

# ECOLOGICAL ASSESSMENT OF NINE CREATED WETLANDS AT THE BIG BROWN MINE, FAIRFIELD, TEXAS, USA

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Over the past 200 years, an estimated 53% of the original wetlands in the conterminous United States have been lost mainly as a result of human activities such as urban development and conversion to agriculture. Mining entities, including large utility corporations such as TXU, are legally required to mitigate land back to its natural state, including wetlands. TXU is required to reclaim its destroyed freshwater wetlands back into their natural state. The scope of my research focused on two fundamental components of the wetland ecosystems at the Big Brown Mine, Fairfield, TX, USA - the abiotic (soils and hydrology) and biotic (vegetation and benthic invertebrates). Specifically, my objectives were to 1) evaluate the surface water and soil characteristics in mine wetlands at Big Brown Mine over a period of 1 year, and 2) relate patterns in surface water and soil conditions within wetlands to hydroperiod, across all wetlands to season, and between different age groups of wetlands to time since creation (i.e., age). Using the results of these analyses, I wanted to determine a metric that best reflected the “maturity” of these reclaimed wetlands.

Trends in soil data showed clear increases in total carbon (C) and nitrogen (N) as the wetlands developed. Soil redox behaved similarly to soil nutrients, in that as wetlands developed the soil redox potential decreased. With increased inundation periods, soil redox also decreased. Hydrologic results were linked mainly to atmospheric conditions and seasonal variability, rather than wetland maturity. Vegetation provided the greatest insight into wetland development. As wetlands developed, a higher diversity of obligate wetland plants and increased plant biomass resulted. A quick survey of vegetation development in and around the wetland could lead to the determination of the wetland’s developmental status. Benthic invertebrates thrived in wetlands where the soil, hydrology, and vegetation were indicative of healthy, mature wetlands. The invertebrates data helped solidify the developmental progress of each wetland.

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