

# FY 2010 RESEARCH PROBLEM STATEMENT

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## TITLE ([more info](#))

Copper Speciation in Roadside Streams

## PROBLEM (Description of need) ([more info](#))

Highway stormwater runoff is a source of copper to receiving streams in the State of Oregon. Trace levels of copper have been shown to have detrimental effects on threatened and endangered salmonid species. Current ODOT funded research is focused on delineating the concentration and speciation of copper in highway stormwater runoff. However, little is known about how that copper will partition once it enters the environment. Because the bioavailability and toxicity of copper is highly dependent on complexation with inorganic and organic constituents in the water, the water quality of individual streams is likely to be extremely important in predicting the likely effects of copper discharges from highway runoff. A better understanding of how roadside streams respond to copper discharges will allow ODOT to more effectively monitor and manage roadway runoff to minimize environmental impacts.

## PROPOSED RESEARCH, DEVELOPMENT OR TECHNOLOGY TRANSFER ACTIVITY ([more info](#))

The proposed research would involve sampling roadside streams that are impacted by highway stormwater runoff, targeting streams that are inhabited by threatened and endangered salmonid species. Because water quality characteristics are likely to vary regionally, sampling sites would be chosen in the various eco-regions of the State. Samples would be collected at long-term USGS streamflow sites using USGS standard Low-Detection Limit protocol. Samples would be collected several times during the year to characterize seasonal variations. Upon collection, waters would be characterized in terms of the pH, alkalinity, hardness, trace metals concentration, and organic carbon. Trace metal measurements will be made at Oregon State University using inductively coupled plasma mass spectroscopy and copper speciation will be measured using competitive ligand exchange-cathodic stripping voltammetry. The research would also investigate differences in the functionality of organic carbon present in regional waters and explore how stormwater copper would ultimately partition when discharged into such water through bench-scale testing and chemical equilibrium modeling.

## BENEFITS ([more info](#))

In order to anticipate and respond to Biological Assessments performed as part of the Endangered Species Act, ODOT has a desire to be able to predict where and when highway stormwater runoff is likely to adversely impact threatened and endangered salmonid species. Coupled with ongoing work characterizing copper speciation in stormwater, an ability to predict how copper in stormwater will partition in the environment is the logical next step. With this improved understanding, ODOT will be in a better position to plan for and mitigate the environmental impacts of highway use, construction and maintenance in relation to copper in highway stormwater runoff.

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Problem Statement Number: **GHE-10-14**