

EARTHWORMS AS ECOENGINEERS IN THE RESTORATION OF OIL AND BRINE-IMPACTED SOILS FOLLOWING REMEDIATION

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The restoration of soil ecosystems following remediation of oil and brine spills can be a lengthy process. As the implementation of eco-based standards are implemented, the domestic oil and gas industry (and especially the small independent producers) will need low-cost methods of accelerating the restoration of these sites. The key to this restoration will be the rebuilding of soil structure, which in turn stimulates soil microbial communities and results in revegetation to pre-spill levels of biomass and species diversity. We propose that re-introduction of earthworms to remediated sites can be a cost-effective technology to rebuild soil structure and restore disturbed soil ecosystems.

In a new project initiated this year we seek to determine the efficacy of the re-introduction of earthworms to sites which have undergone remediation for crude oil or brine spills in order to accelerate the restoration of these sites in terms of soil quality and plant biomass and species diversity. Specifically we are examining the effects of three treatment variables: earthworms, organic matter, and fertilizer, on the restoration of the two previously remediated sites, a brine-impacted site and a crude oil-impacted site. This will be a two-year project. In this first year measures of soil quality are the primary indicators of restoration. These measures include microbial community structure and diversity in terms of phospholipid fatty acid analysis, soil nutrient concentrations, numbers of nitrogen cycling bacteria, nematode numbers and trophic diversity, and earthworm numbers and reproductive status.

This paper will describe the experimental protocol and discuss preliminary results. The most interesting result has been the observation that these damaged areas do not have to be inoculated with earthworms. When hay cover and sufficient moisture were provided we observed that indigenous earthworms quickly invaded the site and that their impact on bioavailability of nutrients was evident in just 30-60 days.