St. Charles Wetland Assimilation Monitoring Report

October 2018

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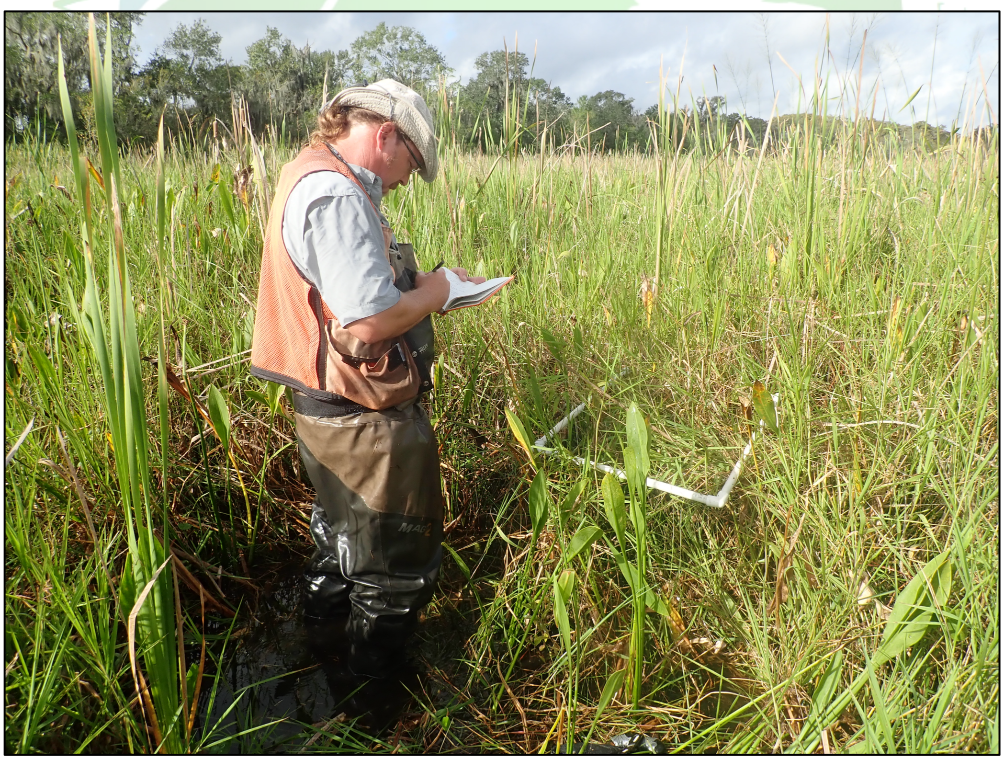
Summary of Activities: October 2018

Site visits

October 16, 2018: Comite Resources biologist's Jason Day and Joel Mancuso traveled to the Luling assimilation wetland to conduct monthly monitoring. Leaf litter biomass and water levels were collected from each site (Treatment, Mid, Out & Reference). Dissolved oxygen, conductivity, temperature, salinity and pH were measured at the Treatment, Mid, Out, and Reference sites, as well as the discharge Pipe (see data below). Water samples were taken at all sites including the discharge pipe for nutrient analysis. Four end-of-season-live (EOSL) biomass samples were taken at the Out site. Water samples were taken to A&E Environmental Testing in Baton Rouge for analysis. EOSL samples were taken to the Comite Resource's lab for processing and analysis.



Jason Day collecting end-of-season-live (EOSL) biomass samples at the Out site on October 16, 2018.

Dissolved Oxygen was relatively low throughout the assimilation wetlands, with the highest concentrations at the Treatment site (1.5 mg/L), followed by the Reference (1.0 mg/L), Mid (0.8 mg/L), and Out (0.2 mg/L) sites, and then the Pipe (0.1 mg/L). Conductivity ranged from ~200 mS at the Reference site to ~900 mS at the Mid site. Water temperature ranged from 25.2˚C at the Out site to 27.1˚C at the discharge Pipe. Salinity ranged from 0.1 PSU at the Reference site to 0.4 PSU at the Treatment site. pH decreased from 7.2 at the Pipe to 6.7 at the Out site. Water level was 42.3 cm at the Tmt site, 25.9 cm at the Mid site, 22.9 cm at the Out site, and 42.9 cm at the Reference site. All these parameters are within expected normal ranges and there are no issues of concern.

Discrete water quality probe data from the Luling assimilation wetlands on October 16, 2018.

Site	DO (mg/L)	Cond (mS)	Temp. (˚C)	Sal (PSU)	pH	Water Level (cm)
Pipe	0.1	814.2	27.1	0.4	7.2	.
Tmt	1.5	834.5	26.9	0.4	7.0	42.3
Mid	0.8	919.5	27.0	0.3	6.9	25.9
Out	0.2	422.4	25.2	0.2	6.7	22.9
Ref	1.0	211.0	26.1	0.1	6.9	42.9

Joel Mancuso collecting leaf litter at the Treatment site on October 16, 2018.

Publications

Comite Resources is dedicated to publishing its work in peer-reviewed scientific journals. Below are five recently published papers, PDF's of which are available using the links given at the end of each reference. We highly recommend that those involved with the assimilation wetlands review the materials. We are available for a meeting or call to discuss any issues or questions that you may have.

Day, J.W., R.G. Hunter, R.R. Lane, G.P. Shaffer, and J.N. Day. 2018. Long-term assimilation wetlands in coastal Louisiana: review of monitoring data and management. *Ecological Engineering*, in press. Available at **https://tinyurl.com/y8tm8e64**

Day, J.W., R.D. DeLaune, J.R. White, R.R. Lane, R.G. Hunter, and G.P. Shaffer. 2018. Can denitrification explain coastal wetland loss: A review of case studies in the Mississippi Delta and New England. *Estuarine, Coastal & Shelf Science* 213: 294-304. Available at **https://tinyurl.com/yb6lqoy2**

Hillmann, E.R., G.P. Shaffer, W.B. Wood, J.W. Day, J. Day, J. Mancuso, R.R. Lane, and R.G. Hunter. 2018. Above-and belowground response of baldcypress and water tupelo seedlings to variable rates of nitrogen loading: Mesocosm and field studies. *Ecological Engineering* doi.org/10.1016/j.ecoleng.2018.08.019 Available at **https://tinyurl.com/y86yrsnu**

Hunter, R.G., J.W. Day, A.R. Wiegman, and R.R. Lane. 2018. Municipal wastewater treatment costs with an emphasis on assimilation wetlands in the Louisiana coastal zone. *Ecological Engineering*, in press. Available at **https://tinyurl.com/yawawge9**

Hunter, R.G., J.W. Day, R.R. Lane, G.P. Shaffer, J.N. Day, W.H. Conner, J.M. Rybczyk, J.A. Mistich, and J-Y. Ko. 2018. Using natural wetlands for municipal effluent assimilation: a half-century of experience for the Mississippi River Delta and surrounding environs. In *Multifunctional Wetlands*, N. Nagabhatla and C.D. Metcalfe (eds.). Springer, Cham, Switzerland. Pp.15-81. Available at **https://tinyurl.com/yd9s7bsr**

POTENTIAL MEETS

Turner Rebuttal

Progress has been made in a rebuttal to the Turner et al. (2017) paper, which also rebuts the Bodker et al. (2015) paper. We received positive reviews and submitted a revised manuscript this month. The abstract is given below. Our rebuttal shows that the hypotheses presented by Turner et al. (2017) and Bodker et al. (2015) are flawed and biased, with the underlying premise without supporting evidence. We expect publication in the journal Wetlands Ecology & Management by the end of the year.

Turner et al. (2017) report on wetland degradation following introduction of secondarily-treated municipal effluent into a freshwater emergent and forested wetland in southeastern Louisiana, referred to as the Hammond assimilation wetland (HAW). They assign the cause of the wetland loss to a combination of increased decomposition and decreased soil strength due to the presence of nutrients from the effluent that led to buoyancy in the marsh soil. They do not, however, discuss or even cite two other papers that have examined the same wetland and have come to different conclusions (Shaffer et al. 2015; Lane et al. 2015), specifically that nutria herbivory was the main cause of the wetland deterioration (Figure 1), or a workshop in October 2016 where these issues were discussed in detail. Most importantly, the authors fail to mention or consider that the wetland vegetation began to recover as soon as nutria control was implemented (Figure 2), though with a different species assemblage most likely due to the combined impacts of herbivory (Shaffer et al. 2015) and perhaps increased water levels (Lane et al. 2015). In general, Turner et al. (2017) selectively cite the literature to support their conclusions. There have been recent concerns that because denitrification, defined as the microbially-mediated reduction of nitrogenous oxides to nitrogen gas, is coupled to the oxidation of organic matter, there is the potential for marsh soil weakening or destabilization as a result of this nitrate addition (Bodker et al. 2015; Turner 2010; Kearney et al. 2011). The observations have primarily been anecdotal or based on simple correlations of nitrate loading and soil strength measurements or measurements of belowground biomass (Darby and Turner 2008a,b,c; Deegan et al. 2012) that do not clearly indicate causation. The two central issues in this paper are the role of nutria in the marsh deterioration and the role of nutrients in causing marsh deterioration. We show below that there is strong evidence that nutria were the primary cause of marsh deterioration at the Hammond assimilation wetland and that based on stoichiometry, the amount of nitrate in the effluent could not explain the observed wetland loss.

Bodker, J.E., R.E. Turner, A. Tweel, C. Schulz, and C. Swarzenski. 2015. Nutrient-enhanced decomposition of plant biomass in a freshwater wetland. Aquatic Botany 127: 44-52.

Turner, R.E., J.E. Bodker, and C. Schulz. 2017. The belowground intersection of nutrients and buoyancy in a freshwater marsh. Wetlands Ecology & Management: 1-9.