Ecological mapping and modeling as a framework for collaborative development of state water withdrawal policy in Michigan

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In 2008 Michigan began regulating water withdrawals, in accordance with the Great Lakes—St. Lawrence River Water Resources Compact. A Water Withdrawal Assessment Screening Tool was developed to determine whether a proposed withdrawal will likely cause an Adverse Resource Impact on local stream and river ecosystems. It operates within a Geographic Information System on the internet, and can be used to examine potential withdrawal sites anywhere in the state. The screening tool uses a statewide ecological river classification to characterize and stratify geographic variations in Michigan's stream flows and fish assemblages. Mathematical models of stream flow, local groundwater depletion, and fish assemblage responses to water withdrawal were created and applied using the rivers classification system. Scientific and technical development of this tool was patiently shepherded by a representative and collaborative state advisory council, so that the final product was well understood and supported. During the final, more adversarial stage leading to finalization of the 2008 state water law, there was essentially no political debate challenging the objectivity of the classification map or the model components. Instead, vigorous debate focused on the element within the tool that requires social value judgments; exactly how far down the fish response curves to implement state policy? This question was ultimately settled through use of a tiered, risk-based policy and some political negotiations. Science behind the tool is clearly understood to be necessarily adaptive, requiring regular revision through time.

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