MassNBCtools: Assessing Natural Background Conditions

**Introduction**

The Massachusetts Surface Water Quality Standards (SWQS) (314 Code of Massachusetts Regulations (CMR) 4.00) are the foundation of the state’s water quality management program. This regulation defines the most sensitive uses for surface waters, prescribes minimum water quality criteria to sustain those uses, and protects existing uses and high-quality waters. However, the SWQS state that waters exhibiting excursions from criteria solely due to natural background conditions are not interpreted as violations of water quality standards (per 314 CMR 4.03(5)). In addition, at 314 CMR 4.05(5)(e)1.: Generally Applicable Criteria, the SWQS state that “[f]or each pollutant identified in 314 CMR 4.06(6)(d): Table 29: Generally Applicable Criteria, the concentrations identified or calculated for that pollutant in or pursuant to Table 29 shall be generally applicable criteria for all categories of surface waters, as specified therein; unless the Department determines that naturally occurring background concentrations are higher. Where the Department determines that naturally occurring background concentrations are higher, those concentrations shall be the allowable receiving water concentrations.” The SWQS define background conditions as “water quality which exists or would exist in the absence of pollutants requiring permits and other controllable cultural factors that are subject to regulation under [Massachusetts General Laws] M.G.L. c. 21, §§ 26 through 53” (314 CMR 4.02).

**Intended Application**

Determining natural background conditions (NBC) is essential to evaluate if surface water quality data represent violations of water quality criteria in the SWQS. The purpose of this app is to provide Massachusetts Department of Environmental Protection (MassDEP) analysts with a tool to determine whether measured exceedances of SWQS could be due to NBC. The app walks the user through a serious of questions designed to match Appendix A of the 2022 MassDEP CALM document. NBC cannot be considered the cause of measured exceedances if anthropogenic stressors dominate the landscape. Detailed instructions on how to use the app are described below.

**Instructions**

The MassNBCtools app has a series of input tabs wherein the user needs to respond to prompts (see *Natural Background Evaluation*). The “*Input: Land Evaluation*” tab is where the user should begin. This tab contains questions that prompt the user to evaluate a specific AU and determine whether anthropogenic land cover/land use may be present. Appendix A of the 2022 MassDEP CALM indicates that extensive anthropogenic stressors will disqualify an AU from being considered for NBC. Beyond the land evaluation tabs are additional parameter-specific tabs. These tabs correspond with the parameter-specific questions described in Appendix A of the 2022 MassDEP CALM. Note, that these parameter-specific tabs may not need to be evaluated if an AU is already excluded from NBC considerations given the presence of anthropogenic stressors.