Project/Activity Number: NE-1938

Project/Activity Title: Carbon Dynamics and Hydromorphology in Depressional Wetland Systems

Period Covered: November 2022 to October 2023

Date of This Report: December 26, 2023

Annual Meeting Date: October 29, 2023-- 12-Noon, America's Center Convention Complex, Room 144, St. Louis, Missouri.

1) Review of what we have said we would do in the proposal.

2) Discussion of timing of each method including time of year, length of deployment, how many deployments, ….

3) Update from each participant… Do you have a site picked out? Is it instrumented to measure hydrology at each transect point? What sampling and analysis have you completed or need to do?

4) Methodology to share.

5) Surface Dowel rod (woody debris) decomposition results, and measuring gas fluxes and root growth.

6) Discussion on potential publications.

7) Additional discussion.

Minutes from the NE-1938 Multistate Meeting

ASA-CSSA-SSSA Annual Meetings
October 29, 2023
St Louis, Missouri

In attendance: Mark Stolt (chair, University of Rhode Island), Colby Moorberg (Kansas State University), Marty Rabenhorst (University of Maryland), Judy Turk (University of Nebraska), and John Galbraith (Virginia Tech University).

1. Review of objectives

   NE-1938 is the fourth iteration of this hydropedology-oriented multistate research project. The focus of this project is to determine C stocks across depressional wetlands having a range of temperatures. In concert with accounting the C stored in these systems, we will measure inputs of C through litter and dead fall, rates of decomposition of these C sources, and the fluxes of C via carbon dioxide (CO_2) and methane (CH_4) that occur in these soils. We will make these measures in, or adjacent to, each of the two zones of these wetlands (seasonally inundated, seasonally saturated), and the adjacent uplands. Our working hypothesis is that since the multistate sites will have similar hydrologic conditions, relationships between soil temperature and soil C additions, decomposition, and losses can be identified. These relationships can be used to understand the effect of increasing temperatures on C stocks and fluxes in wetlands over the next century.

2. Review of newer project sites: Colby (Kansas) and Judy (Nebraska) are newer members to the project and discussed their sites in detail. Although both are in the Great Plains, their study sites have completely different geomorphologies.

   The Kansas sites are bison wallows in an area that is grazed. To minimize disturbance from the animals, the sites had to be fenced off in order to make sure wells and experiments were not disturbed. The soils are clay-rich smectitic, Udertic Paleustolls with carbonates and natric horizons (rich in sodium) in deeper profile.

   The Nebraska site is a deflation basin (blowout) that is loess over sandy alluvium. Soils across the transect classified as Argiudolls in the upland, Argialbolls in the transition zone, and Argiaquolls on the basin floor.

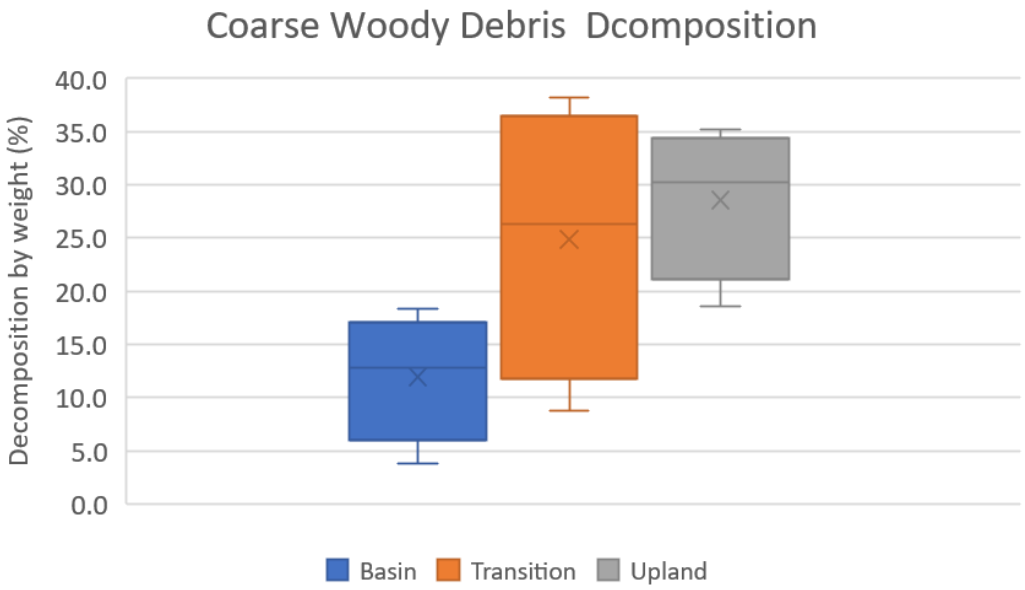
3. Update from each participant: Each of us gave a review of our project activities. As mentioned above Colby and Judy are newer members and are just finishing instrumenting their sites and

establishing experiments. Their hope is to continue this work into the next multistate project (see discussion below) in order to add to our data set of carbon stocks, rates of decomposition of leaf litter and coarse woody debris, relative to soil temperature and hydrologic variations in depressional wetlands. In addition, we hope to further expand our understanding of the effects of temperature and duration of saturation (hydrology) on the removal of Fe and Mn paints from IRIS sensors indicative of reducing conditions along a hydrologic gradient.

4. Methodology: In general, the project methodology for installing wells, monitoring hydrology and soil temperature, and establishing procedures to determine inputs from leaves and coarse woody debris, and loses of those components through decomposition have been tried, tested, and amended to maximize our results. Two components of the original proposal have yet to be completed: greenhouse gas fluxes and carbon inputs from roots. The primary issue has been the loss of time as a result of the Covid pandemic occurring in the middle of the 5-year project. Our plan was to have a two-year extension for the project to complete those aspects but our understanding is that such extensions are not given and that these aspects could be added to the next multistate project (see below for further discussion).

5. Surface Dowel rod (woody debris) decomposition results, and measuring gas fluxes and root growth.

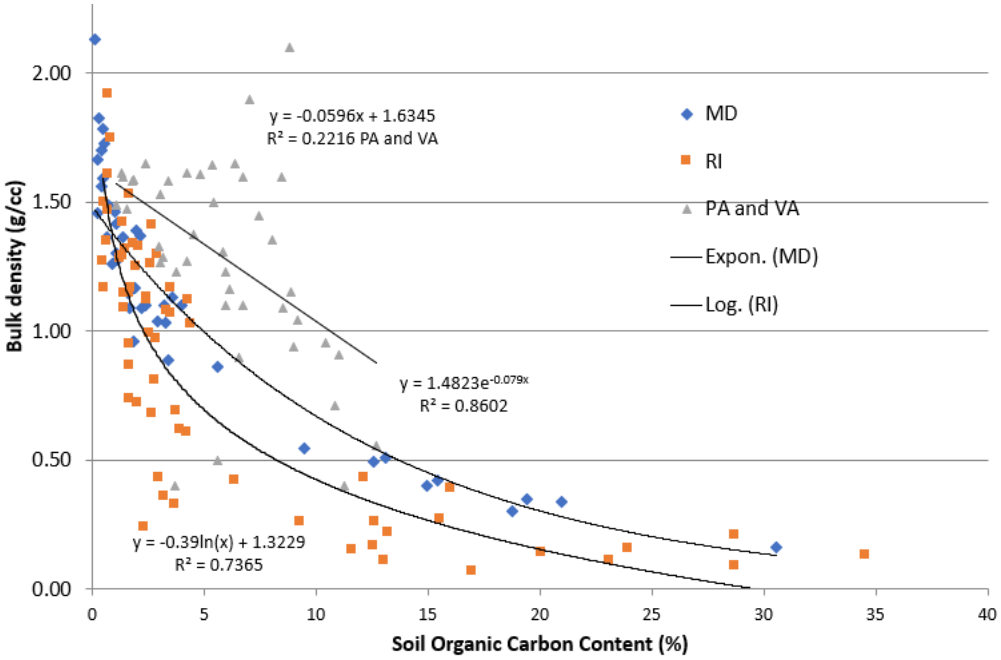
   A set of 5 dowel rods (0.95 cm in diameter and 50 cm long) were placed at the soil surface at each transect point along the 3 transects from the basin to the upland and removed after one-year. The dowel rods were used to simulate decomposition of coarse woody debris. Regardless of the multistate depressional wetland location, significantly less decomposition occurred in the basin as these areas of the landscape were often inundated for long periods minimizing aerobic decomposition. The transition zone showed the most variability with a range from less than 10% to greater than 35%. The mean values for the upland and transition were similar.



As mentioned above, plans to measure greenhouse gas fluxes and root additions along the transects have been slowed by restrictions to activities during the Covid pandemic that occurred in the middle of the 5-year multistate project. Our project is in the final year of activity and our current plans are to complete these measures and analysis during the new multistate project.

6. Potential publications: Discussion continued about publishing a manuscript focused on the carbon stocks across the multistate sites relative to temperature, vegetation, and hydrology.

7. Additional discussion. Much of this discussion focused on wrapping up the current project and how we can make the best of the data we have gathered to support future research. In reviewing the carbon stock data one of the interesting observations was the difference in carbon density among sites. One suggestion was that some of the sites may contain significant black carbon compared to the other sites. We may investigate this more in a new project.



Action Items: everyone responsible

- Provide WETS Table Data http://agacis.rcc-acis.org/ for each site
- Input summary weather station data (temperature and precipitation) from a nearby station with 30 years of records into Google sheet
- Upload vegetation data into Google sheet
- Upload soil temperature data at 10 and 30 cm depths for deployment periods in Google sheet
- Upload carbon stock data into Google sheet
- Upload hydrology data for deployment periods in Google sheet
- Upload site photos https://drive.google.com/drive/folders/1GOlA8RIb9fMEkbMTcoRpDxNixBTemrcA
- Upload nitrogen data into Google sheet
- Upload all data for sticks, leaf and tea bag decomposition data into Google sheet