Research Proposal

Fate and Transport of Highway Runoff Pollutants

Problem Title. What are effects of the various constituents contained in highway runoff at differing spatial scales in receiving waters?

Problem Statement. The fate and transport of most of the constituents contained in highway runoff is poorly known empirically. Potentially specious claims of the effects of highway runoff at multiple scales ("Y creates hot spots", "X is a near-field pollutant") can be difficult or impossible to disprove considering the paucity of available information on the subject. Stormwater mixing zones as defined in state regulations are more products of policy, dogma, and politics than of best available science.

This issue is relevant to WSDOT because where TMDLs for metals are developed in Washington; highway runoff may be targeted for load reduction based on the poor existing data.

Watershed-based trading programs exist in several states and EPA has recently produced a Water Quality Trading Policy that serves as guidance to other states and tribes interested in developing trading programs. In all cases, water quality trading has to be demonstrated to be technically justifiable and result in net water quality benefits. WSDOT has had a keen interest in watershed-based trading for years, and desires to pilot a water-quality trading program for transportation projects in Washington State. Water quality trading between differing highway segments may be considered somewhat analogous to "intra-plant trading", since they are all components of the same overall drainage system.

An associated question that could be addressed by this proposal:

> What are the spatial scales for stormwater mixing characteristics for both construction site runoff and highway runoff to maintain aquatic health and prevent physical/chemical barriers to fish migration in receiving waters?

Literature Search. No significant activities by WSDOT or in Washington State on a governmental level. Some modeling for fate and transport of heavy metals is being conducted in some states for total maximum daily load (TMDL) development, but progress has been very slow. EPA has started conducting a pilot water-quality trading program in the Central Valley of California with the objective of using landscape-scale reductions in selenium levels that may help promote future trading programs for metals in Washington.

Research Methods. Scan technical literature for relevant studies and applicable model development. Support research proposals that can potentially answer these questions. Closely track all TMDL developments for metals to evaluate potential future use. Participate in TMDLs, which may affect WSDOT projects to ensure that any analysis used is technically robust and isn't a product of policy, dogma, or deliberately skewed technical analyses. The mixing zone

expert system CORMIX (CORnell MIXing Zone Model) could potentially be adapted for estimating mixing zone responses to temporal stormwater runoff events and may be useful.

Partnering Opportunities. High, considering the potential financial and institutional impacts of TMDLs, if or when they are developed. Potential partners may be very localized, which tends to lessen the economies of scale

Estimate of Costs and Research Duration. Literature review and support of other research proposals should be an on-going effort. Estimated cost not developed, but expected to be between $50,000 and $100,000.

Urgency, Payoff Potential, and Implementation. Research results could be used to justify a watershed-based trading program, potentially reducing stormwater management costs.

Research Proposer

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