

Cleaning up Oil-Contaminated Salt Marshes

Challenge

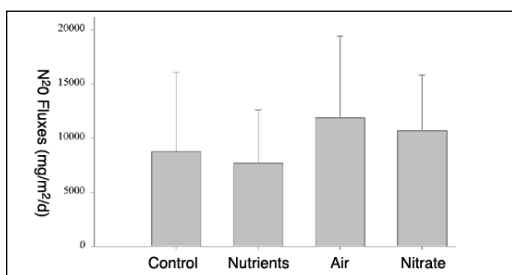
Of all estuarine/coastal environments, salt marshes are the most ecologically sensitive with regard to oil spills. Clean-up measures can be as harmful as the oil itself, resulting in even greater damage to the marsh. The goal of this project is to test various ways of accelerating the natural process by which microbes break down petroleum. Researchers injected three treatments (air, nitrate, nutrients) into the marsh surface in order to determine which amendments were most effective in breaking down various components of oil. Continued research will validate preliminary conclusions and develop a prototype injection system for delivering the amendments to the marsh.



Science

Determining What to Inject

The nutrient amendments proved effective in accelerating the degradation of some oil components (short chain aliphatics and aromatics), while the air and nitrate amendments were effective in removing other chemical components (long chain aliphatics). The graph to the right shows total petroleum hydrocarbons at a control plot and at



a plot that received nitrate injections. (Researchers are no longer pursuing air amendments because of the logistical difficulties involved with injecting air into the marsh.)

Determining How to Inject It

One of the most challenging tasks of this project is injecting the amendments into the marsh in a way that is effective, but not damaging to the habitat. Project researchers, together with University of New Hampshire engineers, are designing a mobile, floating injection platform that will be used at high tide in order to lessen the impacts to the salt marsh. Engineers are designing the system to be remotely operated using data from a geographic positioning system. The system's syringes (seen in the photo to the right) must also be built so that they will retract or deflect when they encounter something hard in the marsh, such as a rock or plant root.



A prototype system being developed to inject air and nitrate into salt marshes contaminated with oil.

Application

How Low Can the TPH Levels Go?

Currently, researchers are not sure how quickly a bioremediation system can degrade hydrocarbons, nor do they know the lowest TPH concentrations achievable. Part of this project will be to determine these limits for future clean up projects.

Testing the Prototype

Researchers also plan to test the injection system at different tidal stages and with differently spaced injection grids to determine the optimum approach for bioremediating spilled oil in salt marshes.

Other Marshes, Other Habitats

Principal investigators will talk with private-sector technology developers about applying this work to other oil-contaminated salt marshes, and even to other shallow habitats where an automated injection system is an alternative.

Project Essentials

Title: Natural and enhanced in situ bioremediation of petroleum of contaminated salt marshes

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