

# Project Spotlight

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### What is the topic of your research within the CWC?

I am working with Brian Roberts (LUMCON) and Anne Bernhard (Connecticut College) to see how bacterial processes in sediments might be changed by exposure to oil. Many important processes, such as those that cycle nitrogen, are carried out by different types of microbes and some processes, such as those that oxidize ammonium, may be more affected by oil than others such as those that reduce nitrate.

### What methods are you using to answer your questions?

Much of our work is done on sediment samples taken back to the lab. We use a stable (non-radioactive) isotope of nitrogen,  $^{15}\text{N}$ , to trace what the microbes are doing. In some experiments we add  $^{15}\text{NO}_3$  and then look to see how much of it going into  $\text{N}_2$  gas, and how much is transformed into ammonium. In other experiments we see how much ammonium is converted to nitrate. We compare sediments that have been exposed to oil to those which have not.

### What results have you gotten thus far?

For the microbial processes regulating the transformation of nitrogen, we have not found much of a difference between sites which were visibly oiled after the Deep Horizon spill vs nearby sites which were not visibly oiled. However our first sampling was 2 years post spill. We are seeing very strong small scale spatial patterns which relate to elevation and other soil properties.

### Did any of these results surprise you?

We had expected to see larger impacts from the oil but it suggests that the oil may be breaking down relatively quickly, or that the microbes are adapting to the soil conditions. In addition we only had qualitative data about the degree of oiling.

### What are the next steps in your research?

The next big step is to add oil to experimental salt marsh mesocosms being built at LUMCON. We will measure the rates of process before oiling and then over the next two years starting from just after the oil is applied. In the mesocosms we will know just how much oil reached the marsh and will follow how much oil remains in the soil over time.

### What are the "big picture" implications of your study?

Nitrogen cycling in salt marshes is a crucial process that controls plant productivity, carbon storage and estuarine eutrophication. We need to know how nitrogen cycling responds to oil spills and how quickly it might recover.

