Evaluating Oil Spill Effects and Restoration Potential of Alabama Salt Marshes Using Experimental Wetlands

Wetland mesocosm and greenhouse experiments were used to determine the susceptibility to oil contamination and restoration potential of salt marshes typically found along the Alabama coast. Unlike marshes impacted in Louisiana following the Deepwater Horizon (DWH) spill (dominated by Spartina alterniflora), Alabama salt marshes studied in these experiments were dominated by black-needle rush (Juncus roemerianus, henceforth Juncus. To determine marsh susceptibility to oil, 32 wetland mesocosms were constructed using oil-free marsh sod collected along the Alabama coast. These were used to examine Juncus response to crude oil dosage (6-, 12-, and 24-L m$^{-2}$), and oil weathering (none, 3-days, and 3-weeks). Dosage and oil weathering treatments were modeled after levels measured in the field after the DWH spill. Juncus was shown to be very sensitive to oil exposure based on measures of survivorship and photosynthetic activity. This study saw significantly greater and earlier stem die-back in mesocosms with the 12-L and 24-L doses than the 6-L dose. Oil weathering treatments did not result in significant differences among Juncus wetlands. Following this study, a second study was conducted to determine the restoration potential of a native salt grass (Distichlis spicata, henceforth Distichlis). Distichlis was chosen because it was observed regrowing in the low dose (6-L m$^{-2}$) mesocosms soon after exposure. Two years after the initial oil contamination, 84 microcosms were constructed of sod containing relic traces of oil, planted with Distichlis plugs, and monitored in a greenhouse for 5 months. Measuring planted salt grass growth across a gradient of remnant oil concentrations suggest that this plant is capable of becoming established in once highly contaminated marshes. Findings from these studies could be used to inform and assist in decisions made by managers before and after oil spills.

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