44.55                         | 33.01                         | 11.54          | 413.62%              | 57.42           | 235.619                | 0.24                 |
| W-2-6     | 50               | 67               |             | 29.98            | 164.58                     | 43.05                         | 32.43                         | 10.62          | 433.47%              | 30.85           | 166.897                | 0.18                 |
| W-2-7     | 67               | 86               |             | 30.35            | 240.19                     | 45.01                         | 32.71                         | 12.3           | 521.19%              | 38.67           | 186.532                | 0.21                 |
| W-2-8     | 86               | 100              |             | 29.49            | 179.89                     | 38.51                         | 31.61                         | 6.9            | 325.47%              | 42.28           | 137.445                | 0.31                 |
|           |                  |                  |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-3-1     | 0                | 4                | C           | 29.9             | 72.41                      | 38.28                         | 35.72                         | 2.56           | 43.99%               | 50.29           | 39.2699                | 1.28                 |
| W-3-2     | 4                | 46               |             | 31.31            | 164.53                     | 46.25                         | 40.44                         | 5.81           | 63.64%               | 100.5           | 412.334                | 0.24                 |
| W-3-3     | 16               | 37               |             | 30.27            | 219.55                     | 37.78                         | 31.66                         | 6.12           | 440.29%              | 40.64           | 206.167                | 0.20                 |
|           |                  |                  |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-4-1     | 0                | 8                | C           | 31.9             | 125.41                     | 48.96                         | 44.58                         | 4.38           | 34.54%               | 93.21           | 78.5398                | 1.19                 |
| W-4-2     | 8                | 26               |             | 30.8             | 363.26                     | 39.17                         | 37.27                         | 1.9            | 29.37%               | 280.8           | 176.715                | 1.59                 |
| W-4-3     | 26               | 49               | Oe          | 30.3             | 223.84                     | 44.6                          | 32.84                         | 11.76          | 462.99%              | 39.76           | 225.802                | 0.18                 |
| W-4-4     | 49               | 62               |             | 30.36            | 181.73                     | 45.3                          | 32.18                         | 13.12          | 720.88%              | 22.14           | 127.627                | 0.17                 |
| W-4-5     | 62               | 78               |             | 31.49            | 227.99                     | 37.88                         | 34.31                         | 3.57           | 126.60%              | 100.6           | 157.08                 | 0.64                 |
|           |                  |                  |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-5-1     | 0                | 16               | C           | 29.71            | 235.84                     | 45.29                         | 40.97                         | 4.32           | 38.37%               | 170.4           | 157.08                 | 1.09                 |
| W-5-2     | 16               | 43               | Oi          | 29.45            | 283.48                     | 40.07                         | 31.08                         | 8.99           | 551.53%              | 43.51           | 265.072                | 0.16                 |
| W-5-3     | 42               | 49               | Oe          | 30.7             | 110.46                     | 40.17                         | 32.24                         | 7.93           | 514.94%              | 17.96           | 68.7223                | 0.26                 |
| W-5-4     | 49               | 67               |             | 30.23            | 193.02                     | 49.11                         | 36.21                         | 12.9           | 215.72%              | 61.14           | 176.715                | 0.35                 |
| W-5-5     | 67               | 73               |             | 28.21            | 86.86                      | 34.26                         | 30.26                         | 4              | 195.12%              | 29.43           | 58.9049                | 0.50                 |
|           |                  |                  |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-6-1     | 0                | 22               | Oe          | 27.89            | 190.52                     | 54.96                         | 33.2                          | 21.76          | 409.79%              | 37.37           | 215.984                | 0.17                 |
| W-6-2     | 22               | 37               | Oi          | 30.27            | 95.26                      | 42.78                         | 31.71                         | 11.07          | 768.75%              | 10.97           | 147.262                | 0.07                 |
| W-6-3     | 37               | 50               | Oa          | 30.17            | 101.92                     | 40.5                          | 31.92                         | 8.58           | 490.29%              | 17.27           | 127.627                | 0.14                 |
| W-6-4     | 50               | 66               | Oa          | 30.3             | 149.49                     | 45.79                         | 33.17                         | 12.62          | 439.72%              | 27.7            | 157.08                 | 0.18                 |
| W-6-5     | 66               | 80               | A           | 31.91            | 172.84                     | 49.2                          | 39.5                          | 9.7            | 127.80%              | 75.87           | 137.445                | 0.55                 |

| Sample ID | Upper Depth (cm) | Lower Depth (cm) | Designation | Empty beaker (g) | Bulk Sample Wet Weight (g) | sub-sample +beaker wet wt (g) | sub-sample+ beaker dry wt (g) | grams of water | Moisture content (%) | Bulk Dry wt (g) | Bulk Soil Volume (cm3) | Bulk Density (g/cm3) |
|-----------|------------------|------------------|-------------|------------------|----------------------------|-------------------------------|-------------------------------|----------------|----------------------|-----------------|------------------------|----------------------|
| W-7-1     | 0                | 7                | A           | 27.89            | 51.23                      | 37.35                         | 32.93                         | 4.42           | 87.70%               | 27.29           | 68.7223                | 0.40                 |
| W-7-2     | 7                | 44               | A           | 31.59            | 86.82                      | 41.37                         | 36.77                         | 4.6            | 88.80%               | 45.98           | 68.7223                | 0.67                 |
| W-7-3     | 44               | 62               | Oe          | 30.17            | 317.94                     | 50.36                         | 35.52                         | 14.84          | 277.38%              | 84.25           | 176.715                | 0.48                 |
| W-7-4     | 62               | 80               | A/C         | 30.05            | 208.62                     | 48.1                          | 39.42                         | 8.68           | 92.64%               | 108.3           | 176.715                | 0.61                 |
| W-7-5     | 80               | 95               | C           | 31.5             | 258.63                     | 50.28                         | 47.01                         | 3.27           | 21.08%               | 213.6           | 147.262                | 1.45                 |
|           |                  |                  |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-8-1     | 0                | 15               | Oi          | 2.33             | 54.63                      | 18.49                         | 6.93                          | 11.56          | 251.30%              | 15.55           | 147.262                | 0.11                 |
| W-8-2     | 15               | 32               | Oi/A        | 2.38             | 151.42                     | 19.43                         | 10.01                         | 9.42           | 123.46%              | 67.76           | 166.897                | 0.41                 |
| W-8-3     | 32               | 50               | A/Oi        | 2.34             | 186.41                     | 25.63                         | 11.98                         | 13.65          | 141.60%              | 77.16           | 176.715                | 0.44                 |
|           |                  |                  |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-10-1    | 0                | 4.5              | Oi          | 31.49            | 37.19                      |                               |                               |                |                      |                 |                        |                      |
| W-10-2    | 4.5              | 27               | AC          | 29.8             | 358.2                      | 53.51                         | 43.65                         | 9.86           | 71.19%               | 209.2           | 220.893                | 0.95                 |
| W-10-3    | 27               | 36               | AC          | 31.27            | 161.82                     | 40.31                         | 37.9                          | 2.41           | 36.35%               | 118.7           | 88.3573                | 1.34                 |
| W-10-4    | 36               | 50               | A           | 30.2             | 87.32                      | 40.63                         | 31.96                         | 8.67           | 492.61%              | 14.73           | 137.445                | 0.11                 |
| W-10-5    | 50               | 63               | Oe          | 29.85            | 177.79                     | 38.48                         | 31.87                         | 6.61           | 327.23%              | 41.61           | 127.627                | 0.33                 |
| W-10-6    | 63               | 74               | C           | 30.13            | 233.29                     | 50.62                         | 46.5                          | 4.12           | 25.17%               | 186.4           | 107.992                | 1.73                 |
| W-10-7    | 74               | 88               | C           | 27.88            | 301.95                     | 38.33                         | 35.2                          | 3.13           | 42.76%               | 211.5           | 137.445                | 1.54                 |
|           |                  |                  |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-11-1    | 0                | 23               | C           | 30.11            | 467.47                     | 44.55                         | 41.48                         | 3.07           | 27.00%               | 368.1           | 225.802                | 1.63                 |
| W-11-2    | 23               | 29               | A           | 30.33            | 98.37                      | 43.52                         | 41.04                         | 2.48           | 23.16%               | 79.87           | 58.9049                | 1.36                 |
| W-11-3    | 29               | 50               | O           | 28.33            | 203.61                     | 53.58                         | 32.64                         | 20.94          | 485.85%              | 34.75           | 206.167                | 0.17                 |
| W-11-4    | 50               | 73               | O           | 29.43            | 194.64                     | 38.99                         | 31.47                         | 7.52           | 368.63%              | 41.53           | 225.802                | 0.18                 |
| W-11-5    | 73               | 87               | O           | 30.18            | 184.77                     | 40.82                         | 32.16                         | 8.66           | 437.37%              | 34.38           | 137.445                | 0.25                 |
| W-11-6    | 87               | 100              | A           | 30.83            | 171.97                     | 41.09                         | 33.31                         | 7.78           | 313.71%              | 41.57           | 127.627                | 0.33                 |
|           |                  |                  |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-12-1    | 0                | 14               |             | 30.37            | 196.41                     | 42.51                         | 37.59                         | 4.92           | 68.14%               | 116.8           | 137.445                | 0.85                 |
| W-12-2    | 14               | 21               |             | 31.59            | 67.72                      | 42.25                         | 33.62                         | 8.63           | 425.12%              | 12.9            | 68.7223                | 0.19                 |
| W-12-3    | 21               | 38               |             | 29.95            | 220.51                     | 41.91                         | 32.02                         | 9.89           | 477.78%              | 38.17           | 166.897                | 0.23                 |
|           |                  |                  |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-13-1    | 0                | 15               | Oi          | 2.3              | 141.14                     | 16.4                          | 6.64                          | 9.76           | 224.88%              | 43.44           | 147.262                | 0.30                 |
| W-13-2    | 15               | 25               | Oi          | 2.31             | 98.58                      | 12.38                         | 4.3                           | 8.08           | 406.03%              | 19.48           | 98.1748                | 0.20                 |
| W-13-3    | 25               | 50               | Oe          | 2.34             | 187.55                     | 28.43                         | 6.71                          | 21.72          | 497.03%              | 31.41           | 245.437                | 0.13                 |
|           |                  |                  |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-14-1    | 0                | 10               | Oe          | 2.38             | 69.94                      | 9.73                          | 4.54                          | 5.19           | 240.28%              | 20.55           | 98.1748                | 0.21                 |
| W-14-2    | 10               | 28               | AC          | 2.32             | 205.03                     | 20.62                         | 13.02                         | 7.6            | 71.03%               | 119.9           | 176.715                | 0.68                 |
| W-14-3    | 28               | 46               | Oe          | 2.34             | 129.9                      | 17.94                         | 7.12                          | 10.82          | 226.36%              | 39.8            | 176.715                | 0.23                 |
| W-14-4    | 46               | 50               | Oe          | 2.33             | 55.39                      | 13.51                         | 6.68                          | 6.83           | 157.01%              | 21.55           | 39.2699                | 0.55                 |
| W-14-5    | 50               | 64               | A           | 2.38             | 103.39                     | 15.54                         | 7.71                          | 7.83           | 146.90%              | 41.87           | 137.445                | 0.30                 |
| W-14-6    | 64               | 80               | C           | 2.34             | 268.54                     | 19.68                         | 16.5                          | 3.18           | 22.46%               | 219.3           | 157.08                 | 1.40                 |
| W-14-7    | 80               | 100              | C           | 2.37             | 351.33                     | 15.04                         | 12.07                         | 2.97           | 30.62%               | 269             | 196.35                 | 1.37                 |

| Sample ID | Upper Depth (cm) | Lower Depth (cm) | Designation | Empty beaker (g) | Bulk Sample Wet Weight (g) | sub-sample +beaker wet wt (g) | sub-sample+ beaker dry wt (g) | grams of water | Moisture content (%) | Bulk Dry wt (g) | Bulk Soil Volume (cm3) | Bulk Density (g/cm3) |
|-----------|------------------|------------------|-------------|------------------|----------------------------|-------------------------------|-------------------------------|----------------|----------------------|-----------------|------------------------|----------------------|
| W-15-1    | 0                | 6                |             |                  | 5.53                       |                               |                               |                |                      |                 |                        |                      |
| W-15-2    | 6                | 24               | Oe          | 2.33             | 161.4                      | 19.08                         | 8.14                          | 10.94          | 188.30%              | 55.98           | 176.715                | 0.32                 |
| W-15-3    | 24               | 37               | Oe          | 2.33             | 128.29                     | 15.36                         | 7.09                          | 8.27           | 173.74%              | 46.87           | 127.627                | 0.37                 |
| W-15-4    | 37               | 50               | Oe          | 2.3              | 139.4                      | 17.66                         | 7.55                          | 10.11          | 192.57%              | 47.65           | 127.627                | 0.37                 |
| W-15-5    | 50               | 55               | Oe          | 2.35             | 33.42                      | 7.43                          | 3.79                          | 3.64           | 252.78%              | 9.473           | 49.0874                | 0.19                 |
| W-15-6    | 55               | 70               | AC          | 2.35             | 163.38                     | 12.35                         | 6.74                          | 5.61           | 127.79%              | 71.72           | 147.262                | 0.49                 |
| W-15-7    | 70               | 83               | C           | 2.42             | 175.03                     | 21.82                         | 18.56                         | 3.26           | 20.20%               | 145.6           | 127.627                | 1.14                 |
| W-15-8    | 83               | 100              |             | 2.4              | 295.26                     | 12.05                         | 9.61                          | 2.44           | 33.84%               | 220.6           | 166.897                | 1.32                 |
|           |                  |                  |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-16-1    | 0                | 13               |             | 30.8             | 25.95                      | 41.12                         | 34.89                         | 6.23           | 152.32%              | 10.28           | 127.627                | 0.08                 |
| W-16-2    | 13               | 30               | A           | 32.38            | 142.58                     | 40.51                         | 34.68                         | 5.83           | 253.48%              | 40.34           | 166.897                | 0.24                 |
| W-16-3    | 30               | 50               | Oi          | 30.12            | 136                        | 35.35                         | 31.07                         | 4.28           | 450.53%              | 24.7            | 196.35                 | 0.13                 |
| W-16-4    | 50               | 62               | Oe          | 29.9             | 82.33                      | 35.81                         | 31.09                         | 4.72           | 396.64%              | 16.58           | 117.81                 | 0.14                 |
| W-16-5    | 62               | 80               | Oi          | 31.31            | 184.58                     | 36.98                         | 33.52                         | 3.46           | 156.56%              | 71.94           | 176.715                | 0.41                 |
| W-16-6    | 80               | 100              | C           | 30.24            | 405.41                     | 35.41                         | 33.85                         | 1.56           | 43.21%               | 283.1           | 196.35                 | 1.44                 |
|           |                  |                  |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-17-1    | 0                | 13               | A           | 29.43            | 105.24                     | 36.97                         | 32.13                         | 4.84           | 179.26%              | 37.69           | 127.627                | 0.30                 |
| W-17-2    | 13               | 30               | Oe          | 30.13            | 140.29                     | 37.67                         | 32.03                         | 5.64           | 296.84%              | 35.35           | 166.897                | 0.21                 |
| W-17-3    | 30               | 50               | Oe          | 30.22            | 179.17                     | 36.59                         | 31.3                          | 5.29           | 489.81%              | 30.38           | 196.35                 | 0.15                 |
| W-17-4    | 50               | 67               | Oe          | 28.99            | 118.88                     | 34.67                         | 30.58                         | 4.09           | 257.23%              | 33.28           | 166.897                | 0.20                 |
| W-17-5    | 67               | 86               | C           | 30.29            | 307.8                      | 37.48                         | 36.19                         | 1.29           | 21.86%               | 252.6           | 186.532                | 1.35                 |
| W-17-6    | 86               | 98               | C           | 30.23            | 208.04                     | 36.85                         | 35.2                          | 1.65           | 33.20%               | 156.2           | 215.984                | 0.72                 |
|           |                  |                  |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-18-1    | 0                | 16               | O           | 30.05            | 17.73                      | 36.39                         | 30.84                         | 5.55           | 702.53%              | 2.209           | 157.08                 | 0.01                 |
| W-18-2    | 16               | 30               | A           | 29.96            | 84.62                      | 37.14                         | 31.42                         | 5.72           | 391.78%              | 17.21           | 137.445                | 0.13                 |
| W-18-3    | 30               | 45               | Oi/A        | 28.54            | 177.98                     | 34.44                         | 30.23                         | 4.21           | 249.11%              | 50.98           | 147.262                | 0.35                 |
| W-18-4    | 45               | 50               | Oi/A        | 30.22            | 48.63                      | 35.15                         | 31.15                         | 4              | 430.11%              | 9.174           | 49.0874                | 0.19                 |
| W-18-5    | 50               | 57               | Oe          | 27.88            | 71.11                      | 33.5                          | 29.09                         | 4.41           | 364.46%              | 15.31           | 68.7223                | 0.22                 |
| W-18-6    | 57               | 67               | Oe          | 30.83            | 114.81                     | 35.78                         | 32.5                          | 3.28           | 196.41%              | 38.73           | 98.1748                | 0.39                 |
| W-18-7    | 67               | 76               | A/C         | 29.46            | 166.69                     | 35.22                         | 33.93                         | 1.29           | 28.86%               | 129.4           | 88.3573                | 1.46                 |
| W-18-8    | 76               | 90               | Cg          | 29.46            | 249.09                     | 36.96                         | 35.82                         | 1.14           | 17.92%               | 211.2           | 137.445                | 1.54                 |
| W-18-9    | 90               | 100              | Cg          | 31.5             | 146.15                     | 38.36                         | 36.74                         | 1.62           | 30.92%               | 111.6           | 98.1748                | 1.14                 |
|           |                  |                  |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-19-1    | 0                | 21               | A/C         | 30.04            | 282.37                     | 48.44                         | 44.67                         | 3.77           | 25.77%               | 224.5           | 206.167                | 1.09                 |
| W-19-2    | 21               | 50               | Oi          | 30.23            | 213.49                     | 46.21                         | 35.71                         | 10.5           | 191.61%              | 73.21           | 284.707                | 0.26                 |
| W-19-3    | 50               | 67               | Oi          | 28.52            | 132.74                     | 45.55                         | 31.18                         | 14.37          | 540.23%              | 20.73           | 166.897                | 0.12                 |
| W-19-4    | 67               | 88               | Oe          | 30.22            | 195.03                     | 40.39                         | 31.77                         | 8.62           | 556.13%              | 29.72           | 206.167                | 0.14                 |
|           |                  |                  |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-20-1    | 0                | 11               | A/C         | 30.8             | 106.69                     | 43.07                         | 39.93                         | 3.14           | 34.39%               | 79.39           | 107.992                | 0.74                 |
| W-20-2    | 11               | 43               | Oi          | 30.87            | 230.25                     | 49.38                         | 35.36                         | 14.02          | 312.25%              | 55.85           | 314.159                | 0.18                 |
| W-20-3    | 43               | 65               | Oi          | 29.95            | 125.72                     | 45.44                         | 32                            | 13.44          | 655.61%              | 16.64           | 215.984                | 0.08                 |
| W-20-4    | 65               | 80               | Oe          | 28.99            | 119.5                      | 36.48                         | 30.35                         | 6.13           | 450.74%              | 21.7            | 147.262                | 0.15                 |
| W-20-5    | 80               | 86               | A           | 30.29            | 60.06                      | 38.79                         | 33.74                         | 5.05           | 146.38%              | 24.38           | 58.9049                | 0.41                 |

| Sample ID | Upper Depth (cm) | Lower Depth (cm) | Designation | Empty beaker (g) | Bulk Sample Wet Weight (g) | sub-sample +beaker wet wt (g) | sub-sample+ beaker dry wt (g) | grams of water | Moisture content (%) | Bulk Dry wt (g) | Bulk Soil Volume (cm3) | Bulk Density (g/cm3) |
|-----------|------------------|------------------|-------------|------------------|----------------------------|-------------------------------|-------------------------------|----------------|----------------------|-----------------|------------------------|----------------------|
| W-21-1    | 0                | 26               | C/A         | 30.14            | 407.17                     | 50.97                         | 47.8                          | 3.17           | 17.95%               | 345.2           | 255.254                | 1.35                 |
| W-21-2    | 26               | 58               | Oe          | 32.37            | 307.14                     | 56.09                         | 38.16                         | 17.93          | 309.67%              | 74.97           | 314.159                | 0.24                 |
| W-21-3    | 58               | 83               | Oe          | 29.9             | 219.14                     | 44                            | 35.47                         | 8.53           | 153.14%              | 86.57           | 245.437                | 0.35                 |
|           |                  |                  |             |                  |                            |                               |                               |                |                      | 0               |                        |                      |
| W-22-1    | 0                | 10               | A/C         | 30.23            | 95.28                      | 38.13                         | 35.99                         | 2.14           | 37.15%               | 69.47           | 98.1748                | 0.71                 |
| W-22-2    | 10               | 37               | Oe          | 31.27            | 124.02                     | 43.2                          | 33.08                         | 10.12          | 559.12%              | 18.82           | 265.072                | 0.07                 |
| W-22-3    | 37               | 70               | Oe          | 29.44            | 313.45                     | 49.31                         | 32.41                         | 16.9           | 569.02%              | 46.85           | 323.977                | 0.14                 |
| W-22-4    | 70               | 81               | A           | 29.98            | 133.38                     | 47.1                          | 38.96                         | 8.14           | 90.65%               | 69.96           | 107.992                | 0.65                 |
|           |                  |                  |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-23-1    | 0                | 25               | Oe          | 22.76            | 119.93                     | 36.53                         | 24.73                         | 11.8           | 598.98%              | 17.16           | 245.437                | 0.07                 |
| W-23-2    | 25               | 50               | Oe          | 22.99            | 226.46                     | 42.73                         | 25.69                         | 17.04          | 631.11%              | 30.97           | 245.437                | 0.13                 |
| W-23-3    | 50               | 74               | Oe          | 23.74            | 179.5                      | 34.81                         | 25.64                         | 9.17           | 482.63%              | 30.81           | 235.619                | 0.13                 |
| W-23-4    | 74               | 90               | Oa          | 23.44            | 135.24                     | 38.91                         | 26.65                         | 12.26          | 381.93%              | 28.06           | 157.08                 | 0.18                 |
|           |                  |                  |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-24-1    | 0                | 10               |             |                  | No sample                  |                               |                               |                |                      |                 |                        |                      |
| W-24-2    | 10               | 22               | A/C         | 30.04            | 117.78                     | 53.22                         | 41.85                         | 11.37          | 96.27%               | 60.01           | 117.81                 | 0.51                 |
| W-24-3    | 22               | 38               | Oe          | 23.04            | 149.81                     | 35.38                         | 24.92                         | 10.46          | 556.38%              | 22.82           | 157.08                 | 0.15                 |
| W-24-4    | 38               | 50               | Oe          | 28.68            | 100.05                     | 40.55                         | 30.76                         | 9.79           | 470.67%              | 17.53           | 117.81                 | 0.15                 |
| W-24-5    | 50               | 55               | Oa          | 29.8             | 36.8                       | 42.71                         | 33.11                         | 9.6            | 290.03%              | 9.435           | 49.0874                | 0.19                 |
| W-24-6    | 55               | 62               | Oa          | 23.39            | 78.45                      | 37.23                         | 27.91                         | 9.32           | 206.19%              | 25.62           | 68.7223                | 0.37                 |
| W-24-7    | 62               | 80               | A           | 23.73            | 198.33                     | 44.6                          | 31.35                         | 13.25          | 173.88%              | 72.41           | 176.715                | 0.41                 |
| W-24-8    | 80               | 90               | A/C         | 23.38            | 139.25                     | 41.98                         | 35.28                         | 6.7            | 56.30%               | 89.09           | 98.1748                | 0.91                 |
| W-24-9    | 90               | 100              | C           | 28.31            | 194.81                     | 56.27                         | 49.73                         | 6.54           | 30.53%               | 149.2           | 98.1748                | 1.52                 |
|           |                  |                  |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-25-1    | 0                | 14               | AC          | 23               | 119.61                     | 45.65                         | 38.26                         | 7.39           | 48.43%               | 80.58           | 137.445                | 0.59                 |
| W-25-2    | 14               | 27               | Oi          | 22.79            | 94.86                      | 33.77                         | 25.43                         | 8.34           | 315.91%              | 22.81           | 127.627                | 0.18                 |
| W-25-3    | 27               | 50               | Oe          | 23.41            | 186.92                     | 36.7                          | 26.95                         | 9.75           | 275.42%              | 49.79           | 225.802                | 0.22                 |
| W-25-4    | 50               | 64               | Oe          | 21.64            | 102.83                     | 31.35                         | 24.27                         | 7.08           | 269.20%              | 27.85           | 137.445                | 0.20                 |
| W-25-5    | 64               | 84               | A           | 23.12            | 200.68                     | 38.43                         | 29.85                         | 8.58           | 127.49%              | 88.22           | 196.35                 | 0.45                 |
| W-25-6    | 84               | 100              | Cg          | 23.4             | 261.7                      | 34.27                         | 32.22                         | 2.05           | 23.24%               | 212.3           | 157.08                 | 1.35                 |
|           |                  |                  |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-26-1    | 0                | 14               | A           | 20.7             | 60.15                      | 31.49                         | 24.37                         | 7.12           | 194.01%              | 20.46           | 137.445                | 0.15                 |
| W-26-2    | 14               | 37               | A/C         | 23.46            | 255.64                     | 47.76                         | 38.8                          | 8.96           | 58.41%               | 161.4           | 225.802                | 0.71                 |
| W-26-3    | 37               | 50               | Oe          | 22.67            | 88.49                      | 34.93                         | 24.79                         | 10.14          | 478.30%              | 15.3            | 127.627                | 0.12                 |
| W-26-4    | 50               | 65               | Oi          | 22.82            | 78.12                      | 38.56                         | 25.97                         | 12.59          | 399.68%              | 15.63           | 147.262                | 0.11                 |
| W-26-5    | 65               | 78               | A           | 23.34            | 128.59                     | 41.63                         | 34.67                         | 6.96           | 61.43%               | 79.66           | 127.627                | 0.62                 |
| W-26-6    | 78               | 94               | C           | 23.71            | 272.71                     | 37.76                         | 35.49                         | 2.27           | 19.27%               | 228.6           | 157.08                 | 1.46                 |
|           |                  |                  |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-27-1    | 0                | 6                | A           | 22.91            | 24.72                      | 28.31                         | 24.99                         | 3.32           | 159.62%              | 9.522           | 58.9049                | 0.16                 |
| W-27-2    | 6                | 15               | A/C         | 28.2             | 77.9                       | 41.41                         | 36.27                         | 5.14           | 63.69%               | 47.59           | 88.3573                | 0.54                 |
| W-27-3    | 15               | 28               | Oi          | 23.18            | 86.95                      | 37.07                         | 25.44                         | 11.63          | 514.60%              | 14.15           | 127.627                | 0.11                 |
| W-27-4    | 28               | 40               | Oi          | 23.27            | 94.34                      | 38.19                         | 25.9                          | 12.29          | 467.30%              | 16.63           | 117.81                 | 0.14                 |

| Sample ID | Upper Depth (cm) | Lower Depth (cm) | Designation | Empty beaker (g) | Bulk Sample Wet Weight (g) | sub-sample +beaker wet wt (g) | sub-sample+ beaker dry wt (g) | grams of water | Moisture content (%) | Bulk Dry wt (g) | Bulk Soil Volume (cm3) | Bulk Density (g/cm3) |
|-----------|------------------|------------------|-------------|------------------|----------------------------|-------------------------------|-------------------------------|----------------|----------------------|-----------------|------------------------|----------------------|
| W-27-5    | 40               | 50               | Oe          | 23.55            | 100.95                     | 37.77                         | 26.11                         | 11.66          | 455.47%              | 18.17           | 98.1748                | 0.19                 |
| W-27-6    | 50               | 57               | Oe          | 22.97            | 53.18                      | 31.44                         | 24.41                         | 7.03           | 488.19%              | 9.041           | 68.7223                | 0.13                 |
| W-27-7    | 57               | 67               | A/C         | 23.37            | 117.13                     | 51.94                         | 40.19                         | 11.75          | 69.86%               | 68.96           | 98.1748                | 0.70                 |
| W-27-8    | 67               | 84               | C           | 23.49            | 293.96                     | 39.25                         | 35.17                         | 4.08           | 34.93%               | 217.9           | 166.897                | 1.31                 |
| W-27-9    | 84               | 99               | Cg          | 23.85            | 281.92                     | 48.63                         | 43.51                         | 5.12           | 26.04%               | 223.7           | 147.262                | 1.52                 |
|           |                  |                  |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-28-1    | 0                | 15               | C/A         | 30.18            | 69.27                      | 44.84                         | 39.85                         | 4.99           | 51.60%               | 45.69           | 147.262                | 0.31                 |
| W-28-2    | 15               | 30               | Oi          | 30.37            | 90.79                      | 41.65                         | 32.3                          | 9.35           | 484.46%              | 15.53           | 147.262                | 0.11                 |
| W-28-3    | 30               | 50               | A           | 27.82            | 170.36                     | 52.71                         | 38.81                         | 13.9           | 126.48%              | 75.22           | 196.35                 | 0.38                 |
| W-28-4    | 50               | 82               | C           | 30.15            | 138.45                     | 40.12                         | 37.47                         |                |                      |                 |                        |                      |
|           |                  |                  |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-29-1    | 0                | 10               | Oe/C        | 23.71            | 84.19                      | 40.2                          | 31.75                         | 8.45           | 105.10%              | 41.05           | 98.1748                | 0.42                 |
| W-29-2    | 10               | 18               | C/Oe        | 23.17            | 59.59                      | 34.91                         | 29.72                         | 5.19           | 79.24%               | 33.25           | 78.5398                | 0.42                 |
| W-29-3    | 18               | 33               | Oe          | 23.34            | 111.44                     | 35.86                         | 25.71                         | 10.15          | 428.27%              | 21.1            | 147.262                | 0.14                 |
| W-29-4    | 33               | 46               | Oi          | 22.79            | 140.69                     | 32.29                         | 25.33                         | 6.96           | 274.02%              | 37.62           | 127.627                | 0.29                 |
| W-29-5    | 46               | 50               | Oe/C        | 23.12            | 40.63                      | 35.59                         | 28.35                         | 7.24           | 138.43%              | 17.04           | 39.2699                | 0.43                 |
|           |                  |                  |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-30-1    | 0                | 6                | Oi/C        |                  | 29.99                      |                               |                               |                |                      |                 |                        |                      |
| W-30-2    | 6                | 13               | C/Oe        | 30.37            | 68.02                      | 40.58                         | 36.28                         | 4.3            | 72.76%               | 39.37           | 68.7223                | 0.57                 |
| W-30-3    | 13               | 26               | Oe          | 30.8             | 102.37                     | 39.24                         | 32.35                         | 6.89           | 444.52%              | 18.8            | 127.627                | 0.15                 |
| W-30-4    | 26               | 40               | Oe          | 31.59            | 113.19                     | 38.96                         | 33.07                         | 5.89           | 397.97%              | 22.73           | 137.445                | 0.17                 |
| W-30-5    | 40               | 50               | Oe          | 29.95            | 88.93                      | 38.09                         | 31.67                         | 6.42           | 373.26%              | 18.79           | 98.1748                | 0.19                 |
| W-30-6    | 50               | 57               | Oe          | 29.9             | 75.03                      | 39.56                         | 31.68                         | 7.88           | 442.70%              | 13.83           | 68.7223                | 0.20                 |
| W-30-7    | 57               | 65               | Oe/C        | 31.31            | 88.59                      | 38.89                         | 34.91                         | 3.98           | 110.56%              | 42.07           | 78.5398                | 0.54                 |
| W-30-8    | 65               | 83               | C           | 30.27            | 311.3                      | 37.36                         | 36.08                         | 1.28           | 22.03%               | 255.1           | 176.715                | 1.44                 |
| W-30-9    | 83               | 98               | C           | 31.9             | 219.08                     | 40.23                         | 38.65                         | 1.58           | 23.41%               | 177.5           | 147.262                | 1.21                 |
|           |                  |                  |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-31-1    | 0                | 10               |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-31-2    | 10               | 23               | Oi          | 30.18            | 69.89                      | 37.43                         | 32.21                         | 5.22           | 257.14%              | 19.57           | 127.627                | 0.15                 |
| W-31-3    | 23               | 50               | Oe          | 31.59            | 188.65                     | 41.62                         | 33.2                          | 8.42           | 522.98%              | 30.28           | 265.072                | 0.11                 |
| W-31-4    | 50               | 66               | Oe          | 30.83            | 111.37                     | 41.97                         | 33.98                         | 7.99           | 253.65%              | 31.49           | 157.08                 | 0.20                 |
| W-31-5    | 66               | 77               | Oe/C        | 31.8             | 153.11                     | 45.46                         | 40.25                         | 5.21           | 61.66%               | 94.71           | 107.992                | 0.88                 |
| W-31-6    | 77               | 100              | C           | 29.81            | 380.91                     | 41.77                         | 38.63                         | 3.14           | 35.60%               | 280.9           | 225.802                | 1.24                 |
|           |                  |                  |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-32-1    | 0                | 10               | Oe          | 30.23            | 58.94                      | 36.25                         | 31.79                         | 4.46           | 285.90%              | 15.27           | 98.1748                | 0.16                 |
| W-32-2    | 10               | 26               | C           | 30.7             | 178.38                     | 49.55                         | 42.05                         | 7.5            | 66.08%               | 107.4           | 157.08                 | 0.68                 |
| W-32-3    | 26               | 41               | C/Oe        | 29.98            | 184.94                     | 37.98                         | 33.35                         | 4.63           | 137.39%              | 77.91           | 147.262                | 0.53                 |
| W-32-4    | 41               | 50               | Oe          | 32.38            | 78.01                      | 41.79                         | 35.1                          | 6.69           | 245.96%              | 22.55           | 88.3573                | 0.26                 |
| W-32-5    | 50               | 58               | Oe/C        | 30.17            | 53.71                      | 33.97                         | 31.38                         | 2.59           | 214.05%              | 17.1            | 78.5398                | 0.22                 |
| W-32-6    | 58               | 73               | C           | 30.16            | 141.03                     | 48.44                         | 38.65                         | 9.79           | 115.31%              | 65.5            | 147.262                | 0.44                 |
| W-32-7    | 73               | 89               | C           | 28.55            | 272.81                     | 44.56                         | 41.48                         | 3.08           | 23.82%               | 220.3           | 157.08                 | 1.40                 |
| W-32-8    | 89               | 100              | C           | 28.71            | 187.51                     | 37.55                         | 35.45                         | 2.1            | 31.16%               | 143             | 107.992                | 1.32                 |

| Sample ID | Upper Depth (cm) | Lower Depth (cm) | Designation | Empty beaker (g) | Bulk Sample Wet Weight (g) | sub-sample +beaker wet wt (g) | sub-sample+ beaker dry wt (g) | grams of water | Moisture content (%) | Bulk Dry wt (g) | Bulk Soil Volume (cm3) | Bulk Density (g/cm3) |
|-----------|------------------|------------------|-------------|------------------|----------------------------|-------------------------------|-------------------------------|----------------|----------------------|-----------------|------------------------|----------------------|
| W-33-1    | 0                | 2                | Oi          |                  | 10.18                      |                               |                               |                |                      |                 |                        |                      |
| W-33-2    | 2                | 10               | C           | 29.8             | 76.06                      | 40.92                         | 36.37                         | 4.55           | 69.25%               | 44.94           | 78.5398                | 0.57                 |
| W-33-3    | 10               | 26               | Oe          | 31.27            | 116.59                     | 45.22                         | 33.49                         | 11.73          | 528.38%              | 18.55           | 157.08                 | 0.12                 |
| W-33-4    | 26               | 41               | Oe          | 30.2             | 123.55                     | 40.57                         | 31.67                         | 8.9            | 605.44%              | 17.51           | 147.262                | 0.12                 |
| W-33-5    | 41               | 50               | Oe          | 29.86            | 73.61                      | 39.93                         | 31.81                         | 8.12           | 416.41%              | 14.25           | 88.3573                | 0.16                 |
| W-33-6    | 50               | 66               | Oe          | 30.15            | 138.35                     | 39.69                         | 31.7                          | 7.99           | 515.48%              | 22.48           | 157.08                 | 0.14                 |
| W-33-7    | 66               | 78               | Oe          | 27.9             | 124.91                     | 37.81                         | 31.39                         | 6.42           | 183.95%              | 43.99           | 117.81                 | 0.37                 |
|           |                  |                  |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-34-1    | 0                | 10               | Oi/C        | 29.49            | 54.98                      | 39.76                         | 33.07                         | 6.69           | 186.87%              | 19.17           | 98.1748                | 0.20                 |
| W-34-2    | 10               | 15               | C/Oe        | 29.95            | 26.13                      | 37.94                         | 34.48                         | 3.46           | 76.38%               | 14.81           | 49.0874                | 0.30                 |
| W-34-3    | 15               | 30               | Oe          | 30.83            | 115.8                      | 44.07                         | 33.05                         | 11.02          | 496.40%              | 19.42           | 147.262                | 0.13                 |
| W-34-4    | 30               | 50               | Oe          | 30.29            | 159                        | 41.99                         | 31.79                         | 10.2           | 680.00%              | 20.38           | 196.35                 | 0.10                 |
|           |                  |                  |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-35-1    | 0                | 8                | C           | 30.21            | 47.12                      | 39.83                         | 34.6                          | 5.23           | 119.13%              | 21.5            | 78.5398                | 0.27                 |
| W-35-2    | 8                | 24               | Oe          | 30.05            | 125.28                     | 38.61                         | 31.28                         | 7.33           | 595.93%              | 18              | 157.08                 | 0.11                 |
| W-35-3    | 24               | 44               | Oe          | 27.82            | 158.78                     | 40.56                         | 29.58                         | 10.98          | 623.86%              | 21.94           | 196.35                 | 0.11                 |
| W-35-4    | 44               | 60               |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-35-5    | 60               | 71.5             |             | 30.17            | 120.54                     | 41.44                         | 34.54                         | 6.9            | 157.89%              | 46.74           | 112.901                | 0.41                 |
|           |                  |                  |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-36-1    | 0                | 10.5             | C           | 29.71            | 110.31                     | 44.81                         | 40.63                         | 4.18           | 38.28%               | 79.77           | 103.084                | 0.77                 |
| W-36-2    | 10.5             | 29               | Oe          | 30.36            | 83.03                      | 44.6                          | 32.97                         | 11.63          | 445.59%              | 15.22           | 181.623                | 0.08                 |
| W-36-3    | 29               | 50               | Oe          | 30.28            | 162.12                     | 39.03                         | 31.5                          | 7.53           | 617.21%              | 22.6            | 206.167                | 0.11                 |
| W-36-4    | 50               | 60               | Oe          | 30.33            | 74.88                      | 39.11                         | 31.94                         | 7.17           | 445.34%              | 13.73           | 98.1748                | 0.14                 |
| W-36-5    | 60               | 71               | Oe          | 23.39            | 155.42                     | 38.17                         | 28.49                         | 9.68           | 189.80%              | 53.63           | 107.992                | 0.50                 |
| W-36-6    | 71               | 88               | C/Oe        | 23.55            | 238.35                     | 32.9                          | 28.07                         | 4.83           | 106.86%              | 115.2           | 166.897                | 0.69                 |
| W-36-7    | 88               | 100              | C           | 23.38            | 208.51                     | 34.71                         | 32.51                         | 2.2            | 24.10%               | 168             | 117.81                 | 1.43                 |
|           |                  |                  |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-37-1    | 0                | 17               | C           | 28.31            | 245.08                     | 39.41                         | 37.54                         | 1.87           | 20.26%               | 203.8           | 166.897                | 1.22                 |
| W-37-2    | 17               | 28               | C           | 30.23            | 182.14                     | 46.99                         | 44.15                         | 2.84           | 20.40%               | 151.3           | 107.992                | 1.40                 |
| W-37-3    | 28               | 34               | C           | 30.05            | 103                        | 41.2                          | 39.27                         | 1.93           | 20.93%               | 85.17           | 58.9049                | 1.45                 |
| W-37-4    | 34               | 50               | Oe          | 22.98            | 163.18                     | 30.63                         | 24.31                         | 6.32           | 475.19%              | 28.37           | 157.08                 | 0.18                 |
| W-37-5    | 50               | 58               | Oe          | 23.41            | 89.84                      | 29.75                         | 24.62                         | 5.13           | 423.97%              | 17.15           | 78.5398                | 0.22                 |
| W-37-6    | 58               | 79               | Oi          | 23.03            | 175.73                     | 32.06                         | 25.28                         | 6.78           | 301.33%              | 43.79           | 206.167                | 0.21                 |
| W-37-7    | 79               | 90               | Oe          | 23.27            | 192.59                     | 35.58                         | 29.07                         | 6.51           | 112.24%              | 90.74           | 107.992                | 0.84                 |
|           |                  |                  |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-38-1    | 0                | 5                | Oi          | 30.33            | 16.21                      |                               |                               | 0              | 0.00%                | 16.21           | 49.0874                | 0.33                 |
| W-38-2    | 5                | 8                | C           |                  | 22.92                      |                               |                               | 0              |                      |                 |                        |                      |
| W-38-3    | 8                | 26               | Oi          | 30.59            | 140.43                     | 44                            | 33.77                         | 10.23          | 321.70%              | 33.3            | 176.715                | 0.19                 |
| W-38-4    | 26               | 50               | Oe          | 30.05            | 160.22                     | 41.8                          | 32.87                         | 8.93           | 316.67%              | 38.45           | 235.619                | 0.16                 |
| W-38-5    | 50               | 69               | Oe          | 30.3             | 176.41                     | 39.04                         | 31.3                          | 7.74           | 774.00%              | 20.18           | 186.532                | 0.11                 |
| W-38-6    | 69               | 84               | Oe/C        | 30.83            | 176.51                     | 41.54                         | 35.89                         | 5.65           | 111.66%              | 83.39           | 147.262                | 0.57                 |

| Sample ID | Upper Depth (cm) | Lower Depth (cm) | Designation | Empty beaker (g) | Bulk Sample Wet Weight (g) | sub-sample +beaker wet wt (g) | sub-sample+ beaker dry wt (g) | grams of water | Moisture content (%) | Bulk Dry wt (g) | Bulk Soil Volume (cm3) | Bulk Density (g/cm3) |
|-----------|------------------|------------------|-------------|------------------|----------------------------|-------------------------------|-------------------------------|----------------|----------------------|-----------------|------------------------|----------------------|
| W-39-1    | 0                | 10               | Oi          | 29.46            | 44.32                      | 35.01                         | 31.22                         | 3.79           | 215.34%              | 14.05           | 98.1748                | 0.14                 |
| W-39-2    | 10               | 34               | Oi          | 30.8             | 153.15                     | 42.58                         | 32.96                         | 9.62           | 445.37%              | 28.08           | 235.619                | 0.12                 |
| W-39-3    | 34               | 50               | Oe          | 30.24            | 145.66                     | 37.39                         | 31.63                         | 5.76           | 414.39%              | 28.32           | 157.08                 | 0.18                 |
| W-39-4    | 50               | 66               | Oe          | 28.21            | 147.71                     | 36.34                         | 29.58                         | 6.76           | 493.43%              | 24.89           | 157.08                 | 0.16                 |
| W-39-5    | 66               | 94               | Oe          | 30.37            | 316.94                     | 43.86                         | 33.69                         | 10.17          | 306.33%              | 78              | 274.889                | 0.28                 |
| W-39-6    | 94               | 100              | C           | 30.15            | 79.97                      | 44.02                         | 41.45                         | 2.57           | 22.74%               | 65.15           | 58.9049                | 1.11                 |
|           |                  |                  |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-40-1    | 0                | 34               | Oi          | 30.11            | 158.44                     | 38.35                         | 31.45                         | 6.9            | 514.93%              | 25.77           | 333.794                | 0.08                 |
| W-40-2    | 34               | 50               | Oe          | 30.33            | 131.01                     | 40.48                         | 32.53                         | 7.95           | 361.36%              | 28.4            | 157.08                 | 0.18                 |
| W-40-3    | 50               | 57               | Oe          | 28.31            | 50.42                      | 38.97                         | 29.64                         | 9.33           | 701.50%              | 6.291           | 68.7223                | 0.09                 |
| W-40-4    | 57               | 76               | Oe          | 29.43            | 171                        | 36.15                         | 31.07                         | 5.08           | 309.76%              | 41.73           | 186.532                | 0.22                 |
| W-40-5    | 76               | 90               | Oe          | 30.18            | 131.92                     | 38.85                         | 33.1                          | 5.75           | 196.92%              | 44.43           | 137.445                | 0.32                 |
| W-40-6    | 90               | 100              | Oe          | 30.82            | 108.66                     | 44.01                         | 36.67                         | 7.34           | 125.47%              | 48.19           | 98.1748                | 0.49                 |
|           |                  |                  |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-41-1    | 0                | 7                | C/Oe        | 30.23            | 43.61                      | 41.03                         | 34.29                         | 6.74           | 166.01%              | 16.39           | 68.7223                | 0.24                 |
| W-41-2    | 7                | 19               | Oe          | 30.13            | 111.08                     | 50.28                         | 33.67                         | 16.61          | 469.21%              | 19.51           | 117.81                 | 0.17                 |
| W-41-3    | 19               | 45               | Oe          | 30.21            | 245.76                     | 41.34                         | 32.07                         | 9.27           | 498.39%              | 41.07           | 255.254                | 0.16                 |
| W-41-4    | 45               | 50               | Oe          | 31.49            | 54.64                      | 41.72                         | 34.93                         | 6.79           | 197.38%              | 18.37           | 49.0874                | 0.37                 |
| W-41-5    | 50               | 66               | C/Oe        | 30.23            | 265.84                     | 42.86                         | 34.09                         | 8.77           | 227.20%              | 81.25           | 157.08                 | 0.52                 |
| W-41-6    | 66               | 89               | C           | 28.99            | 425.48                     | 37.73                         | 35.71                         | 2.02           | 30.06%               | 327.1           | 225.802                | 1.45                 |
|           |                  |                  |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-42-1    | 0                | 5                | C           | 29.43            | 41.44                      | 34.73                         | 33.3                          | 1.43           | 36.95%               | 30.26           | 49.0874                | 0.62                 |
| W-42-2    | 5                | 33               | Oi          | 31.3             | 159.24                     | 39.79                         | 33.04                         | 6.75           | 387.93%              | 32.64           | 274.889                | 0.12                 |
| W-42-3    | 33               | 50               | Oi          | 30.11            | 124.3                      | 47.61                         | 33.11                         | 14.5           | 483.33%              | 21.31           | 166.897                | 0.13                 |
| W-42-4    | 50               | 63               | Oe          | 30.27            | 143.09                     | 40.96                         | 32.56                         | 8.4            | 366.81%              | 30.65           | 127.627                | 0.24                 |
| W-42-5    | 63               | 79               | C/Oe        | 31.91            | 239.77                     | 44.56                         | 40.19                         | 4.37           | 52.78%               | 156.9           | 157.08                 | 1.00                 |
| W-42-6    | 79               | 97               | C           | 30.18            | 351.26                     | 40.48                         | 38.29                         | 2.19           | 27.00%               | 276.6           | 176.715                | 1.57                 |
|           |                  |                  |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-43-1    | 0                | 4                | Oe          | 30.01            | 36.89                      | 35.57                         | 31.48                         | 4.09           | 278.23%              | 9.753           | 39.2699                | 0.25                 |
| W-43-2    | 4                | 13               | Oe/C        | 31.49            | 65.66                      | 38.36                         | 35.13                         | 3.23           | 88.74%               | 34.79           | 88.3573                | 0.39                 |
| W-43-3    | 13               | 25               |             |                  | 20.78                      |                               |                               | 0              |                      |                 |                        |                      |
| W-43-4    | 25               | 47               | Oe          | 29.71            | 201.26                     | 43.48                         | 32.24                         | 11.24          | 444.27%              | 36.98           | 215.984                | 0.17                 |
| W-43-5    | 47               | 58               | Oe          | 29.45            | 47.1                       | 36.35                         | 30.61                         | 5.74           | 494.83%              | 7.918           | 107.992                | 0.07                 |
| W-43-6    | 58               | 70               | Oe/C        | 30.7             | 143.79                     | 37.71                         | 33.88                         | 3.83           | 120.44%              | 65.23           | 117.81                 | 0.55                 |
| W-43-7    | 70               | 81               | C           | 30.23            | 218.62                     | 37.78                         | 36.22                         | 1.56           | 26.04%               | 173.4           | 107.992                | 1.61                 |
| W-43-8    | 81               | 100              | C           | 28.21            | 347.51                     | 37.31                         | 35.39                         | 1.92           | 26.74%               | 274.2           | 186.532                | 1.47                 |

| Sample ID | Upper Depth (cm) | Lower Depth (cm) | Designation | Empty beaker (g) | Bulk Sample Wet Weight (g) | sub-sample +beaker wet wt (g) | sub-sample+ beaker dry wt (g) | grams of water | Moisture content (%) | Bulk Dry wt (g) | Bulk Soil Volume (cm3) | Bulk Density (g/cm3) |
|-----------|------------------|------------------|-------------|------------------|----------------------------|-------------------------------|-------------------------------|----------------|----------------------|-----------------|------------------------|----------------------|
| W-44-1    | 0                | 6                | Oi          | 30.23            | 13.18                      |                               |                               | 0              | 0.00%                | 13.18           | 58.9049                | 0.22                 |
| W-44-2    | 6                | 12               | A/C         |                  | 44.41                      |                               |                               |                |                      |                 |                        |                      |
| W-44-3    | 12               | 33               |             | 30.16            | 89.66                      | 40.51                         | 31.45                         | 9.06           | 702.33%              | 11.18           | 206.167                | 0.05                 |
| W-44-4    | 33               | 48               | Oi          | 30.16            | 122.19                     | 38.03                         | 31.28                         | 6.75           | 602.68%              | 17.39           | 147.262                | 0.12                 |
| W-44-5    | 48               | 64               |             | 30.6             | 138.4                      | 39.55                         | 32.13                         | 7.42           | 484.97%              | 23.66           | 157.08                 | 0.15                 |
| W-44-6    | 64               | 74               |             | 30.05            | 79.41                      | 36.88                         | 31.92                         | 4.96           | 265.24%              | 21.74           | 98.1748                | 0.22                 |
| W-44-7    | 74               | 80               | A           | 30.29            | 72.15                      | 34.33                         | 32.16                         | 2.17           | 116.04%              | 33.4            | 58.9049                | 0.57                 |
|           |                  |                  |             |                  |                            |                               |                               |                |                      |                 |                        |                      |
| W-45-1    | 0                | 12               |             |                  | 0                          |                               |                               |                |                      |                 |                        |                      |
| W-45-2    | 12               | 18               | Oi/C        | 30.6             | 79.88                      | 44.35                         | 34.66                         | 9.69           | 238.67%              | 23.59           | 58.9049                | 0.40                 |
| W-45-3    | 18               | 35               | Oi          | 30.83            | 98.09                      | 43.35                         | 32.55                         | 10.8           | 627.91%              | 13.48           | 166.897                | 0.08                 |
| W-45-4    | 35               | 50               | Oi          | 30.17            | 142.74                     | 37.94                         | 30.15                         | 7.79           |                      |                 | 137.445                | 0.00                 |
| W-45-5    | 50               | 60               | Oi          | 28.99            | 101.36                     | 34.98                         | 31.29                         | 3.69           | 160.43%              | 38.92           | 98.1748                | 0.40                 |
| W-45-6    | 60               | 68               | Oe/C        | 30.22            | 102.97                     | 45.19                         | 38.92                         | 6.27           | 72.07%               | 59.84           | 78.5398                | 0.76                 |
| W-45-7    | 68               | 78               | C           | 30               | 196.6                      | 40.11                         | 37.8                          | 2.31           | 29.62%               | 151.7           | 98.1748                | 1.54                 |
| W-45-8    | 78               | 100              | C           | 30.24            | 398.59                     | 41.19                         | 38.72                         | 2.47           | 29.13%               | 308.7           | 215.984                | 1.43                 |

Appendix 4: Organic carbon data for selected restored marsh core samples

| Sample ID | Upper Depth (cm) | Lower Depth (cm) | Designation | % C   | % H  | % N  |
|-----------|------------------|------------------|-------------|-------|------|------|
| W-1-1     | 0                | 2.5              | A           | 10.04 | 1.59 | 0.12 |
| W-1-2     | 2.5              | 10               | A           | 5.05  | 1.10 | 0.09 |
| W-1-3     | 10               | 38               | O           | 23.25 | 2.98 | 1.35 |
| W-1-4     | 38               | 58               | O           | 24.12 | 2.94 | 1.35 |
| W-1-5     | 58               | 70               | O           | 28.71 | 3.34 | 1.36 |
| W-1-6     | 70               | 76               | AC          | 11.11 | 1.24 | 0.34 |
| W-2-1     | 0                | 2.5              | O           | 3.58  | 0.74 | 0.09 |
| W-2-2     | 2.5              | 10               | C           | 0.70  | 0.46 | 0.02 |
| W-2-3     | 10               | 20               | C           | 0.66  | 0.30 | 0.02 |
| W-2-4     | 20               | 26               | AC          | 2.52  | 0.72 | 0.05 |
| W-2-6     | 50               | 67               | Oe          | 18.16 | 2.16 | 1.01 |
| W-2-7     | 67               | 66               | Oe          | 20.69 | 2.49 | 1.09 |
| W-2-8     | 66               | 100              | A           | 14.24 | 1.72 | 0.73 |
| W-3-1     | 0                | 4                | C           | 1.65  | 0.56 | 0.04 |
| W-3-2     | 4                | 16               | AC          | 2.11  | 0.54 | 0.04 |
| W-3-3     | 16               | 37               | Oe          | 23.63 | 2.96 | 1.44 |
| W-4-1     | 0                | 8                | C           | 0.58  | 0.42 | 0.02 |
| W-4-2     | 8                | 26               | AC          | 0.65  | 0.54 | 0.02 |
| W-4-3     | 26               | 49               | Oe          | 18.67 | 2.20 | 1.05 |
| W-4-5     | 62               | 78               | A           | 11.96 | 1.45 | 0.67 |
| W-5-1     | 0                | 16               | C           | 1.05  | 0.44 | 0.03 |
| W-5-3     | 42               | 49               | Oe          | 25.95 | 3.27 | 1.37 |
| W-5-4     | 49               | 67               | Oe          | 15.43 | 1.94 | 0.82 |
| W-5-5     | 67               | 73               | A           | 12.86 | 1.55 | 0.63 |
| W-10-1    | 0                | 4.5              | Oi          | 11.28 | 1.98 | 0.22 |
| W-10-2    | 4.5              | 27               | AC          | 4.41  | 0.97 | 0.11 |
| W-10-3    | 27               | 36               | AC          | 2.49  | 0.65 | 0.04 |
| W-10-4    | 36               | 50               | A           | 8.22  | 1.35 | 0.13 |
| W-10-5    | 50               | 63               | Oe          | 14.65 | 1.75 | 0.70 |
| W-10-6    | 63               | 74               | C           | 1.56  | 0.48 | 0.03 |
| W-10-7    | 74               | 88               | C           | 0.57  | 0.63 | 0.02 |
| W-11-1    | 0                | 23               | C           | 0.65  | 0.50 | 0.02 |
| W-11-2    | 23               | 29               | A           | 0.48  | 0.39 | 0.02 |
| W-11-3    | 29               | 50               | O           | 12.83 | 1.70 | 0.72 |
| W-11-4    | 50               | 73               | O           | 21.13 | 2.52 | 1.11 |
| W-11-5    | 73               | 87               | O           | 20.94 | 2.38 | 0.90 |
| W-11-6    | 87               | 100              | A           | 11.55 | 1.45 | 0.63 |
| W-12-1    | 0                | 14               | AC          | 2.24  | 0.63 | 0.05 |
| W-12-2    | 14               | 21               | O           | 20.34 | 2.56 | 1.32 |
| W-12-3    | 21               | 38               | O           | 26.10 | 3.28 | 1.48 |

| Sample ID | Upper Depth (cm) | Lower Depth (cm) | Designation | % C   | % H  | % N  |
|-----------|------------------|------------------|-------------|-------|------|------|
| W-30-2    | 6                | 13               | C/Oe        | 3.56  | 0.93 | 0.09 |
| W-30-7    | 57               | 65               | Oe/C        | 6.10  | 1.02 | 0.11 |
| W-30-8    | 65               | 83               | C           | 0.70  | 0.40 | 0.02 |
| W-31-5    | 66               | 77               | Oe/C        | 6.29  | 1.12 | 0.07 |
| W-31-6    | 77               | 100              | C           | 0.75  | 0.66 | 0.02 |
| W-32-5    | 50               | 58               | Oe/C        | 8.46  | 1.21 | 0.52 |
| W-32-6    | 58               | 73               | C           | 1.16  | 0.50 | 0.02 |
| W-32-7    | 73               | 89               | C           | 0.52  | 0.67 | 0.02 |
| W-33-2    | 2                | 10               | C           | 3.90  | 0.87 | 0.10 |
| W-33-7    | 66               | 78               | Oe          | 14.09 | 1.69 | 0.72 |
| W-34-1    | 0                | 10               | Oi/C        | 10.61 | 1.48 | 0.75 |
| W-35-1    | 0                | 8                | C           | 3.78  | 0.90 | 0.07 |
| W-36-7    | 88               | 100              | C           | 1.32  | 0.59 | 0.02 |
| W-37-1    | 0                | 17               | C           | 0.43  | 0.23 | 0.01 |
| W-37-2    | 17               | 28               | C           | 0.30  | 0.48 | 0.01 |
| W-37-3    | 28               | 34               | C           | 0.67  | 0.28 | 0.02 |
| W-38-2    | 5                | 8                | C           | 1.27  | 0.28 | 0.03 |
| W-39-1    | 0                | 10               | Oi          | 18.59 | 1.94 | 0.72 |
| W-39-6    | 94               | 100              | C           | 1.24  | 0.42 | 0.02 |
| W-40-2    | 34               | 50               | Oe          | 24.08 | 2.97 | 1.47 |
| W-40-5    | 76               | 90               | Oe          | 11.41 | 1.40 | 0.67 |
| W-42-1    | 0                | 5                | C           | 0.74  | 0.40 | 0.02 |
| W-43-2    | 4                | 13               | Oe/C        | 2.97  | 0.72 | 0.07 |
| W-43-7    | 70               | 81               | C           | 2.26  | 0.57 | 0.03 |
| W-43-8    | 81               | 100              | C           | 0.66  | 0.50 | 0.02 |
| W-44-2    | 6                | 12               |             | 4.97  | 1.06 | 0.13 |
| W-44-4    | 33               | 48               |             | 29.06 | 3.43 | 1.54 |
| W-45-2    | 12               | 18               | Oi/C        | 3.80  | 0.93 | 0.07 |
| W-45-6    | 60               | 68               | Oe/C        | 10.92 | 1.36 | 0.40 |
| W-45-8    | 78               | 100              | C           | 0.70  | 0.56 | 0.02 |

## Appendix 5: Honor Code

*I pledge on my honor that I have not given or received any unauthorized assistance on this assignment/examination.*

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