Dredge Completion Decision Trees

Michael Erickson, P.E. (Michael.Erickson@arcadis.com) and Lisa Tomlinson, E.I.T. (Lisa.Tomlinson@arcadis.com) (Arcadis, Novi, MI, USA)
Eric Dievendorf, P.E. (Eric.Dievendorf@arcadis.com) (Arcadis, Syracuse, NY, USA)

Background/Objectives. A structured decision-making process is beneficial at sediment sites where the design includes multiple potential completion endpoints for dredging. Often completion of dredging is dependent on whether a residuals management step is implemented if remedial goals are not achieved, and/or some amount of residual contaminated sediment remains. After the first dredge pass, which typically involves completing a contract-required dredge template within specified tolerances verified by survey, there may be multiple levels of assessment to determine whether dredging and/or remediation is complete. Typically, these assessments are done within a certification unit (CU) to release the contractor from further requirements and to move to other CUs. Field decisions can take time and involve subjective/judgmental decisions that may lack consensus with regulatory oversight personnel and can lead to delays. While many projects have been completed without structured decision trees, our experience is that preparing such guidance during design improves delivery.

Approach/Activities. A decision tree is a flow diagram that communicates inputs and decision points. Developing decision trees involves negotiating confirmation survey and/or sampling, action levels (concentration-based and/or sediment thickness based), and a hierarchy of actions. Use of decision trees can expedite CU completion and shorten construction schedules. Flexibility is required with decision trees as not all situations can be anticipated. Defining confirmation survey/sampling data use objectives and clearly representing them in the decision tree provides transparency, clarity, and facilitates addressing unexpected conditions as the project oversight team and contractor have the decision tree as a starting point. Important cost benefits include reduction of field down-time, reduction of multiple dredge pass efforts that may be ineffective, and a clear set of actions/options to resolve concerns with residual contamination that may remain.

Results/Lessons Learned. This presentation aims to provide useful guidance to others developing dredge completion decision trees. The presentation will address key considerations in the process of in building a decision tree and technical considerations such as CU size and configuration, sampling density, synthesis of measurements (e.g., point value versus spatially-averaged values), action level thresholds and tolerances, application of not-to-exceed values in sub-CU decisions, and re-dredge versus residuals cover layer or other residuals management actions as a pathway to CU completion. Examples of projects completed with and without decision trees will be presented and some advantages and limitations of decision trees will be described. This presentation may contribute toward a degree of standardization of the decision tree development process for sediment remedial dredging projects.